



# VAM<sup>®</sup> BOOK

24<sup>th</sup> August 2011



# Introduction

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Congratulations on selecting pipe threaded with VAM connections.

VAM connections were first developed in the early 1960's for applications where reliable sealing ability and performances were necessary. Since then, the VAM Family of connections has grown and evolved to suit a market with a multitude of different applications.

Great care and thought are taken in the design and manufacture of the VAM connections in order to provide you with a threaded connection that will not only meet your technical requirements but will also prove to be simple and easy to use at the rig site.

We ask that you take as much care with the product after delivery as we have put into its design and supply. This instruction book outlines the procedures that we recommend you to adopt in order to get complete satisfaction with these VAM products. Technical data on the main VAM connections are also included.

While every effort has been made to ensure the accuracy of this book we do not accept any responsibility for the information contained herein. Customers should therefore carry out all necessary investigations, to choose for themselves the technical solutions, suited to the installation and functioning conditions under which our products will be used.

Please check at [www.vamservices.com](http://www.vamservices.com) if you have got the latest revision of this VAM Book.

We welcome your feedback for future updates of this book at [Mr Help](#) on the VAM Services website.

Should you require any further assistance, a team of Field Service Technicians are available around the world for technical assistance at the rig site. They are approved and trained on VAM connections. Please see the dedicated section in this book for more information.

**Note:** VAM® is a registered trademarks of Vallourec Mannesmann Oil & Gas France.

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# 1. Introduction to VAM® Connections

## 1.1 VAM Product Line

### 1.1.1 Reference Connections

#### HIGHEST PERFORMANCE

**VAM 21**

The Oil industry's reference product

**VAM TOP**

**VAM TOP HT** **VAM TOP HC**

#### GREATEST CLEARANCE

**VAM SLIJ-III**

Combining generous running clearances with high mechanical performances

**VAM FJL**

For maximum Clearance

#### FASTEST RUNNING

**TOINO VAM**

Providing improved running performance for intermediate casings

**big Ω**

Increasing running reliability for surface casings

### 1.1.2 Speciality Products

Connection	Type of Connection	Description	
VAM SG	IJ	VAM SG brings the complete package to Shale needs	
VAM HTF	IJ	High Torque Flush joints with superior gas-tight sealing performance	
VAM SW	T&C	For steam injection wells	
VAM MUST	IJ	A heavy wall connection for extreme external pressures as found in squeezing clay and salt domes	
VAM HW ST	T&C	For High Pressure, High Temperature wells	
VAM HP	T&C		
VAM ET	IJ	Expandable Products	For all drilling and cladding applications
VAM TOP FE	T&C	Riser application	Drilling surface BOP and Inner Production Riser - TLP / Spar
VAM TTR	T&C		Outer Production Riser - single column / SCR
VAM LDR	T&C		Work over, landing and early production

T&C: Threaded and Coupled - IJ: Integral Joint

### 1.1.3 Classic VAM connections

The classic VAM family connections (VAM standard, VAM AG, VAM AF, VAM ATAC, VAM TOP FL-D, VAM SL, VAM ACE, VAM PRO, NEW VAM) are older products and as such are being used less often in the field. They are not anymore covered within the VAM Book. In case of questions concerning any of these connections, please contact your nearest VAM Field Service office or contact [Mr. Help](#) on the VAM Services website.

### 1.1.4 Tubing & Casing Connection Reference Chart

	VAM 21	VAM TOP	VAM TOP HT	VAM TOP HC	DINO VAM	BIG OMEGA	VAM SG	VAM FJL	VAM SLIJ-II	VAM MUST	VAM HW-ST	VAM HTF	VAM HP
2 3/8		✓						✓					
2 7/8		✓						✓					
3 1/2		✓						✓					
4		✓						✓					
4 1/2		✓	✓	✓			✓	✓	✓			✓	
5		✓	✓	✓			✓	✓	✓		✓	✓	
5 1/2		✓	✓	✓			✓	✓	✓	✓	✓	✓	
6 5/8		✓	✓	✓				✓	✓		✓	✓	
7		✓	✓	✓				✓	✓		✓	✓	
7 5/8		✓	✓	✓				✓	✓	✓	✓	✓	✓
7 3/4		✓		✓					✓				
8 1/8													
8 5/8		✓						✓	✓		✓		
9 5/8	✓	✓			✓			✓	✓		✓	✓	
9 3/4					✓				✓				
9 7/8	✓	✓			✓			✓	✓				
10	✓	✓							✓		✓		
10 1/8													✓
10 3/4	✓	✓			✓			✓	✓	✓	✓		✓
11 3/4	✓	✓			✓			✓	✓		✓		
11 7/8	✓	✓			✓			✓	✓				✓
12									✓				
12 1/8									✓				
13 3/8	✓	✓			✓				✓		✓		
13 1/2	✓	✓											
13 5/8	✓	✓			✓				✓				
13 3/4													
14		✓			✓	✓			✓		✓		
15		✓											
16		✓			✓	✓							
18 5/8						✓							
18 7/8						✓							
20						✓							
24						✓							
26						✓							

## 1.2 VAM Family Options

### 1.2.1 Special Bevel (SB)

**Couplings** can be supplied with a special bevel option. The special bevel is recommended when running multiple strings in the same casing, or when there is a risk of a coupling hanging up down hole.

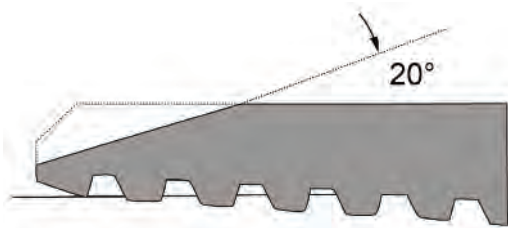
The special bevel option reduces the maximum load on that can be carried on the coupling face. For this reason slip type elevators may be required. The maximum load that can be carried on the coupling face is never less than 3 joints. The exact value can be obtained by emailing at [Mr Help](#) on the VAM Services website.

The default value of the special bevel is an angle of 20°. Alternate angles can be supplied on request.

When considering SB option, the following notation is used:

VAM XXX SB<sub>a</sub> (a = angle of the bevel) ex: VAM TOP SB10

VAM XXX SB (in case of 20 degree Special Bevel on the coupling)



### 1.2.2 Special Clearance (SC)

A Special Clearance connection is a VAM connection with a reduced coupling O.D. With a special clearance coupling, the tensile rating is reduced. A special clearance coupling is identified by a 1 inch wide black paint band located at the center of the coupling. SC option reduces the maximum load that can be applied on the coupling face.

VAM TOP, VAM TOP HT and VAM TOP HC are available with the special clearance option of SC80 and SC90.

VAM 21 is also available with Special Clearance option.

When considering SC option, the following notation is used:

VAM XXX SC<sub>y</sub> (y = Tensile efficiency of the connection)

ex: VAM TOP SC80

### 1.2.3 Matched Strength (MS)

Matched Strength couplings have been designed in order to achieve 100% coupling efficiency in tension. These optional couplings may have an external diameter larger or smaller than a regular one. All VAM TOP and VAM 21 connections are Matched Strength by default. DINO VAM connections can be Matched Strength by option.

Matched Strength in BIG OMEGA stands for matched/adapted IPR, not for tensile properties.

### 1.2.4 Isolated VAM Products

An Isolated Product is a VAM connection designed for a specific customer application or potential needs whereby products belonging to the standard product line could not cover. As such, Isolated products still require the need for full traceability with respect to the VAM family of companies; the licensee network and for the customer.

An Isolated Product is differentiated from standard products by the specific notation **VAM XXX-Kn (example VAM TOP-KP)** or **VAM XXX-Nn (example VAM TOP-NA)**.

Please refer to specific recommendations when using these isolated VAM products.



## 2 VAM® Field Practices

### 2.1 General information

The storage, transportation and handling requirements for pipe with VAM connections has more to do with the steel grade rather than the connection type. There are many steel grades and they are listed in section 4.8 of this book along with their identification colour code. The steel grades can be grouped as in the table below. These groups have been simplified further for the purpose of this book into Carbon, Chromium and CRA.

Steel Type (see VAM Book Section 4.8 for full detail of grades)	VAM Book Simplified Definitions		
	Carbon	Chromium	CRA
API (Carbon)	✓		
API (13% Cr)		✓	
1% Chrome	✓		
High Collapse	✓		
Sour Service	✓		
High Collapse and Sour Service	✓		
Low Temperature	✓		
Martensitic Stainless Steel (13%Cr)		✓	
Martensitic Stainless Steel (Super 13%Cr)		✓	
Duplex and Super Duplex Stainless Steel			✓
Super Austenitic and Nickel Based Alloy			✓
Expandable (Carbon)	✓		
Expandable (13%Cr)		✓	
Riser	✓		

Equally the storage, transportation and handling requirements can be simplified into 3 distinct methods depending on the steel type. These methods are standard, low marking and low marking/non ferrous. The method required for each steel type is listed in the table below.

Steel Type (see VAM Book Section 4.8 for full detail of grades)	Storage and Handling		
	Standard	Low Marking	Low Marking / Non Ferrous
API (Carbon)	✓		
API (13% Cr)			✓
1% Chrome	✓		
High Collapse	✓		
Sour Service	✓		
High Collapse and Sour Service	✓		
Low Temperature	✓		
Martensitic Stainless Steel (13%Cr)			✓
Martensitic Stainless Steel (Super 13%Cr)			✓
Duplex and Super Duplex Stainless Steel			✓
Super Austenitic and Nickel Based Alloy			✓
Expandable (Carbon)		✓	
Expandable (13%Cr)			✓
Riser		✓	

Below is a summary of the individual aspects associated with the three storage, transportation and handling methods. Chapters 2.1, 2.2 and 2.3 explain these in more detail.

Storage, Transportation and Handling Methods	Standard	Low Marking	Low Marking / Non Ferrous
Storage separators	Hardwood or Plastic	Hardwood or Plastic	Hardwood or Plastic
Drift mandrel	Metal	Metal	Plastic or Aluminium
Forklift forks	Metal	Metal	Plastic covered
Inspection benches	Metal	Metal	Plastic, wood or aluminium
Slings	Metal	Metal	Nylon or plastic sheath
Transport frames	Not required	Not required	Required
Bump rings	Not required	Not required	Required if slung or rolled
Tong, elevator, slip jaws	Standard	Low marking	Low Marking and Non
Pipe handling machines	Standard	Low marking	Low Marking and Non
Single Joint Elevators	Standard	Standard	Non Ferrous Contact Area
Maximum Grip Mark	See section 2.4.3.6.	0.3mm (0.012")	0.3mm (0.012")
Vee door	No protection required	No protection required	Plastic/Wood covered
Support posts for storage and transport	No protection required	No protection required	Plastic covered
Mousehole	No protection required	No protection required	Plastic lined
Single Joint Load Compensator	Not required	Not required	Recommended
Paints for stencil, bands and tally #'s	Standard	Standard	Without Florides

More care is required with pipe with integral or special clearance connections as the connection can be very thin at the pipe ends.

## 2.2 Pipe Storage

This section covers storage of pipe. Various other documents and recommended practices exist that go into more detail and there can be regional or customer constraints on pipe storage.

### 2.2.1 Storage in the pipeyard

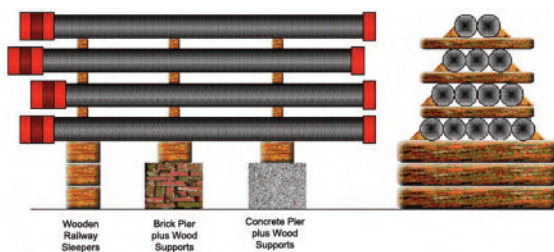
All tubular goods must be stored correctly in order to avoid damage to them. Carbon, chromium and CRA steels must be stored separately to avoid contact. Pipe must be fitted with thread protectors at all times when in storage and during loading or unloading. Ensure that pipes are never piled directly on the ground, rails, steel or concrete floors. They must be at least 18 inches (500mm) above ground level to prevent ingress of dirt, surface water or foreign bodies. Any vegetation, growth or standing water below the pipe stacks must be removed. Storage racks or supports must be strong enough to support the stack weight without pipes bending or the stack settling. Place at least two rows of 4" x 4" hardwood under the first tier of pipe, bundles or transport frame. These supports should be positioned to prevent the pipe bending. This means positioning them at approximately 1/4 of the pipe length from each end as shown below.



It is recommended that closed end non-liftable protectors are used. If open end protectors are used the pipe should lie at an angle of about 2 degrees to allow rainwater to drain from the pipe through the pin end protector.

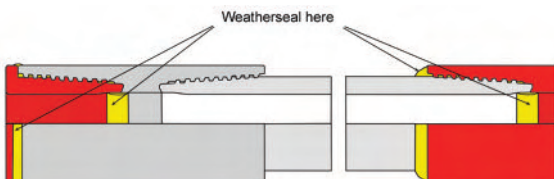
Between each row use 4" x 4" (100mm x 100mm) plastic or wooden separators or 'pipe cradles' positioned perpendicular to the pipe.

Each row of pipe must be secured at each end by wedges secured to prevent the pipe rolling. It is recommended that stacks must be no higher than 10 feet (3 meters).



In order to prevent connections becoming corroded it is essential that a suitable storage compound is applied to the machined areas. See section 2.4 for approved storage compounds.

Also apply storage grease to the machined parts of the bore that are still visible after the protector is fitted. This process is known as weather-sealing and is illustrated below.



### 2.2.2 Storage at the rigsite

There is normally less area for pipe storage at the rig site. For this reason it is recommended to have a good supply chain and order the pipe for delivery just in time.

At a land rig the pipe can be stored as if in the pipe yard. At an offshore rig site the pipe will be stored on a pipe deck. Consider the space available on deck and the running order. Place wood across the deck beams for the pipe. Place at least 2 rows of wood across the first layer of pipe and directly above the deck beams. Continue this until all the pipe is on board.

Ensure that the top layer of pipe is below the height of the deck posts (Samson posts). As this is being done it is possible to carry out an inspection of the connections and a drift and tally of the pipe. It is normally better to have this operation done onshore before the pipe arrives and ensure a good supply chain so that transport damage does not occur.

If there is good planning then pipe should not be required to be stored for a long time at the rig site. During storage it is recommended to keep the

protectors fitted in case of damage to the connections by other activities. It is always necessary to ensure that the connections have suitable storage compound or light oil applied to prevent corrosion. Take care that nothing is placed inside the pipe as this may fall from the pipe when lifted vertically.

### 2.2.3 Special requirements for storage of chromium and CRA steels

- ⇒ Long term contact with C. Steel under storage conditions is an invitation for localized corrosion initiation of lower grade CRAs. Usage of adequate dunnage is therefore mandatory.
- ⇒ Rough handling can lead to local work hardening.

If long term storage is being considered, indoor storage is recommendable. All handling tools and rack space susceptible to be in contact with CRA pipes must be covered with non-metallic material to minimize iron contamination, even though this does not affect the corrosion integrity of the material.

## 2.3 Pipe Transportation

This section covers transportation of pipe. Various other documents and recommended practices exist that go into more detail and there can be regional or customer constraints.

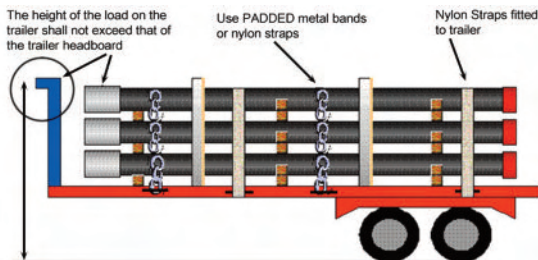
### 2.3.1 Road

Before loading or unloading pipe, make sure that thread protectors are in place. On top of local road haulage regulations pipe must be loaded onto sufficient 4" x 4" (100mm x 100mm) wooden bolsters with nylon or other soft straps of adequate strength fitted and tightened down to secure the load and prevent movement in transit.

Load pipe with couplings at the same end of the truck. Take care to ensure that the straps do not cause damage to the pipe, coatings and markings.

As a safety precaution make sure that the height of the load on the trailer does not exceed that of the headboard.

Warning lights, rear lights or other devices fitted by the driver to indicate the length of the load must be fitted such that no damage to the pipe end or the thread end will result.



### 2.3.2 Forklift

When using a forklift to handle pipe it is important that the road surfaces are smooth and even. Never exceed the load restrictions of the forklift. It is always best to use a forklift with a clamping mechanism as shown below to hold the pipe firmly on the forks. When travelling or moving from one point to the other with a pipe between the forks, it is advisable to keep the load as close to the ground as possible. Never place pipe directly on the ground. When setting pipe down, ensure that pipe is not dropped. When rolling pipe on the racks, make sure the pipes are parallel and do not allow pipes to gather momentum.



### 2.3.3 Cranes

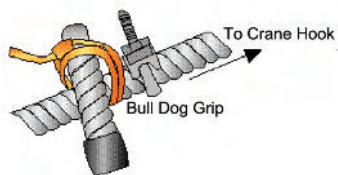
Pipe will need to be lifted on and off trucks and ships. This may have to be done using a crane. It is normal to send the pipe offshore by either slinging bundles of pipe or by using dedicated pipe transport frames. This section covers both.

### 2.3.3.1 Slinging

Before using slings they should be checked for the date of inspection. It is recommended practice to use a sling for one transportation use only. This may be several lifts in practice. If the sling becomes damaged during transportation it must be replaced. In case of re-use ensure that the slings are visually inspected, re-tested and re-certified by a qualified inspector.

The Safe Working Load (SWL) of each sling is to be equal or greater than the gross weight of the total load. The ideal position of the slings is approximately 25% (of the total length) in from either end of the pipe. The angle between the slings at the hook must be less than 60 degrees, so the length of the slings must be sufficient to allow this.

The slings must be double wrapped with a choke hitch taking care not to cross over the wires on the underside of the bundle. The choke hitch is pulled tightly to secure the bundle. A bulldog clamp and tie wrap must then be fitted. The tie wrap will prevent the eye slipping over the bulldog should it loosen in transit.



Always carry out a test lift to ensure that the load is level before sending it to or from the rig site. When slinging pipe it is always necessary to attach a 'tail rope' to the bundle. This is simply a rope hanging from one sling that can be held by the deck crew to align the bundle before lowering it.

### 2.3.3.2 Transport frames

For smaller diameters it is often best to use transport frames. Some designs still need to be slung as the frames just hold the pipe in position. Other designs can take the load using a 4 point lifting harness. Take care to ensure they are built in accordance with the manufacturer's instructions. Consider the space required for the transport systems as some can take up considerable space on deck even when they are empty. Most designs are stackable. For transport frames, the contact surface of the spacers must be padded or coated.





### 2.3.3.3 Supply ship

Care must be taken when transporting pipe to the rig site by supply ship to ensure that the load will not move due to the sea conditions. If using transport frames consider if or how high they can be stacked on the vessel. Consider also if they need to be strapped on the supply ship.

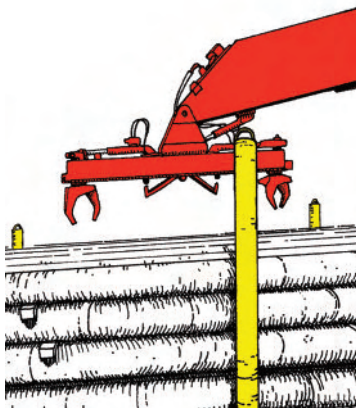
### 2.3.3.4 Rig site

At land rigs handle the pipe with a forklift or crane as described above and place the pipe on a loading rack next to the catwalk.

On offshore rigs the pipe will be taken by crane to the pipe deck and stored in preparation for use. This is normally done on racks either side of the catwalk or on a separate pipe deck.

Pipe can be stored on deck in layers that are stepped up from the catwalk. The purpose of this is to allow the pipe to be rolled down the steps to the catwalk. This is acceptable for carbon steel as long as there is sufficient soft dunnage to drop the pipe onto and the rate of decent is controlled and suitable safe working procedures are followed

A better method is to sling the pipe from the pipe deck and lift them by crane to the catwalk. Better still is the use of pipe handling machines as shown on the following page.



### 2.3.3.5 Special requirements for chromium steels and CRA

There are 2 risks associated with chromium and CRA steels that must be prevented to ensure the success of the well.

⇒ Long term contact with C. Steel under storage conditions is an invitation for localized corrosion initiation of lower grade CRAs. Usage of adequate dunnage is therefore mandatory.

⇒ Rough handling can lead to local work hardening.

All handling tools susceptible to be in contact with CRA pipes must be covered with non-metallic material to minimize iron contamination , even though this does not affect the corrosion integrity of the material.

In order to prevent the above the following actions are recommended.

- ⇒ Ship pipe using dedicated transport systems
- ⇒ Install plastic bump rings
- ⇒ Use a suitable forklift, fitted with protective non metallic covering on the forks, uprights and clamps (replace worn coverings as and when required).
- ⇒ Use nylon or plastic covered steel slings
- ⇒ Use trailers fitted with protective sleeves over the bolster pins and uprights. The sleeves should be checked after each load, and if they are worn they must be replaced.
- ⇒ Use wooden or plastic dunnage between each row of pipe
- ⇒ Use plastic or wooden topped inspection racks
- ⇒ Use nylon straps to secure pipe to trailers or vessel decks
- ⇒ Protect the catwalk and Vee door with wood or 'tail' the pipe into the drill floor using a crane and nylon slings

- ⇒ Protect grips on pipe handling machines if used
- ⇒ Use clean low marking dies on slips, elevators and tongs

**Note:** It is confirmed that surface hardened grips, jaws or dies do not create iron contamination on CRA material provided they are kept clean (free of any metallic debris)

## 2.4 Pipe Preparation and Running Equipment

### 2.4.1 Pre job preparation

Prior to running pipe into the well there is some preparation to do. Ideally prepare a completion or drilling program well in advance of operations. This should be based on best practice, previous experience and lessons learned from similar operations.

Ensure that the program is distributed to those who require it, including subcontractors. Send out a daily look-ahead or forecast from the rig and include the subcontractors in the distribution. Request the pipe from the supplier, remembering to include contingency, pup joints, sub-assemblies, shoe track and make-up and handling equipment.

Ensure that there is sufficient space at the rig site for the pipe before it arrives. Consider how it will be run in hole so that the pipe required first is not buried below the pipe that is required last! Only take what is required as shipping excess contingency has an impact on the environment and additional handling has risk of accident.

### 2.4.2 Pipe preparation

Before running the pipe the following actions must take place. They are described in more detail on the following pages.

- 1 Check that you have received what you require (size, weight, grade, thread type, quantity)
- 2 Remove the transport packaging and protectors
- 3 Clean storage grease from connections
- 4 Fit centralisers and stop collars
- 5 Inspect the pin and box connections
- 6 Drift the pipe full length to check for obstructions
- 7 Tally the pipe in order to get an accurate indication of the true length
- 8 Apply running compound
- 9 Refit clean protectors until running is imminent

Much of the pipe preparation can be done at the storage yard rather than waiting until it arrives at the rig site and some specialised companies exist

that can provide such services. Contact your local VAM Field Service centre to find out who can provide these services in your area.

#### **2.4.2.1 Check that you have received what you require (size, weight, grade, thread type, quantity)**

When the pipe arrives at the rig site the first thing to do is check that you have received what you ordered. First check the paperwork that was supplied with the pipe before checking stencilling and colour codes on the pipe body. If there are discrepancies then contact your supplier immediately to resolve any issues. If you need assistance to carry out these operations contact your local VAM Field Service Centre.

#### **2.4.2.2 Remove the transport packaging and protectors**

Plastic or steel/plastic composite thread protectors are fitted to the ends of the pipe to ensure that damage to the connections does not occur during handling. Storage grease is applied to the ends before the protectors are fitted to prevent corrosion. These storage greases are seldom suitable for running the pipe. Storage greases which can be used for make-up can dry out if left on the pipe for a long period of time and may have to be replaced.

It is important to leave the protectors on whenever possible, since removal makes the connections vulnerable to damage. Mostly, the protectors will be new but in many cases second hand protectors will be supplied. These will have gone through a verification process to ensure that they comply with the requirements. In order to reduce waste and packaging it is important that the protectors are cared for and returned through a suitable supply chain so that they can be reused or recycled. Protectors should be 'paired' at the rig site and placed in a suitable container for safe return. If the protectors are to be refitted to the pipe for transportation to the drill floor they must be cleaned thoroughly before being refitted. Failure to do so will contaminate the clean connections and they will require to be cleaned again on the drill floor.

#### **2.4.2.3 Clean storage grease from connections and protectors**

Having removed the protectors, the connections will require to be cleaned to remove the storage grease. This should be done over a suitable bunded area so that waste is segregated and water can be reused. It is always best to use hot soapy high pressure water. Since hot water is seldom available at the rig site cold water can be used as long as the soap is given time to break down the grease and the connections are left perfectly clean. It is normally best to roll the pipe as the connections are being washed. Take care not to point a high pressure washer at yourself or anyone working in

the area. Use barrier tape to prevent unauthorised personnel entering the wash area. Stand upwind so that any spray is taken away. Always use safety goggles or a full face visor when using a high pressure washer. Never use cleaning agents that will leave a film on the connections. For this reason it is forbidden to use diesel, kerosene, helifuel or similar. It may be necessary to use a nylon brush in order to get the soap solution into the threads. Never use a wire brush or barite on a premium connection as even a small scratch on the seal can cause a leak.

#### 2.4.2.4 Fit centralisers and stop collars

Centralisers and stop collars are often fitted to casing strings in order to hold the pipe in the centre of the well. This will ensure an even cementation. The fitting of centralisers requires care and attention due to the fact the pin protectors are removed and the seal area is exposed. Take the stop collar and check that no grub/set screws are protruding. Place the collar over the pin connections taking care not to touch the shoulder or seal area. Now fit the centraliser again taking great care to ensure seal and thread areas are not damaged. Repeat the process with the next stop collar before placing them in the correct position and torque the grub/set screws to the correct value. Lastly check the connection before applying grease and refitting the protector.

#### 2.4.2.5 Inspect the pin and box connections

Before running pipe it is necessary that a competent person checks that the connections are in good condition.

This can be done at the pipe yard as long as there is a robust supply chain between the yard and drill floor.

If there is any doubt as to the integrity of the supply chain then a final inspection must be done at the rig site either on deck (if there is no chance of further damage en route to the drill floor) or on the drill floor itself. The integrity of a well is at risk if this operation is not carried out properly. The person with overall responsibility for the success of the well can carry out this inspection or he can do one of the following depending on the level of assurance that is required...

- ⇒ ask the rig or casing crews to check the pipe and connections
- ⇒ contract an OCTG inspection company
- ⇒ contract personnel from the local VAM Field Service centre

The choice you make will depend on the amount of risk that you are prepared to take. To reduce the risk to a minimum then it is always best to

use personnel from the pipe supplier. VAM Field Service centers are located around the world and can provide this expertise. After all 'no one knows VAM like VAM'.

Pipe coming from the mill will normally be in good condition, unless it has been badly stored or transported. Pipe that has been returned from previous wells or traded make have other types of damage



*When inspecting the pin and box end connections check the following...*

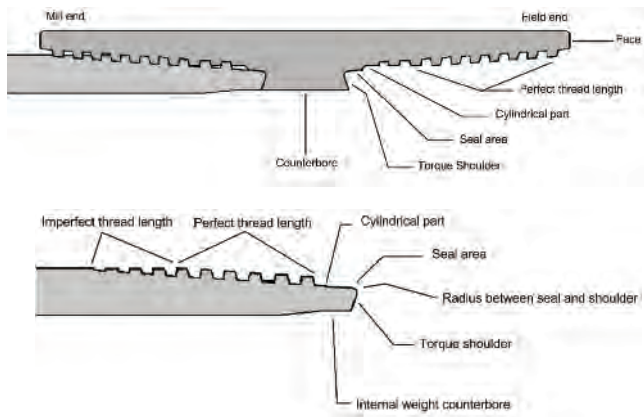
- ⇒ Dents, dings or mashes caused by impact
- ⇒ Galling caused by a poor make-up
- ⇒ Rust, corrosion or pitting caused by the environment

It will be necessary to look closely all around the seal area as simply feeling the connection will not be sufficient to detect minor damage.

Additional checks to be carried out on box end of non mill supplied pipe, pup joints and accessories...

- ⇒ Check that the coupling is made-up tightly and there is no gap at the shoulder
- ⇒ Check that the coupling has not been over torqued and has yielded
- ⇒ Check that the correct weight of coupling is fitted and that there is no step at the shoulder
- ⇒ Check that there is no plastic pressure test seals left inside the connection. (Some companies use Teflon seals when pressure testing assemblies. These are not recommended by VAM.)

If a reject is found with the connection it is important that it is reported correctly. The diagrams on the following page describe the parts of a typical VAM threaded and coupled connection.



#### 2.4.2.6 Drift the pipe full length to check for obstructions

Pipe can be damaged during transportation and it can be difficult to detect visually. If there is any question as to the quality of the supply chain from the last check (either in the mill or despatch yard) then the pipe must be rechecked at the rig site. This is done by running a drift mandrel of the correct size through the pipe. Always use a drift from a known source with a certificate of conformity or check the drift size in at least 3 places across its length and at 90 degrees to each other using a calibrated external micrometer. The drift dimensions are listed in the technical data sections.

Drift mandrels are typically manufactured oversize for rig use and wear down over time. Non ferrous (normally plastic or aluminium) drift mandrels must be used for chromium or CRA steel grades. Plastic drift mandrels will wear down quickly. They can also swell if left in a damp or hot environment. They can be damaged easily if dropped. Care must be taken when inserting a drift into a pipe so that the connection is not damaged. If a rope or rods are being used to pull or push the drift mandrel it is important that these are kept clean. If the pipe has mill scale then it may be necessary to wash or blow this out of the pipe before commencing drifting. Never use force to push or pull a drift through a restriction. If a restriction is found then the pipe must be either quarantined or drifted again using a drift within API specifications.

The standard API drift diameters are listed in this book. After manufacture the pipe will state 'D' on the stencilling to show that the standard API drift was used, 'DA xxxx' will be stencilled to show that an alternate drift was used

with xxxx being the drift size. DT42 is used on the stencil to indicate that a 42" long drift was used for casing sizes. This is only applied when casing is used as tubing. There are 3 very common pipe sizes where alternate drifts are commonly used. These are listed below.

7" x 32 lb/ft alternate drift is 6.000" diameter

9 5/8" x 53.5 lb/ft alternate drift is 8.500" diameter

13 3/8" x 72 lb/ft alternate drift is 12.250" diameter

Drift lengths are typically

6" long for liner applications

12" long for pipe of 7 5/8" casing and above

42" long for pipe for tubing applications

A 6" and 12" long drift is commonly called a 'rabbit'. If casing is used for tubing application then the drift used should be 42" long.



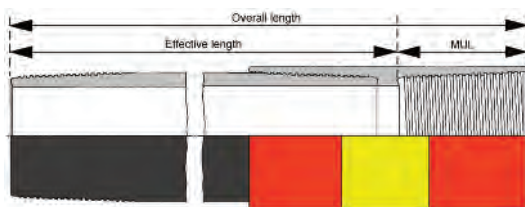
Do not drift GRE lined pipe at the rig site as the drift mandrel may detach the flare at the pipe end. In the case of GRE lined pipe the supply chain from the company inserting the lining to the rig site must be robust.

#### **2.4.2.7 Tally the pipe in order to get an accurate indication of the true length**

Prior to running the string it is important to have an accurate length measurement of each pipe, pup joint and assembly. The length written on the pipe and pup joints coming from the manufacturer is the overall length of the part. API 5CT states that the length stencilled on the part must be accurate to 1/10 of a foot. This is seldom accurate enough for an oil company so most manufactures try to be more accurate. It is vital that an



accurate measurement is made in case the manufactures length is not accurate enough or in case of recuts. When running threaded connections the effective length is less as the box thread 'swallows' the pin thread. This is known as the make-up loss. The make-up loss is different for different sizes, weights and connections so it is important that this is known for each connection type. The make-up loss must be subtracted from the overall length to give the effective length as shown on the picture below.



It is best to look up the make-up loss in this book or by using the connection data sheet on the VAM Services website. Do not measure the make-up loss using a metal rule as it may score the seal area. To measure the pipe length either a metal 'tally tape' or a laser can be used. In either case make sure that the datum point of each does not damage the pin seals.

When marking the tally length and number on CRA pipe use paints that do not contain halogens. Halogens cover the following elements: fluorine, (F); chlorine, (Cl); bromine, (Br); iodine, (I); and astatine (At). This means Trichloroethylene which is sometimes found in paints or paint stick markers must be avoided.

Take care not to apply tally numbers or lengths over the original pipe markings as identification and traceability may be lost.

#### 2.4.2.8 Apply running compound

See section 2.5.2

#### 2.4.2.9 Refit clean protectors until running is imminent

Once the pipe is prepared the protectors must be refitted. If running is about to start then it may not be necessary to refit the box protector. For special clearance or integral that could be damaged during transportation the box protector is required.

### 2.4.3 Running Equipment

In order for VAM connections to perform they must be made-up with suitable equipment. There follows below a list then details of the minimum equipment that is required.

- 1 Tong to apply torque to the connections
- 2 Measuring and recording equipment
- 3 Single joint elevators or pipe handling equipment to lift the pipe to the stabbing position
- 4 Elevators to lift and lower the string
- 5 Slips and safety clamp to hold the string in the rotary table
- 6 Jaws
- 7 Stabbing guides
- 8 Single joint load compensator to counterbalance the pipe during stabbing or back-out is recommended
- 9 Thread compound

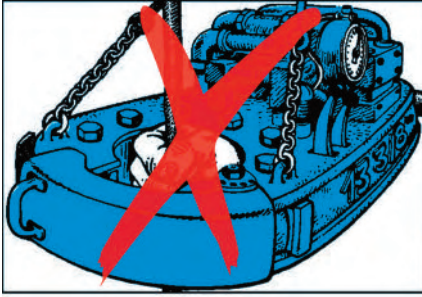
Additional equipment

- 10 Thread protectors if pulling pipe
- 11 Nylon slings and strap wrenches for chromium steels
- 12 Stabbing arm
- 13 Strap wrenches
- 14 Lifting sub and handling plug

There follows more detail about the required equipment.

#### 2.4.3.1 Tong to apply torque to the connections

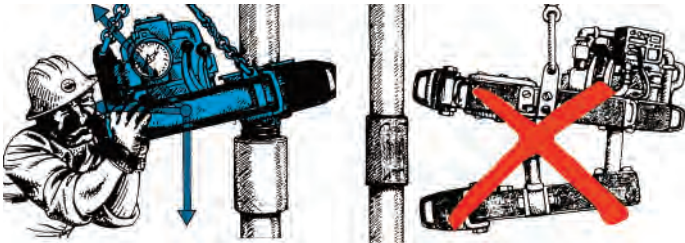
VAM connections must be tightened to the correct torque values in order that they perform. The torque equipment must have a capacity of at least 30% more than the recommended make-up torque. The reason for this is that if a connection has to be backed out the torque may be higher than make-up torque. The tong must have a variable speed control and be capable of operating at <1 rpm for final make-up. Tongs are normally manufactured in various sizes so it is important to select the correct one for the job. The tong must have grips that are matched to the size of the pipe in order to have a large area of contact with the pipe body. The casing crew must also supply back-up grips suitable for the coupling size in case of back-out. Do not use a 13 3/8" tong for a 5 1/2" completion!



The diameter of the grips should be normally 1% bigger than the nominal pipe diameter as the pipe can be rolled to a maximum of 1% oversize. The grips must be adjusted so that they hold the pipe firmly and not slip. Equally the pressure must not be too high or the pipe body can be damaged.

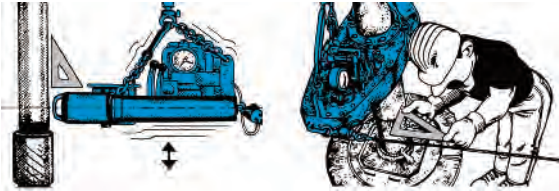


For pipe sizes of 7" and below it is recommended to use a tong with integrated back-up jaws. On larger sizes it is acceptable to use a tong with a snub line. If this is the case then the line must be at 90° to the tong arm and the line must be attached to a post of sufficient height to ensure that the line is kept horizontal. The tong must have the facility to lower gradually as the threads are made-up. When positioned over the pipe the tong must hang horizontally and not as shown below.



When using a tong with integral back-up, one set of jaws must be 'free floating' to compensate for any end kink or bend in the pipe or misalignment between the tong jaws. There must be sufficient travel between the tong and

back-up to compensate for the make-up loss as the threads are engaged. When positioned over the pipe the tong must hang horizontally with the tong and back-up tong being parallel.



On some rigs the tong operation is done remotely. The tong may be mounted on an extending hydraulic arm or on a frame that is pushed over the pipe as required. Pipe wrenches, rig tongs or spinning chain make-up are not permitted.

In recent years companies have applied torque using a top drive make-up system. This tool provides three functions.

- ⇒ Making up the connection
- ⇒ Elevating and lowering the string into the well
- ⇒ Circulation of drilling mud

If such equipment is used care must be taken to ensure that the torque being measured is the same as the torque being applied to the connection.

To reduce the chance of damage to the upper box connection or of debris being left on the torque shoulder an open end protector or handling plug is recommended to be fitted.

It is also important that there is good alignment between the top drive make-up system and the rotary table as the pipe is fixed at both ends.

If using a top drive make-up system in conjunction with a standard tong care must be taken to ensure that when running connections requiring a handling

plug that the plug does not unscrew as the pipe is made-up.

### 2.4.3.2 Measuring and recording equipment

In the VAM Family of connections only BIG OMEGA has a visual indicator (make-up triangle) of torque. In all other cases the connection must be made-up to the correct torque value and the torque increase to this value must be within the correct parameters.

In the past or with DINO VAM it was sufficient to use only a dial gauge to check this build up in torque and it was the skill of the tong operator to determine if the make-up was within parameters.

With new technology, more complex connections, and more demanding performances it is strongly recommended that the torque is plotted on a graph and that a record of this plot is kept. The graph can be produced on paper but is now more likely to be displayed on a computer screen. Different connections have a different graph profile and this is known as the signature of the connection. The machining tolerances of the connections, the thread compound and other factors can affect this signature.

The signature is produced by displaying torque on the vertical axis and turns on the horizontal axis. Both axis must have a linear scale. Only the last 2 to 3 turns require to be shown as the torque increases to the final make-up. Often turns are substituted by time on the horizontal axis but this does not give such a true signature and is not recommended.

To measure torque a load cell is required. The load cell can be either, hydraulic and connected to a dial gauge, or it can be electronic and connected to a computer. As the gauge and computer displays torque and not load the value is multiplied by the arm length to give a value of torque. To confirm the accuracy of the load cell it can be compared to that of a second load cell with known calibration on a snub line. The equipment must be calibrated at a sufficient frequency across its working range. The accuracy must be as follow:

Minimum torque measurement accuracy:

- torque values  $\leq 3120$  N.m.:  $\pm 5\%$
- torque values between 3120 and 7800 N.m.:  $\pm 156$  N.m.
- torque values  $\geq 7800$  N.m.:  $\pm 2\%$

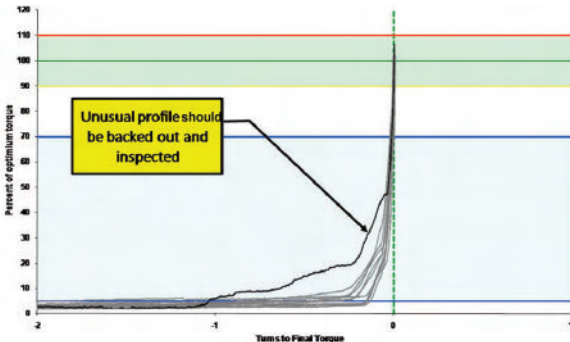
To measure turns a turns counter is required. The turns counter must be capable of recording a minimum of 500 positions per turn.

In all cases the company supplying the make-up equipment must be able to

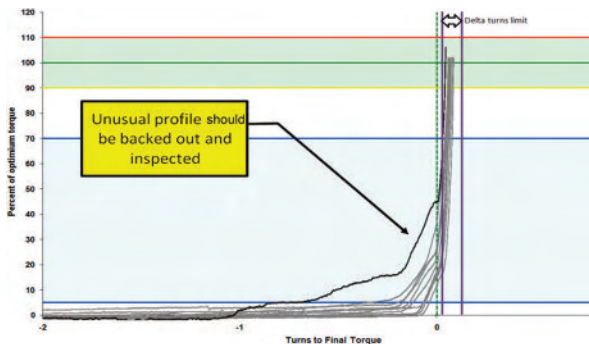
supply a calibration certificate to the user. This certificate must show that the equipment has been calibrated to National Standards within the previous 6 months. If using a computer to display torque verses turns the make-up graph produced should have the following features.

- ⇒ Sufficient resolution to accurately display the signature (profile). A display screen of >10" (25 cm) is required with the make-up graph filling at least 80% of the area of the screen. The screen resolution must be at least 800x600 pixels.
- ⇒ Display of minimum and maximum torque values as horizontal lines (optimum torque value optional)
- ⇒ Display of minimum and maximum shoulder torque values as horizontal lines
- ⇒ Automatic or operator forced detection of the shoulder point value
- ⇒ Numerical display of final torque, shoulder torque and delta turns (turns from shoulder to final torque)
- ⇒ Display of rig tally number on every make-up
- ⇒ Display of date and time of make-up
- ⇒ Ability to have manual comment added
- ⇒ Display of customer, well #, pipe size, weight, grade, thread type and full description of make-up compound and manufacturer in the job report

It is highly recommended for the make-up display equipment to have the ability to overlay the most recent make-up graph on top of the previous make-ups graphs as shown below. This is sometimes known as shadowing. By doing this any unusual profiles can be easily identified and questioned. To do this the make-up graphs must have the shoulder point or the final torque plotted on the same datum line on the turns axis.

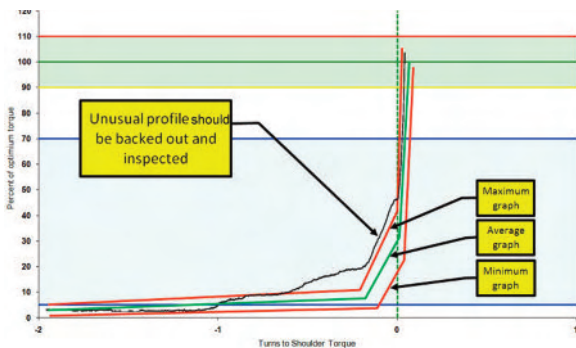


*Shadow graphs with final torque as the datum*



Shadow graphs with shoulder torque as the datum with minimum and maximum delta turns shown

An alternative idea is to plot an average graph for the job and display high and low lines. Any graphs out with the high and low lines will be highlighted as different and be cause for alarm.



It is also recommended to have a speed verses turns display either on the make-up graph or as a separate graph.

It is not acceptable for computer software to report a make-up as acceptable without validation by a competent person.

### 2.4.3.3 Single joint elevators or pipe handling equipment to lift the pipe to the stabbing position

The pipe must be lifted from horizontal on the pipe rack to vertical for stabbing. This is normally done by dragging the pipe from the box end along a catwalk and up an inclined slope called the Vee door. The pipe can be lifted to the vertical position by attaching a single joint elevator behind the coupling (or a handling plug for integral connections) and using a tugger line

to pull the pipe up. The single joint elevators must fit neatly round the pipe and have a safety pin to ensure they do not accidentally unlatch. It is always necessary to use a pin protector and depending on how much impact there is with the Vee door a box protector may also be required. If running integral connections with increased pipe OD dimensions then special single joint elevators are required to allow for the larger diameter at the connection.

Alternative methods exist to pick up the pipe including 'pick-up and lay down machines' which replace catwalks and raise the pipe on a conveyor system where it can be latched directly by the main elevators.

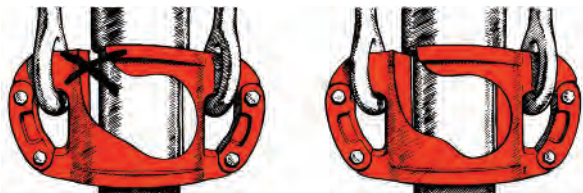
Another method is a pipe handling system which consists of a grab arm which takes the pipe from the catwalk and lifts it to the vertical position before swinging it into the drill floor and to the stabbing position. It is normally possible to handle the pipe without protectors as long as the connections are not damaged by this handling method.

#### 2.4.3.4 Elevators to lift and lower the string

When using slip type elevators the string weight is transferred from the pipe body through the jaws into the elevators body. The jaws must be clean and sharp. Slip type elevators are recommended for integral connections, special clearance couplings, special bevel couplings and fatigue enhanced connections.

If using side door elevators for integral strings then lifting subs are required. See section 2.4.3.14 for more information. If running integral connections with increased pipe OD dimensions then special single joint elevators are required to allow for the larger diameter at the connection.

The amount of load that can be lifted on the coupling face for all threaded and coupled connections using side door elevators is limited. The reason for this is that the cross sectional area of the coupling face is normally much less than the critical cross sectional area of the connection. If the string weight will exceed this value then the pipe must be gripped on the pipe body and not the coupling face. To do this slip type elevators are required.





To calculate the maximum value that can be carried on the coupling face simply multiply the coupling face cross section area (as listed in the data tables for threaded and coupled connection) by the steel strength to get the answer in lbs.

#### Examples:

7" 32lb/ft L80 VAM TOP

Max Load on Coupling Face= 5.297 sq.in. \* 80,000 lbs / sq.in.= 424,000Lbs.

7" 32lb/ft L80 VAM TOP SC90

Max Load on Coupling Face= 4.400 sq.in. \* 80,000 lbs / sq.in.= 352,000 Lbs.

7" 32lb/ft L80 VAM TOP SC80

Max Load on Coupling Face= 3.647 sq.in. \* 80,000 lbs / sq.in.= 292,000 Lbs.

Remember if the coupling has a special clearance or a bevel this value will be much less so make sure to look up the coupling face cross section for the correct coupling design option.

#### **2.4.3.5 Slips and safety clamp to hold the string in the rotary table**

Slips are required to support the string weight in the rotary table during make-up. They can be manually inserted or operated remotely. They can be mounted on the rotary table or flush with the drill floor. Slips work best when the string weight is high. For the first few joints it may be necessary to compliment the slips by inserting a safety clamp round the pipe. This will reduce the chance of the string falling into the well if the slips fail. Slips must be designed with jaws that wrap around as much of the pipe body as possible.

#### **2.4.3.6 Jaws**

Slips, slip type elevators and tongs are all fitted with jaws to grip the pipe.

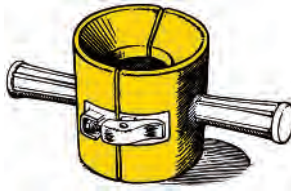
For chromium steels the jaws must be non ferrous and low marking. On carbon steels the jaw marks must be less than indicated below.

Pipe Diameter	Maximum Grip Marks for Standard Handling Methods	
	inch	mm
2 3/8" to 2 7/8"	0.025	0.64
3 1/2" to 5 1/2"	0.030	0.76
6 5/8" and above	0.040	1.02

On chromium steels the jaws must be non ferrous and leave a mark no greater than 0.3mm (0.012") in depth. A pit depth gauge is required to measure the depth of jaw mark.

#### 2.4.3.7 Stabbing guides

One of the most critical operations to ensure integrity is stabbing the pin and the box for make-up. After this point the connections will never be seen so great care must be taken to ensure that no damage occurs during stabbing. The best method to protect against stabbing damage is to use a stabbing guide. This is a plastic guide which is fitted over the box connection in the rotary table. As the pin is inserted into the box the guide will ensure it is central and prevent damage to the connections. The stabbing guide must be correctly designed for the connection. Some tongs have a stabbing guide which is built in to the tong.



#### 2.4.3.8 Single joint compensator to counterbalance the pipe during stabbing (recommended)

When stabbing together the threads care must be taken to ensure they are correctly aligned. It is always best to do this by hand so the operator can have a feel to ensure that no cross threading has taken place. This is easy if the pipe is a small diameter but for pipe over 4 1/2" a counterbalance is useful. This counterbalance is called a single joint load compensator and is highly recommended for steel grades that are susceptible to galling such as chromium steels. A single joint load compensator is also useful when pulling pipe or running in stands as again it reduces the chance of galling. In many cases single joint load compensators are not used simply because they take time to rig up. They are well worth the effort.

### 2.4.3.9 Thread compound, brushes and applicators

See section 2.5.2

### 2.4.3.10 Thread protectors if pulling pipe

The purpose of thread protectors is to hold the storage compound which avoids corrosion and to protect the threads against damage. They are designed to strict specifications from VAM and API. Thread protectors are designed to suit specific diameters and thread types and in some cases pipe weights. Protectors have a value and should not be treated as waste when they are removed from the pipe. Thread protectors can be reused many times as long as they pass performance tests. In many countries there will be a supply chain for returning thread protectors to the pipe manufacturer or for recycling them. Take care when removing thread protectors to pair them together and place them in a compactor bag or container for return.

If pulling pipe remember to order thread protectors. If running pipe keep the protectors on board until the string is in the well and tested in case it has to be pulled. Remember to keep some protectors for returning contingency pipe. Always apply some thread compound or storage grease to returned pipe in case there is a delay in the restocking.

Always use the correct thread protector for the job. NEVER fit the wrong protector as it may fall off the pipe onto a supply ship or on the public roads. If the correct protectors are not available it is best to fit none and live with the consequences of a damaged connection rather than the consequences or a protector falling and injuring someone!

Some protectors can be used with several different connections. Protector interchangeable rules can be found on the VAM Services website - library section.

Thread protectors must be tightened fully with a wrench. Take care not to cross thread the protectors as this makes them very difficult to remove and may result in the connection below having to be re-cut. Quick release pin end thread protectors are useful for short term use to handle the pipe from the rack to the drill floor. Some designs are better than others. A common design is the inflatable thread protector which works well as long as the air does not escape. They are normally just designed for connections with a 1:16 thread taper.

Never use thread protectors with a locking arm as shown below as this can cause pin seal damage.



Thread protectors can be all plastic or a composite with plastic and metal. They can be open ended or closed end. Protectors that are open end will normally permit a drift mandrel to pass. Closed end protectors normally give better resistance against corrosion.

#### 2.4.3.11 Nylon slings and strap wrenches for chromium steels

Slings are normally required for pipe handling at the rig site. Metallic slings are used for carbon steels and nylon slings (or plastic wrapped metal slings) must be used for chromium steels. Slings must be double wrapped round the pipe and each sling must have the capacity to lift the entire load in case one breaks. See section on handling for more details.

#### 2.4.3.12 Stabbing Arm

When stabbing pipe it is best to have an operator positioned on a stabbing board to hold the top of the pipe central during stabbing. Nowadays most rigs do not use a stabbing operator and instead have a remotely operated stabbing arm or the main elevators to hold the pipe centrally. A stabbing arm is normally attached to the derrick and retracts when the pipe is made-up. It is important to ensure that the arm is central as any eccentricity will prevent good make-up.

#### 2.4.3.13 Strap Wrenches

When making-up pipe manufactured from chromium steels it is recommended to use a strap wrench as shown below to ensure the threads are stabbed correctly. This should be used in conjunction with a single joint load compensator for heavy pipes. Alternatively a chain tong may be used as long as the pipe body is protected with rubber or similar to prevent ferrous contact.



#### 2.4.3.14 Lifting sub and handling plug

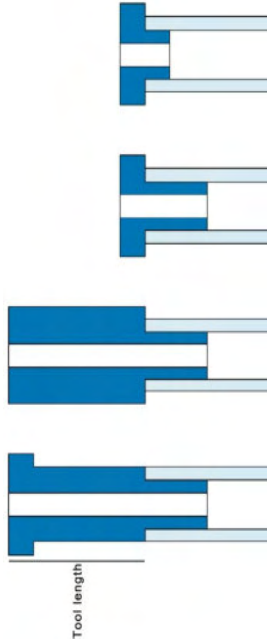
For integral connections a lifting or handling tool is required. These are screwed by hand then chain tong into the box connection to simulate a square face with which to lift the pipe. They must be made up so there is no gap at the box face. It is important that these are manufactured in accordance with VAM specifications. They can also be used to protect the box connection from damage caused by elevators or fill up tools or for setting manual slip type elevators.

Normally three sets of tools are taken to the rig site. Some connection types have different designs across the weight range so the tools must be matched to the weight of the pipe as well as the diameter. Care must be taken when fitting these as they can be heavy. Always apply storage grease and a thread protector to these tools when not in use. It is recommended to paint a white stripe on the tools so that they can be seen to be rotating as the pipe rotates.

The box connection on integral connections can be quite thin. The protectors should be fitted until the pipe is ready to run. Take care when inserting and removing the lifting tools to ensure that no damage is done to either the connection or the tool. Check the threads of the lifting tools before and after each use for damage as they can be used many hundred times during the running of one string.

The table below shows the types available:

Type	1 Lifting Sub	2 Lifting Plug (long)	3 Lifting Plug (short)	4 Handling Plug
Tool length	>18"	>18"	2" to 4"	2" to 4"
Thread length	Long	Long	Long	Short
Max capacity	as per tool strength	as per tool strength	as per tool strength	3 joints
Material yield strength	110 - 125 ksi	110 - 125 ksi	110 - 125 ksi	110 - 125 ksi
Single joint elevators	Yes	Yes	Yes	Yes
Slip type elevators	Yes - on tool	Yes - on pipe OD	Yes - on pipe OD	Yes - on pipe OD
Side door / Collar elevators	Yes	Yes	Yes	Yes



The maximum weight that can be lifted with a lifting sub (design 1 to 3) is the lesser of either the tool tensile strength or the connection tensile strength. These values are a factor of material strength.

The lifting sub is designed for using side door elevators with chromium of CRA pipe to ensure there is no ferrous contact. The lifting plug long and short (tool length) are designed for side door elevators where contact with the pipe is permitted. The short one is the lighter. The handling plug is designed to be as light as possible so that it can be easily handled but is for lifting just one stand of max. three joints.

VAM designed lifting tools have low interference threads and no contact on the metal-to-metal seal surfaces. They can be made-up using a chain tong until there is no gap between lifting tool face and the end of the pipe as

shown in the table.

## 2.5 Lubricants and thread compounds

The purpose of this chapter is to inform the approved thread compounds for storage and running of VAM tubing and casing connections and how it must be applied.

### 2.5.1 Storage compound

If the pipes are not being run within a month, storage compound must be applied on pin and box connections. The purpose of storage compound is to prevent the connections corroding after they leave the factory. Seldom are storage compounds suitable as running compounds so they must be removed and the connections cleaned prior to application of a thread running compound for make-up. For a full list of storage compounds refer to the 'VAM Approved Storage and Running Compounds' table on the VAM Services website

### 2.5.2 Running compound

In order to provide lubrication between the connections during make-up and prevent galling of the mating surfaces it is necessary to apply a running compound (often called dope) to the connections prior to stabbing and makeup. Some connections can have a mill applied coating called CLEANWELL and do not require running compound to be applied.

A separate procedure details the methods to be taken when products are supplied with CLEANWELL. API 5A3 is the standard for thread compound performance however only some compounds that comply with this standard are suitable for VAM connections. All compounds conforming to API 5A2 are acceptable. Examples of these are

- ⇒ 'API Modified'
- ⇒ 'API High Pressure Modified'
- ⇒ 'API Modified HP/HT'
- ⇒ Best-o-Life 72733
- ⇒ Weatherford Lubeseal
- ⇒ Jet Lube API Modified High Pressure

These running compounds contain soft metals that act well as a lubricant. They are harmful for the environment and can cause skin problems. Ensure that barrier cream is applied to hands and wrists and wear gloves. For this reason some metal free running compounds have been tested and approved for VAM connections. They offer some more protection to the environment and some are approved for use in countries where there is strict

environmental legislation. The full list of approved thread compounds can be found in a table on the VAM Services website ([www.vamservices.com](http://www.vamservices.com)). If the end user wishes to use another type of running compound then they do so at their own risk.

### 2.5.3 Recommendations prior to running pipe

Before starting to run pipe first check that there is sufficient quantity of running compound available at the rig site to complete the job. If any expiry date is marked on the container check that it has not expired. It is recommended to use a new container of thread compound for each job. If excess thread compound has been left from a previous job and it has been stored properly then it is acceptable to use this. Always stir the running compound prior to use. Ensure that the compound is free of foreign particles.

Never use a thread compound which has been contaminated (liquids, solids particles, etc.). This may have a negative effect on the anti-galling performance of the thread compound. Never dilute the compound with oil, diesel or water and this may effect the friction factor of the compound which could lead to the connection being overtorqued or undertorqued. Do not allow the mud or drilling/completion fluids to overflow the box connection when filling up or running in hole. If this happens carefully clean the mud from the connection and take preventative action to stop reoccurrence. Remove all other compounds from the rig floor to prevent confusion.



Do not use drill pipe compounds for tubing and casing and vice-versa.

If the pipe has been prepared for running (Rig Ready) at a location other than the rig site it is essential that the compound applied to the connection is known as well as the duration that the thread compound has been on the pipe. If there is a robust supply chain between the company preparing the pipe and the rig site it may not be required to further inspect the pipe. It is still best practice to perform a final check of the connections immediately prior to stabbing.



If the pipe has come straight from stock then an inspection at the rig site before application of running compound is required.

In cold climates the running compound may have to be warmed slightly to make application easier. Thread compounds are all required to be regularly mixed during use.

#### 2.5.4 Application of thread compound

Prior to applying running compound and make-up it is necessary to check the connections to ensure that there is no damage or corrosion. Never use barite or a wire brush to clean connections as damage can occur. Never use diesel or helifuel to clean the connection as this will leave a film that may cause make-up problems or affect the performance. Water contamination of the thread compound can cause a change in its friction properties which may in turn affect make-up. For this reason the connections and brushes must be kept as dry as possible and the compound must not become contaminated with water. If it is raining then rag wipe the connections before application of compound to remove the excess water and keep the bucket of thread compound in a dry location on the drill floor. If the compound becomes contaminated with water it must be replaced with a new bucket. The same rules apply when running compound is applied to connections prior to shipping to the rig.

For all VAM connections except BIG OMEGA, DINO VAM and VAM HP the thread compound should be applied to both pin and box ends. For Big OMEGA and DINO VAM the compound can be applied to either the pin or the box only.

A flat brush can be used to apply the thread compound to the pin end and a 'moustache' type brush can be used for the box end. Motorised applicators can also be used to apply the thread compound to the box connections.



Evenly apply the correct quantity of compound to all the thread, seal and shoulder areas. The compound must reach the bottom of the thread. The minimum (and maximum for VAM SLIJ II) quantities of thread compound are listed in the

individual connection sections.

To put these values in perspective use a plastic cup, like the type found on a drill floor, and knowing its volume calculate how many make-ups can be achieved with a full cup. Cups are typically 12 fluid ounces or 200 ml. Always check first. If the cup is emptied before completing the specified

number of make-ups then too much is being used and it will extrude from the connection during make-up. The converse is true if too little is used.

The pictures below show good application of thread compound.



Too little



Too much



Just right Pin



Just right Box

It is essential to ensure that there is no contamination of the threads and seal areas with mud or drilling fluid prior to stabbing the connections. Mud can contain small particles which may tear the connection seals. If drilling fluid is on the connections it must be removed and fresh thread compound applied. In order to prevent this from happening in the first place the reason for the contamination must be found and actions taken to prevent reoccurrence. If no action can be taken then the responsible person must be informed that proceeding with contaminated threads and seals may affect the integrity of the connection. VAM connections are not qualified with mud on the threads so to run pipe in this way is an unknown risk.

The thread compound must be stirred at regular intervals during use. This is especially true of compounds containing heavy metals and biodegradable compounds.

After use ensure that the lid is placed firmly back on the container of the thread compound. The container must be placed back in a suitable store,

and labelled properly, ready for the next job.

**\*\*\* Remember - Good 'doping' practice is the key to success \*\*\***

### 2.5.5 Friction Factors

Some thread compounds have a 'Friction Factor' written on the label. The friction factor of the thread compound may have an effect on make-up as the threads engage. The friction factor has no or little effect during seal and shoulder engagement. For this reason on VAM connections torque figures must NOT be multiplied by the friction factor.

### 2.5.6 Thread locking of the shoe track

It may be necessary to use thread locking compound for the shoe track on a liner or casing string. This is required if the shoe will be drilled out using a torque greater than the make up torque. If thread locking compounds are used the following guidelines must be applied.

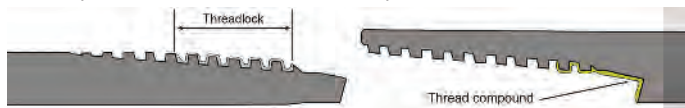
Thread locking compounds normally come with instructions that are written for API type connections and do not apply to shouldering type VAM connections. The instructions usually refer to a friction factor and recommend that the torque be multiplied by the friction factor. This recommendation does NOT apply to shouldering type VAM connections. When using thread locking compounds there will be a significant increase in torque required reaching the shoulder point.

- ⇒ If the shoulder point is within the normal acceptance criteria using the standard torques, the make-up is acceptable.
- ⇒ If the thread interference is higher than normal resulting in a shoulder point higher than 70% but less than 80% of optimum torque then it is acceptable if the final torque is above optimum torque.
- ⇒ If the shoulder point is above 80% of optimum torque and not as a result of galling or damaged threads then accept this make-up as long as 20% of optimum torque is applied after shouldering. This may mean that the final torque is above maximum torque for the connection.

In other words

- ⇒ Accept if shoulder torque is less than 70% of optimum torque
- ⇒ Accept if shoulder torque is less than 80% of peak torque
- ⇒ If necessary increase final torque to achieve a minimum of 20% shouldering torque

When using a thread locking compound apply a little standard running compound to the box seal and shoulder area and threadlocking compound to the pin thread as shown below. This will avoid contamination of the thread lock compound with standard thread compound.



### 2.5.7 Molykote

Molykote™ is a trade name for a substance containing MoS<sub>2</sub>. It is an anti-galling compound. It is not necessary for use this on VAM connections.

### 2.5.8 CLEANWELL®

The aim of the CLEANWELL technology is to provide an environmental friendly "rig ready" solution that avoids storage and running compounds usage. CLEANWELL technology is applied during manufacture just after threading on both pin and box connections. All connections manufactured with CLEANWELL will be clearly marked as such on the stencil. CLEANWELL provides:

- ⇒ Anti-corrosion during storage
- ⇒ Anti-galling properties during running

CLEANWELL is not available for connections already manufactured. The CLEANWELL layer is applied evenly over the complete surface of the connection. During the running of a connection using CLEANWELL, there is not necessity to apply any additional make up dope. For further details please contact VAM Services or VAM Field Service International.

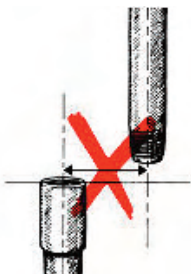
## 2.6 Running

Running is the process of connecting the pipes and lowering them into the well. This section includes stabbing, make-up, checking the make-up graph and if necessary backing out and also horizontal make-up.

### 2.6.1 Stabbing and Make-up

Stabbing is the process of placing the connections together. Make-up is the process of applying rotation to the connections until they reach the required torque. The correct make-up torque for each connection is listed in this book and on connection data sheets. The make-up torque is a factor of diameter, weight, steel grade and connection type and, in the case of VAM TOP HT, the steel type and final application.

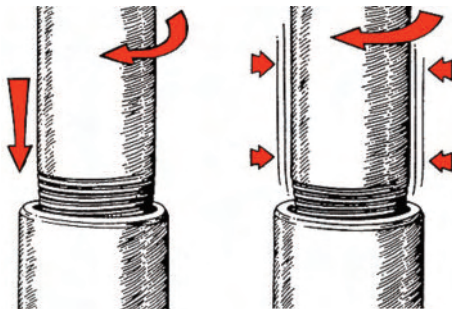
Prior to make-up select the correct torques. Most VAM connections are run with the pin end down so stabbing is when the pin connection is placed into the box connection. To prevent cross threading or make-up problems there must be good alignment between the two pipes.



In order to have the pipe well aligned during the stabbing and make-up then there are three common methods to support the pipe

- ⇒ A stabbing operator standing on a stabbing board to hold the box end
- ⇒ A stabbing arm to hold the pipe centrally
- ⇒ Remotely operated pipe handling equipment found on latest generation rigs

In order to reduce the chance of damage to the pin seal it is required to use a plastic or rubber stabbing guide over the box connection. Care must be taken by the driller not to lower the pin into the box too fast or damage may occur. The driller must have a clear line of vision so that he can see the stabbing process.



Some casing crews can supply a 'load compensator' which makes the stabbing and make-up process easier. It allows more control over the stabbing and acts as a counterbalance during initial make-up ensuring that there is little, or no, load on the threads. It is particularly useful for Chromium, CRA steels, pulling operations or running in stands.

Remove the stabbing guide when the threads have been stabbed. After the pipe has been stabbed the first one or two turns are critical to ensure that the threads are properly engaged. This can be done using a strap wrench or chain tong for small diameter pipes or using the power tong in high gear at low speed for larger diameter pipe. If a torque build up is detected then back-out the connection and retry. If the damage is severe the connections must be rejected. The make-up speeds and gears as listed below are recommended.

Do not rock the pipe to engage the threads. If the threads do not align after stabbing then rotate the pipe in reverse until the threads drop and commence make-up.

Material	First two turns	Thread engagement	Final make-up including seal and shoulder engagement
Carbon steel and Chromium steels	Low speed (high gear) or by hand using chain tong or strap wrench	High gear (<30 rpm for tubing or <15 rpm for casing)	Low gear with maximum speed of 5 rpm
Corrosion Resistant Alloys (CRA)	By hand until difficult to turn	Low gear with maximum speed of 5 rpm	Low gear with maximum speed of 5 rpm

Once the threads are engaged the power tong can be used on the pipe. If the power tong has a single set of rotating jaws then these are placed just above the pin threads taking care to ensure that the back-up line is level

and that the tong jaws will not hit the coupling (or box) face as the threads engage. If the tong has an integral set of back-up jaws then the tong should be placed with the backup jaws below the coupling and the rotating jaws above the coupling. In the case of integral joints the back-up jaws must be placed below the box connection to avoid the connection being crushed. Do not lower the elevators over the pipe until the connection is fully made-up. If the elevator is already on the pipe it must be released before make-up. It is normal for the tong to have a high and low gear ratio. It is best to start in high gear with a low speed as cross threading will cause the tong to stall before damage has occurred. Once the threads are engaged then a higher speed can be used until the torque starts to increase as the threads interfere. At this point low speed and low gear is required to take the make-up to the correct torque in a controlled manner.

Any early torque increase is indicative of a problem in make-up such as a cross threading or galling. If this occurs rotation must be stopped and the connection broken-out fully and inspected. Thread interference does not normally start until 2/3 of the threads have disappeared inside the box.

Although not necessary for all connections it is recommended to use torque turn monitoring equipment which is described in the next section. After the connection is made-up check the monitoring system for the 'VAM Signature'.

When the make-up is finished and the signature is accepted, disengage the power tong. If the string is not open at the bottom as it is run in hole it will be required to fill it from the top at regular intervals. If this is not done the external pressure can collapse the string. Care must be taken to ensure the casing fill up tool does not damage box connections or leave drilling or completion fluids or debris on the connections.

Many modern rigs can have more than one derrick allowing stands of pipe to be made up 'offline' and racked back in a spare derrick until required. Running pipe into a well in stands is much quicker than doing it as single joints as fewer make-ups are required over the well. When working by stands speed must be reduced by 50%.

Final torque must be between minimum and maximum as per the torque tables. Some end users may require the final torque to be between optimum and maximum.

Shoulder torque must be between 5% and 70% of optimum torque. For VAM SLIJ II and VAM HP it is acceptable to have a shoulder torque of up to 80%

as long as the final torque is over optimum and the threads are not galled.

Evidence of shouldering only is required for DINO VAM and Big Omega IS. A visual guide (make-up triangle) is used to ensure Big Omega is made-up correctly. Refer to the connection specific sections in this book for more detail about these connections.

The number of turns applied to the connection after shouldering is known as delta turns. It is now a requirement that these are within set parameters for all VAM connection that have a torque shoulder.

Delta turns must be within the values listed below

VAM TOP HT (carbon and Chromium)	0.01 and 0.13	non linearity permitted
Other VAM connections	0.01 and 0.10	straight line from shoulder to final only

The slope of the graph between the shoulder point and the final torque must be a straight line with a slope greater than 5 x optimum torque. This can be expressed with the formula below.

$$\frac{\text{final torque} - \text{shoulder torque}}{\text{optimum torque} \times \text{delta turns}} > 5$$

Some make-up companies do this calculation with their software and identify any make-ups that have a slope out with the criteria.

### 2.6.2 Understanding make-up graphs

When casing or tubing is joined using VAM premium connections, the connection performance is validated only when the connections are checked to ensure they are in good condition, the correct torque is applied and the correct 'VAM Signature' is obtained.

The most accurate method of ensuring that connections are made up correctly is by monitoring the torque being applied by the tong relative to the number of turns. By connecting a computer to both the load cell on the tong and an electronic turns counter a graph can be plotted showing torque on the vertical axis and turns on the horizontal.



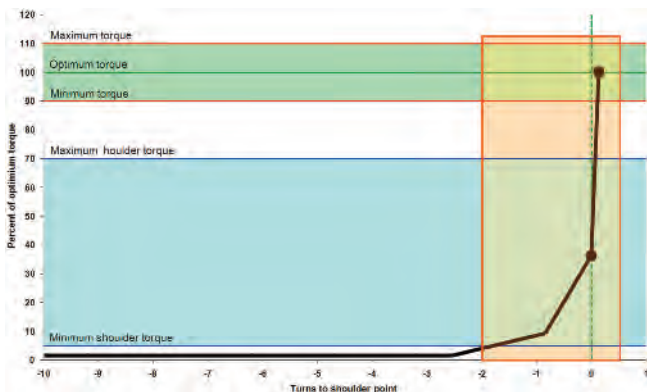


It is strongly recommended to have torque/turn monitoring and recording for all VAM premium connections. Big Omega and DINO VAM are semi premium connections and do not require torque/turn monitoring. Most casing crew companies provide a torque/turn monitoring service and keep a record of each makeup for future reference. Simply by connecting a torque/turn monitoring device to the tong does not guarantee a good make-up. It can be useful to detect any anomalies, particularly during thread engagement. Eyes to inspect the connections and review the graphs and a brain to accept/reject are also required. A competent person is therefore needed in addition to the make-up equipment. Such persons can be provided by your local VAM Field Service Centre.

There must be a system of ensuring that a competent person is on the drill floor at all times with the most senior person checking any make-up graphs that have been done during his breaks. If any unacceptable makeup graphs have been accepted then the string should be pulled back to investigate any anomalies. It is better to do this at the time rather than have a leak in the future.

For all VAM connections there is little resistance to torque during the first few turns until the threads and start to interfere. This normally occurs during the last two turns and is followed by a sharp increase again as the 'shoulders' of the connections meet.

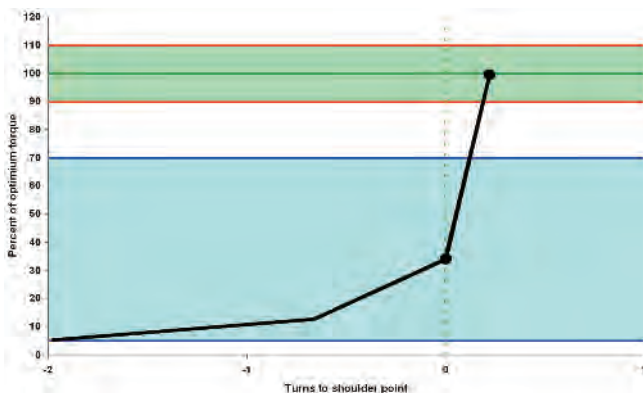
Some connections also show a change in profile during seal engagement. The black line below is typical of VAM TOP signature from stabbing to final make-up.



As it is impossible to achieve a final torque that is exactly the same after each make-up, an acceptance window exists. This is normally  $\pm 10\%$  of optimum torque however some VAM connections have a wider window while others have a narrower window. This is displayed as the green shaded area above. A final torque anywhere between minimum and maximum is acceptable although some end users may insist on the final torque being between optimum and maximum.

It is expected that the shoulders will meet when the torque is greater than 5% of optimum and less than 70% of optimum as shown by the blue shaded area above. As there is a  $\pm 10\%$  acceptance criteria for the final torque this guarantees that at least 20% of the optimum torque will be applied to the connection after the shoulders have made contact.

Depending on the scale and resolution of the make-up graph axis very different make-up profiles can be achieved. A make-up graph can be 'stretched' or 'squashed' depending on the scale so it is important to not only look at the profile but also the numbers on the axis. There can be circumstances where, if the resolution is poor, a make-up graph can look acceptable but when the resolution is increased the graph may not be acceptable. For this reason the graph should be as large as possible on the screen with a turns scale showing at least the last 2 turns as shown by the orange area above and in the stretched graph below.



All make-up graphs must have the pipe tally number, time and date. If for any reason a graph is not accepted it must be kept for records along with a reason for rejection.

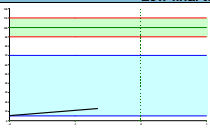
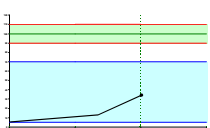
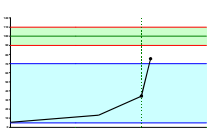
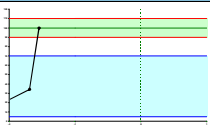
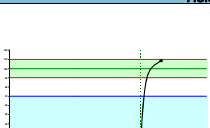
### 2.6.3 Unacceptable make-up graphs

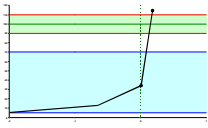
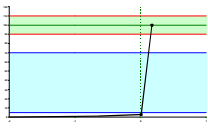
By oilfield standards, running casing or tubing is a very low-risk activity and VAM products have been designed with ease and reliability of make-up as priorities. As such 98% of connections are made-up first time without a problem. There still remains a small chance of incorrect make-up. The problems that might occur include:

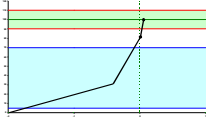
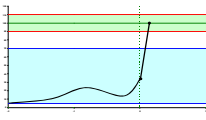
- ⇒ Low Final Torque with no seal or shoulder contact
- ⇒ Low Final Torque with seal but no shoulder contact
- ⇒ Low Final Torque having reached shoulder
- ⇒ Short Graph - no thread interference
- ⇒ Yielded Graph - no seal or shoulder
- ⇒ High Final torque
- ⇒ Low Shoulder
- ⇒ High Thread Interference
- ⇒ 'Humping' (peak below the shoulder)
- ⇒ 'Humping' (peak above the shoulder)
- ⇒ Irregular Thread Interference
- ⇒ High turns after shoulder
- ⇒ Step/Torque Drop During Shouldering
- ⇒ Step in Graph
- ⇒ Spike in Graph
- ⇒ Unusual profile

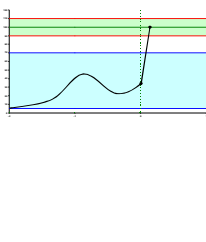
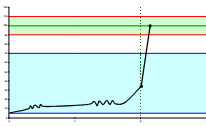
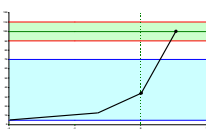
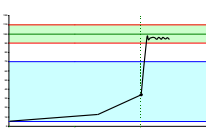
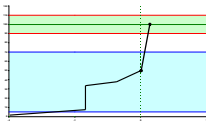
Although not exhaustive, the possible cause, consequences and remedial actions for each of the above is as listed on the table on the following page.

This table uses VAM TOP as the comparison.

Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
<b>Low final torque with no seal or shoulder contact</b>			
	<ol style="list-style-type: none"> <li>Wrong dump valve setting</li> <li>Unable to select low gear</li> <li>Operator stopped make-up</li> </ol>	<ol style="list-style-type: none"> <li>Risk of back out</li> <li>Risk of threads jump out</li> <li>Risk of leak</li> </ol>	<ol style="list-style-type: none"> <li>Back-out three turns (unless Oil Company or end user has different policy)</li> <li>Remake</li> </ol>
<b>Low final torque with seal but no shoulder contact</b>			
	<ol style="list-style-type: none"> <li>Wrong dump valve setting</li> <li>Unable to select low gear</li> <li>Operator stopped make-up</li> </ol>	<ol style="list-style-type: none"> <li>Risk of back out</li> <li>Risk of leak</li> </ol>	<ol style="list-style-type: none"> <li>Break out fully</li> <li>Clean and inspect threads and seal</li> <li>If OK remake</li> </ol>
<b>Low final torque having reached shoulder</b>			
	<ol style="list-style-type: none"> <li>Wrong dump valve setting</li> <li>Unable to select low gear</li> <li>Operator stopped make-up</li> </ol>	<ol style="list-style-type: none"> <li>Risk of back out</li> <li>Risk of leak</li> </ol>	<ol style="list-style-type: none"> <li>Break out fully</li> <li>Clean and inspect threads and seal</li> <li>If OK remake</li> </ol>
<b>Short graph - no thread interference</b>			
	<ol style="list-style-type: none"> <li>Reference torque set too high</li> <li>Second attempt at make-up without back out</li> </ol>	<ol style="list-style-type: none"> <li>There is no thread engagement shown so it is not know what may have happened</li> <li>Consequences unknown so risky</li> </ol>	<ol style="list-style-type: none"> <li>Break out fully</li> <li>Clean and inspect threads and seal</li> <li>If OK remake</li> </ol>
<b>Yielded graph - no seal or shoulder</b>			
	<ol style="list-style-type: none"> <li>Bad load cell calibration</li> <li>Wrong torque values entered</li> <li>Wrong tong arm length</li> <li>Mixing interchangeable connections with big difference in weight or grade</li> <li>Wrong connection types</li> </ol>	<ol style="list-style-type: none"> <li>Risk of jump in</li> <li>Risk of coupling parting</li> <li>Risk of leak</li> <li>No drift – damage to pin and box shoulder area</li> </ol>	<ol style="list-style-type: none"> <li>Break out fully</li> <li>Clean threads and seal</li> <li>Visual inspect counter bore (D1) for deformation</li> <li>If OK remake</li> </ol>

Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
<b>High final torque</b>			
	<ol style="list-style-type: none"> <li>1. Bad load cell calibration</li> <li>2. Wrong dump valve setting</li> <li>3. Bad tong adjustment</li> <li>4. Tong too powerful</li> </ol>	<ol style="list-style-type: none"> <li>1. Risk of jump in</li> <li>2. Risk of coupling parting</li> <li>3. Risk of leak</li> <li>4. No drift – damage to pin and box shoulder area</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean threads and seal</li> <li>3. Visual inspect counter bore (D1) for deformation</li> <li>4. If OK remake to correct torques</li> </ol>
<b>low Shoulder</b>			
	<ol style="list-style-type: none"> <li>1. Friction factor &lt; 1.0</li> <li>2. Wrong type of thread compound</li> <li>3. Compound not stirred</li> <li>4. Compound too hot</li> <li>5. Compound contaminated</li> <li>6. Wrong torque values</li> <li>7. MoS2 (Molykote) on connections</li> <li>8. Wrong connection types</li> </ol>	<ol style="list-style-type: none"> <li>1. Risk of back out</li> <li>2. Risk of threads jump out</li> <li>3. Risk of leak</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seal</li> <li>3. If OK remake</li> </ol>

Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
<b>High Thread Interference</b>			
	<ol style="list-style-type: none"> <li>1. Wrong type of thread compound</li> <li>2. Not enough thread compound</li> <li>3. Compound too cold</li> <li>4. Compound not stirred</li> <li>5. Friction factor &gt; 1.0</li> <li>6. Girt/dirt in thread compound</li> <li>7. Bad load cell calibration</li> <li>8. Wrong torque values</li> <li>9. Wrong tong arm setting</li> <li>10. Running speed too high or too low</li> <li>11. Tong dies reaching coupler face</li> <li>12. Not enough freedom between tong and backup</li> <li>13. Spring supporting tong completely extended</li> <li>14. Coupler hitting face of elevators</li> <li>15. Misalignment between pin and box</li> <li>16. Bad stabbing</li> <li>17. Threads not clean</li> <li>18. Threads galled</li> <li>19. Threads damaged</li> <li>20. Wrong connections</li> </ol>	<ol style="list-style-type: none"> <li>1. Risk of back out</li> <li>2. Risk of leak</li> <li>3. Risk of threads and/or seal galling</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seal</li> <li>3. If OK remake</li> </ol>
<b>Humping (peak below the shoulder)</b>			
	<ol style="list-style-type: none"> <li>1. Too high a thread compound applied.</li> <li>2. Slight misalignment</li> <li>3. Bad stabbing</li> <li>4. Thick phosphate</li> <li>5. Minor thread damage</li> <li>6. Teflon seal from assembly testing left in box connection (Note: These are not to be used for VAM testing)</li> <li>7. Elevators hitting coupling face</li> </ol>	<ol style="list-style-type: none"> <li>1. Excessive thread compound down hole</li> <li>2. Unable to set plugs</li> <li>3. Contamination impact</li> <li>4. Leak is seal left in connection</li> </ol>	<ol style="list-style-type: none"> <li>1. Accept once but establish reasons and correct problem</li> <li>2. If there is any suspicion that there may be a seal in the connection then back out fully and remove. Report to Co. Man.</li> </ol>

Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
<b>Humping (peak above shoulder)</b>			
	<ol style="list-style-type: none"> <li>1. Too much thread compound</li> <li>2. Slight misalignment</li> <li>3. Bad stabbing</li> <li>4. Minor thread damage</li> <li>5. Plastic seal from assembly testing left in box connection (Note: These are not to be used for VAM testing)</li> </ol>	<ol style="list-style-type: none"> <li>1. Excessive thread compound down hole</li> <li>2. Unable to set plugs</li> <li>3. Contamination of well</li> <li>4. Leak or drift failure if plastic seal left in connection</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seal</li> <li>3. If OK remake</li> </ol>
<b>Irregular thread interference</b>			
	<ol style="list-style-type: none"> <li>1. Blocks coming down catching elevators</li> <li>2. Problems with electric or hydraulic power systems</li> <li>3. Poor alignment</li> </ol>	<ol style="list-style-type: none"> <li>1. Galled threads</li> <li>2. Unacceptable profile</li> <li>3. Questionable torque data</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seal</li> <li>3. If OK remake</li> </ol>
<b>High turns after shoulder</b>			
	<ol style="list-style-type: none"> <li>1. Wrong pipe diameter for turns counter</li> <li>2. Mill side torque lower than field side (coupling turns)</li> <li>3. Wrong shoulder detection</li> </ol>	<ol style="list-style-type: none"> <li>1. Risk of leak if debris in mill end torque shoulder</li> <li>2. Risk of leak if wrong shoulder detection</li> <li>3. Risk of back out</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully (including mill ends)</li> <li>2. Clean and inspect threads and seals</li> <li>3. If OK remake</li> </ol>
<b>Step/Torque drop during shouldering</b>			
	<ol style="list-style-type: none"> <li>1. Unsuited dies</li> <li>2. Hydraulic pressure for jaws too low</li> <li>3. Rotary table turning</li> <li>4. Excessive paint on pipe causing slippage</li> </ol>	<ol style="list-style-type: none"> <li>1. Damage to pipe body</li> </ol>	<ol style="list-style-type: none"> <li>1. Accept if cause is grips slipping and pipe body is not damaged. If reason is unknown then</li> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seals</li> <li>3. If OK remake</li> </ol>
<b>Step in graph</b>			
	<ol style="list-style-type: none"> <li>1. Turns counter sticking</li> </ol>	<ol style="list-style-type: none"> <li>1. No immediate consequence but what happened during make up when turns were not recorded?</li> </ol>	<ol style="list-style-type: none"> <li>1. Partial break out</li> <li>2. Acceptable but correct problem</li> </ol>

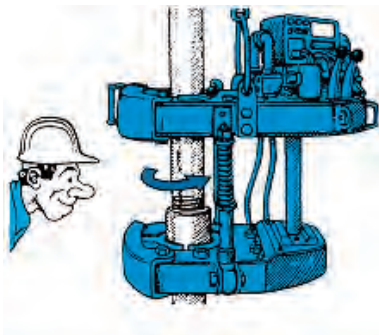
Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
<b>Spike in graph</b>			
	<ol style="list-style-type: none"> <li>1. Late gear change</li> <li>2. Radio interference (mobile phone or lightning)</li> <li>3. Elevators banging on pipe body</li> <li>4. Electrical interference caused</li> </ol>	<ol style="list-style-type: none"> <li>1. No consequence for connection</li> <li>2. Customer will not accept</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seals</li> <li>3. If OK remake</li> </ol>
<b>Unusual profile</b>			
	<ol style="list-style-type: none"> <li>1. Teflon seal from assembly testing left in box connection</li> <li>2. Wrong connections</li> <li>3. Minor thread damage</li> <li>4. Plastic seal from assembly testing left in box connection (Note: These are not to be used for VAM testing)</li> </ol> <p>NB: These are not to be used for VAM testing</p> <p>NB: Wrong connections may also produce a 'good' make up graph. Always check connections before make-up</p>	<ol style="list-style-type: none"> <li>1. Drift failure</li> <li>2. Unable to set plugs</li> <li>3. Contamination of well</li> <li>4. Leak or drift failure if plastic seal left in connection</li> </ol>	<ol style="list-style-type: none"> <li>1. Break out fully</li> <li>2. Clean and inspect threads and seals</li> <li>3. If OK remake</li> </ol>

The maximum number of attempts at make-up is 3 before picking up a new pin connection. If this does not make-up into the box on the next attempt then the box connection (or coupling) should be replaced. If the pin connection of the laid out joint has no damage it can be retried later in string. The reason for this restriction is to save rig time.



## 2.7 Break out

Unlatch the elevators before breakout. Locate the connection to be broken out at a comfortable working height above the slips. Set the power tong and the backup tongs or slips as close together as possible to prevent bending during breakout. For threaded and coupled connections place the back-up tongs on the lower half of the coupling as shown below. For VAM TOP FE then grip the central flat section of the coupling.



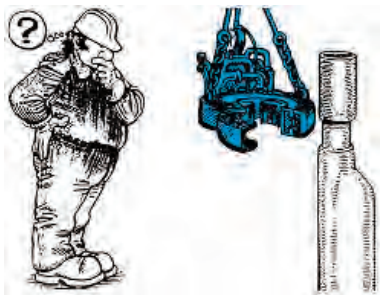
Maintain vertical alignment and control of pipe. This is accomplished by a man on the stabbing board or a stabbing arm. Slowly apply the torque required to break the connection. Never use a hammer or other hard object to beat on a connection. It may be that considerably more torque is required to break out a connection compared to make-up. This is especially true if the pipe has been in the well for some time. The opposite can be true in some instances.

Maintain a steady, controlled speed until the pin jumps inside the box. A weight compensator may be used to reduce the chance of thread galling during breakout. Ensure that the pin does not bounce as it is pulled out of the box by using a stabbing guide.

Once the connections are broken out, if they are being returned for inspection and stockholding they must have storage grease applied before fitting thread protectors. Ensure the correct protectors are available. Never fit the wrong type of protector to a joint as it may become loose during transportation.

## 2.8 Horizontal make-up of accessories

It is normal to make-up accessories at a workshop prior to sending them to the rigsite. The reason for this is that the rig is designed to handle long items with standard diameters and weights. Typically short pipe called pup joints will be attached above and below assemblies to ease handling at the rig site. The equipment is different from that used at the rig site since the make-up is normally done horizontally. The equipment has jaws that can be adjusted to cover many sizes and even components with offset connections.



The equipment for horizontal make-up is often called a 'bucking unit' or horizontal make-up machine. Companies with such equipment may not be part of the VAM Licensee network so this section covers the minimum requirements that they must meet.

The bucking unit must have a minimum capacity of 130% of the maximum torque to be reached (160% in the case of Big Omega connections). A torque/turn monitoring device must be connected to the bucking unit as described in previous sections. The bucking unit must have rotating jaws and back-up jaws with at least one set being 'free floating' to accommodate any kink or eccentricity in the pipe or on the connection. The tong and back-up jaws must be perpendicular to the pipe. The bucking unit must have a continuous rotation and is not permitted to use a chain tong type arrangement as the method of gripping.

For a list of permitted thread compounds and their application and make-up graphs see previous sections.

Prior to starting check the torque figures to be used. This requires that the steel strength is known. Enter the parameters into the make-up computer.

If making up items with different steel strengths or weights refer to the interchangeability section of this book. Next, clean the connections

thoroughly and apply running compound. To avoid galling, the connection shall be made-up as far as possible by hand, then by using a strap wrench or chain tong. This must be done without crossing or forcing the threads. Doing this will mean only a few turns will be required in the bucking unit. Next grip the jaws on pin and box ends being careful not to place the jaws over the box connection. It is preferable to rotate the lighter of the two components.

Make-up the connections at low speed until optimum torque is reached. Check the make-up graph for conformance and accept or reject as necessary. Keep all records of make-ups for at least 5 years or as required to suit the end user. If a make-up is not acceptable then break it out fully using the bucking unit. Rotate until it is possible to unscrew by hand. Inspect the connections and if OK then remake.

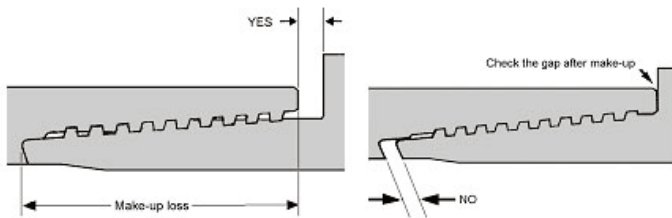
In the case of thread locking compound there may be more torque required to reach and engage the seals and shoulder. The same may be true of assemblies where the inside or outside diameters may be larger than that of a standard connection. This is often the case with a hanger body.

To establish the correct torque to use, first make-up the connections to the standard torque and if there is at least 20% of the torque applied to the shoulder then accept the make-up. If there is less, record the shoulder torque value and break-out the connection fully then clean and visually inspect. If there is no galling or damage then remake to a final torque defined by

$$FT = ST + 0.20 \times OT$$

Whereby FT = final torque  
 ST = shouldering torque evaluated from the first graph  
 OT = optimum torque specified by the torque table

The final torque may be above the range given by the torque table. Take care with assemblies that they have been manufactured with sufficient clearance behind the pin threads otherwise there could be a case as shown on the following page where the assembly upset causes a false shoulder and of course the make-up is unacceptable.



After making up assemblies they should be full length drifted and pressure tested using VAM approved pressure test caps as described below.

If assistance is required for assembly make-up then contact your nearest VAM Field Service centre.

## 2.9 Interchangeability

### 2.9.1 Definitions

Some connections can be considered compatible or interchangeable. For the purpose of this book they have the same meaning and the word interchangeable will be used from this point on.

### 2.9.2 General rules

Designs which are interchangeable can be successfully made-up and will retain, at a minimum, the performance (including seal ability) of the side with the lowest grade, lowest weight. Internal flushness is not guaranteed as often a step may appear in the bore as a consequence of different internal diameters.

If mixing there will be a step in the bore



Box lighter weight  
Step on pin shoulder.

Pin lighter weight  
Step on box shoulder.

The step may cause:

- ⇒ turbulence which may lead to erosion when the well flows,
- ⇒ drift issues,
- ⇒ damage of the lowest D1 by internal tools in the well.

VAM connections are only interchangeable with VAM connections from the same family. They cannot be mixed with API connections, copycat connections, competitor's connections and connections from other VAM designs.

This does not mean that they cannot be screwed together. In some cases they will screw together but will not work correctly and will fail in service. This could lead to harm to people and the environment.

Connections with the suffix Nx where 'x' is a sequential letter (A,B,C....) are not interchangeable with the standard product line for the same family. (except some particular cases). N: Not interchangeable.

Connections with the suffix Kx where 'x' is a sequential letter (A,B,C...) are interchangeable with the standard product line for the same family. K: Kompatible; interchangeable.

Even connections which are interchangeable may not always be mixed as a large difference in weight or steel grade could induce derating on performances or problems of torque determination.

### 2.9.3 Specific rules for VAM connections

#### 2.9.3.1 VAM TOP and derivates

Generally:

- ⇒ VAM TOP Tubing is in sizes 2 3/8" to 4 1/2"
- ⇒ VAM TOP Casing is in sizes 5" to 14"

Many connections from the VAM TOP family are interchangeable. See table below for details.

#### **VAM TOP Tubing interchangeability**

There is limited interchangeability of VAM TOP Tubing across the weight range. The different designs types are shown in the table below. If different weights are mixed within each group there will be a step in the bore.

	Pipe Diameter				
	2 3/8	2 7/8	3 1/2	4	4 1/2
Design 1	4.60	6.40	6.50	8.20	10.50
OK to mix	5.10		7.70	9.50	11.60
same diameter			9.20	10.90	12.60
in these			10.20	11.60	13.50
weights				12.10	15.10
				13.20	
Design 2	5.80	7.80	12.70	14.80	17.00
OK to mix	6.30	8.60	13.70	16.10	17.70
same diameter	6.60	9.35	14.30	16.50	18.90
in these	7.35	9.80	14.70		
weights		10.50			
		10.70			
Design 3		11.50	15.50	18.90	21.50
OK to mix			16.70	22.20	23.70
same diameter			18.35		
in these					
weights					

4 1/2" VAM TOP is not compatible with 4 1/2" VAM TOP HC,  
VAM TOP HT and VAM TOP-ND

#### Notes:

1 - Special care with 4 1/2" which can be Tubing design or Casing design.

2 - Design 1,2,3 cannot be mixed.

3 - 4 1/2" VAM TOP is not compatible with 4 1/2" VAM TOP HC, VAM TOP HT and VAM TOP-ND

## VAM TOP Casing interchangeability

A case exists where 4 1/2" VAM TOP ND is interchangeable with 4 1/2" VAM TOP HT and VAM TOP HC. The 4 1/2" VAM TOP ND connection is identified by a 10mm groove around the centre of the coupling. Many connections from the VAM TOP family are interchangeable. See table below for details.

	VAM TOP HT	VAM TOP HC	VAM TOP casing	VAM TOP KS	VAM TOP KX	VAM TOP KP	VAM TOP FE
	pin	pin	pin	pin	pin	pin	pin
VAM TOP HT box	Inter-changeable	Inter-changeable	Inter-changeable	n/a	n/a	Inter-changeable	not Inter-changeable
VAM TOP HC box	Inter-changeable	Inter-changeable	Inter-changeable	n/a	n/a	Inter-changeable	not Inter-changeable
VAM TOP casing	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable	not Inter-changeable
VAM TOP KS box	n/a	n/a	Inter-changeable	Inter-changeable	Inter-changeable	n/a	not Inter-changeable
VAM TOP KX box	n/a	n/a	Inter-changeable	Inter-changeable	Inter-changeable	n/a	not Inter-changeable
VAM TOP KP box	Inter-changeable	Inter-changeable	Inter-changeable	n/a	n/a	Inter-changeable	not Inter-changeable
VAM TOP FE box	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable	Inter-changeable

### 2.9.3.2 VAM 21

There is limited interchangeability of VAM 21 across the weight range. The different designs types are shown in the table below. If different weights are mixed within each group there will be a step in the bore.

	Pipe Diameter					
	9 5/8	9 7/8	10 3/4	11 3/4	11 7/8	13 3/8
	40.00		45.50	54.00		61.00
OK to mix same size in these weights	43.50		51.00	60.00	67.80	68.00
	47.00		55.50	65.00		72.00
	53.50		60.70			
OK to mix same size in these weights	58.40	62.80	65.70			77.00
		65.30				
		66.40				
		66.90				

#### Notes:

Design 1,2,3 cannot be mixed.

### 2.9.3.3 DINO VAM

There is limited interchangeability of DINO VAM across the weight range. The groups that are interchangeable are shown in the table below. If different weights are mixed within each group there will be a step in the bore.

	Pipe Diameter								
	9 5/8	9 3/4	9 7/8	10 3/4	11 3/4	13 3/8	13 5/8	14	16
Design 1 OK to mix same diameter in these weights	36.00	59.20	62.80	40.50	47.00	54.50	88.20	82.50	65.00
	40.00	60.20	66.40	45.50	54.00	61.00		86.00	75.00
	43.50		67.50	51.00		68.00		93.00	84.00
	47.00		68.90	55.50		72.00		94.80	84.80
	53.50		70.50	60.70				99.00	
	58.40			65.70				100.00	
Design 2 OK to mix same diameter in these weights				66.15	60.00	77.00			94.50
				73.20	65.00	80.70			104.00
				76.10	71.00	85.00			109.00
				79.20		86.00			128.00

#### Notes:

Design 1,2 cannot be mixed.



### 2.9.3.4 Other connections

VAM SLIJ II, VAM FJL, VAM MUST, VAM HTF, VAM HW ST, VAM HP are not interchangeable across the weight range.

In some other cases there is interchangeability within two weights. Contact Mr. Help in the VAM Services website.

## 2.9.4 Torque with mixed grades and weight rules.

### 2.9.4.1 Verifying the weights and grades that can be mixed

**NOTE:** never do extrapolation or interpretation of these tables. Not applicable for VAM SLIJ-II, VAM HTF and VAM 21.

READ CAREFULLY THE SCOPE OF APPLICATION.

#### Table 1 applicable only for:

- ⇒ VAM TOP casing 5" and above
- ⇒ VAM HW ST for mixed grade only
- ⇒ VAM FJL for mixed grade only

Grade difference (KSI) Weight difference (1)	Grade difference (KSI)				
	0	10	20	30	>30
0	✓	✓	✓	✓	✗
1	✓	✓	✓	✓	✗
2	✓	✓	✓	✗	✗
3	✓	✓	✗	✗	✗
>3	✗	✗	✗	✗	✗

If █ selecting suitable torque value according section 2.9.4.6

If █ cross-over is highly recommended.

If █ cross-over is mandatory even if there is overlap in the torque figures.

**Table 2 applicable only for:**

- ⇒ VAM TOP casing (5" and above) mixed with VAM TOP HT
- ⇒ VAM TOP casing (5" and above) mixed with VAM TOP HC
- ⇒ VAM TOP HT mixed with VAM TOP HC
- ⇒ VAM TOP HC with VAM TOP HC
- ⇒ VAM TOP HT mixed with VAM TOP HT (see special recommendations for VAM TOP HT in section 2.9.4.5).

Grade difference (KSI) \ Weight difference (1)	Grade difference (KSI)			
	0	10	20	>20
0	✓	✓	✓	✗
1	✓	✓	✓	✗
2	✓	✓	✗	✗
>2	✗	✗	✗	✗

**NOTE:** If the connection type is not listed above then contact VAM Services for advice!

**2.9.4.2 Terms description.**

Before mixing interchangeable connections first verify if a torque can be determined. Even connections which are interchangeable may not always be mixed as a large difference in weight or steel grade could induce derating on performance and/or torque problems.

**2.9.4.3 Difference in weights and grades.**

For each diameter exists different weights. For example in 7" you have 23 lb./ft. 26 lb./ft. 29 lb./ft. 32 lb./ft. 35 lb./ft. 38 lb./ft.

When this document mentioned difference of 2 weights is acceptable means for example 7" 26# L80 VAM TOP can be mixed with 7" 32# L80 VAM TOP.

**Note:** The reference table shall be the weight in the technical data table in the connection section.

Size (OD)	Nominal weight	Wall thickness		API Drill Diameter	Spec Drill D	
		inch	mm			inch
7 177.80	23.00	0.317	8.05	5.250 A	} 2 weights	
	26.00	0.362	9.19	6.151		
	29.00	0.408	10.36	6.059		
	32.00	0.453	11.51	6.000 A		
	35.00	0.496	12.65	5.879		6.0
	38.00	0.540	13.72	5.795		5.8
					} 1 weight	

When this document mentioned grade difference of 30 ksi is allowed. Means for example 7" 26# L80 VAM TOP and 7" 26# P110 VAM TOP can be mixed. (110 ksi - 80 ksi = 30ksi)

### 2.9.4.4 Performance when mixed connections.

Resulting performances when mixing connections: Not for calculations (1)

BOX \ PIN	VAM TOP	VAM TOP HC	VAM TOP HT
VAM TOP	T=100% C=60% (2)	T=100% C=60% (2)	T=100% C=60% (2)(Not using liner torques)
VAM TOP HC	T=100% C=60% (2)	T=100% C=100% (2)	T=100% C=80% (2)(Not using liner torques)
VAM TOP HT	T=100% C=60% (2)(Not using liner torques)	T=100% C=80% (2)(Not using liner torques)	T=100% C=80% (2) Using liner torques

(1) For actual performances contact VAM Services.

(2) In % of the most critical connection of the assembly.

T: For numerical calculation of Tension, use conservatively the lowest grade and weight of the 2 members.

C: For numerical calculation of Compression, use conservatively the lowest grade and weight of the 2 members.

■ Follow instructions in section 2.9.4.6 to selecting the suitable torque values.

■ Follow instructions in section 2.9.4.6 to selecting the suitable torque values. Liner torque (also mill & licensee torques) are not available (2.9.4.5)

■ For tubing application values follow instructions in section 2.9.4.6. Liner torque (mill & licensee torques) are available (contact VAM Services for values). Be aware liner torque and compression performance can be drastically reduced.

### 2.9.4.5 Specific rules for VAM TOP HT mixed with VAM TOP HT but with different grade or weight.

If it is written not using liner torques, columns in red cannot be used.

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi					
			Field			Mill & licensee		
			Tubing + Liner		Tubing	Liner		
min.	opti	max.	Min.	min.	max.			
in. mm	lb/ft	in. mm	ft.lbs N.m					
4 1/2" <i>114.30</i>	10.50	0.224	2220	2460	2700	2700	2900	3100
		<i>5.69</i>	<i>3010</i>	<i>3330</i>	<i>3660</i>	<i>3990</i>	<i>4320</i>	<i>4650</i>
	11.60	0.250	2800	3110	3420	3730	4040	4130
		<i>6.35</i>	<i>3800</i>	<i>4220</i>	<i>4640</i>	<i>5060</i>	<i>5480</i>	<i>5600</i>
	12.60	0.271	3260	3620	3980	4340	4700	4850
		<i>6.88</i>	<i>4420</i>	<i>4910</i>	<i>5400</i>	<i>5890</i>	<i>6380</i>	<i>6580</i>
	13.50	0.290	3710	4120	4530	4940	5350	5560
		<i>7.37</i>	<i>5030</i>	<i>5590</i>	<i>6140</i>	<i>6690</i>	<i>7240</i>	<i>7540</i>
	15.10	0.337	4630	5140	5650	6160	6670	7000
		<i>8.56</i>	<i>6280</i>	<i>6970</i>	<i>7660</i>	<i>8350</i>	<i>9040</i>	<i>9490</i>

### 2.9.4.6 Selecting suitable torque values for interchangeable connections.

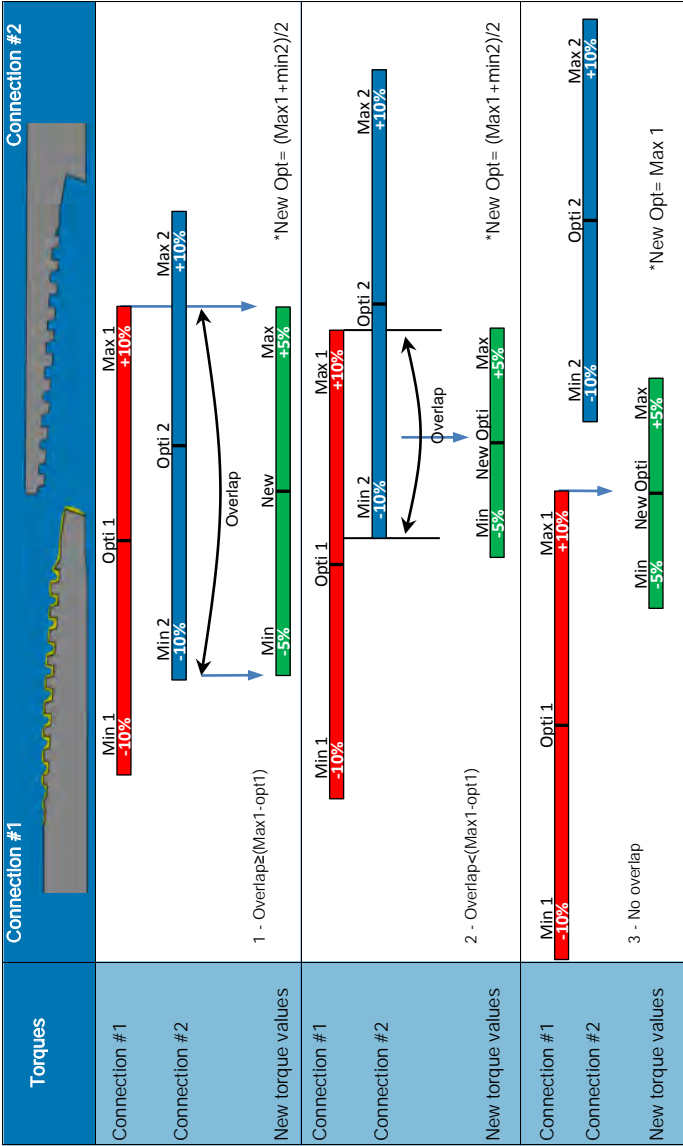
After checking:

- ⇒ Interchangeability feasibility of mixing connections.
- ⇒ Weight & grade feasibility of mixing connections.

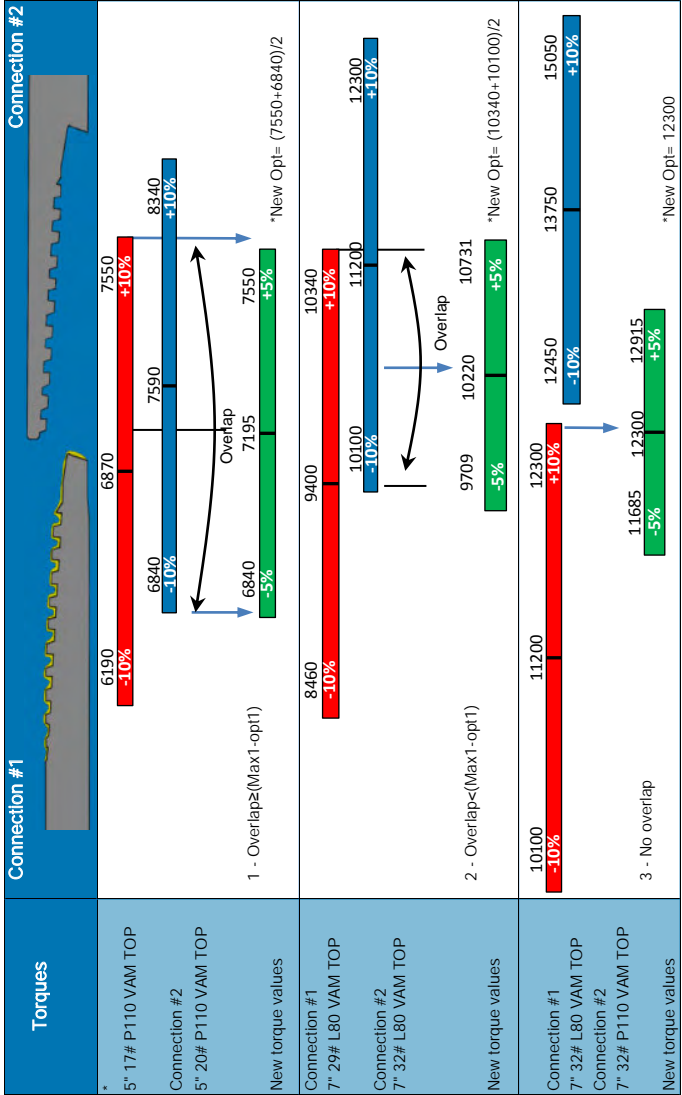
Then a torque can be determined following strict respect of the following tables.

Note: changing the torque values as recommended in the table does not prevent from applying the VAM criteria for Making-Up a connection.

Theoretical examples:



Numerical example:

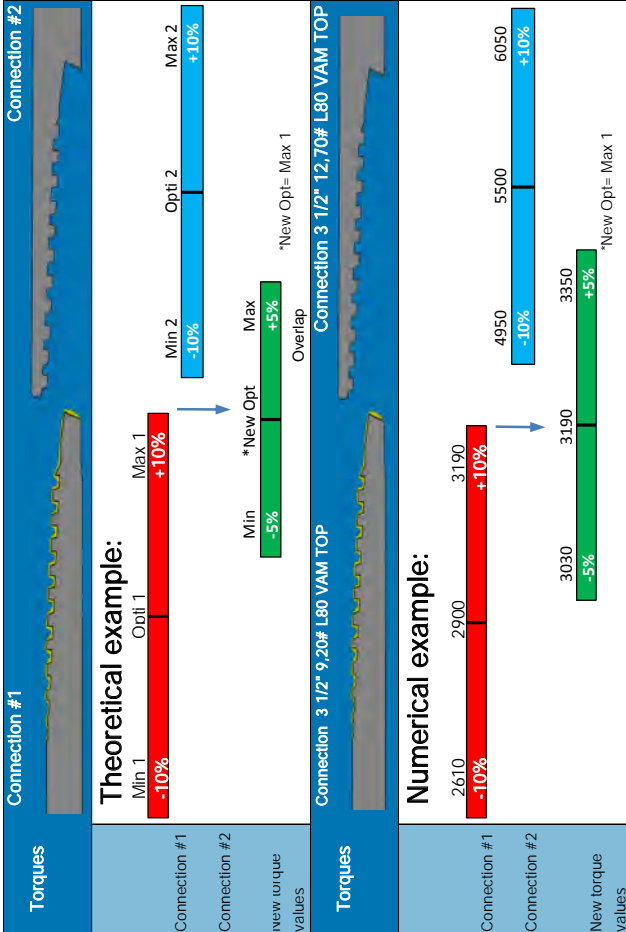


### 2.9.4.7 Specific rules for VAM TOP tubing

Mixing weight and grade at the same time is forbidden for VAM TOP tubing. An X-over is mandatory, for more information contact VAM Services.

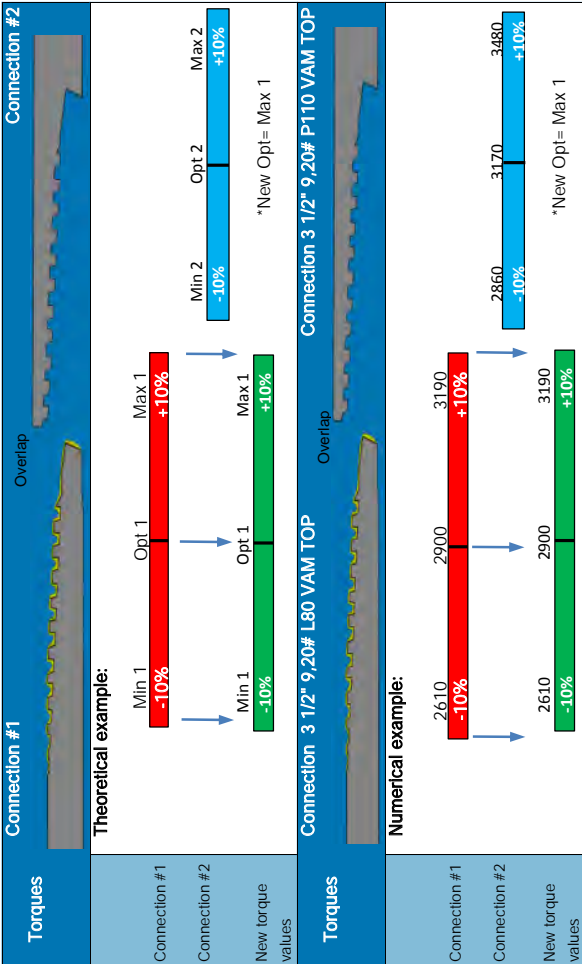
#### 2.9.4.7.1 Mixing Weights VAM TOP tubing

When mixing **maximum 2 weights with the same grade** the following rules shall be applied:



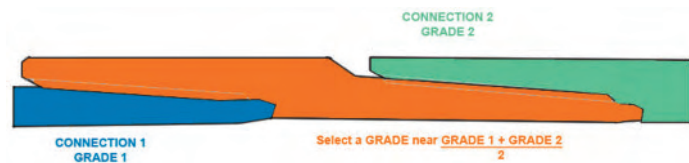
2.9.4.7.2 Mixing grades VAM TOP tubing

When mixing grades maximum 30 ksi and with the same weight take the smallest grade torques.





## 2.9.5 Guideline to select the grade of a cross-over



## 2.10 Pressure Test Caps

It is normal to pressure test assemblies after make-up. In the past this has been done with test caps which rely on a Teflon seal between the torque shoulders. These are NOT acceptable for VAM connections as in some cases the unsupported pin seal can yield causing galling on make-up and leaking on service. In addition there have been cases where the seals were not removed after pressure testing and the assemblies with seals still in place were run down hole and leaked in service.

For these reasons VAM R&D have a new test cap design. These rely on a specially designed 'polymeric' sealing system and are available for short or long term rental. For more information on ordering these contact [Mr Help](#).

The purpose of these 'Low-Torque Test Fixtures' is to reduce galling and ensure seal integrity. The test caps differ from the conventional types in several key ways:

- ⇒ There is a specially designed area that compensates for the thread taper and supports the component's pin end. This eliminates the risk of permanently deforming the connection during internal pressure testing;
- ⇒ A seal ring made of a particular resilient material is placed between the 'seal / shoulder' of the Test cap and the corresponding parts of the accessory to be pressure tested;
- ⇒ A 'make-up ring' provides a positive stop at the end of the make-up to prevent excessive forces being applied to the seal ring. This eliminates the risks of seal damage.

The thread on the new-style fixture also differs from the former models, as it has been specifically designed to leave a radial gap with the accessory thread. This allows the test cap to be made up by hand, and further minimises the risks of damaging the component.

## 2.11 Surface Treatment

In order to reduce the chance of the threads galling during make-up thread compound or CLEANWELL is required. However, in addition to this, the connections are treated during the manufacturing process. A consequence of this treatment is also improved corrosion resistance and a better surface for the adhesion of storage and thread compound. Depending on the manufacturing route, thread type and steel type different surface finishes are used for VAM connections and the appearance of each is described below

### 2.11.1 Phosphating

Phosphating is the anti galling treatment for carbon steels. It is grey or black in colour and must be applied to one end of each pipe (normally the box end). It may also be applied to the pin end. The phosphate may be worn in areas after repeated make-up but unless it is missing it is not cause for rejection.

### 2.11.2 Copper Coating

Copper coating is the anti galling treatment for chromium steels. It is copper in colour and must be applied to one end of each pipe (normally the box end). The pin end is normally left as machined. The copper may be tarnished in appearance and this is not reason for rejection.

### 2.11.3 Blasting

Blasting compliments copper coating for CRA steels. It turns the machined surface dull in colour. One end of each make-up (normally the box end) must be copper coated.

### 2.11.4 Piotec

Piotech is a treatment used for the box end of connections that are supplied as CLEANWELL or for certain 13%Cr connections. It is light grey in colour.

### 2.11.5 As machined

It is permitted to have one connection as machined (no treatment) as long as the other end of the connection has a treatment as described above. Never make-up two as machined connections together.

There may be other coatings seen on VAM connections but these are not permitted and are always cause for rejection

## 2.12 Corrosion

Corrosion is a big subject. Steel corrodes over time. The rate of the corrosion depends on a number of factors including the steel type and the environment. As far as the connections are concerned corrosion can be a major problem. Rust is light corrosion that can be removed with a plastic scouring pad. Pitting creates small holes that can be deeper than they appear. Pitting is not acceptable on VAM connections

## 3.1 VAM 21

### Application



#### Description:

Threaded & Coupled Premium Connection  
9 5/8" – 13 3/8" OD

#### Applications:

Tubing – Liner – Production Casing  
– Intermediate casing

#### Main features:

- ISO 13679 CAL-IV performances within the full pipe envelope
- Extreme compression resistance (100%)
- Excellent gas tight sealing under combined loads
- Innovative VAM effect with the VAM Stabilizer™
- Seal protected from rough handling
- Fit for automated rig handling systems
- Reliable running ability
- Superior torque resistance
- Reduced drilling wear susceptibility

VAM 21 is the latest generation of T&C connection introducing an innovative and revolutionary design.

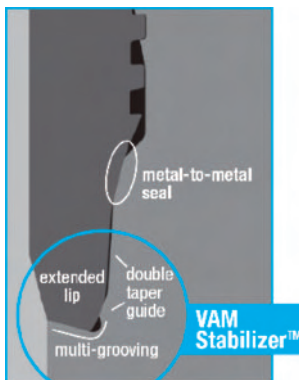
Confidence thanks to ISO 13679 CAL-IV compliance within the full pipe body envelope extends the opportunities for your well designs.

### Torque

It is recommended that VAM 21 is made-up to its optimum torque value. The possibility exists to make-up the connection up to the Maximum Torque with Sealability (MTS) value. Performances will be retained. An adequate power tong may need to be supplied to achieve these higher torque values.

### Seal location

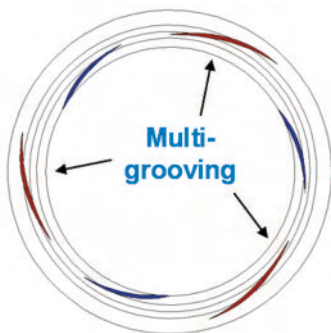
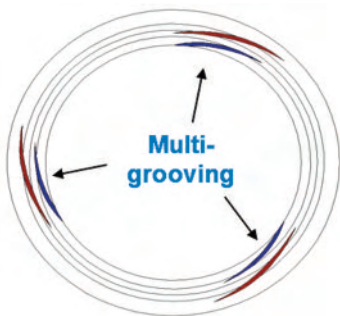
Contrary to usual Threaded & Coupled premium connections, the metal-to-metal seal is not located at the end of the lip, but just after the threads. This position allows the pin seal to be protected against handling damages.



### VAM Stabilizer™ – Multi-grooving

The VAM Stabilizer™ lip design includes a multi-grooving.

Six spiral grooves should be present on the shoulder and taper guide of the pin, and allow easy recognition of the connection.



### VAM 21 TECHNICAL DATA

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		API Drift Diameter inch.	Coupling OD (reg.) inch.	Coupling ID inch.	Make-up Loss inch.	Coupling Length inch.	Pipe Body Section sq.in.	Coupling CCS sq.in.	Regular Yield Strength (1000 lb.)							
		inch	mm								80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	
9 5/8" 244.48	40.00	0.395	10.03	8.679	10.319	8.845	4.748	10.512	11.455	11.704	6.868	916	974	1031	1088	1145	1260	1432
	43.50	0.435	11.05	8.599	10.356	8.924	5.378	11.772	12.560	12.837	7.349	1005	1068	1130	1193	1256	1382	1570
	47.00	0.472	11.99	8.525	10.419	8.852	5.378	11.772	13.572	13.865	8.171	1086	1154	1221	1289	1357	1493	1696
	53.50	0.545	13.84	8.379	10.541	8.722	5.378	11.772	15.546	15.874	9.777	1244	1321	1399	1477	1555	1710	1943
	58.40	0.595	15.11	8.279	10.610	8.609	5.496	12.008	16.880	17.248	10.695	1350	1435	1519	1604	1688	1857	2110
9 7/8" 250.83	62.80	0.625	15.88	8.469	10.941	8.790	5.398	11.811	18.161	18.547	12.067	1453	1544	1635	1725	1816	1998	2270
	65.30	0.650	16.51	8.419	10.980	8.735	5.398	11.811	18.839	19.226	12.604	1507	1601	1695	1790	1884	2072	2355
	66.40	0.661	16.79	8.397	10.998	8.694	5.398	11.811	19.133	19.532	12.853	1531	1626	1722	1818	1913	2105	2392
	66.90	0.668	16.97	8.383	11.010	8.696	5.398	11.811	19.322	19.736	13.018	1546	1642	1739	1836	1932	2125	2415
10 3/4" 273.05	45.50	0.400	10.16	9.794	11.482	10.119	4.846	10.709	13.006	13.271	8.185	1040	1106	1171	1236	1301	1431	1626
	51.00	0.450	11.43	9.694	11.549	10.028	5.280	11.575	14.561	14.888	9.154	1165	1238	1310	1383	1456	1602	1820
	55.50	0.495	12.57	9.604	11.626	9.947	5.280	11.575	15.946	16.284	10.275	1276	1355	1435	1515	1595	1754	1993
	60.70	0.545	13.84	9.504	11.711	9.859	5.280	11.575	17.473	17.836	11.522	1398	1485	1573	1660	1747	1922	2184
	65.70	0.595	15.11	9.404	11.778	9.763	5.358	11.732	18.981	19.364	12.511	1519	1613	1708	1803	1898	2088	2373
11 3/4" 298.45	54.00	0.435	11.05	10.724	12.539	11.063	5.043	11.102	15.463	15.790	9.812	1237	1314	1392	1469	1546	1701	1933
	60.00	0.489	12.42	10.616	12.622	10.966	5.280	11.575	17.300	17.665	11.124	1384	1470	1557	1643	1730	1903	2162
	65.00	0.534	13.56	10.526	12.699	10.885	5.280	11.575	18.815	19.192	12.349	1505	1599	1693	1787	1882	2070	2352
	71.00	0.582	14.78	10.430	12.770	10.807	5.280	11.575	20.420	20.851	13.486	1634	1736	1838	1940	2042	2246	2552
11 7/8" 301.63	67.80	0.550	13.97	10.619	12.846	10.981	5.398	11.811	19.567	19.967	12.830	1565	1663	1761	1859	1957	2152	2446
	71.80	0.582	14.78	10.555	12.894	10.933	5.319	11.654	20.648	21.085	13.606	1652	1755	1858	1962	2065	2271	2581
13 3/8" 339.73	61.00	0.430	10.92	12.359	14.150	12.709	5.280	11.575	17.487	17.853	10.868	1399	1486	1574	1661	1749	1924	2186
	68.00	0.480	12.26	12.259	14.224	12.619	5.555	12.126	19.445	19.840	12.187	1556	1653	1750	1847	1945	2139	2431
	72.00	0.514	13.06	12.191	14.285	12.558	5.555	12.126	20.768	21.207	13.280	1661	1765	1869	1973	2077	2285	2596
	77.00	0.550	13.97	12.119	14.319	12.502	5.909	12.835	22.160	22.644	13.891	1773	1884	1994	2105	2216	2438	2770

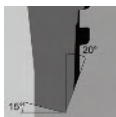
## VAM 21 TORQUE VALUES

SIZE (OD) in. mm.	NOMINAL WEIGHT ft.lb.	min.	opti.	max.	Max Torque with Sealability			
					80 ksi	95 ksi	110 ksi	125 ksi
					ft.lb. N.m.			
9 5/8 244.48	40.00	21000	23350	25700	26300	27350	29300	31100
		28500	31650	34800	35700	37100	39700	42200
	43.50	24750	27500	29850	29850	30850	32800	34650
		33600	37300	40500	40500	41800	44400	47000
	47.00	28450	31600	34700	34700	36000	38450	40800
		38500	42800	47000	47000	48800	52200	55300
9 7/8 250.83	53.50	38300	42550	46800	51450	53650	57500	61150
		51900	57650	63400	69700	72700	78000	82900
	58.40	39350	43700	48050	63050	66350	71500	76300
		53300	59250	65200	85500	89900	96900	103400
	62.80	40350	44850	49350	74450	78650	85100	91050
		54700	60800	66900	100900	106700	115400	123500
10 3/4 273.05	65.30	41350	45950	50550	81450	86100	93150	99750
		56000	62250	68500	110400	116700	126300	135200
	66.40	41750	46400	51050	86350	91350	98850	105950
		56600	62900	69200	117000	123800	134100	143700
	66.90	42050	46700	51350	86400	91400	98950	106000
		57000	63300	69600	117200	123900	134100	143700
11 3/4 298.45	45.50	23600	26200	28800	31500	32850	35200	37450
		32000	35500	39100	42700	44500	47700	50700
	51.00	27950	31050	34150	35300	36650	39150	41550
		37900	42100	46300	47800	49700	53100	56400
	55.50	35700	39650	43600	48150	50250	53850	57300
		48300	53700	59100	65300	68100	73000	77700
11 7/8 301.63	60.70	38650	42950	47250	62400	65250	70100	74700
		52400	58200	64000	84600	88500	95000	101300
	65.70	39400	43800	48200	73250	77400	83700	89400
		53500	59400	65300	99300	105000	113500	121200
	54.00	31400	34900	38400	44700	46800	50300	53600
		42600	47300	52000	60600	63400	68200	72700
13 3/8 339.73	60.00	36600	40650	44700	52350	54600	58550	62300
		49600	55100	60600	71000	74000	79400	84500
	65.00	38700	43000	47300	67950	71100	76300	81300
		52500	58300	64100	92100	96400	103500	110200
	67.80	40150	44600	49050	74250	77800	83600	89150
		54400	60450	66500	100700	105500	113400	120900
13 3/8 339.73	61.00	32200	35750	39350	45700	47800	51300	54650
		43600	48450	53300	62000	64800	69600	74100
	68.00	37650	41850	46050	53350	55600	59500	63250
		51100	56750	62400	72400	75400	80700	85800
	72.00	39400	43750	48150	68300	71350	76600	81550
		53400	59350	65300	92600	96700	103800	110600
13 3/8 339.73	77.00	39500	43900	48300	74300	78350	84700	90650
		53600	59500	65500	100700	106300	114900	122900



## 3.2 VAM TOP

### Application



VAM TOP is a Threaded and Coupled (T&C) connection for tubing and production casing strings applications.

It provides gas-tight sealing under the most severe conditions: VAM TOP minimises the risks that results from combined loads induced by: gas pressure, temperature, bending and compression.

VAM TOP product line covers a wide range of diameters and wall thicknesses, for API material as well as for proprietary corrosion resistant material (Sour Service and CRA materials).



VAM TOP is globally recognised as the industry reference for premium connections: it has been extensively tested and widely used. VAM TOP track record stretches back over more than a decade.

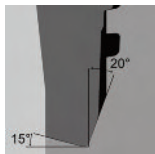
VAM TOP is available to you, wherever you are: connections and accessories are supported throughout the world by the VAM licensee network managed by VAM Services.

#### - Optimized Metal-to-Metal Seal:

VAM TOP metal-to-metal seal was optimized to improve sealability performances while preventing from any galling issue.

Sealing integrity remains constant despite repeated make-up and break-out, and combined loads cycling.

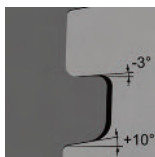
The performances of the metal-to-metal seal have been validated through more than 120 qualifications tests under the most demanding testing procedures.



### - Reverse Angle Torque Shoulder:

Torque shoulder provides a positive torque stop which allows accurate power tight make-up and minimizes hoop stresses in the connection.

The wedge effect caused by the reverse angle gives the connection superior structural strength and energizes the metal-to-metal seal contact.



### - Hook thread profile:

VAM TOP thread includes a negative load flank of  $-3^\circ$ .

This specific feature provides, in addition to an improved tensile resistance, higher performances under external pressure, compression and bending. Optimized thread geometry also minimizes the risk of galling even when thread lubricants are poorly applied.

	2 3/8" - 2 7/8"	3 1/2" - 4 1/2"	5" - 7 5/8"	8 5/8" and above
Thread Per Inch (TPI)	<b>8 TPI</b>	<b>6 TPI</b>	<b>5 TPI</b>	<b>4 TPI</b>

### Options

- Special Clearance option: VAM TOP-SC90 / VAM TOP-SC80

These extra-clearance couplings offer 90% and 80% tensile efficiency respectively.

- GRE liner: the combination of a GRE (Glass Reinforced Epoxy) liner with a VAM TOP connection has been tested and fully validated, from 2 3/8" up to 10 3/4".

- CLEANWELL: this option gives access to all the benefits coming from a dope-free solution: no storage dope, no running dope.

- VAM TOP HT / VAM TOP HC / VAM TOP FE: specific VAM TOP designs are available for High Torque / High Compression / Fatigue Enhanced applications. Please refer to the dedicated product descriptions for further details.

## Running VAM TOP - Dope quantities

Nominal OD (in.)	Weight (lb.ft.)	Dope volume	
		(cm <sup>3</sup> )	(in <sup>3</sup> )
2 3/8	4.6 & 5.1	2	0.1
2 3/8	5.8 to 7.35	3	0.2
2 7/8	6.4	3	0.2
2 7/8	7.8 to 10.7	4	0.2
2 7/8	11.5	5	0.3
3 1/2	6.5 to 10.2	4	0.2
3 1/2	12.7 to 14.7	6	0.4
3 1/2	15.7 to 18.35	7	0.4
4	8.2 to 13.2	5	0.3
4	14.8 to 16.5	7	0.4
4	18.9 & 22.2	8	0.5
4 1/2	10.5 to 15.1	6	0.4
4 1/2	17 to 18.9	8	0.5
4 1/2	21.5 & 23.7	9	0.5
5		14	0.9
5 1/2		16	1
5 3/4		17	1.1
6 5/8		19	1.2
7		25	1.5
7 5/8		27	1.7
7 3/4		28	1.7
8 5/8		37	2.3
9 5/8		41	2.5
9 7/8		43	2.6
10		44	2.7
10 3/4		46	2.8
10 7/8		50	3.05
11 3/4		59	3.6
11 7/8		60	3.6
13 3/8		67	4.1
14		70	4.3
15		78	4.8
16		84	5.2

**VAM TOP TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)								
		in	mm									55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi
2 3/8" 60.33	4.60	0.190	4.83	1.901	2.677	1.957	2.444	5.906	1.304	1.530	0.654	104	111	117	124	130	143	163	183	196
	5.10	0.218	5.54	1.845	2.719	1.913	2.444	5.906	1.477	1.508	0.796	118	126	133	140	148	162	185	207	222
	5.80	0.254	6.45	1.773	2.746	1.827	2.891	6.772	1.692	1.728	0.889	135	144	152	161	169	186	212	237	254
	6.30	0.280	7.11	1.721	2.781	1.783	2.891	6.772	1.843	1.880	1.011	147	157	166	175	184	203	230	258	276
	6.60	0.295	7.49	1.691	2.801	1.760	2.891	6.772	1.928	1.969	1.081	154	164	174	183	193	212	241	270	289
2 7/8" 73.03	7.35	0.336	8.53	1.609	2.852	1.693	2.891	6.772	2.152	2.195	1.262	172	183	194	204	215	237	269	301	323
	6.40	0.217	5.51	2.347	3.222	2.409	2.519	6.024	1.812	1.849	0.962	145	154	163	172	181	199	227	254	272
	7.80	0.276	7.01	2.229	3.275	2.271	3.180	7.362	2.254	2.299	1.178	180	192	203	214	225	248	282	316	338
	8.60	0.308	7.82	2.165	3.320	2.220	3.180	7.362	2.484	2.536	1.365	199	211	224	236	248	273	311	348	373
	9.35	0.340	8.64	2.101	3.364	2.169	3.180	7.362	2.708	2.764	1.549	217	230	244	257	271	298	339	379	406
10.70	9.80	0.362	9.19	2.057	3.393	2.133	3.180	7.362	2.858	2.916	1.673	229	243	257	272	286	314	357	400	429
	10.50	0.392	9.96	1.997	3.431	2.086	3.180	7.362	3.058	3.120	1.835	245	260	275	291	306	336	382	428	459
	10.70	0.405	10.29	1.971	3.447	2.066	3.180	7.362	3.143	3.207	1.905	251	267	283	299	314	346	393	440	471
	11.50	0.440	11.18	1.901	3.470	1.987	3.558	8.110	3.366	3.427	2.005	269	286	303	320	337	370	421	471	505
	3 1/2" 88.90	6.50	0.170	4.32	3.035	3.770	3.104	3.032	7.047	1.778	1.815	0.787	142	151	160	169	178	196	222	249
4"	7.70	0.216	5.49	2.943	3.846	3.022	3.032	7.047	2.228	2.272	1.151	178	189	201	212	223	245	279	312	334
	9.20	0.254	6.45	2.867	3.907	2.959	3.032	7.047	2.590	2.644	1.448	207	220	233	246	259	285	324	363	389
	10.20	0.289	7.34	2.797	3.961	2.894	3.032	7.047	2.915	2.974	1.715	233	248	262	277	292	321	364	408	437
	12.70	0.375	9.53	2.625	4.043	2.707	3.820	8.622	3.682	3.757	2.127	295	313	331	350	368	405	460	515	552
	13.70	0.413	10.49	2.549	4.095	2.648	3.820	8.622	4.005	4.087	2.393	320	340	360	380	401	441	501	561	601
101.60	14.30	0.430	10.92	2.515	4.117	2.620	3.820	8.622	4.147	4.232	2.507	332	352	373	394	415	456	518	581	622
	14.70	0.449	11.40	2.477	4.142	2.589	3.820	8.622	4.304	4.393	2.637	344	366	387	409	430	473	538	603	646
	15.50	0.476	12.09	2.423	4.154	2.518	4.261	9.528	4.522	4.613	2.699	362	384	407	430	452	497	565	633	678
	16.70	0.510	12.95	2.355	4.196	2.467	4.261	9.528	4.791	4.890	2.919	383	407	431	455	479	527	599	671	719
	18.35	0.575	0.58	2.225	4.271	2.368	4.261	9.528	5.284	5.392	3.318	423	449	476	502	528	581	661	740	793
4"	8.20	0.190	4.83	3.495	4.300	3.567	3.159	7.323	2.274	2.320	1.056	182	193	205	216	227	250	284	318	341
	9.50	0.226	5.74	3.423	4.361	3.500	3.159	7.323	2.680	2.736	1.388	214	228	241	255	268	295	335	375	402
	10.90	0.262	6.65	3.351	4.420	3.437	3.159	7.323	3.077	3.140	1.713	246	262	277	292	308	338	385	431	462

## VAM TOP TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm									55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
4"	11.60	0.286	7.26	3.303	4.458	3.398	3.159	7.323	3.337	3.404	1.924	267	284	300	317	334	367	417	467	501	
	101.60	0.299	7.59	3.277	4.478	3.374	3.159	7.323	3.476	3.546	2.037	278	295	313	330	348	382	435	487	521	
	13.20	0.330	8.38	3.215	4.526	3.327	3.159	7.323	3.805	3.884	2.309	304	323	342	361	381	419	476	533	571	
	14.80	0.380	9.65	3.115	4.552	3.189	4.041	9.094	4.322	4.411	2.457	346	367	389	411	432	475	540	605	648	
	16.10	0.415	10.54	3.045	4.602	3.130	4.041	9.094	4.674	4.768	2.745	374	397	421	444	467	514	584	654	701	
	16.50	0.430	10.92	3.015	4.623	3.106	4.041	9.094	4.823	4.921	2.867	386	410	434	458	482	531	603	675	723	
	18.90	0.500	12.70	2.875	4.691	2.969	4.545	10.079	5.498	5.611	3.264	440	467	495	522	550	605	687	770	825	
	22.20	0.610	15.49	2.655	4.827	2.799	4.545	10.079	6.496	6.626	4.078	520	552	585	617	650	715	812	909	974	
	4 1/2"	10.50	0.224	5.69	3.927	4.858	3.999	3.222	7.441	3.009	3.071	1.533	241	256	271	286	301	331	376	421	451
	114.30	11.60	0.250	6.35	3.875	4.902	3.952	3.222	7.441	3.338	3.408	1.803	267	284	300	317	334	367	417	467	501
12.60	0.271	6.88	3.833	4.937	3.913	3.913	3.222	7.441	3.600	3.674	2.019	288	306	324	342	360	396	450	504	540	
13.50	0.290	7.37	3.795	4.968	3.877	3.836	3.222	7.441	3.836	3.915	2.212	307	326	345	364	384	422	480	537	575	
15.10	0.337	8.56	3.701	5.042	3.798	3.798	3.222	7.441	4.407	4.498	2.678	353	375	397	419	441	485	551	617	661	
17.00	0.380	9.65	3.615	5.063	3.680	3.680	4.041	9.094	4.918	5.017	2.811	393	418	443	467	492	541	615	689	738	
18.90	0.430	10.92	3.515	5.137	3.586	3.586	4.041	9.094	5.175	5.282	3.022	414	440	466	492	518	569	647	725	776	
21.50	0.500	12.70	3.375	5.209	3.444	3.444	4.545	10.079	5.498	5.611	3.285	440	467	495	522	550	605	687	770	825	
23.70	0.560	14.22	3.255	5.289	3.350	3.350	4.545	10.079	6.283	6.412	3.753	503	534	565	597	628	691	785	880	942	
5"	13.00	0.253	6.43	4.369	5.400	4.439	4.191	10.394	3.773	3.856	1.657	208	302	321	340	358	377	415	472	528	566
	127.00	15.00	0.296	7.52	4.283	5.470	4.392	10.394	4.374	4.462	2.135	241	350	372	394	416	437	481	547	612	656
	18.00	0.362	9.19	4.151	5.577	4.392	4.191	10.394	5.275	5.385	2.878	290	422	448	475	501	528	580	659	739	791
	20.30	0.408	10.36	4.059	5.648	4.307	4.191	10.394	5.886	6.009	3.379	324	471	500	530	559	589	647	736	824	883
	20.80	0.422	10.72	4.031	5.669	4.283	4.191	10.394	6.069	6.202	3.528	334	486	516	546	577	607	668	759	850	910
	21.40	0.437	11.10	4.001	5.691	4.256	4.191	10.394	6.264	6.395	3.685	345	501	532	564	595	626	689	783	877	940
23.20	0.478	12.14	3.919	5.750	4.181	4.191	10.394	6.971	6.925	4.109	374	543	577	611	645	679	747	849	951	1019	
24.10	0.500	12.70	3.875	5.781	4.142	4.191	10.394	7.069	7.069	4.337	389	566	601	636	672	707	778	884	990	1060	
5 1/2"	14.00	0.244	6.20	4.887	5.876	4.931	4.382	10.748	4.029	4.115	1.637	222	322	342	363	383	403	443	504	564	604
139.70	15.50	0.275	6.99	4.825	5.929	4.896	4.382	10.748	4.514	4.608	2.030	248	361	384	406	429	451	497	564	632	677



**VAM TOP TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		in	mm									55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
5 1/2" 139.70	17.00	0.304	7.72	4.767	5.978	4.896	4.382	10.748	4.962	5.069	2.396	273	397	422	447	471	496	546	620	695	744
	20.00	0.361	9.17	4.663	6.071	4.896	4.382	10.748	5.828	5.944	3.101	321	466	495	525	554	583	641	729	816	874
	23.00	0.415	10.54	4.545	6.156	4.801	4.382	10.748	6.630	6.756	3.754	365	530	564	597	630	663	729	829	928	995
	26.00	0.476	12.09	4.423	6.248	4.691	4.382	10.748	7.513	7.659	4.471	413	601	639	676	714	751	826	939	1052	1127
	26.80	0.500	12.70	4.375	6.283	4.648	4.382	10.748	7.854	8.007	4.746	432	628	668	707	746	785	864	982	1100	1178
28.40	0.530	13.46	4.315	6.327	4.594	4.382	4.382	10.748	8.275	8.437	5.095	455	662	703	745	786	828	910	1034	1159	1241
29.70	0.562	14.27	4.251	6.372	4.535	4.382	4.382	10.748	8.718	8.988	5.454	479	697	741	785	828	872	959	1090	1221	1308
5 3/4" 146.05	18.10	0.304	7.72	5.017	6.264	5.173	3.772	9.528	5.201	5.298	2.780	286	416	442	468	494	520	572	650	728	780
	19.70	0.335	8.51	4.955	6.317	5.138	3.772	9.528	5.699	5.823	3.200	313	456	484	513	541	570	627	712	798	855
	21.80	0.375	9.53	4.875	6.382	5.091	3.772	9.528	6.335	6.471	3.719	348	507	538	570	602	633	697	792	887	950
6 5/8" 168.28	20.00	0.288	7.32	5.924	7.081	6.049	4.427	10.866	5.734	5.845	2.664	315	459	487	516	545	573	631	717	803	860
	23.20	0.330	8.38	5.840	7.154	6.049	4.427	10.866	6.526	6.659	3.317	359	522	555	587	620	653	718	816	914	979
	24.00	0.352	8.94	5.796	7.191	6.049	4.427	10.866	6.937	7.080	3.650	382	555	590	624	659	694	763	867	971	1041
	28.00	0.417	10.59	5.666	7.297	5.931	4.427	10.866	8.133	8.289	4.615	447	651	691	732	773	813	895	1017	1139	1220
	32.00	0.475	12.07	5.550	7.390	5.825	4.427	10.866	9.177	9.357	5.474	505	734	780	826	872	918	1009	1147	1285	1377
	36.70	0.562	14.27	5.676	7.524	5.669	4.427	10.866	10.705	10.924	6.729	589	856	910	963	1017	1071	1178	1338	1499	1606
7" 177.80	23.00	0.317	8.05	6.250 A	7.488	6.325	4.776	11.535	6.655	6.786	3.109	366	532	566	599	632	666	732	832	932	998
	26.00	0.362	9.19	6.151	7.565	6.325	4.776	11.535	7.549	7.693	3.837	415	604	642	679	717	755	830	944	1057	1132
	29.00	0.408	10.36	6.059	7.644	6.325	4.776	11.535	8.449	8.634	4.592	465	676	718	760	803	845	929	1056	1183	1267
	32.00	0.453	11.51	6.000 A	7.717	6.242	4.776	11.535	9.317	9.512	5.297	512	745	792	839	885	932	1025	1165	1304	1398
	35.00	0.498	12.65	5.879	7.787	6.161	4.776	11.535	10.172	10.376	5.978	559	814	865	915	966	1017	1119	1272	1424	1526
	38.00	0.540	13.72	5.795	7.852	6.087	4.776	11.535	10.959	11.172	6.617	603	877	932	986	1041	1096	1205	1370	1534	1644
	41.00	0.590	14.99	5.695	7.929	5.996	4.776	11.535	11.881	12.124	7.381	653	950	1010	1069	1129	1188	1307	1485	1663	1782
	42.70	0.625	15.88	5.625	7.980	5.933	4.776	11.535	12.517	12.764	7.890	688	1001	1064	1127	1189	1252	1377	1565	1752	1878
7 5/8" 193.68	26.40	0.328	8.33	6.844	8.132	6.919	4.868	11.732	7.519	7.680	3.568	414	602	639	677	714	752	827	940	1053	1128
	29.70	0.375	9.53	6.750	8.213	6.919	4.868	11.732	8.541	8.716	4.400	470	683	726	769	811	854	940	1068	1196	1281
	33.70	0.430	10.92	6.640	8.305	6.919	4.868	11.732	9.720	9.917	5.355	535	778	826	875	923	972	1069	1215	1361	1458
	35.80	0.465	11.81	6.570	8.362	6.856	4.868	11.732	10.460	10.664	5.952	575	837	889	941	994	1046	1151	1308	1464	1569

## VAM TOP TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm									55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
7 5/8"	39.00	0.500	12.70	6.500	8.419	6.793	4.868	11.732	11.192	11.416	6.553	616	895	951	1007	1063	1119	1231	1399	1567	1679
193.68	42.80	0.562	14.27	6.376	8.518	6.683	4.868	11.732	12.470	12.726	7.606	686	998	1060	1122	1185	1247	1372	1559	1746	1871
	45.30	0.595	15.11	6.310	8.569	6.622	4.868	11.732	13.141	13.412	8.154	723	1051	1117	1183	1248	1314	1446	1643	1840	1971
	47.10	0.625	15.88	6.250	8.614	6.567	4.868	11.732	13.744	14.023	8.640	756	1100	1168	1237	1306	1374	1512	1718	1924	2062
7 3/4"	46.10	0.595	15.11	6.500 A	8.693	6.750	4.915	11.850	13.374	13.642	8.268	736	1070	1137	1204	1271	1337	1471	1672	1872	2006
196.85	36.00	0.400	10.16	7.700	9.266	7.980	5.604	13.189	10.336	10.560	5.566	568	827	879	930	982	1034	1137	1292	1447	1550
8 5/8"	40.00	0.450	11.43	7.625 A	9.350	7.890	5.604	13.189	11.557	11.797	6.548	636	925	982	1040	1098	1156	1271	1445	1618	1734
219.08	44.00	0.500	12.70	7.500	9.433	7.799	5.604	13.189	12.763	13.017	7.528	702	1021	1085	1149	1212	1276	1404	1595	1787	1914
	49.00	0.557	14.15	7.386	9.526	7.697	5.604	13.189	14.118	14.395	8.636	776	1129	1200	1271	1341	1412	1553	1765	1977	2118
	52.00	0.595	15.11	7.310	9.587	7.630	5.604	13.189	15.010	15.311	9.368	826	1201	1276	1351	1426	1501	1651	1876	2101	2252
9 5/8"	36.00	0.352	8.94	8.765	10.188	8.998	5.589	13.189	10.254	10.466	5.168	564	820	872	923	974	1025	1128	1282	1436	1538
244.48	40.00	0.395	10.03	8.750 A	10.264	8.925	5.589	13.189	11.454	11.699	6.157	630	916	974	1031	1088	1145	1260	1432	1604	1718
	43.50	0.435	11.05	8.599	10.333	8.858	5.589	13.189	12.559	12.814	7.050	691	1005	1068	1130	1193	1256	1381	1570	1758	1884
	47.00	0.472	11.99	8.525	10.396	8.726	5.589	13.189	13.572	13.838	7.870	746	1086	1154	1221	1289	1357	1493	1697	1900	2036
	53.50	0.545	13.84	8.500 A	10.520	8.638	5.589	13.189	15.546	15.877	9.500	855	1244	1321	1399	1477	1555	1710	1943	2176	2332
	58.40	0.595	15.11	8.375 A	10.600	8.637	5.589	13.189	16.879	17.214	10.562	928	1350	1435	1519	1604	1688	1857	2110	2363	2532
9 7/8"	62.80	0.625	15.88	8.469	10.907	8.835	5.484	12.953	18.162	18.519	11.600	999	1453	1544	1635	1725	1816	1998	2270	2543	2724
250.83	65.30	0.650	16.51	8.419	10.949	8.789	5.484	12.953	18.838	19.229	12.177	1036	1507	1601	1695	1790	1884	2072	2352	2637	2826
	66.40	0.661	16.79	8.397	10.965	8.770	5.484	12.953	19.134	19.501	12.397	1062	1531	1626	1722	1818	1913	2105	2395	2679	2870
	66.90	0.668	16.97	8.383	10.978	8.758	5.484	12.953	19.332	19.738	12.576	1063	1546	1642	1739	1836	1932	2125	2415	2705	2898
	67.50	0.678	17.22	8.363	10.992	8.740	5.484	12.953	19.590	19.975	12.770	1077	1567	1665	1763	1861	1959	2155	2449	2743	2939
	68.00	0.694	17.63	8.331	11.018	8.700	5.484	12.953	20.017	20.418	13.129	1101	1601	1701	1802	1902	2002	2202	2502	2802	3003
	68.90	0.700	17.78	8.319	11.028	8.701	5.484	12.953	20.778	20.589	13.268	1110	1614	1715	1816	1917	2018	2218	2522	2825	3027
	70.50	0.720	18.29	8.279	11.059	8.663	5.484	12.953	20.708	21.134	13.698	1139	1657	1760	1864	1967	2071	2278	2589	2899	3106
	72.00	0.725	18.42	8.269	11.067	8.656	5.484	9.409	20.841	21.271	13.809	1146	1667	1771	1876	1980	2084	2293	2605	2918	3126
10"	67.20	0.672	17.07	8.500	11.116	8.866	5.484	12.953	19.693	20.099	12.908	1083	1575	1674	1772	1871	1969	2166	2462	2757	2954
254.00	68.70	0.688	17.48	8.468	11.142	8.838	5.484	12.953	20.127	20.547	13.271	1107	1610	1711	1811	1912	2013	2214	2516	2818	3019





**VAM TOP TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		in	mm									55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
10 3/4"	45.50	0.722	18.34	8.400	11.195	8.777	5.484	12.953	21.045	13.273	14.015	1157	1684	1789	1894	1999	2105	2315	2631	2946	3157
273.05	51.00	0.450	11.43	9.694	11.400	10.122	5.634	13.268	13.006	13.273	7.006	715	1040	1106	1171	1236	1301	1431	1626	1821	1951
	55.50	0.495	12.57	9.625 A	11.565	9.951	5.634	13.268	15.947	14.865	8.271	801	1165	1238	1310	1383	1456	1602	1820	2039	2184
	60.70	0.545	13.84	9.504	11.652	9.862	5.634	13.268	17.473	16.255	9.387	877	1276	1355	1435	1515	1595	1754	1993	2233	2392
	65.70	0.595	15.11	9.404	11.734	9.772	5.634	13.268	18.982	17.834	10.656	961	1398	1485	1573	1660	1747	1922	2184	2446	2621
	71.10	0.650	16.51	9.294	11.825	9.671	5.634	13.268	20.625	19.353	11.861	1044	1519	1613	1708	1803	1898	2088	2373	2657	2847
	73.20	0.672	17.07	9.250	11.862	9.631	5.634	13.268	21.276	21.027	13.205	1134	1650	1755	1856	1959	2063	2246	2578	2888	3094
10 7/8"	72.00	0.656	16.66	9.407	11.951	9.751	5.843	13.701	21.060	21.491	13.568	1158	1685	1790	1895	2001	2106	2317	2633	2948	3159
276.23	54.00	0.435	11.05	10.724	12.463	11.067	5.713	13.425	15.463	15.796	8.618	850	1237	1314	1392	1469	1546	1701	1933	2165	2319
	60.00	0.489	12.42	10.625 A	12.557	10.970	5.713	13.425	17.300	17.653	10.096	952	1384	1471	1557	1644	1730	1903	2163	2422	2595
	65.00	0.534	13.56	10.625 A	12.636	10.890	5.713	13.425	18.816	19.211	11.347	1035	1505	1599	1693	1788	1882	2070	2352	2634	2822
	71.00	0.582	14.78	10.430	12.719	10.803	5.713	13.425	20.420	20.857	12.669	1123	1634	1736	1838	1940	2042	2246	2553	2859	3063
11 7/8"	67.80	0.550	13.97	10.619	12.787	10.986	5.713	13.425	19.568	19.941	11.880	1076	1565	1663	1761	1859	1957	2152	2446	2740	2935
301.63	71.80	0.582	14.78	10.555	12.844	10.929	5.713	13.425	20.648	21.089	12.797	1136	1652	1755	1858	1962	2065	2271	2581	2891	3095
13 3/8"	61.00	0.430	10.92	12.359	14.085	12.715	5.698	13.386	17.487	17.842	9.715	962	1399	1486	1574	1661	1749	1924	2186	2448	2623
339.73	68.00	0.480	12.19	12.259	14.175	12.624	5.698	13.386	19.445	19.852	11.313	1069	1556	1653	1750	1847	1945	2139	2431	2722	2917
	72.00	0.514	13.06	12.250 A	14.236	12.563	5.698	13.386	20.768	21.213	12.402	1142	1661	1765	1869	1973	2077	2284	2596	2908	3115
	77.00	0.550	13.97	12.119	14.299	12.498	5.698	13.386	22.160	22.625	13.531	1219	1773	1884	1994	2105	2216	2438	2770	3102	3324
	80.70	0.580	14.73	12.059	14.350	12.443	5.698	13.386	23.314	23.777	14.449	1282	1865	1982	2098	2215	2331	2565	2914	3264	3497
	85.00	0.608	15.44	12.003	14.400	12.394	5.698	13.386	24.386	24.888	15.353	1341	1951	2073	2195	2317	2439	2682	3048	3414	3658
	86.00	0.625	15.88	11.969	14.429	12.362	5.698	13.386	25.035	25.556	15.878	1377	2003	2128	2253	2378	2504	2754	3129	3505	3755
	92.00	0.672	17.07	11.875	14.510	12.277	5.698	13.386	26.818	27.392	17.351	1475	2145	2280	2414	2548	2682	2950	3352	3755	4023
13 5/8"	88.20	0.625	15.88	12.250 A	14.681	12.614	5.698	13.386	25.525	26.065	16.199	1404	2042	2170	2297	2425	2553	2808	3191	3574	3829
346.08	82.20	0.560	14.22	12.693	14.878	13.098	6.946	15.906	23.644	24.130	13.277	1300	1892	2010	2128	2246	2364	2601	2956	3310	3547
14"	82.50	0.562	14.27	12.689	14.882	13.096	6.946	15.906	23.726	24.223	13.351	1305	1898	2017	2135	2254	2373	2610	2966	3322	3559



**VAM TOP TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		in	mm									55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
14"	86.00	0.600	15.24	12.613	14.943	13.037	6.946	15.906	25.258	25.653	14.496	1389	2021	2147	2273	2400	2526	2778	3157	3536	3789
355.60	93.00	0.650	16.51	12.513	15.030	12.947	6.946	15.906	27.261	27.691	16.134	1499	2181	2317	2453	2590	2726	2999	3408	3817	4089
	96.90	0.670	17.02	12.473	15.069	12.900	6.946	15.906	28.058	28.622	16.870	1543	2245	2385	2525	2666	2806	3086	3507	3928	4209
	100.00	0.700	17.78	12.413	15.114	12.856	6.946	15.906	29.248	29.695	17.725	1609	2340	2486	2632	2779	2925	3217	3656	4095	4387
	106.00	0.750	19.05	12.313	15.199	12.768	6.946	15.906	31.220	31.710	19.344	1717	2498	2654	2810	2966	3122	3434	3903	4371	4683
	114.00	0.800	20.32	12.213	15.281	12.677	6.946	15.906	33.175	33.689	20.915	1825	2654	2820	2986	3152	3318	3649	4147	4645	4976
15"	92.50	0.580	14.73	13.653	15.994	14.077	5.528	13.071	26.275	26.798	16.516	1445	2102	2233	2365	2496	2628	2890	3284	3679	3941
381.00	107.00	0.675	17.15	13.463	16.161	13.906	5.528	13.071	30.377	31.025	19.898	1671	2430	2582	2734	2886	3038	3341	3797	4253	4557
16"	84.00	0.495	12.57	14.823	16.862	15.233	5.253	12.520	24.112	24.597	14.768	1326	1929	2050	2170	2291	2411	2652	3014	3376	3617
406.40	95.00	0.566	14.38	14.679	16.992	15.107	5.253	12.520	27.444	28.050	17.534	1509	2196	2333	2470	2607	2744	3019	3431	3842	4117

\* VAM TOP-KB

\*\* VAM TOP-KA

\*\*\* VAM TOP-ND

**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)											
		inch	mm							SC80	SC80	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
2 3/8	4.60	0.190	4.83	2.608	2.444	5.910	1.304	1.043	0.425	83	89	94	99	104	115	130	146	156			
60.33	5.10	0.218	5.54	2.641	2.444	5.910	1.477	1.181	0.534	94	100	106	112	118	130	148	165	177			
	5.80	0.254	6.45	2.658	2.891	6.770	1.692	1.355	0.670	108	115	122	129	136	149	169	190	203			
	6.30	0.280	7.11	2.687	2.891	6.770	1.843	1.476	0.688	118	125	133	140	148	162	185	207	221			
	6.60	0.295	7.49	2.703	2.891	6.770	1.928	1.542	0.742	123	131	139	146	154	170	193	216	231			
	7.35	0.336	8.53	2.745	2.891	6.770	2.152	1.722	0.886	138	146	155	164	172	189	215	241	258			
2 7/8	6.40	0.217	5.51	3.143	2.519	6.020	1.812	1.451	0.646	116	123	131	138	145	160	181	203	218			
73.03	7.80	0.276	7.01	3.177	3.180	7.360	2.254	1.803	0.781	144	153	162	171	180	198	225	252	270			
	8.60	0.308	7.82	3.214	3.180	7.360	2.484	1.987	0.929	159	169	179	189	199	219	248	278	298			
	9.35	0.340	8.64	3.249	3.180	7.360	2.708	2.167	1.072	173	184	195	206	217	238	271	303	325			
	9.80	0.362	9.19	3.272	3.180	7.360	2.858	2.286	1.166	183	194	206	217	229	251	286	320	343			
	10.50	0.392	9.96	3.304	3.180	7.360	3.058	2.446	1.298	196	208	220	232	245	269	306	342	367			
	10.70	0.405	10.29	3.317	3.180	7.360	3.143	2.514	1.352	201	214	226	239	251	277	314	352	377			
	11.50	0.440	11.18	3.331	3.558	8.110	3.366	2.694	1.411	216	229	242	256	269	296	337	377	404			
3 1/2	6.50	0.170	4.32	3.713	3.032	7.050	1.778	1.480	0.519	118	126	133	141	148	163	185	207	222			
88.90	7.70	0.216	5.49	3.765	3.032	7.050	2.228	1.781	0.764	142	151	160	169	178	196	223	249	267			
	9.20	0.254	6.45	3.813	3.032	7.050	2.590	2.072	0.992	166	176	186	197	207	228	259	290	311			
	10.20	0.289	7.34	3.857	3.032	7.050	2.915	2.333	1.204	187	198	210	222	233	257	292	327	350			
	12.70	0.375	9.53	3.914	3.820	8.620	3.682	2.947	1.483	236	250	265	280	295	324	368	413	442			
	13.70	0.413	10.49	3.956	3.820	8.620	4.005	3.204	1.690	256	272	288	304	320	352	401	449	481			
	14.30	0.430	10.92	3.974	3.820	8.620	4.147	3.317	1.780	265	282	299	315	332	365	415	464	498			
	14.70	0.449	11.40	3.994	3.820	8.620	4.304	3.443	1.880	275	293	310	327	344	379	430	482	516			
	15.50	0.476	12.09	3.998	4.261	9.530	4.522	3.619	1.900	290	308	326	344	362	398	452	507	543			
	16.70	0.510	12.95	4.032	4.261	9.530	4.791	3.832	2.072	307	326	345	364	383	422	479	536	575			
	18.35	0.575	14.61	4.094	4.261	9.530	5.284	4.230	2.388	338	360	381	402	423	465	529	592	635			
4	8.20	0.190	4.83	4.226	3.159	7.320	2.274	1.820	0.659	146	155	164	173	182	200	228	255	273			
101.60	9.50	0.226	5.74	4.274	3.159	7.320	2.680	2.144	0.916	172	182	193	204	214	236	268	300	322			
	10.90	0.262	6.65	4.321	3.159	7.320	3.077	2.461	1.169	197	209	221	234	246	271	308	345	369			

Coupling ID = VAM TOP regular

## VAM TOP TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)																																																																																																																																																																
		inch	mm							SC80	SC80	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi																																																																																																																																																					
4	101.60	11.60	0.286	7.26	4.352	3.159	7.320	3.337	1.338	2.671	3.337	2.671	1.338	214	227	240	254	267	294	334	374	401																																																																																																																																																				
																							12.10	0.299	7.59	4.368	3.159	7.320	3.476	2.782	1.426	2.836	2.236	250	264	278	306	348	389	417																																																																																																																																		
																																									13.20	0.330	8.38	4.406	3.159	7.320	3.805	3.043	1.635	2.435	259	274	289	304	335	380	426	456																																																																																																																
																																																											14.80	0.380	9.65	4.417	4.041	9.090	4.322	3.458	1.696	2.777	294	311	329	346	380	432	484	519																																																																																														
																																																																													16.10	0.415	10.54	4.457	4.041	9.090	4.674	3.740	1.919	2.999	318	337	355	374	411	468	524	561																																																																												
																																																																																															16.50	0.430	10.92	4.474	4.041	9.090	4.823	3.856	2.015	3.008	328	347	366	386	424	482	540	578																																																										
																																																																																																																	18.90	0.500	12.70	4.524	4.545	10.080	5.498	4.399	2.298	3.52	374	396	418	440	484	550	616	660																																								
																																																																																																																																			22.20	0.610	15.49	4.635	4.545	10.080	6.496	5.197	2.936	4.16	442	468	494	520	572	650	728	780																						
																																																																																																																																																					10.50	0.224	5.69	4.771	3.222	7.440	3.009	2.407	1.007	1.93	205	217	229	241	265	301	337	361				
																																																																																																																																																																							11.60	0.250	6.35	4.806
12.60	0.271	6.88	4.833	3.222	7.440	3.600	2.880	1.381	2.30	245	259	274	288	317	360	403	432																																																																																																																																																									
																		13.50	0.290	7.37	4.858	3.222	7.440	3.836	3.069	1.533	2.46	261	276	292	307	338	384	430	460																																																																																																																																							
																																				15.10	0.337	8.56	4.918	3.222	7.440	4.407	3.525	1.902	2.82	300	317	335	353	388	441	494	529																																																																																																																					
																																																						17.00	0.380	9.65	4.925	4.041	9.090	4.918	3.935	1.945	3.15	334	354	374	394	433	492	551	590																																																																																																			
																																																																								18.90	0.402	10.21	4.951	4.041	9.090	5.175	4.140	2.106	3.31	352	373	393	414	455	518	580	621																																																																																	
																																																																																										21.50	0.500	12.70	5.037	4.545	10.080	6.283	5.025	2.646	4.02	427	452	477	503	553	628	704	754																																																															
																																																																																																												23.70	0.560	14.22	5.102	4.545	10.080	6.932	5.546	3.060	4.44	471	499	527	555	610	693	776	832																																													
																																																																																																																														13.00	0.253	6.43	5.301	4.191	10.390	3.773	3.030	0.992	1.67	242	258	273	288	303	333	379	424	455																										
																																																																																																																																																	15.00	0.296	7.52	5.358	4.191	10.390	4.374	3.508	1.373	1.93	281	298	316	333	351	386	439	491	526							
																																																																																																																																																																				18.00	0.362	9.19	5.443	4.191	10.390	5.275
20.30	0.408	10.36	5.500	4.191	10.390	5.886	4.717	2.342	2.59	377	401	425	448	472	519	590	660																																																																																																																																																									
																		20.80	0.422	10.72	5.518	4.191	10.390	6.069	4.870	2.467	2.68	390	414	438	463	487	536	609	682																																																																																																																																							
																																				21.40	0.437	11.10	5.535	4.191	10.390	6.264	5.024	2.585	2.76	402	427	452	477	522	553	628	703																																																																																																																					
																																																						23.20	0.478	12.14	5.583	4.191	10.390	6.791	5.436	2.920	2.99	435	462	489	516	544	598	680	761																																																																																																			
																																																																								24.10	0.500	12.70	5.608	4.191	10.390	7.069	5.661	3.096	3.11	453	481	509	538	566	623	708	793																																																																																	
																																																																																										15.50	0.275	6.99	5.821	4.382	10.750	4.514	3.610	1.233	1.99	289	307	325	343	361	397	451	505																																																															
																																																																																																												17.00	0.304	7.72	5.860	4.382	10.750	4.962	3.971	1.519	2.18	318	338	357	377	397	437	496	556																																													

Coupling ID = VAM TOP regular

VAM TOP

**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)											
		inch	mm							SC80	SC80	55 ksl	80 ksl	85 ksl	90 ksl	95 ksl	100 ksl	110 ksl	125 ksl	140 ksl	150 ksl
5 1/2 139.70	20.00 23.00 26.00 26.80 28.40 29.70	0.361 0.415 0.476 0.500 0.530 0.562	9.17 10.54 12.09 12.70 13.46 14.27	5.935 6.004 6.079 6.106 6.142 6.179	4.382 4.382 4.382 4.382 4.382 4.382	10.750 10.750 10.750 10.750 10.750 10.750	5.828 6.630 7.513 7.854 8.645 8.718	4.664 5.310 6.020 6.284 6.625 6.986	2.075 2.592 3.162 3.368 3.64 3.932	2.075 2.592 3.162 3.368 3.64 3.932	373 425 482 503 530 559	396 451 512 534 563 594	420 478 542 566 596 629	443 504 572 597 629 664	466 531 602 628 663 699	513 584 662 691 729 768	583 664 753 786 828 873	653 743 843 880 928 978	700 797 903 943 994 1048		
5 3/4 146.05	18.10 19.70 21.80	0.361 0.510 0.530	9.17 13.00 13.46	5.935 6.189 6.240	4.382 3.772 3.772	10.750 9.528 9.528	5.828 5.699 6.335	4.664 4.566 5.065	2.075 2.195 2.595	2.075 2.195 2.595	329 353 375	354 388 411	375 411 456	396 434 481	417 457 507	458 502 557	521 571 633	583 639 709	625 685 760		
6 5/8 168.28	20.00 23.20 24.00 28.00 32.00	0.288 0.330 0.352 0.417 0.475	7.32 8.38 8.94 10.59 12.07	6.967 7.026 7.055 7.140 7.215	4.427 4.427 4.427 4.427 4.427	10.870 10.870 10.870 10.870 10.870	5.734 6.526 6.937 8.133 9.177	4.585 5.234 5.560 6.504 7.347	1.658 2.177 2.433 3.191 3.747	1.658 2.177 2.433 3.191 3.747	367 419 445 520 588	390 445 473 585 624	413 471 500 618 661	436 497 528 618 698	459 523 556 650 735	482 554 587 682 783	504 576 612 715 808	573 654 695 813 918	642 733 778 911 1029	688 785 834 976 1102	
7 177.80	23.00 26.00 29.00 32.00 35.00 38.00 41.00 42.70	0.317 0.362 0.408 0.453 0.498 0.540 0.590 0.625	8.05 9.19 10.36 11.51 12.65 13.72 14.99 15.88	7.364 7.425 7.486 7.545 7.602 7.656 7.717 7.758	4.776 4.776 4.776 4.776 4.776 4.776 4.776 4.776	11.540 11.540 11.540 11.540 11.540 11.540 11.540 11.540	6.655 7.549 8.449 9.317 10.172 10.959 11.881 12.517	5.338 6.048 6.763 7.460 8.139 8.776 9.512 10.015	1.952 2.518 3.090 3.647 4.190 4.707 5.297 5.695	1.952 2.518 3.090 3.647 4.190 4.707 5.297 5.695	294 333 372 410 448 483 523 551	427 484 541 597 651 700 746 801	454 514 575 634 692 733 779 851	480 544 609 671 709 746 784 901	507 575 642 704 733 779 834 904	534 605 676 744 821 895 967 1046	587 665 744 821 907 997 1097 1229	667 756 845 933 1044 1119 1221 1316 1427	747 847 947 1014 1119 1221 1316 1427	801 907 1014 1119 1221 1316 1427	
7 5/8 193.68	26.40 29.70 33.70 35.80 39.00	0.328 0.375 0.430 0.465 0.500	8.33 9.53 10.92 11.81 12.70	8.002 8.067 8.140 8.187 8.232	4.868 4.868 4.868 4.868 4.868	11.730 11.730 11.730 11.730 11.730	7.519 8.541 9.720 10.460 11.192	6.034 6.854 7.781 8.387 8.971	2.250 2.977 3.650 4.132 4.596	2.250 2.977 3.650 4.132 4.596	332 377 428 461 493	483 548 622 671 718	513 583 661 713 763	553 617 700 755 807	603 681 739 797 852	664 754 856 923 987	754 857 973 1048 1121	845 960 1089 1174 1256	905 1028 1167 1258 1346		

Coupling ID = VAM TOP regular

## VAM TOP TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm							SC80	inch	SC80	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi
7 5/8	42.80	0.562	14.27	8.311	4.868	11.730	12.470	9.994	5.417	550	800	849	899	949	999	1099	1249	1399	1499
193.68	45.30	0.595	15.11	8.352	4.868	11.730	13.141	10.535	5.847	579	843	895	948	1001	1054	1159	1317	1475	1580
	47.10	0.625	15.88	8.388	4.868	11.730	13.744	11.000	6.225	605	880	935	990	1045	1100	1210	1375	1540	1650
7 3/4	46.10	0.595	15.11	8.476	4.915	11.850	13.374	10.723	5.927	590	858	911	965	1019	1072	1180	1340	1501	1608
196.85																			
8 5/8	36.00	0.400	10.16	9.108	5.604	13.190	10.336	8.286	3.742	456	663	704	746	787	829	911	1036	1160	1243
219.08	40.00	0.450	11.43	9.175	5.604	13.190	11.557	9.247	4.511	509	740	786	832	878	925	1017	1156	1295	1387
	44.00	0.500	12.70	9.242	5.604	13.190	12.763	10.216	5.287	562	817	868	919	971	1022	1124	1277	1430	1532
	49.00	0.557	14.15	9.317	5.604	13.190	14.118	11.306	6.161	622	904	961	1018	1074	1131	1244	1413	1583	1696
	52.00	0.595	15.11	9.366	5.604	13.190	15.010	12.028	6.736	662	962	1022	1083	1143	1203	1323	1504	1684	1804
9 5/8	36.00	0.352	8.94	10.045	5.589	13.190	10.254	8.213	3.362	452	657	698	739	780	821	903	1027	1150	1232
244.48	40.00	0.395	10.03	10.106	5.589	13.190	11.454	9.179	4.135	505	734	780	826	872	918	1010	1147	1285	1377
	43.50	0.435	11.05	10.161	5.589	13.190	12.559	10.056	4.835	553	804	855	905	955	1006	1106	1257	1408	1508
	47.00	0.472	11.99	10.213	5.589	13.190	13.572	10.876	5.501	598	870	924	979	1033	1088	1196	1360	1523	1631
	53.50	0.545	13.84	10.311	5.589	13.190	15.546	12.462	6.765	685	997	1059	1122	1184	1246	1371	1558	1745	1869
	58.40	0.595	15.11	10.376	5.589	13.190	16.879	13.518	7.609	743	1081	1149	1217	1284	1352	1487	1690	1893	2028
9 7/8	62.80	0.625	15.88	10.673	5.484	12.950	18.162	14.548	8.427	800	1164	1237	1309	1382	1455	1600	1819	2037	2182
250.83	65.30	0.650	16.51	10.705	5.484	12.950	18.838	15.077	8.857	829	1206	1282	1357	1432	1508	1658	1885	2111	2262
	66.40	0.661	16.79	10.719	5.484	12.950	19.134	15.309	9.046	842	1225	1301	1378	1454	1531	1684	1914	2143	2296
	66.90	0.668	16.97	10.728	5.484	12.950	19.322	15.475	9.167	851	1238	1315	1393	1470	1548	1702	1934	2167	2321
	67.50	0.678	17.22	10.740	5.484	12.950	19.590	15.674	9.329	862	1254	1332	1411	1489	1567	1724	1959	2194	2351
	68.00	0.694	17.63	10.762	5.484	12.950	20.017	16.039	9.626	882	1283	1363	1444	1524	1604	1764	2005	2245	2406
	68.90	0.700	17.78	10.768	5.484	12.950	20.177	16.139	9.707	888	1291	1372	1453	1533	1614	1775	2017	2259	2421
	70.50	0.720	18.29	10.793	5.484	12.950	20.708	16.573	10.046	912	1326	1409	1492	1574	1657	1823	2072	2320	2486
	72.00	0.725	18.42	10.799	5.484	12.950	20.841	16.673	10.127	917	1334	1417	1501	1584	1667	1834	2084	2334	2501
10	67.20	17.070	0.67	10.866	5.484	12.953	19.693	15.784	9.457	868	1263	1342	1421	1499	1578	1736	1973	2210	2368
254.00	68.70	17.480	0.69	10.886	5.484	12.953	20.127	16.120	9.726	887	1290	1370	1451	1531	1612	1773	2015	2257	2418
	71.80	18.340	0.72	10.929	5.484	12.953	21.045	16.861	10.319	927	1349	1433	1517	1602	1686	1855	2108	2361	2529

Coupling ID = VAM TOP regular

VAM TOP

**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)											
		inch	mm							SC80	SC80	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
10 3/4	45.50	0.400	10.16	11.238	5.634	13.270	13.006	10.402	4.702	572	832	884	936	988	1040	1144	1300	1456	1560		
273.05	51.00	0.450	11.43	11.309	5.634	13.270	14.561	11.658	5.707	641	933	991	1049	1108	1166	1282	1457	1632	1749		
	55.50	0.495	12.57	11.372	5.634	13.270	15.947	12.780	6.605	703	1022	1086	1150	1214	1278	1406	1598	1789	1917		
	60.70	0.545	13.84	11.439	5.634	13.270	17.473	13.978	7.565	769	1118	1188	1258	1328	1398	1538	1747	1957	2097		
	65.70	0.595	15.11	11.506	5.634	13.270	18.982	15.185	8.531	835	1215	1291	1367	1443	1519	1670	1898	2126	2278		
	71.10	0.650	16.51	11.579	5.634	13.270	20.625	16.504	9.590	908	1320	1403	1485	1568	1650	1815	2063	2311	2476		
	73.20	0.672	17.07	11.608	5.634	13.270	21.276	17.042	10.013	937	1363	1449	1534	1619	1704	1875	2130	2386	2556		
11 3/4	54.00	0.400	10.16	12.287	5.713	13.425	15.463	12.391	5.887	681	991	1053	1115	1177	1239	1363	1549	1735	1859		
298.45	60.00	0.450	11.43	12.362	5.713	13.425	17.300	13.838	7.046	761	1107	1176	1245	1315	1384	1522	1730	1937	2076		
	65.00	0.500	12.70	12.425	5.713	13.425	18.816	15.064	8.027	829	1205	1280	1356	1431	1506	1657	1883	2109	2260		
	71.00	0.550	13.97	12.490	5.713	13.425	20.420	16.335	9.044	898	1307	1389	1470	1552	1634	1797	2042	2287	2450		
11 7/8	67.80	0.550	13.97	12.573	5.713	13.425	19.568	15.666	8.467	862	1253	1332	1410	1488	1567	1723	1958	2193	2350		
301.63	71.80	0.582	14.78	12.616	5.713	13.430	20.648	16.523	9.150	909	1322	1404	1487	1570	1652	1818	2065	2313	2478		
13 3/8	61.00	0.430	10.92	13.909	5.698	13.390	17.487	13.990	6.619	769	1119	1189	1259	1329	1399	1539	1749	1959	2099		
339.73	68.00	0.480	12.19	13.982	5.698	13.390	19.445	15.585	7.898	857	1247	1325	1403	1481	1559	1714	1948	2182	2338		
	72.00	0.514	13.06	14.030	5.698	13.390	20.768	16.625	8.743	914	1330	1413	1496	1579	1663	1829	2078	2328	2494		
	77.00	0.550	13.97	14.081	5.698	13.390	22.160	17.755	9.644	977	1420	1509	1598	1687	1776	1953	2219	2486	2663		
	80.70	0.580	14.73	14.122	5.698	13.390	23.314	18.670	10.371	1027	1494	1587	1680	1774	1867	2054	2334	2614	2801		
	85.00	0.608	15.44	14.161	5.698	13.390	24.386	19.544	11.064	1075	1564	1661	1759	1857	1954	2150	2443	2736	2932		
	86.00	0.625	15.88	14.183	5.698	13.390	25.035	20.026	11.455	1101	1602	1702	1802	1902	2003	2203	2503	2804	3004		
13 5/8	88.20	0.625	15.88	14.435	5.698	13.390	25.525	20.437	11.698	1124	1635	1737	1839	1942	2044	2248	2555	2861	3066		
346.08																					

Coupling ID = VAM TOP regular

**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm							SC90	inch	SC90	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi
2 3/8	4.60	0.190	4.83	2.639	2.444	5.910	1.304	1.173	0.527	94	100	106	111	117	129	147	164	176	
60.33	5.10	0.218	5.54	2.677	2.444	5.910	1.477	1.330	0.654	106	113	120	126	133	146	166	186	200	
	5.80	0.254	6.45	2.698	2.891	6.770	1.692	1.524	0.725	122	130	137	145	152	168	191	213	229	
	6.30	0.280	7.11	2.730	2.891	6.770	1.843	1.660	0.834	133	141	149	158	166	183	208	232	249	
	6.60	0.295	7.49	2.748	2.891	6.770	1.928	1.736	0.896	139	148	156	165	174	191	217	243	260	
	7.35	0.336	8.53	2.794	2.891	6.770	2.152	1.936	1.056	155	165	174	184	194	213	242	271	290	
2 7/8	6.40	0.217	5.51	3.179	2.519	6.020	1.812	1.631	0.789	130	139	147	155	163	179	204	228	245	
73.03	7.80	0.276	7.01	3.222	3.180	7.360	2.254	2.029	0.962	162	172	183	193	203	223	254	284	304	
	8.60	0.308	7.82	3.263	3.180	7.360	2.484	2.235	1.129	179	190	201	212	224	246	279	313	335	
	9.35	0.340	8.64	3.302	3.180	7.360	2.708	2.437	1.290	195	207	219	232	244	268	305	341	366	
	9.80	0.362	9.19	3.328	3.180	7.360	2.858	2.571	1.398	206	219	231	244	257	283	321	360	386	
	10.50	0.392	9.96	3.362	3.180	7.360	3.058	2.751	1.541	220	234	248	261	275	303	344	385	413	
	10.70	0.405	10.29	3.376	3.180	7.360	3.143	2.829	1.600	226	240	255	269	283	311	354	396	424	
	11.50	0.440	11.18	3.395	3.558	8.110	3.366	3.030	1.681	242	258	273	288	303	333	379	424	455	
3 1/2	6.50	0.170	4.32	3.734	3.032	7.050	1.778	1.601	0.618	128	136	144	152	160	176	200	224	240	
88.90	7.70	0.216	5.49	3.802	3.032	7.050	2.228	2.006	0.940	160	171	181	191	201	221	251	281	301	
	9.20	0.254	6.45	3.856	3.032	7.050	2.590	2.330	1.199	186	198	210	221	233	256	291	326	350	
	10.20	0.289	7.34	3.904	3.032	7.050	2.915	2.623	1.433	210	223	236	249	262	289	328	367	393	
	12.70	0.375	9.53	3.973	3.820	8.620	3.682	3.314	1.775	265	282	298	315	331	365	414	464	497	
	13.70	0.413	10.49	4.020	3.820	8.620	4.005	3.605	2.011	288	306	324	342	361	397	451	505	541	
	14.30	0.430	10.92	4.040	3.820	8.620	4.147	3.732	2.112	299	317	336	355	373	411	467	522	560	
	14.70	0.449	11.40	4.062	3.820	8.620	4.304	3.873	2.224	310	329	349	368	387	426	484	542	581	
	15.50	0.476	12.09	4.070	4.261	9.530	4.522	4.070	2.265	326	346	366	387	407	448	509	570	611	
	16.70	0.510	12.95	4.107	4.261	9.530	4.791	4.314	2.455	345	367	388	410	431	475	539	604	647	
	18.35	0.575	14.61	4.177	4.261	9.530	5.284	4.766	2.820	381	405	429	453	477	524	596	667	715	
4	8.20	0.190	4.83	4.259	3.159	7.320	2.274	2.046	0.835	164	174	184	194	205	225	256	286	307	
101.60	9.50	0.226	5.74	4.314	3.159	7.320	2.680	2.412	1.131	193	205	217	229	241	265	302	338	362	
	10.90	0.262	6.65	4.366	3.159	7.320	3.077	2.768	1.415	221	235	249	263	277	304	346	388	415	

Coupling ID = VAM TOP regular



**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)														
		inch	mm							55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi					
inch	lb./ft.	mm	mm	SC90	inch.	inch.	sq. in.	SC90	sq. in.	SC90	SC90	SC90	SC90	SC90	SC90	SC90	SC90	SC90	SC90	SC90	SC90	SC90		
4 101.60	11.60	0.286	7.26	4.400	3.159	7.320	3.337	3.004	1.602	240	255	270	285	300	330	376	421	451						
	12.10	0.299	7.59	4.419	3.159	7.320	3.476	3.129	1.708	250	266	282	297	313	344	391	438	469						
	13.20	0.330	8.38	4.461	3.159	7.320	3.805	3.424	1.942	274	291	308	325	342	377	428	479	514						
	14.80	0.380	9.65	4.479	4.041	9.090	4.322	3.889	2.043	311	331	350	369	389	428	486	544	583						
	16.10	0.415	10.54	4.524	4.041	9.090	4.674	4.207	2.298	337	358	379	400	421	463	526	589	631						
	16.50	0.430	10.92	4.542	4.041	9.090	4.823	4.338	2.400	347	369	390	412	434	477	542	607	651						
	18.90	0.500	12.70	4.600	4.545	10.080	5.498	4.948	2.733	396	421	445	470	495	544	619	693	742						
	22.20	0.610	15.49	4.723	4.545	10.080	6.496	5.848	3.454	468	497	526	556	585	643	731	819	877						
	4 1/2 114.30	10.50	0.224	5.69	4.811	3.222	7.440	3.009	2.709	1.248	217	230	244	257	271	298	339	379	406					
		11.60	0.250	6.35	4.850	3.222	7.440	3.338	3.005	1.484	240	255	270	285	301	331	376	421	451					
	12.60	0.271	6.88	4.881	3.222	7.440	3.600	3.240	1.674	259	275	292	308	324	356	405	454	486						
	13.50	0.290	7.37	4.908	3.222	7.440	3.836	3.452	1.840	276	293	311	328	345	380	432	483	518						
	15.10	0.337	8.56	4.974	3.222	7.440	4.407	3.965	2.250	317	337	357	377	397	436	496	555	595						
	17.00	0.380	9.65	4.988	4.041	9.090	4.918	4.397	2.337	352	374	396	418	440	484	550	616	660						
	17.00	0.402	10.21	5.017	4.041	9.090	5.175	4.658	2.520	373	396	419	443	466	512	582	652	699						
	18.90	0.430	10.92	5.054	4.041	9.090	5.498	4.948	2.754	396	421	445	470	495	544	619	693	742						
	21.50	0.500	12.70	5.115	4.545	10.080	6.283	5.653	3.144	452	481	509	537	565	622	707	791	848						
	23.70	0.560	14.22	5.188	4.545	10.080	6.932	6.240	3.616	499	530	562	593	624	686	780	874	936						
5 127.00	13.00	0.253	6.43	5.346	4.191	10.390	3.773	3.408	1.293	187	213	290	307	324	341	375	426	477	511					
	15.00	0.296	7.52	5.409	4.191	10.390	4.374	3.940	1.718	217	245	335	355	374	394	433	493	552	591					
	18.00	0.362	9.19	5.504	4.191	10.390	5.275	4.751	2.370	261	380	404	428	451	475	523	594	665	713					
	20.30	0.408	10.36	5.567	4.191	10.390	5.886	5.298	2.808	291	424	450	477	503	530	583	662	742	795					
	20.80	0.422	10.72	5.587	4.191	10.390	6.069	5.470	2.948	301	438	465	492	520	547	602	684	766	821					
	21.40	0.437	11.10	5.606	4.191	10.390	6.264	5.644	3.082	310	452	480	508	536	564	621	706	790	847					
	23.20	0.478	12.14	5.659	4.191	10.390	6.971	6.115	3.457	336	489	520	550	581	612	673	764	856	917					
	24.10	0.500	12.70	5.689	4.191	10.390	7.069	6.377	3.671	351	510	542	574	606	638	701	797	893	957					
	5 1/2 139.70	15.50	0.275	6.99	5.870	4.382	10.750	4.514	4.061	1.592	223	325	345	365	386	406	447	508	569	609				
		17.00	0.304	7.72	5.915	4.382	10.750	4.962	4.481	1.926	246	358	381	403	426	448	493	560	627	672				

Coupling ID = VAM TOP regular



## VAM TOP TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm							SC90 inch	SC90 mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
5 1/2 139.70	20.00 23.00	0.361 0.415	9.17 10.54	5.998 6.075	4.382 4.382	10.750 10.750	5.828 6.630	5.255 5.981	2.547 3.131	329 329	420 478	447 508	473 538	499 568	526 598	578 658	657 748	736 837	888 897
	26.00 26.80	0.476 0.500	12.09 12.70	6.157 6.189	4.382 4.382	10.750 10.750	7.513 7.854	6.777 7.082	3.761 4.009	373 390	542 567	576 602	610 637	644 673	678 708	745 779	847 885	949 991	1017 1062
	28.40 29.70	0.530 0.562	13.46 14.27	6.226 6.268	4.382 4.382	10.750 10.750	8.275 8.718	7.446 7.852	4.298 4.628	410 432	596 628	633 667	670 707	745 746	819 864	931 982	1042 1099	1117 1178	
5 3/4 146.05	18.10 19.70	0.720 0.810	0.30 0.34	6.201 6.248	3.772 3.772	9.528 9.528	5.201 5.699	4.681 5.143	2.287 2.656	257 283	374 411	398 437	421 463	445 489	515 514	585 566	655 643	702 720	702 771
	21.80	0.930	0.38	6.305	3.772	9.528	6.335	5.706	3.107	314	456	485	514	542	571	628	713	799	856
6 5/8 168.28	20.00 23.20	0.288 0.330	7.32 8.38	7.020 7.085	4.427 4.427	10.870 10.870	5.734 6.526	5.169 5.888	2.124 2.700	284 324	414 471	439 530	465 559	491 589	517 589	569 648	646 736	724 824	775 883
	24.00 28.00	0.352 0.417	8.94 10.59	7.118 7.213	4.427 4.427	10.870 10.870	6.937 8.133	6.262 7.325	2.994 3.850	344 403	501 586	532 623	564 659	595 696	626 733	689 806	783 916	877 1026	939 1099
	32.00	0.475	12.07	7.295	4.427	10.870	9.177	8.268	4.597	455	661	703	744	785	827	909	1034	1158	1240
7	36.70	0.562	14.27	7.413	4.427	10.870	10.705	9.632	5.688	530	771	819	867	915	963	1060	1204	1348	1445
	23.00	0.317	8.05	7.421	4.776	11.540	6.655	6.002	2.481	330	480	510	540	570	600	660	750	840	900
177.80	26.00	0.362	9.19	7.490	4.776	11.540	7.549	6.809	3.128	374	545	579	613	647	681	749	851	953	1021
	29.00	0.408	10.36	7.559	4.776	11.540	8.449	7.623	3.780	419	610	648	686	724	762	839	953	1067	1143
	32.00	0.453	11.51	7.624	4.776	11.540	9.317	8.398	4.400	462	672	714	756	798	840	924	1050	1176	1260
	35.00	0.498	12.65	7.687	4.776	11.540	10.172	9.154	5.006	503	732	778	824	870	915	1007	1144	1282	1373
	38.00	0.540	13.72	7.746	4.776	11.540	10.959	9.870	5.578	543	790	839	888	938	987	1086	1234	1382	1471
	41.00	0.590	14.99	7.815	4.776	11.540	11.881	10.714	6.253	589	857	911	964	1018	1071	1179	1339	1500	1607
	42.70	0.625	15.88	7.860	4.776	11.540	12.517	11.270	6.696	620	902	958	1014	1071	1127	1240	1409	1578	1691
7 5/8	26.40	0.328	8.33	8.061	4.868	11.730	7.519	6.780	2.846	373	542	576	610	644	678	746	848	949	1017
193.68	29.70	0.375	9.53	8.134	4.868	11.730	8.541	7.705	3.589	424	616	655	693	732	771	848	963	1079	1156
	33.70	0.430	10.92	8.217	4.868	11.730	9.720	8.767	4.441	482	701	745	789	833	877	964	1096	1227	1315
	35.80	0.465	11.81	8.268	4.868	11.730	10.460	9.430	4.970	519	754	802	849	896	943	1037	1179	1320	1415
	39.00	0.500	12.70	8.317	4.868	11.730	11.192	10.070	5.480	554	806	856	906	957	1007	1108	1259	1410	1511

Coupling ID = VAM TOP regular

VAM TOP

**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm							SC90	inch	SC90	55 ksl	80 ksl	85 ksl	90 ksl	95 ksl	100 ksl	110 ksl
7 5/8	42.80	0.562	14.27	8.406	4.868	11.730	12.470	11.234	6.415	618	899	955	1011	1067	1123	1236	1404	1573	1685
193.68	45.30	0.595	15.11	8.451	4.868	11.730	13.141	11.834	6.892	651	947	1006	1065	1124	1183	1302	1479	1657	1775
	47.10	0.625	15.88	8.492	4.868	11.730	13.744	12.385	7.328	681	991	1053	1115	1177	1239	1362	1548	1734	1858
7 3/4	46.10	0.595	15.11	8.575	4.915	11.850	13.374	12.040	6.987	662	963	1023	1084	1144	1204	1324	1505	1686	1806
196.85																			
8 5/8	36.00	0.400	10.16	9.179	5.604	13.190	10.336	9.305	4.558	512	744	791	837	884	931	1024	1163	1303	1396
219.08	40.00	0.450	11.43	9.256	5.604	13.190	11.557	10.416	5.449	573	833	885	937	990	1042	1146	1302	1458	1562
	44.00	0.500	12.70	9.331	5.604	13.190	12.763	11.509	6.325	633	921	978	1036	1093	1151	1266	1439	1611	1726
	49.00	0.557	14.15	9.413	5.604	13.190	14.118	12.726	7.291	700	1018	1082	1145	1209	1273	1400	1591	1782	1909
9 5/8	52.00	0.595	15.11	9.467	5.604	13.190	15.010	13.513	7.932	743	1081	1149	1216	1284	1351	1486	1689	1892	2027
244.48	36.00	0.352	8.94	10.110	5.589	13.190	10.254	9.241	4.186	508	739	785	832	878	924	1017	1155	1294	1386
	40.00	0.395	10.03	10.177	5.589	13.190	11.454	10.308	5.040	567	825	876	928	979	1031	1134	1289	1443	1546
	43.50	0.435	11.05	10.240	5.589	13.190	12.559	11.318	5.848	622	905	962	1019	1075	1132	1245	1415	1585	1698
	47.00	0.472	11.99	10.297	5.589	13.190	13.572	12.239	6.583	673	979	1040	1102	1163	1224	1346	1530	1713	1836
	53.50	0.545	13.84	10.406	5.589	13.190	15.546	14.000	8.001	770	1120	1190	1260	1330	1400	1540	1750	1960	2100
	58.40	0.595	15.11	10.478	5.589	13.190	16.879	15.195	8.946	836	1216	1292	1368	1444	1520	1671	1899	2127	2279
9 7/8	62.80	0.625	15.88	10.781	5.484	12.950	18.162	16.373	9.883	901	1310	1392	1474	1555	1637	1801	2047	2292	2456
250.83	65.30	0.650	16.51	10.817	5.484	12.950	18.838	16.974	10.372	934	1358	1443	1528	1613	1697	1867	2122	2376	2546
	66.40	0.661	16.79	10.833	5.484	12.950	19.134	17.241	10.589	948	1379	1465	1552	1638	1724	1897	2155	2414	2586
	66.90	0.668	16.97	10.843	5.484	12.950	19.322	17.410	10.725	958	1393	1480	1567	1654	1741	1915	2176	2437	2612
	67.50	0.678	17.22	10.856	5.484	12.950	19.590	17.644	10.903	970	1412	1500	1588	1676	1764	1941	2206	2470	2647
	68.00	0.694	17.63	10.878	5.484	12.950	20.017	18.014	11.203	991	1441	1531	1621	1711	1801	1982	2252	2522	2702
	68.90	0.700	17.78	10.888	5.484	12.950	20.177	18.182	11.340	1000	1465	1545	1636	1727	1818	2000	2273	2545	2727
	70.50	0.720	18.29	10.915	5.484	12.950	20.708	18.654	11.710	1026	1492	1586	1679	1772	1865	2052	2332	2612	2798
	72.00	0.725	18.42	10.921	5.484	12.950	20.841	18.755	11.792	1032	1500	1594	1688	1782	1876	2063	2344	2626	2813
10	67.20	17.070	0.67	10.980	5.484	12.953	19.693	17.743	11.024	976	1419	1508	1597	1686	1774	1952	2218	2484	2661
254.00	68.70	17.480	0.69	11.002	5.484	12.953	20.127	18.116	11.323	996	1449	1540	1630	1721	1812	1993	2265	2536	2717
	71.80	18.340	0.72	11.051	5.484	12.953	21.045	18.969	12.005	1043	1518	1612	1707	1802	1897	2087	2371	2656	2845

Coupling ID = VAM TOP regular

**VAM TOP TECHNICAL DATA (OPTIONS)**

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb.)									
		inch	mm							SC90	inch	SC90	55 ksl	80 ksl	85 ksl	90 ksl	95 ksl	100 ksl	110 ksl
10 3/4	45.50	0.400	10.16	11.313	5.634	13.270	13.006	11,727	5,764	938	997	1055	1114	1173	1290	1466	1642	1759	
273.05	51.00	0.450	11.43	11.392	5.634	13.270	14.561	13,132	6,891	722	1051	1116	1182	1248	1313	1445	1642	1838	
	55.50	0.495	12.57	11.461	5.634	13.270	15.947	14,369	7,882	790	1150	1221	1293	1365	1437	1581	1796	2012	
	60.70	0.545	13.84	11.537	5.634	13.270	17.473	15,754	8,980	866	1260	1339	1418	1497	1575	1733	1969	2206	
	65.70	0.595	15.11	11.612	5.634	13.270	18.982	17,115	10,071	941	1369	1455	1540	1626	1712	1883	2139	2396	
	71.10	0.650	16.51	11.691	5.634	13.270	20.625	18,555	11,228	1021	1484	1577	1670	1763	1856	2041	2319	2598	
	73.20	0.672	17.07	11.724	5.634	13.270	21.276	19,172	11,713	1054	1534	1630	1725	1821	1917	2109	2397	2684	
11 3/4	54.00	11.050	0.44	12.366	5.713	13.425	15.463	13,914	7,107	765	1113	1183	1252	1322	1391	1531	1739	1948	
298.45	60.00	12.420	0.49	12.453	5.713	13.425	17.300	15,602	8,458	858	1248	1326	1404	1482	1560	1716	1950	2184	
	65.00	13.560	0.53	12.522	5.713	13.425	18.816	16,954	9,539	932	1356	1441	1526	1611	1695	1865	2119	2374	
	71.00	14.780	0.58	12.594	5.713	13.425	20.420	18,391	10,688	1011	1471	1563	1655	1747	1839	2023	2299	2575	
11 7/8	67.80	13.970	0.55	12.671	5.713	13.425	19.568	17,617	10,028	969	1409	1497	1586	1674	1762	1938	2202	2466	
301.63	71.80	0.582	14.78	12.720	5.713	13.430	20.648	18,598	10,806	1023	1488	1581	1674	1767	1860	2046	2325	2604	
13 3/8	61.00	0.430	10.92	13.990	5.698	13.390	17.487	15,759	8,039	867	1261	1340	1418	1497	1576	1733	1970	2206	
339.73	68.00	0.480	12.19	14.071	5.698	13.390	19.445	17,537	9,467	965	1403	1491	1578	1666	1754	1929	2192	2455	
	72.00	0.514	13.06	14.124	5.698	13.390	20.768	18,713	10,406	1029	1497	1591	1684	1778	1871	2058	2339	2620	
	77.00	0.550	13.97	14.181	5.698	13.390	22.160	19,983	11,420	1099	1599	1699	1798	1898	1998	2198	2498	2798	
	80.70	0.580	14.73	14.226	5.698	13.390	23.314	20,993	12,223	1155	1679	1784	1889	1994	2099	2309	2624	2939	
	85.00	0.608	15.44	14.270	5.698	13.390	24.386	21,962	13,011	1208	1757	1867	1977	2086	2196	2416	2745	3075	
	86.00	0.625	15.88	14.295	5.698	13.390	25.035	22,537	13,460	1240	1803	1916	2028	2141	2254	2479	2817	3155	
13 5/8	88.20	0.625	15.88	14.547	5.698	13.390	25.525	22,991	13,738	1265	1839	1954	2069	2184	2299	2529	2874	3219	
346.08																			

Coupling ID = VAM TOP regular





**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
2 3/8" 60.33	4.60	0.190	-	-	-	960	1010	1060	1110	1160	1210	1170	1290	1410	1240	1370	1500
		4.83	-	-	-	1300	1370	1440	1490	1570	1650	1580	1760	1940	1670	1860	2050
	5.10	0.218	-	-	-	1190	1250	1310	1360	1430	1500	1430	1580	1730	1520	1680	1840
		5.54	-	-	-	1620	1700	1780	1850	1940	2030	1930	2150	2370	2050	2280	2510
	5.80	0.254	-	-	-	1560	1640	1720	1680	1760	1840	1800	1990	2180	1950	2160	2370
		6.45	-	-	-	2120	2230	2340	2270	2390	2510	2430	2700	2970	2640	2930	3220
	6.30	0.280	-	-	-	1790	1880	1970	1940	2040	2140	2070	2290	2510	2230	2470	2710
		7.11	-	-	-	2420	2550	2680	2630	2770	2910	2790	3100	3410	3010	3350	3690
	6.60	0.295	-	-	-	1900	2000	2100	2090	2190	2290	2210	2450	2690	2390	2650	2910
		7.49	-	-	-	2590	2720	2850	2820	2970	3120	2990	3320	3650	3240	3600	3960
7.35	0.336	-	-	-	2280	2390	2500	2490	2620	2750	2640	2930	3220	2840	3150	3460	
	8.53	-	-	-	3090	3250	3410	3370	3550	3730	3570	3970	4370	3850	4280	4710	
2 7/8" 73.03	6.40	0.217	-	-	-	1530	1610	1690	1670	1850	2030	1800	1990	2180	1860	2060	2260
		5.51	-	-	-	2080	2190	2300	2260	2510	2760	2430	2700	2970	2510	2790	3070
	7.80	0.276	-	-	-	2170	2280	2390	2360	2620	2880	2670	2960	3250	2830	3140	3450
		7.01	-	-	-	2940	3090	3240	3190	3550	3910	3610	4010	4410	3830	4260	4690
	8.60	0.308	-	-	-	2510	2640	2770	2750	3050	3350	3090	3430	3770	3290	3650	4010
		7.82	-	-	-	3400	3580	3760	3730	4140	4550	4180	4650	5120	4400	4900	5400
	9.35	0.340	-	-	-	2890	3040	3190	3150	3490	3830	3520	3910	4300	3740	4150	4560
		8.64	-	-	-	3920	4120	4320	4270	4740	5210	4800	5300	5800	5000	5600	6200
	9.80	0.362	-	-	-	3120	3280	3440	3420	3800	4180	3830	4250	4670	4060	4510	4960
		9.19	-	-	-	4220	4440	4660	4700	5200	5700	5200	5800	6400	5500	6100	6700
10.50	0.392	-	-	-	3440	3620	3800	3780	4190	4600	4240	4710	5180	4500	4990	5480	
	9.96	-	-	-	4650	4900	5150	5100	5700	6300	5800	6400	7000	6100	6800	7500	
10.70	0.405	-	-	-	3520	3700	3880	3900	4330	4760	4410	4900	5390	4680	5190	5700	
	10.29	-	-	-	4750	5000	5250	5300	5900	6500	5900	6600	7300	6300	7000	7700	

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.		
2 3/8" 60.33	4.60	0.190	1310	1460	1590	1340	1480	1620	1360	1500	1650
		4.83	1770	1970	2170	1810	2010	2210	1840	2040	2240
	5.10	0.218	1560	1730	1900	1590	1760	1930	1620	1790	1960
		5.54	2110	2340	2570	2150	2390	2630	2190	2430	2670
	5.80	0.254	2060	2270	2490	2120	2350	2580	2180	2420	2660
		6.45	2770	3080	3390	2870	3190	3510	2960	3290	3620
	6.30	0.280	2340	2600	2860	2430	2690	2950	2510	2780	3050
		7.11	3180	3530	3880	3280	3650	4020	3390	3770	4150
	6.60	0.295	2520	2790	3060	2600	2880	3160	2680	2970	3260
		7.49	3410	3790	4170	3510	3900	4290	3630	4030	4430
7.35	0.336	2980	3310	3640	3070	3410	3750	3170	3520	3870	
	8.53	4040	4490	4940	4170	4630	5090	4300	4780	5260	
2 7/8" 73.03	6.40	0.217	1920	2130	2340	1960	2170	2380	1990	2210	2430
		5.51	2590	2880	3170	2650	2940	3230	2690	2990	3290
	7.80	0.276	3000	3330	3660	3060	3390	3720	3110	3450	3790
		7.01	4060	4510	4960	4140	4600	5060	4210	4680	5150
	8.60	0.308	3480	3860	4240	3540	3930	4320	3600	4000	4400
		7.82	4700	5200	5700	4800	5300	5800	4900	5400	5900
	9.35	0.340	3960	4390	4820	4040	4480	4920	4110	4560	5010
		8.64	5400	6000	6600	5500	6100	6700	5600	6200	6800
	9.80	0.362	4290	4760	5230	4370	4850	5330	4450	4940	5430
		9.19	5800	6500	7200	5900	6600	7300	6000	6700	7400
10.50	0.392	4750	5270	5790	4840	5370	5900	4930	5470	6010	
	9.96	6400	7100	7800	6600	7300	8000	6700	7400	8100	
10.70	0.405	4940	5480	6020	5040	5590	6140	5130	5690	6250	
	10.29	6700	7400	8100	6800	7600	8400	6900	7700	8500	



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
<b>2 7/8"</b> 73.03	<b>11.50</b>	<b>0.440</b>	-	-	-	<b>3970</b> 5400	<b>4170</b> 5900	<b>4370</b> 5900	<b>4200</b> 5700	<b>4660</b> 6300	<b>5120</b> 6900	<b>4790</b> 6500	<b>5320</b> 7200	<b>5850</b> 7900	<b>5290</b> 7200	<b>5870</b> 8000	<b>6450</b> 8800
<b>3 1/2"</b> 88.90	<b>6.50</b>	<b>0.170</b>	-	-	-	<b>1290</b> 1730	<b>1350</b> 1820	<b>1410</b> 1910	<b>1380</b> 1860	<b>1530</b> 2070	<b>1680</b> 2280	<b>1440</b> 1940	<b>1590</b> 2160	<b>1740</b> 2380	<b>1500</b> 2020	<b>1660</b> 2250	<b>1820</b> 2480
<b>7.70</b>	<b>0.216</b>	-	-	-	-	<b>2040</b> 2760	<b>2140</b> 2900	<b>2240</b> 3040	<b>2040</b> 2750	<b>2260</b> 3060	<b>2480</b> 3370	<b>2130</b> 2880	<b>2360</b> 3200	<b>2590</b> 3520	<b>2220</b> 3000	<b>2460</b> 3330	<b>2700</b> 3660
<b>9.20</b>	<b>0.254</b>	-	-	-	-	<b>2630</b> 3560	<b>2760</b> 3740	<b>2890</b> 3920	<b>2610</b> 3540	<b>2900</b> 3930	<b>3190</b> 4320	<b>2720</b> 3690	<b>3020</b> 4100	<b>3320</b> 4510	<b>2860</b> 3870	<b>3170</b> 4300	<b>3480</b> 4730
<b>10.20</b>	<b>0.289</b>	-	-	-	-	<b>3210</b> 4340	<b>3370</b> 4570	<b>3530</b> 4800	<b>3200</b> 4320	<b>3550</b> 4820	<b>3900</b> 5320	<b>3330</b> 4500	<b>3700</b> 5000	<b>4070</b> 5500	<b>3500</b> 4800	<b>3880</b> 5300	<b>4260</b> 5800
<b>12.70</b>	<b>0.375</b>	-	-	-	-	<b>4660</b> 6250	<b>4900</b> 6600	<b>5140</b> 6950	<b>4950</b> 6700	<b>5500</b> 7500	<b>6050</b> 8300	<b>5310</b> 7200	<b>5890</b> 8000	<b>6470</b> 8800	<b>5610</b> 7500	<b>6120</b> 7500	<b>6730</b> 9100
<b>13.70</b>	<b>0.413</b>	-	-	-	-	<b>5200</b> 7050	<b>5470</b> 7400	<b>5740</b> 7750	<b>5610</b> 7600	<b>6230</b> 8500	<b>6850</b> 9400	<b>6020</b> 8200	<b>6680</b> 9100	<b>7340</b> 10000	<b>6230</b> 8500	<b>6920</b> 9400	<b>7610</b> 10300
<b>14.30</b>	<b>0.430</b>	-	-	-	-	<b>5440</b> 7400	<b>5720</b> 7800	<b>6000</b> 8200	<b>5900</b> 8000	<b>6550</b> 9000	<b>7200</b> 9800	<b>6340</b> 8500	<b>7040</b> 9400	<b>7740</b> 10500	<b>6570</b> 8900	<b>7300</b> 9900	<b>8030</b> 10900
<b>14.70</b>	<b>0.449</b>	-	-	-	-	<b>5700</b> 7700	<b>6000</b> 8100	<b>6300</b> 8500	<b>6210</b> 8400	<b>6890</b> 9300	<b>7570</b> 10200	<b>6690</b> 9100	<b>7430</b> 10100	<b>8170</b> 11100	<b>6930</b> 9400	<b>7700</b> 10400	<b>8470</b> 11400
<b>15.50</b>	<b>0.476</b>	-	-	-	-	<b>6020</b> 8150	<b>6330</b> 8600	<b>6640</b> 9050	<b>6670</b> 9000	<b>7410</b> 10000	<b>8150</b> 11000	<b>7310</b> 9900	<b>8120</b> 11000	<b>8930</b> 12100	<b>7790</b> 10600	<b>8650</b> 11800	<b>9510</b> 13000
<b>16.70</b>	<b>0.510</b>	-	-	-	-	<b>6470</b> 8750	<b>6810</b> 9200	<b>7140</b> 9650	<b>7160</b> 9700	<b>7950</b> 10800	<b>8740</b> 11900	<b>7880</b> 10700	<b>8750</b> 11900	<b>9620</b> 13100	<b>8420</b> 11400	<b>9350</b> 12700	<b>10280</b> 14000
<b>18.35</b>	<b>0.575</b>	-	-	-	-	<b>6900</b> 9350	<b>7680</b> 10400	<b>8450</b> 11450	<b>8040</b> 10900	<b>8930</b> 12110	<b>9820</b> 13320	<b>9040</b> 12240	<b>10040</b> 13600	<b>11040</b> 14960	<b>9610</b> 13050	<b>10680</b> 14500	<b>11750</b> 15950
<b>4"</b> 101.60	<b>8.20</b>	<b>0.190</b>	-	-	-	<b>1940</b> 2630	<b>2040</b> 2770	<b>2140</b> 2910	<b>2020</b> 2740	<b>2240</b> 3040	<b>2460</b> 3340	<b>2110</b> 2860	<b>2340</b> 3180	<b>2570</b> 3500	<b>2190</b> 2970	<b>2430</b> 3300	<b>2670</b> 3630

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.		
<b>2 7/8"</b> 73.03	<b>11.50</b>	<b>0.440</b>	<b>5580</b>	<b>6190</b>	<b>6800</b>	<b>5760</b>	<b>6400</b>	<b>7040</b>	<b>5960</b>	<b>6610</b>	<b>7270</b>
			7600	8400	9200	7800	8700	9600	8100	9000	9900
<b>3 1/2"</b> 88.90	<b>6.50</b>	<b>0.170</b>	<b>1540</b>	<b>1710</b>	<b>1880</b>	<b>1570</b>	<b>1740</b>	<b>1910</b>	<b>1620</b>	<b>1800</b>	<b>1980</b>
			2080	2370	2540	2120	2360	2600	2200	2440	2680
<b>7.70</b>	<b>0.216</b>	<b>0.216</b>	<b>2360</b>	<b>2610</b>	<b>2870</b>	<b>2440</b>	<b>2710</b>	<b>2980</b>	<b>2530</b>	<b>2810</b>	<b>3090</b>
			3190	3540	3890	3370	3680	4050	3430	3870	4190
<b>9.20</b>	<b>0.254</b>	<b>0.3030</b>	<b>3030</b>	<b>3360</b>	<b>3690</b>	<b>3150</b>	<b>3490</b>	<b>3830</b>	<b>3260</b>	<b>3620</b>	<b>3980</b>
			4700	5560	5020	4260	4730	5200	4400	4900	5400
<b>10.20</b>	<b>0.289</b>	<b>0.3710</b>	<b>4120</b>	<b>4530</b>	<b>4830</b>	<b>3860</b>	<b>4280</b>	<b>4700</b>	<b>3990</b>	<b>4430</b>	<b>4870</b>
			5000	5600	6200	5200	5800	6400	5400	6000	6600
<b>12.70</b>	<b>0.375</b>	<b>0.413</b>	<b>5680</b>	<b>6310</b>	<b>6940</b>	<b>5800</b>	<b>6440</b>	<b>7080</b>	<b>5900</b>	<b>6550</b>	<b>7200</b>
			7700	8600	9500	7800	8700	9600	8000	8900	9800
<b>13.70</b>	<b>0.413</b>	<b>0.413</b>	<b>6440</b>	<b>7150</b>	<b>7860</b>	<b>6570</b>	<b>7290</b>	<b>8010</b>	<b>6680</b>	<b>7420</b>	<b>8160</b>
			8700	9700	10700	8900	9900	10900	9100	10100	11100
<b>14.30</b>	<b>0.430</b>	<b>0.430</b>	<b>6790</b>	<b>7540</b>	<b>8290</b>	<b>6920</b>	<b>7680</b>	<b>8440</b>	<b>7040</b>	<b>7820</b>	<b>8600</b>
			9200	10200	11200	9400	10400	11400	9500	10600	11700
<b>14.70</b>	<b>0.449</b>	<b>0.449</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>	<b>7300</b>	<b>8110</b>	<b>8920</b>	<b>7440</b>	<b>8260</b>	<b>9080</b>
			9700	10800	11900	9900	11000	12100	10100	11200	12300
<b>15.50</b>	<b>0.476</b>	<b>0.476</b>	<b>8060</b>	<b>8950</b>	<b>9840</b>	<b>8240</b>	<b>9150</b>	<b>10060</b>	<b>8370</b>	<b>9300</b>	<b>10230</b>
			10900	12100	13300	11200	12400	13600	11300	12600	13900
<b>16.70</b>	<b>0.510</b>	<b>0.510</b>	<b>8690</b>	<b>9650</b>	<b>10610</b>	<b>8950</b>	<b>9850</b>	<b>10750</b>	<b>9000</b>	<b>10000</b>	<b>11000</b>
			11800	13100	14400	12100	13400	14700	12200	13600	15000
<b>18.35</b>	<b>0.575</b>	<b>0.575</b>	<b>9930</b>	<b>11030</b>	<b>12130</b>	<b>10130</b>	<b>11250</b>	<b>12400</b>	<b>10300</b>	<b>11450</b>	<b>12600</b>
			13460	14950	16450	13700	15250	16800	13950	15500	17050
<b>4"</b> 101.60	<b>8.20</b>	<b>0.190</b>	<b>2260</b>	<b>2510</b>	<b>2760</b>	<b>2350</b>	<b>2610</b>	<b>2870</b>	<b>2440</b>	<b>2710</b>	<b>2980</b>
			3060	3400	3740	3190	3540	3890	3300	3670	4040



VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
in. mm.			ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.		
4" 101.60	9.50	0.226	-	-	2670	2810	2950	3240	2660	2950	3240	2780	3080	3380	2950	3270	3590	
		5.74	-	-	3610	3800	3990	4400	3600	4000	4400	3760	4180	4600	3990	4430	4870	
		10.90	0.262	-	-	3390	3560	3730	4120	3380	3750	4120	3520	3910	4300	3740	4150	4560
			6.65	-	-	4570	4820	5070	5600	4600	5100	5600	4800	5300	5800	5000	5600	6200
		11.60	0.286	-	-	3660	4060	4460	4710	3850	4280	4710	4010	4460	4910	4260	4730	5200
			7.26	-	-	4950	5500	6050	6380	5220	5800	6380	5450	6050	6650	5770	6410	7050
		12.10	0.299	-	-	4140	4350	4560	5030	4130	4580	5030	4310	4780	5250	4570	5070	5570
			7.59	-	-	5600	5900	6200	6800	5600	6200	6800	5800	6500	7200	6200	6900	7600
		13.20	0.330	-	-	4750	4990	5230	5770	4730	5250	5770	4940	5480	6020	5220	5790	6360
			8.38	-	-	6450	6800	7150	7800	6400	7100	7800	6700	7400	8100	7100	7900	8700
		14.80	0.380	-	-	5910	6220	6530	7630	6250	6940	7630	6530	7250	7970	6770	7620	8270
			9.65	-	-	8000	8400	8800	9800	8500	9400	10300	8800	9800	10800	9200	10200	11200
	16.10	0.415	-	-	6650	6990	7330	8630	7070	7850	8630	7380	8190	9000	7650	8600	9350	
		10.54	-	-	9000	9500	10000	11700	9500	10600	11700	10000	11100	12200	10300	11500	12700	
	16.50	0.430	-	-	6920	7280	7640	9040	7400	8220	9040	7740	8600	9460	8010	8900	9790	
		10.92	-	-	9400	9900	10400	12300	10100	11200	12300	10400	11600	12800	10900	12100	13300	
	18.90	0.500	-	-	8030	8450	8870	10800	9000	9900	10800	9800	10800	11800	10150	11250	12350	
		12.70	-	-	10650	11400	11950	14700	12100	13400	14700	13200	14700	16200	13700	15200	16700	
	22.20	0.610	-	-	9900	10400	10900	13400	11000	12200	13400	12300	13600	14900	13100	14600	15900	
		15.49	-	-	13400	14100	14800	18200	14800	16500	18200	16600	18400	20200	17600	19600	21600	
4 1/2" 114.30	10.50	0.224	-	-	2890	3040	3190	3530	2890	3210	3530	3150	3490	3830	3390	3760	4130	
		5.69	-	-	3930	4130	4340	4790	3910	4350	4790	4260	4730	5200	4600	5100	5600	
	11.60	0.260	-	-	3440	3620	3800	4260	3500	3880	4260	3800	4220	4640	4090	4540	4990	
		6.35	-	-	4650	4900	5150	5800	4800	5300	5800	5100	5700	6300	5600	6200	6800	
12.60	0.271	-	-	3890	4090	4290	4880	4000	4440	4880	4340	4820	5300	4680	5200	5700		
	6.88	-	-	5200	5500	5800	6600	5400	6000	6600	5800	6500	7200	6300	7000	7700		



## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.		
4" 101.60	9.50	0.226 5.74	3140	3480	3820	3260	3620	3980	3380	3750	4120
			4250	4720	5190	4400	4900	5400	4600	5100	5600
			3980	4420	4860	4140	4600	5060	4300	4770	5240
	10.90	0.262 6.65	5400	6000	6600	5600	6200	6800	5800	6500	7200
			4530	5030	5530	4710	5230	5750	4890	5430	5970
			6150	6830	7510	6380	7090	7800	6620	7360	8100
	12.10	0.299 7.59	6600	7300	8000	6800	7600	8400	7100	7900	8700
			4860	5400	5940	5050	5610	6170	5240	5820	6400
			5550	6160	6770	5760	6400	7040	5970	6630	7290
	13.20	0.330 8.38	7600	8400	9200	7800	8700	9600	8100	9000	9900
			7000	7770	8540	7130	7920	8710	7320	8130	8940
			9400	10500	11600	9600	10700	11800	9900	11000	12100
14.80	0.380 9.65	7880	8750	9620	8060	8950	9840	8240	9150	10060	
		10700	11900	13100	10900	12100	13300	11200	12400	13600	
		8280	9200	10120	8420	9350	10280	8640	9600	10560	
16.50	0.430 10.92	11200	12500	13800	11400	12700	14000	11700	13000	14300	
		10500	11600	12700	10700	11800	12900	10850	12050	13250	
		14100	15700	17300	14400	16000	17600	14700	16300	17900	
18.90	0.500 12.70	13550	14950	16350	13750	15250	16750	14000	15500	17000	
		18300	20300	22300	18600	20700	22800	18900	21000	23100	
		3620	4020	4420	3780	4200	4620	3940	4370	4800	
10.50 114.30	0.224 5.69	4900	5500	6100	5100	5700	6300	5300	5900	6500	
		4380	4860	5340	4570	5070	5570	4760	5280	5800	
		5900	6600	7300	6200	6900	7600	6500	7200	7900	
11.60	0.260 6.35	5010	5560	6110	5220	5800	6380	5430	6030	6630	
		6700	7500	8300	7100	7900	8700	7400	8200	9000	

**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
4 1/2" 114.30	13.50	0.290 7.37	-	4370	4600	4830	4450	4940	5430	4830	5360	5890	5200	5770	6340		
			-	5900	6200	6500	6000	6700	7400	6600	7300	8000	7000	7800	8600		
			-	5490	5770	6060	5550	6160	6770	6010	6670	7330	6460	7170	7880		
			-	7400	7800	8200	7500	8300	9100	8100	9000	9900	8700	9700	10700		
			-	6880	7240	7600	6620	7350	8080	7140	7930	8720	7650	8500	9350		
			-	9300	9800	10300	9000	10000	11000	9600	10700	11800	10300	11500	12700		
			-	7500	7890	8280	7190	7980	8770	7740	8600	9460	8280	9200	10120		
			-	10150	10700	11250	9700	10800	11900	10500	11700	12900	11200	12500	13800		
			-	8270	8700	9140	7920	8800	9680	8550	9500	10450	9200	10200	11200		
			-	11200	11800	12400	10800	12000	13200	11600	12900	14200	12400	13800	15200		
21.50	0.500	12.70	-	10100	10600	11100	9950	11050	12150	10400	11500	12600	11150	12350	13550		
			-	13700	14400	15100	13500	15000	16500	14000	15600	17200	15000	16700	18400		
			-	11350	11900	12450	11450	12650	13850	11750	13050	14350	12600	14000	15400		
			-	15300	16100	16900	15400	17100	18800	15900	17700	19500	17100	19000	20900		
			-	3330	3690	4050	3710	4120	4530	4230	4700	5170	4560	5060	5560		
15.00	0.296	7.52	3000	4060	4510	4960	5000	5600	6200	5800	6400	7000	6200	6900	7600		
			3910	4340	4770	4230	4700	5170	4560	5060	5560	5220	5790	6360	5860	6510	7160
			5300	5900	6500	5800	6400	7000	6200	6900	7600	7000	7800	8600	7900	8800	9700
			4560	5060	5560	4880	5420	5960	5220	5790	6360	5540	6150	6760	6190	6870	7550
			6200	6900	7600	6700	7400	8100	7000	7800	8600	7500	8300	9100	8400	9300	10200
20.30	0.408	10.36	5540	6150	6760	5860	6510	7160	6510	7230	7950	7170	7960	8750	8150	9050	9950
			7500	8300	9100	7900	8800	9700	8800	9800	10800	9700	10800	11900	11100	12300	13500
			5860	6510	7160	6510	7230	7950	7170	7960	8750	7830	8700	9570	8780	9750	10720
			7900	8800	9700	8800	9800	10800	9700	10800	11900	10600	11800	13000	11900	13200	14500
			6190	6870	7550	6840	7590	8340	7470	8300	9130	8460	9400	10340	9150	10150	11150
21.40	0.437	11.10	8400	9300	10200	9300	10300	11300	10200	11300	12400	11400	12700	14000	12300	13700	15100
			8400	9300	10200	9300	10300	11300	10200	11300	12400	11400	12700	14000	12300	13700	15100

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	lb/ft	in.	ft.lb.			ft.lb.			ft.lb.		
mm.		mm.	N.m.			N.m.			N.m.		
4 1/2" 114.30	13.50	0.290	5560	6170	6780	5790	6430	7070	6030	6690	7350
		7.37	7600	8400	9200	7800	8700	9600	8200	9100	10000
	15.10	0.337	6890	7650	8410	7180	7970	8760	7470	8290	9110
		8.56	9400	10400	11400	9700	10800	11900	10100	11200	12300
	17.00	0.380	8150	9050	9950	8450	9400	10340	8780	9750	10720
		9.65	11000	12200	13400	11400	12700	14000	11900	13200	14500
	17.70	0.402	8900	9800	10700	9200	10200	11200	9550	10550	11550
		10.21	12000	13300	14600	12400	13800	15200	12900	14300	15700
	18.90	0.430	9850	10850	11850	10150	11250	12350	10550	11650	12750
		10.92	13200	14700	16200	13800	15300	16800	14200	15800	17400
21.50	0.500	11800	13100	14400	12300	13600	14900	12650	14050	15450	
	12.70	16000	17800	19600	16600	18400	20200	17200	19100	21000	
23.70	0.560	13450	14850	16250	13950	15450	16950	14400	16000	17600	
	14.22	18200	20200	22200	18500	20900	23000	19500	21700	23900	
5" 127.00	13.00	0.253	5220	5790	6360	5540	6150	6760	5860	6510	7160
		6.43	7000	7800	8600	7500	8300	9100	7900	8800	9700
	15.00	0.296	6510	7230	7950	6840	7590	8340	7170	7960	8750
		7.52	8800	9800	10800	9300	10300	11300	9700	10800	11900
	18.00	0.362	6840	7590	8340	7170	7960	8750	7630	8500	9370
		9.19	9300	10300	11300	9700	10800	11900	10600	11800	13000
	20.30	0.408	8780	9750	10720	9500	10500	11500	10100	11200	12300
		10.36	11900	13200	14500	12800	14200	15600	13700	15200	16700
	20.80	0.422	9500	10500	11500	10450	11550	12650	11100	12300	13500
		10.72	12800	14200	15600	14100	15700	17300	15000	16700	18400
21.40	0.437	9850	10850	11850	10850	11950	13050	11700	13000	14300	
	11.10	13200	14700	16200	14600	16200	17800	15900	17700	19500	



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	
5" 127.00	23.20	0.478	7170	7960	8750	8150	9050	9950	8780	9750	10720	9500	10500	11500	10850	11950	13050
			9700	10800	11900	11700	12300	13500	11900	13200	14500	12800	14200	15600	14600	16200	17800
			8010	8900	9790	8730	9700	10670	9900	11000	12100	11050	12250	13450	12300	13600	14900
			10800	12000	13200	11900	13200	14500	13400	14900	16400	14900	16600	18300	16600	18400	20200
			3190	3540	3890	3590	3980	4370	4040	4480	4920	4650	5060	5560	5080	5640	6200
5 1/2" 139.70	15.50	0.275	4330	4810	5290	4900	5400	5900	5500	6100	6700	6200	6900	7600	6800	7600	8400
			3590	3980	4370	4230	4700	5170	4560	5060	5560	5220	5790	6360	5860	6510	7160
			4900	5400	5900	5800	6400	7000	6200	6900	7600	7000	7800	8600	7900	8800	9700
			3910	4340	4770	4560	5060	5560	4880	5420	5960	5540	6150	6760	6190	6870	7650
			4880	5420	5960	5220	5790	6360	5860	6510	7160	6610	7230	7950	6840	7690	8340
23.00	0.415	10.54	6700	7400	8100	7000	7800	8600	7900	8800	9700	8800	9800	10800	9300	10300	11300
			6190	6870	7550	6840	7590	8340	7470	8300	9130	8150	9050	9950	9600	10500	11500
			8400	9300	10200	9300	10300	11300	10200	11300	12400	11100	12300	13500	12800	14200	15600
			10600	11800	13000	11900	13200	14500	13200	14700	16200	14600	16200	17800	16700	18600	20500
			8730	9700	10670	9700	10700	11700	11000	12200	13400	12400	13700	15000	13700	15200	16700
26.80	0.500	12.09	11900	13200	14500	13000	14500	16000	14800	16500	18200	16700	18600	20500	18500	20600	22700
			10750	11750	12800	11850	12950	14200	13500	14800	13650	15150	16650	15250	16850	18450	
			13100	14600	16100	14400	16000	17600	16500	18300	20100	18500	20600	22700	20600	22900	25200
			10600	11700	12800	11750	13050	14350	13500	14900	16300	15200	16800	18400	16850	18650	20450
			14300	15900	17500	15900	17700	19500	18200	20200	22200	20500	22800	25100	22800	25300	27800
5 3/4" 146.05	18.10	0.304	4370	4850	5330	5540	6150	6760	6250	6940	7630	7170	7960	8750	7830	8700	9570
			5900	6600	7300	7500	8300	9100	8500	9400	10300	9700	10800	11900	10600	11800	13000
			5040	5610	6170	5580	6210	6830	6430	7150	7860	7290	8100	8910	8170	9080	9980
			6900	7600	8400	7600	8400	9300	8700	9700	10700	9900	11000	12100	11100	12300	13500

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.			ft.lb. N.m.			ft.lb. N.m.		
5" 127.00	23.20	0.478	12100	13400	14700	12700	14100	15500	13700	15200	16700
			16300	18100	19900	17200	19100	21000	18500	20600	22700
			13500	14900	16300	14400	16000	17600	15400	17100	18800
5 1/2" 139.70	14.00	0.244	18200	20200	22200	19500	21700	23900	20900	23200	25500
			5670	6290	6910	6120	6800	7480	6510	7230	7950
			7600	8500	9400	8300	9200	10100	8800	9800	10800
15.50	0.275	0.304	8800	9800	10800	9700	10800	11900	10200	11300	12400
			6510	7230	7950	7170	7960	8750	7470	8300	9130
			6840	7590	8340	7470	8300	9130	7830	8700	9570
17.00	0.361	7.72	10200	11300	12400	10200	11300	12400	10600	11800	13000
			7470	8300	9130	8150	9050	9950	8460	9400	10340
			11100	12300	13500	11100	12300	13500	11700	13000	14300
20.00	0.415	9.17	15000	16700	18400	15000	16700	18400	15900	17700	19500
			13700	15200	16700	15060	16650	18250	15650	17350	19050
			20300	22600	24900	21100	23500	25900	21100	23500	25900
23.00	0.500	12.09	20400	22700	25000	22000	24500	27000	22000	24500	27000
			16800	18600	20400	18050	20050	22050	19400	21500	23600
			24500	27000	29900	24500	27200	29900	26200	29100	32000
26.80	0.562	14.27	25100	27900	30700	27100	30100	33100	28300	31400	34500
			16800	18600	20400	16300	18100	19900	17500	19400	21300
			24500	27000	29900	22000	24500	27000	23700	26300	28900
29.70	0.630	13.46	27100	29900	32700	27100	30100	33100	28300	31400	34500
			18600	20600	22600	20000	22200	24400	20850	23150	25450
			24500	27000	29900	24500	27200	29900	26200	29100	32000
18.10 146.05	19.70	0.335	8460	9400	10340	8780	9750	10720	9150	10150	11150
			11400	12700	14000	11900	13200	14500	12300	13700	15100
			9040	10050	11050	9810	10900	11990	10500	11700	12800
		8.51	12300	13600	15000	13300	14800	16300	14200	15900	17400



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi							
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.					
in. mm.			ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.	ft.-lb. N.m.						
<b>5 3/4*</b> 146.05	<b>21.70</b>	<b>0.375</b> 9.53	<b>5980</b>	<b>6650</b>	<b>7310</b>	<b>6620</b>	<b>7360</b>	<b>8090</b>	<b>7630</b>	<b>8480</b>	<b>9320</b>	<b>8640</b>	<b>9610</b>	<b>10570</b>	<b>9670</b>	<b>10750</b>	<b>11820</b>					
			8100	9000	9900	9000	10000	11000	10300	11500	12600	11700	13000	14300	13100	14600	16000					
			<b>6 5/8*</b> 168.28	<b>20.00</b>	<b>0.288</b> 7.32	<b>4230</b>	<b>4700</b>	<b>5170</b>	<b>4880</b>	<b>5420</b>	<b>5960</b>	<b>5540</b>	<b>6150</b>	<b>6760</b>	<b>6190</b>	<b>6870</b>	<b>7550</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>		
						5800	6400	7000	6700	7400	8100	7500	8300	9100	8400	9300	10200	9700	10800	11900		
						<b>23.20</b>	<b>0.330</b>	<b>4560</b>	<b>5060</b>	<b>5560</b>	<b>5220</b>	<b>5790</b>	<b>6360</b>	<b>5860</b>	<b>6510</b>	<b>7160</b>	<b>6610</b>	<b>7230</b>	<b>7950</b>	<b>7470</b>	<b>8300</b>	<b>9130</b>
						6200	6900	7600	7000	7800	8600	7900	8800	9700	8800	9800	10800	10200	11300	12400		
						<b>24.00</b>	<b>0.352</b>	<b>4880</b>	<b>5420</b>	<b>5960</b>	<b>5540</b>	<b>6150</b>	<b>6760</b>	<b>6190</b>	<b>6870</b>	<b>7550</b>	<b>6840</b>	<b>7590</b>	<b>8340</b>	<b>7830</b>	<b>8700</b>	<b>9570</b>
						6700	7400	8100	7500	8300	9100	8400	9300	10200	9300	10300	11300	10300	11300	12300	13300	
						<b>28.00</b>	<b>0.417</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>	<b>7830</b>	<b>8700</b>	<b>9570</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10100</b>	<b>11200</b>	<b>12300</b>
						10.59	9700	10800	11900	10600	11800	13000	11400	12700	14000	12300	13700	15100	13700	15200	16700	
<b>32.00</b>	<b>0.475</b>	<b>8780</b>	<b>9750</b>	<b>10720</b>	<b>9800</b>	<b>10600</b>	<b>11500</b>	<b>10850</b>	<b>11950</b>	<b>13050</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>						
12.07	11900	13200	14500	12800	14200	15600	14600	16200	17800	15900	17700	19500	17600	19600	21600							
<b>36.70</b>	<b>0.562</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>12700</b>	<b>14100</b>	<b>15500</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>16000</b>	<b>17700</b>	<b>19400</b>	<b>17650</b>	<b>19550</b>	<b>21450</b>						
14.27	15900	17700	19500	17200	19100	21000	19400	21600	23800	21600	24000	26400	23800	26500	29200							
<b>7*</b> 177.80	<b>23.00</b>	<b>0.317</b> 8.05	<b>5540</b>	<b>6150</b>	<b>6760</b>	<b>6190</b>	<b>6870</b>	<b>7550</b>	<b>6840</b>	<b>7590</b>	<b>8340</b>	<b>7470</b>	<b>8300</b>	<b>9130</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>					
			7500	8300	9100	8400	9200	10200	9300	10300	11300	10200	11300	12400	11400	12700	14000					
			<b>26.00</b>	<b>0.362</b>	<b>6190</b>	<b>6870</b>	<b>7550</b>	<b>6840</b>	<b>7590</b>	<b>8340</b>	<b>7470</b>	<b>8300</b>	<b>9130</b>	<b>8150</b>	<b>9050</b>	<b>9950</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>			
			8400	9300	10200	9300	10300	11300	10200	11300	12400	11100	12300	13500	12300	13700	15100					
			<b>29.00</b>	<b>0.408</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>	<b>7830</b>	<b>8700</b>	<b>9570</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10450</b>	<b>11550</b>	<b>12650</b>			
			9700	10800	11900	10600	11800	13000	11400	12700	14000	12300	13700	15100	14100	15700	17300					
			<b>32.00</b>	<b>0.453</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10100</b>	<b>11200</b>	<b>12300</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>			
			11.51	11400	12700	14000	12300	13700	15100	13700	15200	16700	18400	15000	16700	18400	16700	18600	20500			
			<b>35.00</b>	<b>0.498</b>	<b>9850</b>	<b>10850</b>	<b>11850</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>12100</b>	<b>13400</b>	<b>14700</b>	<b>13700</b>	<b>15200</b>	<b>16700</b>	<b>15050</b>	<b>16650</b>	<b>18250</b>			
			12.65	13200	14700	16200	15000	16700	18400	16300	18100	19900	18500	20600	22700	20300	22600	24900				
<b>38.00</b>	<b>0.540</b>	<b>11450</b>	<b>12650</b>	<b>13850</b>	<b>12700</b>	<b>14100</b>	<b>15500</b>	<b>14050</b>	<b>15550</b>	<b>17050</b>	<b>16650</b>	<b>17350</b>	<b>19050</b>	<b>17000</b>	<b>18800</b>	<b>20600</b>						
13.72	15500	17200	18900	17200	19100	21000	19000	21100	23200	21100	23500	25900	22900	25500	28100							

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.			ft.lb. N.m.			ft.lb. N.m.		
<b>5 3/4*</b> 146.05	<b>21.70</b>	<b>0.375</b>	<b>10750</b>	<b>11950</b>	<b>13140</b>	<b>11610</b>	<b>12900</b>	<b>14190</b>	<b>12500</b>	<b>13900</b>	<b>15200</b>
		9.53	14600	16200	17800	15700	17500	19200	16900	18800	20600
<b>6 5/8*</b> 168.28	<b>20.00</b>	<b>0.288</b>	<b>8700</b>	<b>9750</b>	<b>10340</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>
		7.32	10600	11800	13000	11400	12700	14000	12300	13700	15100
<b>23.20</b>	<b>0.330</b>	<b>0.330</b>	<b>8150</b>	<b>9050</b>	<b>9950</b>	<b>8780</b>	<b>9750</b>	<b>10720</b>	<b>9500</b>	<b>10500</b>	<b>11500</b>
		8.38	11100	12300	13500	11900	13200	14500	12800	14200	15600
<b>24.00</b>	<b>0.352</b>	<b>0.352</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>9850</b>	<b>10850</b>	<b>11850</b>
		8.94	11400	12700	14000	12300	13700	15100	13200	14700	16200
<b>28.00</b>	<b>0.417</b>	<b>0.417</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>
		10.59	15000	16700	18400	15900	17700	19500	16700	18600	20500
<b>32.00</b>	<b>0.475</b>	<b>0.475</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>15300</b>	<b>17000</b>	<b>18700</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>
		12.07	19400	21600	23800	20700	23000	25300	22000	24500	27000
<b>36.70</b>	<b>0.562</b>	<b>0.562</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		14.27	26500	29400	32300	28300	31400	34500	28300	31400	34500
<b>7*</b> 177.80	<b>23.00</b>	<b>0.317</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10100</b>	<b>11200</b>	<b>12300</b>	<b>10850</b>	<b>11950</b>	<b>13050</b>
		8.05	12300	13700	15100	13700	15200	16700	14600	16200	17800
<b>26.00</b>	<b>0.362</b>	<b>0.362</b>	<b>9850</b>	<b>10850</b>	<b>11850</b>	<b>10850</b>	<b>11950</b>	<b>13050</b>	<b>11450</b>	<b>12650</b>	<b>13850</b>
		9.19	13200	14700	16200	14600	16200	17800	15500	17200	18900
<b>29.00</b>	<b>0.408</b>	<b>0.408</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>
		10.36	15000	16700	18400	15900	17700	19500	16700	18600	20500
<b>32.00</b>	<b>0.453</b>	<b>0.453</b>	<b>13400</b>	<b>14800</b>	<b>16200</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>15050</b>	<b>16650</b>	<b>18250</b>
		11.51	18100	20100	22100	19400	21600	23800	20300	22600	24900
<b>35.00</b>	<b>0.498</b>	<b>0.498</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>17600</b>	<b>19500</b>	<b>21400</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>
		12.65	22000	24500	27000	23800	26500	29200	25600	28400	31200
<b>38.00</b>	<b>0.540</b>	<b>0.540</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>	<b>20200</b>	<b>22400</b>	<b>24600</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		13.72	25600	28400	31200	27400	30400	33400	28300	31400	34500

**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
<b>7"</b> 177.80	<b>41.00</b>	<b>0.590</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>	<b>15050</b>	<b>16650</b>	<b>18250</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>
			17600	19600	21600	20300	22600	24900	22000	24500	27000	24700	27500	30300	26500	29400	32300
			15050	16650	18250	16300	18100	19900	18250	20250	22250	20850	23150	25450	20850	23150	25450
<b>7 5/8"</b> 193.68	<b>26.40</b>	<b>0.328</b>	<b>6510</b>	<b>7230</b>	<b>7950</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>	<b>8150</b>	<b>9050</b>	<b>9950</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10450</b>	<b>11650</b>	<b>12650</b>
			8800	9800	10800	9700	10800	11900	11100	12300	13500	12300	13700	15100	14100	15700	17300
			7630	8700	9570	8460	9400	10340	9150	10150	11150	10450	11550	12650	11700	13000	14300
<b>7 3/4"</b> 196.85	<b>29.70</b>	<b>0.430</b>	<b>7830</b>	<b>8700</b>	<b>9570</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10450</b>	<b>11550</b>	<b>12650</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>
			10600	11800	13000	11400	12700	14000	12300	13700	15100	14100	15700	17300	15900	17700	19500
			12300	13700	15100	13700	15200	16700	15000	16700	18400	16700	18600	20500	18500	20600	22700
<b>8 5/8"</b> 219.08	<b>35.80</b>	<b>0.465</b>	<b>10450</b>	<b>11550</b>	<b>12650</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>
			14100	15700	17300	15900	17700	19500	17600	19600	21600	19400	21600	23800	22000	24500	27000
			13700	15200	16700	14650	16250	17850	17000	18800	20600	18900	21000	23100	20850	23150	25450
<b>8 3/4"</b> 219.08	<b>39.00</b>	<b>0.500</b>	<b>13700</b>	<b>15200</b>	<b>16700</b>	<b>14650</b>	<b>16250</b>	<b>17850</b>	<b>17000</b>	<b>18800</b>	<b>20600</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
			18500	20600	22700	19900	22100	24300	22900	25500	28100	25600	28400	31200	28300	31400	34500
			15050	16650	18250	16300	18100	19900	18900	21000	23100	20850	23150	25450	20850	23150	25450
<b>9 5/8"</b> 244.48	<b>45.30</b>	<b>0.595</b>	<b>20300</b>	<b>22600</b>	<b>24900</b>	<b>22000</b>	<b>24500</b>	<b>27000</b>	<b>25600</b>	<b>29400</b>	<b>31200</b>	<b>28300</b>	<b>31400</b>	<b>34500</b>	<b>28300</b>	<b>31400</b>	<b>34500</b>
			16300	18100	19900	18000	19900	21800	20200	22400	24600	20850	23150	25450	20850	23150	25450
			22000	24500	27000	24300	27000	29700	27400	30400	33400	28300	31400	34500	28300	31400	34500
<b>10 5/8"</b> 271.45	<b>47.10</b>	<b>0.625</b>	<b>15050</b>	<b>16650</b>	<b>18250</b>	<b>17000</b>	<b>18800</b>	<b>20600</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
			20300	22600	24900	22900	25500	28100	24700	27500	30300	28300	31400	34500	28300	31400	34500
			7170	7960	8750	7470	8300	9130	8150	9050	9950	9150	10150	11150	12300	13700	15100
<b>11 5/8"</b> 295.25	<b>46.10</b>	<b>0.595</b>	<b>10200</b>	<b>11300</b>	<b>12400</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>	<b>13700</b>	<b>15000</b>	<b>16200</b>
			9700	10800	11900	10200	11300	12400	11100	12300	13500	12450	13750	15050	13700	15000	16200
			12300	13700	15100	14100	15700	17300	15000	16700	18400	16700	18600	20500	18500	20600	22700



## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.			ft.lb. N.m.			ft.lb. N.m.		
<b>7"</b> <i>177.80</i>	<b>41.00</b>	<b>0.590</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		<i>14.99</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
	<b>42.70</b>	<b>0.625</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
<b>7 5/8"</b> <i>193.68</i>		<i>15.88</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
	<b>26.40</b>	<b>0.328</b>	<b>11450</b>	<b>12650</b>	<b>13850</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>	<b>13450</b>	<b>14850</b>	<b>16250</b>
		<i>8.33</i>	<i>15500</i>	<i>17200</i>	<i>18900</i>	<i>16700</i>	<i>18600</i>	<i>20500</i>	<i>18100</i>	<i>20100</i>	<i>22100</i>
<b>29.70</b>		<i>9.53</i>	<i>11700</i>	<i>13000</i>	<i>14300</i>	<b>12700</b>	<b>14100</b>	<b>15500</b>	<b>13700</b>	<b>15200</b>	<b>16700</b>
		<i>0.430</i>	<i>15900</i>	<i>17700</i>	<i>19500</i>	<i>17200</i>	<i>19100</i>	<i>21000</i>	<i>18500</i>	<i>20600</i>	<i>22700</i>
	<b>33.70</b>	<b>0.465</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>	<b>13400</b>	<b>14800</b>	<b>16200</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>
<b>35.80</b>		<i>10.92</i>	<i>16700</i>	<i>18600</i>	<i>20500</i>	<i>18100</i>	<i>20100</i>	<i>22100</i>	<i>19400</i>	<i>21600</i>	<i>23800</i>
		<i>11.81</i>	<i>20300</i>	<i>22600</i>	<i>24900</i>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>17600</b>	<b>19500</b>	<b>21400</b>
	<b>39.00</b>	<b>0.500</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
<b>42.80</b>		<i>12.70</i>	<i>24700</i>	<i>27500</i>	<i>30300</i>	<i>26500</i>	<i>29400</i>	<i>32300</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
		<i>0.562</i>	<i>20850</i>	<i>23150</i>	<i>25450</i>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		<i>14.27</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
<b>45.30</b>		<i>15.11</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		<i>0.595</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
	<b>47.10</b>	<b>0.625</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
<b>7 3/4"</b> <i>196.85</i>		<i>15.88</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
	<b>46.10</b>	<b>0.595</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		<i>15.11</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
<b>8 5/8"</b> <i>219.08</i>		<i>10.16</i>	<i>14100</i>	<i>15700</i>	<i>17300</i>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>
		<i>0.450</i>	<i>15050</i>	<i>16650</i>	<i>18250</i>	<i>15000</i>	<i>16700</i>	<i>18400</i>	<i>15900</i>	<i>17700</i>	<i>19500</i>
	<b>40.00</b>	<b>0.450</b>	<b>20300</b>	<b>22600</b>	<b>24900</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>17600</b>	<b>19500</b>	<b>21400</b>
		<i>11.43</i>	<i>20300</i>	<i>22600</i>	<i>24900</i>	<i>22000</i>	<i>24500</i>	<i>27000</i>	<i>23800</i>	<i>26500</i>	<i>29200</i>



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
<b>8 5/8"</b> 219.08	<b>44.00</b>	<b>0.500</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>13400</b>	<b>14800</b>	<b>16200</b>	<b>15080</b>	<b>16650</b>	<b>18250</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>
		12.70	15900	17700	19500	18100	20100	22100	20300	22600	24900	22000	24500	27000	24700	27500	30300
	<b>49.00</b>	<b>0.557</b>	<b>15050</b>	<b>16650</b>	<b>18250</b>	<b>17000</b>	<b>18800</b>	<b>20600</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>	<b>20200</b>	<b>22400</b>	<b>24600</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		14.15	20300	22600	24900	22900	25500	28100	25600	28400	31200	27400	30400	33400	28300	31400	34500
	<b>52.00</b>	<b>0.595</b>	<b>17000</b>	<b>18800</b>	<b>20600</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		15.11	22900	25500	28100	25600	28400	31200	28300	31400	34500	28300	31400	34500	28300	31400	34500
	<b>36.00</b>	<b>0.352</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>	<b>7630</b>	<b>8700</b>	<b>9570</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10450</b>	<b>11550</b>	<b>12650</b>
		8.94	9700	10800	11900	10600	11800	13000	11400	12700	14000	12300	13700	15100	14100	15700	17300
	<b>40.00</b>	<b>0.395</b>	<b>7170</b>	<b>7960</b>	<b>8750</b>	<b>7630</b>	<b>8700</b>	<b>9570</b>	<b>8460</b>	<b>9400</b>	<b>10340</b>	<b>9150</b>	<b>10150</b>	<b>11150</b>	<b>10450</b>	<b>11550</b>	<b>12650</b>
		10.03	9700	10800	11900	10600	11800	13000	11400	12700	14000	12300	13700	15100	14100	15700	17300
<b>43.50</b>	<b>0.435</b>	<b>9850</b>	<b>10850</b>	<b>11850</b>	<b>10450</b>	<b>11550</b>	<b>12650</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>	
	11.05	13200	14700	16200	14100	15700	17300	15900	17700	19500	17600	19600	21600	19400	21600	23800	
<b>47.00</b>	<b>0.472</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>15650</b>	<b>17350</b>	<b>19050</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	
	11.99	15900	17700	19500	17600	19600	21600	19400	21600	23800	21100	23500	25900	24700	27500	30300	
<b>53.50</b>	<b>0.545</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
	13.84	22000	24500	27000	24700	27500	30300	28300	31400	34500	28300	31400	34500	28300	31400	34500	
<b>58.40</b>	<b>0.595</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
	15.11	26500	29400	32300	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
<b>62.80</b>	<b>0.625</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
	15.88	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
<b>65.30</b>	<b>0.650</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
	16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
<b>66.40</b>	<b>0.661</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
	16.79	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
<b>66.90</b>	<b>0.668</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
	16.97	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.			ft.lb. N.m.			ft.lb. N.m.		
<b>8 5/8"</b> 219.08	<b>44.00</b>	<b>0.500</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		12.70	26500	29400	32300	28300	31400	34500	28300	31400	34500
	<b>49.00</b>	<b>0.557</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		14.15	28300	31400	34500	28300	31400	34500	28300	31400	34500
	<b>52.00</b>	<b>0.595</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		15.11	28300	31400	34500	28300	31400	34500	28300	31400	34500
<b>9 5/8"</b> 244.48	<b>36.00</b>	<b>0.352</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>
		8.94	15000	16700	18400	15900	17700	19500	16700	18600	20500
	<b>40.00</b>	<b>0.395</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>12450</b>	<b>13750</b>	<b>15050</b>
		10.03	15000	16700	18400	15900	17700	19500	16700	18600	20500
	<b>43.50</b>	<b>0.435</b>	<b>15650</b>	<b>17350</b>	<b>19050</b>	<b>16650</b>	<b>18450</b>	<b>20250</b>	<b>17600</b>	<b>19500</b>	<b>21400</b>
		11.05	21100	23500	25900	22500	25000	27500	23800	26500	29200
<b>47.00</b>	<b>0.472</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
		11.99	26500	29400	32300	28300	31400	34500	28300	31400	34500
	<b>53.50</b>	<b>0.545</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		13.84	28300	31400	34500	28300	31400	34500	28300	31400	34500
	<b>58.40</b>	<b>0.595</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		15.11	28300	31400	34500	28300	31400	34500	28300	31400	34500
<b>9 7/8"</b> 250.83	<b>62.80</b>	<b>0.625</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		15.88	28300	31400	34500	28300	31400	34500	28300	31400	34500
	<b>65.30</b>	<b>0.650</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500
	<b>66.40</b>	<b>0.661</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>
		16.79	28300	31400	34500	28300	31400	34500	28300	31400	34500
<b>66.90</b>	<b>0.668</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	
		16.97	28300	31400	34500	28300	31400	34500	28300	31400	34500



## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.			ft.lb. N.m.			ft.lb. N.m.		
9 7/8" 250.83	67.50	0.678	22800	26300	27800	22800	26300	27800	22800	26300	27800
		17.22	30900	34300	37700	30900	34300	37700	30900	34300	37700
	68.00	0.694	24800	27500	30200	24800	27500	30200	24800	27500	30200
		17.63	33600	37300	41000	33600	37300	41000	33600	37300	41000
	68.90	0.700	24800	27500	30200	24800	27500	30200	24800	27500	30200
		17.78	33600	37300	41000	33600	37300	41000	33600	37300	41000
70.50	0.720	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	18.29	36600	40700	44800	36600	40700	44800	36600	40700	44800	
72.00	0.725	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	18.42	36600	40700	44800	36600	40700	44800	36600	40700	44800	
10" 254.00	67.20	0.672	27000	30000	33000	27000	30000	33000	27000	30000	33000
		17.07	36600	40700	44800	36600	40700	44800	36600	40700	44800
	68.70	0.688	27000	30000	33000	27000	30000	33000	27000	30000	33000
		17.48	36600	40700	44800	36600	40700	44800	36600	40700	44800
	71.80	0.722	27000	30000	33000	27000	30000	33000	27000	30000	33000
		18.34	36600	40700	44800	36600	40700	44800	36600	40700	44800
10 3/4" 273.05	45.50	0.400	13050	14450	16850	13700	15200	16700	20850	23150	25450
		10.16	17600	19600	21600	18500	20600	22700	28300	31400	34500
	51.00	0.460	19600	21700	23800	20200	22400	24600	20850	23150	25450
		11.43	26500	29400	32300	27400	30400	33400	28300	31400	34500
	55.50	0.495	20850	23150	25450	20850	23150	25450	20850	23150	25450
		12.57	28300	31400	34500	28300	31400	34500	28300	31400	34500
60.70	0.545	20850	23150	25450	20850	23150	25450	20850	23150	25450	
	13.84	28300	31400	34500	28300	31400	34500	28300	31400	34500	
65.70	0.595	20850	23150	25450	20850	23150	25450	20850	23150	25450	
	15.11	28300	31400	34500	28300	31400	34500	28300	31400	34500	



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	ft. lb. N. m.	
10 3/4* 273.05	71.10	0.650	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
73.20	73.20	0.672	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
			36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
10 7/8*	72.00	0.666	29300	32550	35800	29300	32550	35800	29300	32550	35800	29300	32550	35800	29300	32550	35800
			39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
11 3/4* 298.45	54.00	0.435	11100	12300	13500	12450	13750	15050	13700	15200	16700	16050	16650	18250	17000	18800	20600
			15000	16700	18400	16700	18600	20500	18500	20600	22700	20300	22600	24900	22900	25500	28100
60.00	60.00	0.489	15050	16650	18250	17600	19500	21400	19600	21700	23800	20850	23150	25450	20850	23150	25450
			20300	22600	24900	23800	26500	29200	26500	29400	32300	28300	31400	34500	28300	31400	34500
65.00	65.00	0.534	18900	21000	23100	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			25600	28400	31200	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
71.00	71.00	0.582	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
11 7/8* 301.63	67.80	0.550	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
71.80	71.80	0.582	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8* 339.73	61.00	0.430	11700	13000	14300	13050	14450	15850	16050	16650	18250	17000	18800	20600	18900	21000	23100
			15900	17700	19500	17600	19600	21600	20800	22600	24900	22900	25500	28100	25600	28400	31200
68.00	68.00	0.480	17000	18800	20600	18900	21000	23100	20850	23150	25450	20850	23150	25450	20850	23150	25450
			22900	25500	28100	25600	28400	31200	28300	31400	34500	28300	31400	34500	28300	31400	34500
72.00	72.00	0.514	19600	21700	23800	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			26500	29400	32300	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
77.00	77.00	0.550	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500

## VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.			ft.lb. N.m.			ft.lb. N.m.			ft.lb. N.m.		
10 3/4* 273.05	71.10	0.650	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
10 7/8*	73.20	0.672	27000	30000	33000	27000	30000	33000	27000	30000	33000
			36600	40700	44800	36600	40700	44800	36600	40700	44800
11 3/4* 298.45	72.00	0.666	29300	32550	35800	29300	32550	35800	29300	32550	35800
			39700	44100	48500	39700	44100	48500	39700	44100	48500
11 3/4* 298.45	54.00	0.435	18900	21000	23100	20200	22400	24600	20850	23150	25450
			25600	28400	31200	27400	30400	33400	28300	31400	34500
11 3/4* 298.45	60.00	0.489	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
11 3/4* 298.45	65.00	0.534	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
11 7/8* 301.63	71.00	0.582	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
11 7/8* 301.63	67.80	0.550	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
11 7/8* 301.63	71.80	0.582	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8* 339.73	61.00	0.430	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8* 339.73	68.00	0.480	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8* 339.73	72.00	0.514	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8* 339.73	77.00	0.550	20850	23150	25450	20850	23150	25450	20850	23150	25450
			28300	31400	34500	28300	31400	34500	28300	31400	34500



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
			ft-lb.	N.m.	ft-lb.	N.m.	ft-lb.	N.m.	ft-lb.	N.m.	ft-lb.	N.m.	ft-lb.	N.m.	ft-lb.	N.m.	
13 3/8" 339.73	80.70	0.580	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
		14.73	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	85.00	0.608	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
		15.44	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	86.00	0.625	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450
		15.88	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	92.00	0.672	45000	50000	55000	45000	50000	55000	45000	50000	55000	45000	50000	55000	45000	50000	55000
		17.07	61000	67800	74600	61000	67800	74600	61000	67800	74600	61000	67800	74600	61000	67800	74600
13 5/8" 346.08	88.20	0.625	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		15.88	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
	118.20	0.850	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		21.59	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
14" 355.60 VAM TOP-KB	82.20	0.560	-	-	-	-	-	-	25750	28550	31350	27000	30000	33000	27000	30000	33000
		14.22	-	-	-	-	-	-	34800	38700	42600	36600	40700	44800	36600	40700	44800
	82.50	0.562	20200	22400	24600	-	-	-	26050	28950	31850	27000	30000	33000	27000	30000	33000
		14.28	27400	30400	33400	-	-	-	35300	39200	43100	36600	40700	44800	36600	40700	44800
	86.00	0.600	-	-	-	-	-	-	27000	30000	33000	27000	30000	33000	27000	30000	33000
		15.24	-	-	-	-	-	-	36600	40700	44800	36600	40700	44800	36600	40700	44800
	93.00	0.650	-	-	-	-	-	-	27000	30000	33000	27000	30000	33000	27000	30000	33000
		16.51	-	-	-	-	-	-	36600	40700	44800	36600	40700	44800	36600	40700	44800
	96.90	0.670	-	-	-	-	-	-	27000	33000	36300	27000	33000	36300	27000	33000	36300
		17.02	-	-	-	-	-	-	36600	44800	49200	36600	44800	49200	36600	44800	49200
	100.00	0.700	-	-	-	-	-	-	32400	36000	39600	32400	36000	39600	32400	36000	39600
		17.80	-	-	-	-	-	-	43900	48800	53700	43900	48800	53700	43900	48800	53700



**VAM TOP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	lb/ft	in. mm.	ft.lb. N.m.		ft.lb. N.m.		ft.lb. N.m.				
<b>13 3/8"</b> 339.73	80.70	0.590	20850	23150	25450	20850	23150	25450	20850	23150	25450
		14.73	28300	31400	34500	28300	31400	34500	28300	31400	34500
	85.00	0.608	20850	23150	25450	20850	23150	25450	20850	23150	25450
		15.44	28300	31400	34500	28300	31400	34500	28300	31400	34500
	86.00	0.625	20850	23150	25450	20850	23150	25450	20850	23150	25450
	15.88	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	92.00	0.672	45000	50000	55000	45000	50000	55000	45000	50000	55000
		17.07	61000	67800	74600	61000	67800	74600	61000	67800	74600
<b>13 5/8"</b> 346.08	88.20	0.625	27000	30000	33000	27000	30000	33000	27000	30000	33000
		15.88	36600	40700	44800	36600	40700	44800	36600	40700	44800
	118.20	0.850	27000	30000	33000	27000	30000	33000	27000	30000	33000
		21.59	36600	40700	44800	36600	40700	44800	36600	40700	44800
<b>14"</b> 355.60 VAM TOP-KB	82.20	0.560	27000	30000	33000	-	-	-	-	-	-
		14.22	36600	40700	44800	-	-	-	-	-	-
	82.50	0.562	27000	30000	33000	-	-	-	-	-	-
		14.28	36600	40700	44800	-	-	-	-	-	-
	86.00	0.600	27000	30000	33000	-	-	-	-	-	-
		15.24	36600	40700	44800	-	-	-	-	-	-
	93.00	0.650	27000	30000	33000	-	-	-	-	-	-
	16.51	36600	40700	44800	-	-	-	-	-	-	
	96.90	0.670	27000	33000	36300	-	-	-	-	-	-
		17.02	36600	44800	49200	-	-	-	-	-	-
	100.00	0.700	32400	36000	39600	-	-	-	-	-	-
		17.80	43900	48800	53700	-	-	-	-	-	-

**VAM TOP TORQUE VALUES**

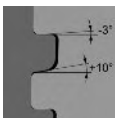
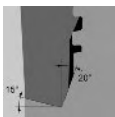
SIZE (OD)	NOMINAL WEIGHT lb/ft	WALL THICKNESS in. mm.	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in. mm.			ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
<b>14"</b> 355.60 VAM TOP-KB	<b>106.00</b>	<b>0.750</b> 19.05 <b>0.800</b> 20.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>15"</b> 381.00 VAM TOP-KA	<b>92.50</b>	<b>0.580</b> 14.73 <b>0.675</b> 17.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>16"</b> 406.40 VAM TOP-ND	<b>84.00</b>	<b>0.495</b> 12.57 <b>0.566</b> 14.38	<b>25400</b>	<b>28200</b>	<b>31000</b>	-	-	-	-	-	-	-	-	-	-	-	
			<b>34400</b>	<b>38200</b>	<b>42000</b>	-	-	-	-	-	-	-	-	-	-	-	-
			<b>36100</b>	<b>40100</b>	<b>44100</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>97.00</b>	<b>0.575</b> 14.61 <b>0.625</b> 15.88	<b>49000</b>	<b>54400</b>	<b>59800</b>	<b>65200</b>	-	-	-	-	-	-	-	-	-	-	-	
			<b>37600</b>	<b>41750</b>	<b>45900</b>	-	-	-	-	-	-	-	-	-	-	-	-
			<b>50900</b>	<b>56600</b>	<b>62300</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>104.00</b>	<b>0.625</b> 15.88	<b>37600</b>	<b>41750</b>	<b>45900</b>	<b>50100</b>	-	-	-	-	-	-	-	-	-	-	-	
			<b>50900</b>	<b>56600</b>	<b>62300</b>	-	-	-	-	-	-	-	-	-	-	-	-
			<b>61000</b>	<b>67800</b>	<b>74600</b>	-	-	-	-	-	-	-	-	-	-	-	-

### VAM TOP TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi			135-140 ksi			145-150-155 ksi			
			lb/ft	in. mm.	min.	opt.	max.	min.	opt.	max.	min.	opt.
14" 355.60 VAM TOP-KB	106.00	0.750	39700	44100	48500	-	-	-	-	-	-	-
			53800	59800	65800	-	-	-	-	-	-	-
			0.800	41400	46000	50600	-	-	-	-	-	-
15" 387.00 VAM TOP-KA	92.50	0.580	30000	33300	36600	-	-	-	-	-	-	-
			40600	45100	49600	-	-	-	-	-	-	-
			0.675	36400	40500	44600	-	-	-	-	-	-
16" 406.40 VAM TOP-ND	84.00	0.495	30000	33300	36600	-	-	-	-	-	-	-
			40600	45100	49600	-	-	-	-	-	-	-
			0.566	45000	50000	55000	-	-	-	-	-	-
	97.00	0.575	61000	67800	74600	-	-	-	-	-	-	-
			45000	50000	55000	-	-	-	-	-	-	-
			0.625	45000	50000	55000	-	-	-	-	-	-
	104.00	15.88	61000	67800	74600	-	-	-	-	-	-	

## 3.3 VAM TOP HT

### Application



**VAM TOP HT (High Torque)** is a Threaded and Coupled (T&C) connection for liners applications where reinforced torque capability is anticipated due to string rotation during running operations.

VAM TOP HT has been designed based on the main features of the VAM TOP product line. VAM TOP casing and VAM TOP HT are interchangeable; **please refer to section 2.8 of the VAM Book** for details.

VAM TOP HT product line covers diameters from 4 1/2" up to 7 3/4" on a wide range of wall thicknesses, for API material as well as for proprietary steel grades

VAM TOP connections are stronger than the pipe in tension

#### - Optimized Metal-to-Metal Seal:

VAM TOP HT metal-to-metal seal design is based on the same design rules as VAM TOP. It consequently benefit of excellent and constant gas-tight sealing under combined loads despite repeated make-ups and break-outs.

#### - Reverse Angle Torque Shoulder:

The torque shoulder of VAM TOP HT is significantly thicker than VAM TOP and enables the connection to provide excellent torque capability with regards to VAM TOP. This is achieved by an extra manufacturing process to compress (swage) the pipe end before machining. During the machining process the pin end bore is machined to allow a standard drift mandrel to pass. In addition, the increased robustness of the torque shoulder enable extended performances under combined loads, especially with compression.

## Running

Running VAM TOP HT is like running most other premium connections with the following exceptions.

### Thread Compound Quantities

It is important that the correct volume of thread compound is used for VAM connections. The wrong quantity will lead to make-up problems or contamination of the well. The values given below are minimum values. To put these into perspective a plastic cup, like those used on a drill floor are normally about 200 ml. So 1 cup will be sufficient thread compound for 8 of 7" make-ups (that is 16 threaded ends).

Nominal OD (inch)	Thread compound volume	
	ml	US fluid ounce
4 1/2	10	0.34
5	14	0.47
5 1/2	16	0.54
6 5/8	19	0.64
7	25	0.85
7 5/8	28	0.91

Equally it is important that the compound is applied correctly. See the section on thread compounds for this information. For mill make-ups and assemblies it is acceptable to apply the thread compound to the box end only.

### Make-up torques

VAM TOP HT has much higher torque values compared to the equivalent VAM TOP connection. The torque values that are applied in the mill are just below the yield point for the material. Due to the different ways that steel act in compression there are two sets of torque values depending on the steel types. These torque tables are headed:

- except for CRA
- with CRA

The table below explains which torque tables should be used

Steel Type (see VAM Book Section 4.8 for full detail of)	VAM TOP HT Torque Tables	
	except for CRA	with CRA
API (Carbon)	✓	
API (13% Cr)	✓	
1% Chrome	✓	
High Collapse	✓	
Sour Service	✓	
High Collapse and Sour Service	✓	
Low Temperature	✓	
Martensitic Stainless Steel (13%Cr)	✓	
Martensitic Stainless Steel (Super 13%Cr)		✓
Duplex and Super Duplex Stainless Steel		✓
Super Austenitic and Nickel Based Alloy		✓

The torque values are available in the VAM Book, Connection Data Sheets and VAM Services Library. Always check the online data rather than paper copies in case of change.

VAM TOP HT was designed to be used as a rotating liner so it is necessary to apply as high a torque as possible on the drill floor to ensure that there is no movement of connections during rotation downhole. The maximum value to be used in such cases is listed as the liner maximum and the target torque should be as close to this as possible.

Although VAM TOP HT was designed for rotating liners some companies use VAM TOP HT for non rotating applications such as completions. When this is the case it is recommended to use lower torque values since the standard performances can still be achieved at a lower torque.

The table below gives an example of 7" x 29 lb/ft L80 13%Cr VAM TOP HT torque values depending on application. Since the grade is L80 13%Cr the 'except for CRA' torque values have been used in this example.

Application	Parameter	Logic	Calculation ft.lbs	Result ft.lbs
The torque is not performed in the rig site (mill & licensee)	Maximum	<b>Lookup</b> Mill & Licensee Maximum		24 250
	Target torque	<b>Calculate</b> mid point between Mill & Licensee Max. and Min.	$(22050+24250)/2$	23 150
	Minimum	<b>Lookup</b> Mill & Licensee Minimum		22 050
	Max. Shoulder	<b>Calculate</b> 70% of the Optimum field value	$14850 \times 0.70$	10 395
	Min. Shoulder	<b>Calculate</b> 5% of the Optimum value	$14850 \times 0.05$	742
Rig site make-up Liners applications	Maximum	<b>Lookup</b> Liner Maximum		22 050
	Target torque	<b>Select</b> a value just below Liner Maximum to ensure no overtorque based on equipment	<i>(Suggest)</i>	21 500
	Optimum	<b>Lookup</b> Optimum		14 850
	Minimum	<b>Lookup</b> Minimum		13 450
	Max. Shoulder	<b>Calculate</b> 70% of the Optimum value	$14850 \times 0.70$	10 395
Min. Shoulder	<b>Calculate</b> 5% of the Optimum value	$14850 \times 0.05$	742	
Rig site make-up Tubing applications	Maximum	<b>Lookup</b> Tubing Maximum		16 250
	Optimum	<b>Lookup</b> Optimum		14 850
	Minimum	<b>Lookup</b> Minimum		13 450
	Max. Shoulder	<b>Calculate</b> 70% of the Optimum value	$14850 \times 0.70$	10 395
	Min. Shoulder	<b>Calculate</b> 5% of the Optimum value	$14850 \times 0.05$	742

## Difference between the mill & licensee and field torques

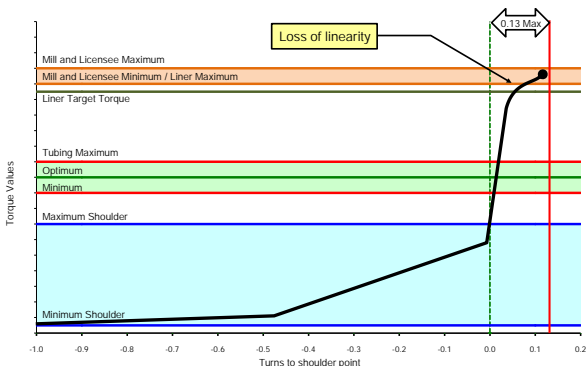
Mill & licensee.- This torque shall be applied when the connection is made-up not in the rig site and couplings on pin end. This is applicable for VAM licensees and for not VAM licensees.

Field Torques.- This torque shall be only applied in the rig site and the maximum torque will be depending in the application.

For Liner applications.- Make-up can be performed to any torque comprised between the values specified in "tubing+ Liner min" and "liner max" columns.

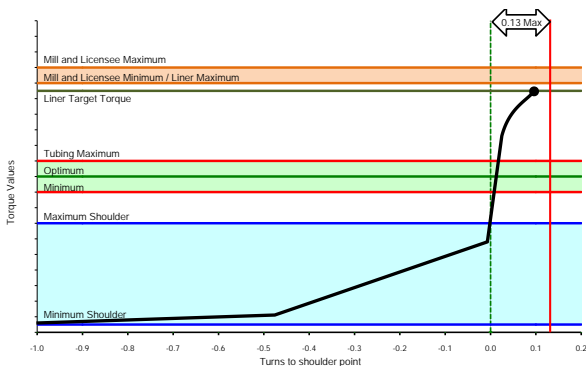
For Tubing applications.- Make-up torque range is defined by the "tubing+liner min" and "tubing max" columns.

A standard VAM TOP style graph is produced except that if the high values are used there will be much more shoulder torque. Since very high torque values are used for rotating liner applications a loss of linearity may be observed on the torque/turn graph at the end of the make-up as shown below. This is normal and has been validated through extensive R&D tests. In order to avoid excessive shoulder deformation that could result in a failure to drift the connection after make-up the following criteria applies.



### Steel types listed as without CRA (Carbon and Standard 13%Cr)

A loss of linearity is permitted following shouldering as long as there is no more than 0.13 turns between the shoulder and final torque. This is illustrated below.

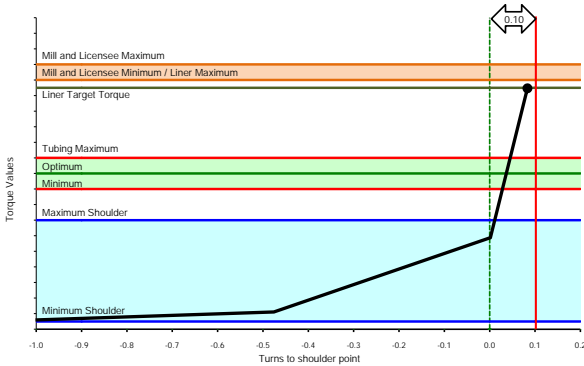


If this value is exceeded the connection will be broken out fully and the coupling counterbore will be checked using a flashlight or by feel for deformation. If there is no deformation the connection can be remade. If there is deformation then both the pin and box will be rejected and the equipment checked to ensure that it is not applying overtorque to the connection.



### Steel types listed as with CRA (Super 13%Cr, Duplex and Ni Based Alloys)

A loss of linearity is not permitted following shouldering and the turns from shoulder to final torque must be less than 0.10 turns. If non-linearity is observed, the make-up should not be stopped at the point of non-linearity, but should continue until the target torque has been achieved. Thereafter the connection should be broken out fully and inspected. If there is no evidence of over torque, the connection can be re-run. A second "failure" will result in the pin and box being laid down and replaced and the make-up equipment checked.



**VAM TOP HT TECHNICAL DATA**

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		API Drift Diameter inch.	Coupling OD (reg) inch.	Coupling ID (reg) inch.	Make-up Loss inch.	Coupling Length inch.	Pipe Body Section sq. in.	Coupling CCS sq. in.	Coupling Face Area sq. in.	Yield Strength (1000 lb.)					
		inch	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
4 1/2	10.50	0.224	5.69	3.927	4.827	3.970	3.662	9.331	3.009	3.077	1.345	165	241	271	286	331	376
114.30	11.60	0.250	6.35	3.875	4.870	3.918	3.662	9.331	3.338	3.407	1.607	184	267	300	317	367	417
		0.271	6.88	3.833	4.906	3.876	3.662	9.331	3.600	3.678	1.828	198	288	324	342	396	450
	13.50	0.290	7.37	3.795	4.937	3.838	3.662	9.331	3.836	3.922	2.019	211	307	345	364	422	480
	15.10	0.337	8.56	3.701	5.017	3.763	3.662	9.331	4.407	4.407	2.488	242	353	397	419	485	551
	17.00	0.380	9.65	3.615	5.077	3.678	3.662	9.331	4.918	5.022	2.900	270	393	443	467	541	615
	17.70	0.402	10.21	3.571	5.110	3.633	3.662	9.331	5.175	5.289	3.112	285	414	466	492	569	647
	21.50	0.500	12.70	3.375	5.248	3.437	3.662	9.331	6.283	6.411	4.010	346	503	565	597	691	785
	23.70	0.560	14.22	3.255	5.329	3.318	3.662	9.331	6.932	7.080	4.548	381	555	624	659	763	867
5	15.00	0.296	7.52	4.283	5.470	4.346	4.191	10.394	4.374	4.462	2.135	241	350	394	416	481	547
127.00	18.00	0.362	9.19	4.151	5.577	4.214	4.191	10.394	5.275	5.385	2.878	290	422	475	501	580	659
	20.30	0.408	10.36	4.059	5.648	4.122	4.191	10.394	5.886	6.009	3.379	324	471	530	559	647	736
	20.80	0.422	10.72	4.031	5.669	4.093	4.191	10.394	6.069	6.202	3.528	334	486	546	577	668	759
	21.40	0.437	11.10	4.001	5.691	4.063	4.191	10.394	6.264	6.395	3.685	345	501	564	595	689	783
	23.20	0.478	12.14	3.919	5.750	3.981	4.191	10.394	6.791	6.925	4.109	374	543	611	645	747	849
5 1/2	17.00	0.304	7.72	4.767	5.978	4.811	4.382	10.748	4.962	5.069	2.396	273	397	447	471	546	620
139.70	20.00	0.361	9.17	4.653	6.071	4.715	4.382	10.748	5.828	5.944	3.101	321	466	525	554	641	729
	23.00	0.415	10.54	4.545	6.156	4.607	4.382	10.748	6.630	6.756	3.754	365	530	597	630	729	829
	26.00	0.476	12.09	4.423	6.248	4.485	4.382	10.748	7.513	7.659	4.471	413	601	676	714	826	939
6 5/8	23.20	0.330	8.38	5.840	7.154	5.883	4.427	10.866	6.526	6.659	3.317	359	522	587	620	718	816
168.28	24.00	0.352	8.94	5.796	7.191	5.839	4.427	10.866	6.937	7.080	3.650	382	555	624	659	763	867
	28.00	0.417	10.59	5.666	7.297	5.725	4.427	10.866	8.133	8.289	4.615	447	651	732	773	895	1017
	32.00	0.475	12.07	5.550	7.390	5.609	4.427	10.866	9.177	9.357	5.474	505	734	826	872	1009	1147
	36.70	0.562	14.27	5.376	7.524	5.454	4.427	10.866	10.705	10.924	6.729	589	856	963	1017	1178	1338
7	26.00	0.362	9.19	6.151	7.565	6.210	4.776	11.535	7.549	7.693	3.837	415	604	679	717	830	944
177.80	29.00	0.408	10.36	6.059	7.644	6.118	4.776	11.535	8.449	8.634	4.592	465	676	760	803	929	1056
	32.00	0.463	11.51	5.969	7.717	6.059	4.776	11.535	9.317	9.512	5.297	512	745	839	885	1025	1165
	35.00	0.498	12.65	5.879	7.787	5.941	4.776	11.535	10.172	10.376	5.978	559	814	915	966	1119	1272
	38.00	0.540	13.72	5.795	7.852	5.857	4.776	11.535	10.959	11.172	6.617	603	877	986	1041	1205	1370
	41.00	0.590	14.99	5.695	7.929	5.757	4.776	11.535	11.881	12.124	7.381	653	950	1069	1129	1307	1485

### VAM TOP HT TECHNICAL DATA

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		API Drift Diameter inch	Coupling OD (reg) inch	Coupling ID (reg) inch	Make-up Loss inch	Coupling Length inch	Pipe Body Section sq. in.	Coupling CCS sq. in.	Coupling Face Area sq. in.	Yield Strength (1000 lb.)					
		inch	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
7 5/8 193.68	29.70	0.375	9.53	6.750	8.213	6.809	4.868	11.732	8.541	8.716	4.400	470	683	769	811	940	1068
	33.70	0.430	10.92	6.640	8.305	6.700	4.868	11.732	9.720	9.917	5.355	535	778	875	923	1069	1215
	35.80	0.465	11.81	6.570	8.362	6.644	4.868	11.732	10.460	10.664	5.952	575	837	941	994	1151	1308
	39.00	0.500	12.70	6.500	8.419	6.589	4.868	11.732	11.192	11.416	6.553	616	895	1007	1063	1231	1399
	42.80	0.562	14.27	6.376	8.518	6.479	4.868	11.732	12.470	12.726	7.606	686	998	1122	1185	1372	1559
	45.30	0.595	15.11	6.310	8.569	6.424	4.868	11.732	13.141	13.412	8.154	723	1051	1183	1248	1446	1643
	47.10	0.625	15.88	6.250	8.614	6.373	4.868	11.732	13.744	14.023	8.640	756	1100	1237	1306	1512	1718

**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi						75-80-85 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner	opti	max.	min.	max.	max.	Tubing + Liner	opti	max.	min.	max.	max.
4 1/2" 114.30	10.50	0.224	2220	2460	2700	2890	3170	2540	2820	3100	3470	3810		
			3000	3330	3660	3920	4370	3440	3820	4200	4710	5180		
11.60	11.60	0.250	2800	3110	3420	3760	4130	3260	3620	3980	4560	5010		
			3800	4220	4640	5100	5600	4400	4900	5400	6200	6800		
12.60	12.60	0.271	3260	3620	3980	4410	4850	3710	4120	4530	5420	5960		
			4400	4900	5400	6000	6600	5000	5600	6200	7400	8100		
13.50	13.50	0.290	3710	4120	4530	5060	5560	4170	4630	5090	6150	6760		
			5000	5600	6200	6900	7600	5700	6300	6900	8300	9100		
15.10	15.10	0.337	4630	5140	5650	6370	7000	5220	5790	6360	7670	8430		
			6300	7000	7700	8600	9500	7000	7800	8600	10400	11400		
17.00	17.00	0.380	5600	6220	6840	7810	8590	6390	7090	7790	9400	10340		
			7600	8400	9200	10600	11700	8600	9600	10600	12700	14000		
17.70	17.70	0.402	6120	6800	7480	8550	9400	6840	7690	8340	10350	11350		
			8300	9200	10100	11600	12800	9300	10300	11300	14000	15400		
18.90	18.90	0.430	6840	7590	8340	9500	10450	7830	8700	9670	11450	12550		
			9300	10300	11300	12800	13000	10600	11800	13000	15500	17100		
21.50	21.50	0.500	8150	9050	9950	11200	12300	9500	10600	11500	13900	15200		
			11700	12300	13500	15200	15200	12800	14200	15600	18800	20700		
23.70	23.70	0.560	9150	10150	11150	12650	13850	10850	11950	13050	15600	17100		
			12900	13700	15100	17200	17200	14600	16200	17800	21200	23300		
5" 127.00	15.00	0.296	4370	4850	5330	5930	6510	4950	5500	6050	7090	7800		
			5900	6600	7300	8040	8830	6700	7500	8300	9610	10600		
18.00	18.00	0.362	6190	6870	7550	8700	9500	7170	7960	8750	10150	11150		
			8400	9300	10200	11800	12900	9700	10800	11900	13750	15050		
20.30	20.30	0.408	7470	8300	9130	10500	11500	8460	9400	10340	12650	14000		
			10200	11300	12400	14250	14250	11400	12700	14000	17150	19000		

**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi						105-110-115 ksi							
			Field			Mill & licensee			Field			Mill & licensee				
			Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl
in. mm.	lb/ft	in. mm.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
4 1/2" 114.30	10.50	0.224	2800	3110	3420	4120	4120	4530	3130	3470	3810	4770	4770	5240	5240	5240
		5.69	3800	4220	4640	5600	5600	6200	4240	4710	5180	6500	6500	7200	7200	7200
	11.60	0.250	3650	4050	4450	5350	5350	5980	4040	4480	4920	6150	6150	6760	6760	6760
		6.35	4900	5500	6100	7300	7300	8000	5500	6100	6700	8300	8300	9100	9100	9100
	12.60	0.271	4110	4560	5010	6370	6370	7000	4560	5060	5560	7310	7310	8040	8040	8040
		6.88	5600	6200	6800	8600	8600	9500	6200	6900	7600	9900	9900	10900	10900	10900
	13.50	0.290	4690	5210	5730	7230	7230	7950	5220	5790	6360	8300	8300	9130	9130	9130
		7.37	6400	7100	7800	9800	9800	10800	7000	7800	8600	11300	11300	12400	12400	12400
	15.10	0.337	5860	6510	7160	9050	9050	9950	6450	7160	7870	10400	10400	11400	11400	11400
		8.56	7900	8800	9700	12300	12300	13500	8700	9700	10700	14100	14100	15500	15500	15500
	17.00	0.380	7170	7960	8750	11050	11050	11850	7830	8700	9570	12750	12750	13950	13950	13950
		9.65	9700	10800	11900	15000	15000	16500	10600	11800	13000	17300	17300	19000	19000	19000
	17.70	0.402	7830	8700	9570	12100	12100	13300	8460	9400	10340	13950	13950	15250	15250	15250
	10.21	10600	11800	13000	16400	16400	18000	11400	12700	14000	18900	18900	20800	20800	20800	
18.90	0.430	8460	9400	10340	13400	13400	14700	9500	10500	11500	15400	15400	16900	16900	16900	
	10.92	11400	12700	14000	18100	18100	19900	12800	14200	15600	20900	20900	23000	23000	23000	
21.50	0.500	10850	11950	13050	16500	16500	18100	11700	13000	14300	19100	19100	21000	21000	21000	
	12.7	14600	16200	17800	22400	22400	24600	15900	17700	19500	25900	25900	28500	28500	28500	
23.70	0.560	12100	13400	14700	18600	18600	20400	13700	15200	16700	21650	21650	23750	23750	23750	
	14.22	16300	18100	19900	25200	25200	27700	18500	20600	22700	29300	29300	32200	32200	32200	
5"	15.00	0.296	5480	6080	6680	8300	8300	9200	6060	6730	7400	9400	9400	10300	10300	10300
	7.52	7400	8200	9000	11250	11250	12450	8200	9100	10000	12750	12750	13950	13950	13950	
127.00	18.00	0.362	7830	8700	9570	11950	11950	13100	8780	9750	10720	13750	13750	15100	15100	15100
	9.19	10600	11800	13000	16200	16200	17750	11900	13200	14500	18650	18650	20450	20450	20450	
20.30	0.408	9500	10500	11500	14800	14800	16300	10850	11950	13050	17000	17000	18700	18700	18700	
	10.36	12800	14200	15600	20050	20050	22100	14600	16200	17800	20350	20350	25350	25350	25350	



**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi						135-140 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner	opti	max.	min.	max.	max.	Tubing + Liner	opti	max.	min.	max.	max.
in. mm	lb/ft	in. mm	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.
4 1/2" 114.30	10.50	0.224	3450	3830	4210	5420	5960	3710	4120	4530	5930	5930	8000	8800
		5.69	4700	5200	5700	7400	8100	5000	5600	6200	8000	8000	8800	9600
	11.60	0.250	4500	4990	5480	7020	7720	4820	5350	5880	7740	7740	10500	11600
		6.35	6100	6800	7500	9500	10500	6600	7300	8000	10500	10500	10500	11600
	12.60	0.271	5020	5570	6120	8300	9130	5400	6000	6600	9100	9100	12400	13600
		6.88	6800	7600	8400	11300	12400	7300	8100	8900	12400	12400	12400	13600
	13.50	0.290	5740	6370	7000	9500	10450	6120	6800	7480	10400	10400	14100	15500
		7.37	7100	8600	9500	12800	14100	8300	9200	10100	14100	14100	14100	15500
	15.10	0.337	9700	10800	11900	16000	17600	7830	8700	9570	13000	13000	17700	19500
		8.56	9700	10800	11900	16000	17600	10600	11800	13000	17700	17700	17700	19500
	17.00	0.380	8780	9750	10720	14450	15850	9500	10500	11500	15900	15900	21600	23800
		9.65	11900	13200	14500	19600	21600	12800	14200	15600	21600	21600	21600	23800
	17.70	0.402	9500	10500	11500	15750	17250	10100	11200	12300	17350	17350	23500	25900
	10.21	12800	14200	15600	21400	23500	13700	15200	16700	23500	23500	23500	25900	
18.90	0.430	10450	11550	12650	17500	19200	11450	12650	13850	19150	19150	26000	28600	
	10.92	14100	15700	17300	23700	26100	15500	17200	18900	26000	26000	26000	28600	
21.50	0.500	13050	14450	15850	21650	23750	14050	15550	17050	23700	23700	32200	35400	
	12.7	17600	19600	21600	29300	32200	19000	21100	23200	32200	32200	32200	35400	
23.70	0.560	15050	16650	18250	24650	27050	15300	17000	18700	27250	27250	37000	40700	
	14.22	20300	22600	24900	33400	36700	20700	23000	25300	37000	37000	37000	40700	
5" 127.00	15.00	0.296	6510	7230	7950	10850	11850	7170	7960	8750	11950	11950	16200	17750
		7.52	8800	9800	10800	14700	16200	9700	10800	11900	16200	16200	16200	17750
	18.00	0.362	9500	10500	11500	15550	17100	10450	11650	12650	17350	17350	23500	25900
	9.19	12800	14200	15600	21100	23200	14100	15700	17300	23500	23500	23500	25900	
20.30	0.408	11700	13000	14300	19150	21050	12450	13750	15050	20950	20950	28400	31300	
	10.36	15900	17700	19500	25950	28450	16700	18600	20500	28400	28400	28400	31300	

**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-150-155 ksi										
			Tubing + Liner		Field		Tubing		Liner		Mill & licensee		
			min.	opt.	max.	min.	max.	min.	max.	min.	max.		
in. mm.	lb/ft	in. mm.	ft. lb. N.m.										
4 1/2" 114.30	10.50	0.224	3970	4410	4850	6440	6440	7080	7080	7080	7080	7080	7080
		5.69	5400	6000	6600	8700	8700	9600	9600	9600	9600	9600	9600
	11.60	0.250	5220	5790	6360	8400	8400	9240	9240	9240	9240	9240	9240
		6.35	7000	7800	8600	11400	11400	12500	12500	12500	12500	12500	12500
	12.60	0.271	5800	6440	7080	10000	10000	11000	11000	11000	11000	11000	11000
		6.88	7800	8700	9600	13500	13500	14900	14900	14900	14900	14900	14900
	13.50	0.290	6510	7230	7950	11350	11350	12450	12450	12450	12450	12450	12450
		7.37	8800	9800	10800	15400	15400	16900	16900	16900	16900	16900	16900
	15.10	0.337	8150	9050	9950	14200	14200	15600	15600	15600	15600	15600	15600
		8.56	11100	12300	13500	19200	19200	21100	21100	21100	21100	21100	21100
17.00	0.380	10100	11200	12300	17300	17300	19000	19000	19000	19000	19000	19000	
	9.65	13700	15200	16700	23400	23400	25700	25700	25700	25700	25700	25700	
17.70	0.402	10850	11950	13050	18900	18900	20700	20700	20700	20700	20700	20700	
	10.21	14600	16200	17800	25600	25600	28200	28200	28200	28200	28200	28200	
18.90	0.430	12100	13400	14700	20900	20900	22900	22900	22900	22900	22900	22900	
	10.92	16300	18100	19900	28300	28300	31100	31100	31100	31100	31100	31100	
21.50	0.500	15050	16650	18250	25800	25800	28300	28300	28300	28300	28300	28300	
	12.7	20300	22600	24900	35000	35000	38500	38500	38500	38500	38500	38500	
23.70	0.560	15650	17350	19050	29850	29850	32750	32750	32750	32750	32750	32750	
	14.22	21100	23500	25900	40500	40500	44600	44600	44600	44600	44600	44600	
5"	0.296	7470	8300	9130	13000	13000	14300	14300	14300	14300	14300	14300	
	7.52	10200	11300	12400	17650	17650	19400	19400	19400	19400	19400	19400	
127.00	0.362	11100	12300	13500	18800	18800	20700	20700	20700	20700	20700	20700	
	9.19	15000	16700	18400	25500	25500	28050	28050	28050	28050	28050	28050	
20.30	0.408	13450	14850	16250	23150	23150	25400	25400	25400	25400	25400	25400	
	10.36	18100	20100	22100	31400	31400	34450	34450	34450	34450	34450	34450	

**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi						75-80-85 ksi								
			Field			Mill & licensee			Field			Mill & licensee					
			Tubing + Liner	Tubing	Liner	min.	max.	optl.	min.	max.	Tubing + Liner	Tubing	Liner	min.	max.	optl.	min.
lb/ft	in. mm	in. mm	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
5" 12.700	20.80	0.422	7830	8700	9570	10850	10850	11950	9150	10150	11150	13400	13400	14800	18150	20050	20050
	21.40	0.437	8460	9400	10340	11550	12700	11550	10600	11500	12300	14100	14100	15550	19100	21700	21700
	23.20	0.478	9500	10500	11500	13000	14300	13000	10850	11950	13050	16250	16250	17900	24250	24250	24250
5 1/2" 139.70	17.00	0.304	5220	5790	6360	7230	7230	7960	5930	6580	7230	8700	8700	9500	11800	12900	12900
	20.00	0.361	6840	7590	8340	9750	9750	10800	7830	8700	9570	11950	11950	13100	16200	17750	17750
	23.00	0.415	8780	9750	10720	12300	13500	12300	10600	11800	13000	15200	15200	16700	20600	22650	22650
6 5/8" 168.28	26.00	0.476	10850	11950	13050	15550	15550	17100	12100	13400	14700	18800	18800	20700	25500	28050	28050
	23.20	0.330	7830	8700	9570	11950	11950	13100	9150	10150	11150	14800	14800	16300	20050	22100	22100
	24.00	0.362	8780	9750	10720	13400	14800	13400	10100	11200	12300	16650	16650	18300	22550	24800	24800
28.00	0.417	10100	11200	12300	17700	17700	19600	17700	13700	15200	16700	22550	22550	24800	29400	32350	32350
	32.00	0.475	14050	15550	17050	22050	22050	24250	14400	15900	17400	27000	27000	29650	36600	40200	40200
	36.70	0.562	15650	17350	19050	27100	27100	30050	18000	19900	21800	33500	33500	37150	45400	50400	50400
7" 177.80	26.00	0.362	9500	10500	11500	14100	14100	15500	10850	11950	13050	17350	17350	19100	23500	25900	25900
	26.00	0.362	9500	10500	11500	14100	14100	15500	10850	11950	13050	17350	17350	19100	23500	25900	25900
	26.00	0.362	9500	10500	11500	14100	14100	15500	10850	11950	13050	17350	17350	19100	23500	25900	25900



**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi						105-110-115 ksi							
			Field			Mill & licensee			Field			Mill & licensee				
			Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl
in. mm	lb/ft	in. mm	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
6" 127.00	20.80	0.422	10100	11200	12300	16550	16550	17100	11100	12300	13500	18100	18100	19900	18100	19900
		10.72	13700	15200	16700	21100	21100	23200	15000	16700	18400	24550	24550	27000	18100	27000
	21.40	0.437	10850	11950	13050	16650	16650	18300	11700	13000	14300	19150	19150	21000	19150	21000
		11.1	14600	16200	17800	22550	22550	24800	15900	17700	19500	25950	25950	28450	19150	28450
5 1/2" 139.70	23.20	0.478	12100	13400	14700	19150	19150	21000	13450	14850	16250	21700	21700	23850	21700	23850
		12.14	16300	18100	19900	25950	25950	28450	18100	20100	22100	29400	29400	32350	21700	32350
	17.00	0.304	6510	7230	7950	10500	10500	11500	7470	8300	9130	11950	11950	13100	11950	13100
		7.72	8800	9800	10800	14250	14250	15600	10200	11300	12400	16200	16200	17750	11950	17750
20.00	0.361	8780	9750	10720	13750	13750	15100	13750	15100	16500	19500	19500	17500	13750	17500	
		9.17	11900	13200	14500	18650	18650	20450	13200	14700	16200	21550	21550	23750	19500	23750
	23.00	0.415	11100	12300	13500	17700	17700	19500	12450	13750	15050	20600	20600	22700	20600	22700
		10.54	15000	16700	18400	24000	24000	26450	16700	18600	20500	27950	27950	30800	20600	30800
26.00	0.476	13700	15200	16700	22050	22050	24250	22050	24250	26500	31500	31500	28000	26500	28000	
		12.09	18500	20600	22700	29900	29900	32900	20300	22600	24900	34500	34500	37950	31500	37950
	23.20	0.330	10100	11200	12300	17350	17350	19100	11450	12650	13850	20250	20250	22300	20250	22300
		8.38	13700	15200	16700	23500	23500	25900	15500	17200	18900	27450	27450	30250	20250	30250
24.00	0.362	11450	12650	13850	19500	19500	21500	19500	21500	23500	28800	28800	26100	23500	26100	
		8.94	15500	17200	18900	26450	26450	29150	17600	19600	21600	30900	30900	34050	28800	34050
	28.00	0.417	13700	15200	16700	25600	25600	28200	14650	16250	17850	29600	29600	32650	29600	32650
		10.59	18500	20600	22700	34700	34700	38250	19900	22100	24300	40150	40150	44250	29600	44250
32.00	0.475	16900	18100	19900	32100	32100	35350	32100	35350	38600	47150	47150	40850	38600	40850	
		12.07	22000	24500	27000	43500	43500	47950	24300	27000	29700	50350	50350	55400	40850	55400
	36.70	0.562	20600	22800	25000	39900	39900	44300	20850	23150	25450	46100	46100	51200	46100	51200
		14.27	27800	30900	34000	54200	54200	60100	28300	31400	34500	62500	62500	69400	46100	69400
7" 177.80	26.00	0.362	12450	13750	15050	20600	20600	22700	13700	15200	16700	24000	24000	26450	24000	26450
		9.19	16700	18600	20500	27950	27950	30800	18500	20600	22700	32550	32550	35850	26450	35850



**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi						135-140 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner max.	Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner max.
in. mm	lb/ft	in. mm	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.		
5" 127.00	20.80	0.422	12450	13750	15050	20250	20250	22300	13050	14450	15850	22400	22400	24650
		10.72	16700	18600	20500	27450	27450	30250	17600	19600	21600	30350	30350	33400
	21.40	0.437	13050	14450	15850	21350	23500	17050	18550	20050	23200	23500	25900	
23.20		11.1	17600	19600	21600	28950	31850	19000	21100	23200	31850	31850	35750	
	23.20	0.478	14400	15900	17400	24650	27150	15050	16650	18250	27050	27050	29150	
		12.14	19400	21600	23800	33450	36750	20300	22600	24900	36650	36650	40350	
5 1/2" 139.70	17.00	0.304	8150	9050	9950	13750	15050	13750	15050	16700	15200	15200	16700	
		7.72	11100	12300	13500	18650	18650	20450	11900	13200	14500	20600	20600	22650
	20.00	0.361	10850	11950	13050	18100	18100	19900	11700	13000	14300	19900	19900	21900
23.00		9.17	14600	16200	17800	24450	27000	15900	17700	19500	27000	27000	29700	
	23.00	0.415	13700	15200	16700	23150	25650	14400	15900	17400	25600	25600	28150	
		10.54	18500	20600	22700	31400	34700	19400	21600	23800	34700	34700	38150	
26.00	26.00	0.476	15650	17350	19050	28850	28850	31800	16300	18100	19900	31700	31700	34850
		12.09	21100	23500	25900	39150	43050	22000	24500	27000	43000	43000	47250	
	23.20	0.330	12700	14100	15500	22800	22800	25100	13700	15200	16700	25250	25250	27750
6 5/8" 168.28		8.38	17200	19100	21000	30900	30900	34050	18500	20600	22700	34250	34250	37600
	24.00	0.362	14400	15900	17400	25950	25950	28600	15050	16650	18250	28550	28550	31450
		8.94	19400	21600	23800	35200	35200	38700	20300	22600	24900	38700	38700	42650
28.00	28.00	0.417	16000	17700	19400	33700	37150	17250	19150	21050	37200	37200	40850	
		10.59	21600	24000	26400	45700	50300	23400	26000	28600	50450	50450	55400	
	32.00	0.475	19850	22050	24250	42250	46450	20850	23150	25450	46500	46500	51150	
36.70		12.07	26900	29900	32900	57250	63950	28300	31400	34500	63050	63050	69350	
	36.70	0.562	20850	23150	25450	52400	58100	20850	23150	25450	57600	57600	63900	
		14.27	28300	31400	34500	71000	78800	28300	31400	34500	78200	78200	86700	
7" 177.80	26.00	0.362	15050	16650	18250	27350	27350	30100	16000	17700	19400	30100	30100	33150
		9.19	20300	22600	24900	37050	40800	21600	24000	26400	40800	40800	44950	
	26.00	0.362	15050	16650	18250	27350	27350	30100	16000	17700	19400	30100	30100	33150

### VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-150-155 ksi										
			Tubing + Liner		Field		Liner		Mill & licensee				
			min.	opt.	min.	max.	min.	max.	min.	max.			
6" 127.00	20.80	0.422	14060	15550	17050	24400	24400	26850	24400	26850	24400	26850	
			19000	21100	23200	33100	33100	36400	33100	36400			
	21.40	0.437	15050	16650	18250	25800	25800	28350	25800	28350	25800	28350	
			20300	22600	24900	35000	35000	38450	35000	38450			
	23.20	0.478	16000	17700	19400	29400	29400	32350	29400	32350	29400	32350	
			21600	24000	26400	39850	39850	43850	39850	43850			
	5 1/2" 139.70	17.00	0.304	9500	10500	11500	16650	16650	18300	16650	18300	16650	18300
				12800	14200	15600	22550	22550	24800	22550	24800		
		20.00	0.361	12450	13750	15050	21700	21700	23850	21700	23850	21700	23850
				16700	18600	20500	29400	29400	32350	29400	32350		
23.00		0.415	15050	16650	18250	27900	27900	30650	27900	30650	27900	30650	
			20300	22600	24900	37850	37850	41550	37850	41550			
26.00		0.476	17000	18800	20600	34600	34600	38050	34600	38050	34600	38050	
			22900	25500	28100	46900	46900	51600	46900	51600			
6 5/8" 168.28		23.20	0.330	15050	16650	18250	27600	27600	30400	27600	30400	27600	30400
				20300	22600	24900	37400	37400	41200	37400	41200		
	24.00	0.362	15650	17350	19050	31250	31250	34350	31250	34350	31250	34350	
			21100	23500	25900	42350	42350	46500	42350	46500			
	28.00	0.417	18600	20600	22600	40550	40550	44650	40550	44650	40550	44650	
			25100	27900	30700	55000	55000	60550	55000	60550			
	32.00	0.475	20850	23150	25450	50750	50750	55850	50750	55850	50750	55850	
			28300	31400	34500	68800	68800	75700	68800	75700			
	36.70	0.562	20850	23150	25450	62900	62900	69800	62900	69800	62900	69800	
			28300	31400	34500	85300	85300	94600	85300	94600			
7" 177.80	26.00	0.362	16300	18100	19900	32850	32850	36150	32850	36150	32850	36150	
			22000	24500	27000	44550	44550	49000	44550	49000			

## VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi												75-80-85 ksi																
			Field						Mill & licensee						Field						Mill & licensee										
			Tubing + Liner		Tubing		Liner		min.		max.		ft. lb.		N.m.		Tubing + Liner		Tubing		Liner		min.		max.		ft. lb.		N.m.		
in.	mm	lb/ft	in.	mm	optl	max.	in.	mm	optl	max.	in.	mm	optl	max.	in.	mm	optl	max.	in.	mm	optl	max.	in.	mm	optl	max.	in.	mm	optl	max.	
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	11700	13000	14300	18100	18100	19900	18100	19900	13450	14850	16250	22050	22050	24550	27000	20600	22700	14050	15550	17050	25450	28000	19000	21100	23200	34500	37950	30600	33750
			15900	17700	19500	24550	24550	27000	20600	22700	16300	18100	19900	27900	31000	18600	20600	22600	35150	38250	22000	24500	27000	41500	45750	22000	24500	27000	41500	45750	
			13050	14450	15850	20600	20600	22700	27950	30800	19000	21100	23200	34500	37950	25100	27900	30700	47650	51850	16300	18100	19900	27900	31000	18600	20600	22600	35150	38250	
			17600	19600	21600	27950	27950	30800	34050	37550	22000	24500	27000	42350	46650	25100	27900	30700	47650	51850	16300	18100	19900	27900	31000	18600	20600	22600	35150	38250	
			14400	15900	17400	25100	25100	27700	34050	37550	22000	24500	27000	42350	46650	25100	27900	30700	47650	51850	16300	18100	19900	27900	31000	18600	20600	22600	35150	38250	
<b>7 5/8"</b> 193.68	<b>29.70</b>	<b>0.375</b>	11100	12300	13500	17950	17950	19900	17950	19900	13050	14450	15850	21980	21980	24300	27000	20600	22600	14050	15550	17050	25450	28000	19000	21100	23200	34500	37950	30600	33750
			15000	16700	18400	24300	24300	27000	31400	34800	22000	24500	27000	42350	46650	25100	27900	30700	47650	51850	16300	18100	19900	27900	31000	18600	20600	22600	35150	38250	
			13700	15200	16700	23130	23130	25650	31400	34800	22000	24500	27000	42350	46650	25100	27900	30700	47650	51850	16300	18100	19900	27900	31000	18600	20600	22600	35150	38250	
			18500	20600	22700	31400	31400	34800	31400	34800	19400	21600	23800	38400	42600	28300	31400	34500	52150	57750	22000	24500	27000	41500	45750	22000	24500	27000	41500	45750	
			13700	15200	16700	23130	23130	25650	31400	34800	19400	21600	23800	38400	42600	28300	31400	34500	52150	57750	22000	24500	27000	41500	45750	22000	24500	27000	41500	45750	
	<b>33.70</b>	<b>0.430</b>	13700	15200	16700	23130	23130	25650	31400	34800	19400	21600	23800	38400	42600	28300	31400	34500	52150	57750	22000	24500	27000	41500	45750	22000	24500	27000	41500	45750	

### VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi						105-110-115 ksi								
			Field			Mill & licensee			Field			Mill & licensee					
			Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl	max.
in. mm.	lb/ft	in. mm.	ft. lb. N.m.						ft. lb. N.m.								
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	15300	17000	18700	26050	26050	28650	16000	17700	19400	30100	30100	33150	30100	33150	
			20700	23000	25300	35300	35300	38850	21600	24000	26400	40800	40800	44950	40800	44950	
	<b>32.00</b>	<b>0.453</b>	16000	17700	19400	31400	31400	33050	17650	19550	21450	34700	34700	38200	34700	38200	
			21600	24000	26400	42550	44800	42550	44800	23800	26500	29200	47050	47050	51800	47050	51800
	<b>35.00</b>	<b>0.498</b>	18600	20600	22600	36150	39800	36150	39800	20600	22800	25000	41800	41800	46050	41800	46050
<b>38.00</b>			25100	27900	30700	49050	53950	49050	53950	27800	30900	34000	56650	56650	62450	56650	62450
	<b>38.00</b>	<b>0.540</b>	20850	23150	25450	41000	45150	41000	45150	20850	23150	25450	47300	47300	52150	47300	52150
			28300	31400	34500	55600	61200	55600	61200	28300	31400	34500	64150	64150	70700	64150	70700
	<b>41.00</b>	<b>0.590</b>	20850	23150	25450	46150	50750	46150	50750	20850	23150	25450	53750	53750	59150	53750	59150
			28300	31400	34500	62600	68800	62600	68800	28300	31400	34500	72900	72900	80200	72900	80200
<b>7 5/8"</b> 193.68	<b>29.70</b>	<b>0.375</b>	14400	15900	17400	26050	28900	26050	28900	15050	16650	18250	30200	30200	33500	30200	33500
			19400	21600	23800	35300	39200	35300	39200	20300	22600	24900	40900	40900	45400	40900	45400
	<b>33.70</b>	<b>0.430</b>	16300	18100	19900	33550	37200	33550	37200	18250	20250	22250	38900	38900	43100	38900	43100
		22000	24500	27000	45500	50400	45500	50400	24700	27500	30200	52700	52700	58400	52700	58400	

**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi												135-140 ksi											
			Field				Mill & licensee				Field				Mill & licensee											
			Tubing + Liner min.	optl	Tubing max.	Liner Max.	min.	max.	Tubing + Liner min.	optl	Tubing max.	Liner Max.	min.	max.	Tubing + Liner min.	optl	Tubing max.	Liner Max.	min.	max.						
in. mm.	lb/ft	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.							
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>34300</b>	<b>34300</b>	<b>37750</b>	<b>37750</b>	<b>17650</b>	<b>19650</b>	<b>21450</b>	<b>37750</b>	<b>37750</b>	<b>17650</b>	<b>19650</b>	<b>21450</b>	<b>37750</b>	<b>37750</b>	<b>41500</b>						
			22000	24500	27000	46500	46500	51700	51700	23800	26500	29200	51200	51200	23800	26500	29200	51200	51200	56250						
	<b>32.00</b>	<b>0.463</b>	<b>19600</b>	<b>21700</b>	<b>23800</b>	<b>39400</b>	<b>39400</b>	<b>43400</b>	<b>43400</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>43400</b>	<b>43400</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>43400</b>	<b>43400</b>	<b>47750</b>						
			26500	29400	32300	53450	53450	58850	58850	28300	31400	34500	58850	58850	28300	31400	34500	58850	58850	64750						
	<b>35.00</b>	<b>0.498</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>47500</b>	<b>47500</b>	<b>52350</b>	<b>52350</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>52350</b>	<b>52350</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>52350</b>	<b>52350</b>	<b>57850</b>						
		28300	31400	34500	64450	64450	70900	70900	28300	31400	34500	70900	70900	28300	31400	34500	70900	70900	78050							
	<b>38.00</b>	<b>0.540</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>53800</b>	<b>53800</b>	<b>59150</b>	<b>59150</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>59250</b>	<b>59250</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>59250</b>	<b>59250</b>	<b>65200</b>						
			28300	31400	34500	72950	72950	80200	80200	28300	31400	34500	80350	80350	28300	31400	34500	80350	80350	88400						
	<b>41.00</b>	<b>0.590</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>61250</b>	<b>61250</b>	<b>67420</b>	<b>67420</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>67400</b>	<b>67400</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>67400</b>	<b>67400</b>	<b>74150</b>						
			28300	31400	34500	83050	83050	91400	91400	28300	31400	34500	91400	91400	28300	31400	34500	91400	91400	100550						
<b>7 5/8"</b> 193.68	<b>29.70</b>	<b>0.375</b>	<b>15650</b>	<b>17350</b>	<b>19050</b>	<b>34400</b>	<b>34400</b>	<b>38150</b>	<b>38150</b>	<b>16900</b>	<b>18800</b>	<b>20700</b>	<b>37900</b>	<b>37900</b>	<b>16900</b>	<b>18800</b>	<b>20700</b>	<b>37900</b>	<b>37900</b>	<b>42050</b>						
			21100	23500	25900	46600	46600	51700	51700	22900	25500	28100	51400	51400	22900	25500	28100	51400	51400	57000						
	<b>33.70</b>	<b>0.430</b>	<b>20150</b>	<b>22400</b>	<b>24650</b>	<b>44300</b>	<b>44300</b>	<b>49100</b>	<b>49100</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>48800</b>	<b>48800</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>48800</b>	<b>48800</b>	<b>54150</b>						
			27300	30400	33400	60100	60100	66600	66600	28300	31400	34500	66200	66200	28300	31400	34500	66200	66200	73400						

**VAM TOP HT TORQUE VALUE - EXCEPT FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-150-155 ksi										
			Field					Mill & licensee					
			Tubing + Liner		Tubing		Liner		min.		max.		
in. mm.	lb/ft	in. mm.	ft. lb. N.m.	min.	opt.	max.	min.	max.	min.	max.	min.	max.	
<b>7"</b> <i>177.80</i>	<b>29.00</b>	<b>0.408</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>	<b>41250</b>	<b>41250</b>	<b>41250</b>	<b>45350</b>				
		<i>10.36</i>	<i>25600</i>	<i>28400</i>	<i>31200</i>	<i>55950</i>	<i>55950</i>	<i>55950</i>	<i>61500</i>				
	<b>32.00</b>	<b>0.463</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>47500</b>	<b>47500</b>	<b>52200</b>					
		<i>11.51</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>64400</i>	<i>64400</i>	<i>70750</i>					
	<b>35.00</b>	<b>0.498</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>57200</b>	<b>57200</b>	<b>62950</b>					
	<i>12.65</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>77550</i>	<i>77550</i>	<i>85350</i>						
	<b>38.00</b>	<b>0.540</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>64700</b>	<b>64700</b>	<b>71150</b>					
	<i>13.72</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>87700</i>	<i>87700</i>	<i>96450</i>						
	<b>41.00</b>	<b>0.590</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>73500</b>	<b>73500</b>	<b>80850</b>					
	<i>14.99</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>99650</i>	<i>99650</i>	<i>109600</i>						
<b>7 5/8"</b> <i>193.68</i>	<b>29.70</b>	<b>0.375</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>41500</b>	<b>41500</b>	<b>46000</b>					
		<i>9.53</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>56300</i>	<i>56300</i>	<i>62400</i>					
	<b>33.70</b>	<b>0.430</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>53350</b>	<b>53350</b>	<b>59180</b>					
	<i>10.92</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>72300</i>	<i>72300</i>	<i>80200</i>						

**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi						75-80-85 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner	opti	max.	min.	max.	max.	Tubing + Liner	opti	max.	min.	max.	max.
4 1/2" 114.30	10.50	0.224	2220	2460	2700	2890	2890	3170	2540	2820	3100	3470	3470	3810
			3010	3330	3660	3920	4300	3440	3820	4200	4700	4700	5170	
11.60	0.250	0.260	2800	3110	3420	3760	3760	4130	3260	3620	3980	4560	4560	5010
			3800	4220	4640	5100	5600	4400	4900	5400	6180	6180	6790	
12.60	0.271	0.320	3260	3620	3980	4410	4410	4850	3710	4120	4530	5420	5420	5960
			4420	4910	5400	5980	6580	5030	5590	6140	7350	7350	8080	
13.50	0.290	0.337	3710	4120	4530	5060	5060	5560	4170	4630	5090	6150	6150	6760
			5030	5590	6140	6860	7540	5650	6280	6900	8340	8340	9170	
15.10	0.337	0.356	4630	5140	5650	6370	6370	7000	5220	5790	6360	7670	7670	8430
			6280	6970	7660	8640	9490	7080	7850	8620	10400	10400	11430	
17.00	0.380	0.402	5600	6220	6840	7810	7810	8590	6390	7090	7790	9400	9400	10340
			7590	8430	9270	10590	11650	8660	9610	10560	12740	12740	14020	
17.70	0.421	0.430	6120	6800	7480	8550	8550	9400	6840	7690	8340	10350	10350	11350
			8300	9220	10140	11590	12740	9270	10290	11310	14030	14030	15390	
18.90	10.92	0.500	6840	7590	8340	9500	9500	10450	7830	8700	9670	11450	11450	12550
			9270	10290	11310	12880	14170	10620	11800	12980	15520	15520	17020	
21.50	12.70	0.560	8150	9050	9950	11200	11200	12300	9500	10500	11500	13900	13900	15200
			11050	12270	13490	15190	16680	12880	14240	15590	18850	18850	20610	
23.70	14.22	0.560	9150	10150	11150	12650	12650	13850	10850	11950	13050	15600	15600	17100
			12410	13760	15120	17150	18780	14710	16200	17690	21150	21150	23180	
5" 127.00	15.00	0.296	4370	4850	5330	5930	5930	6510	4950	5500	6050	7090	7090	7800
			5920	6580	7230	8040	8830	6710	7460	8200	9610	9610	10580	
18.00	0.362	0.362	6190	6870	7550	8700	8700	9500	7170	7960	8750	10150	10150	11100
			8390	9310	10240	11800	12880	9720	10790	11860	13760	13760	15050	
20.30	0.408	0.408	7470	8300	9130	10500	10500	11500	8460	9400	10340	12650	12650	14000
			10130	11250	12380	14240	15590	11470	12740	14020	17150	17150	18980	



**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi						105-110-115 ksi							
			Field			Mill & licensee			Field			Mill & licensee				
			in. mm.	lb/ft	in. mm.	Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.	max.	Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.
4 1/2" 114.30	10.50	0.224	2800	3110	3420	3620	3980	3130	3470	3810	4120	4530	5600	6200	5600	6200
		5.69	3800	4220	4640	4900	5400	4240	4710	5180	5600	6200	5600	6200	5600	6200
	11.60	0.250	3650	4050	4450	4560	5010	4040	4480	4920	5280	5800	7200	7900	7200	7900
		6.35	4900	5500	6100	6200	6800	5500	6100	6700	7200	7900	7200	7900	7200	7900
	12.60	0.271	4110	4550	5010	5420	5960	4560	5060	5560	6220	6840	8400	9200	8400	9200
		6.88	5570	6180	6790	7400	8100	6200	6900	7600	8400	9200	8400	9200	8400	9200
	13.50	0.290	4690	5210	5730	6220	6840	5220	5790	6360	7090	7790	9600	10600	9600	10600
		7.37	6400	7100	7800	8400	9200	7000	7800	8600	9600	10600	9600	10600	9600	10600
	15.10	0.337	5860	6510	7160	7740	8510	6450	7160	7870	8900	9790	12100	13300	12100	13300
		8.56	7900	8800	9700	10500	11600	8700	9700	10700	12100	13300	12100	13300	12100	13300
	17.00	0.380	7170	7960	8750	9350	10280	7830	8700	9570	10650	11650	14400	15800	14400	15800
		9.65	9720	10790	11860	12700	14000	10600	11800	13000	14400	15800	14400	15800	14400	15800
	17.70	0.402	7830	8700	9570	10050	11050	8460	9400	10340	11550	12650	15700	17300	15700	17300
	10.21	10620	11800	12980	13600	15000	11400	12700	14000	15700	17300	15700	17300	15700	17300	
18.90	0.430	8460	9400	10340	11050	12150	9500	10500	11500	12650	13850	17200	18900	17200	18900	
	10.92	11470	12740	14020	15000	16500	12800	14200	15600	17200	18900	17200	18900	17200	18900	
21.50	0.500	10850	11950	13050	13250	14550	11700	13000	14300	15200	16700	20600	22700	20600	22700	
	12.70	14710	16200	17690	17900	19700	15860	17630	19390	20600	22700	20600	22700	20600	22700	
23.70	0.560	12100	13400	14700	14700	16000	13700	15200	16700	16800	18400	22800	25100	22800	25100	
	14.22	16410	18170	19930	19930	21800	19930	20610	22640	22800	25100	22800	25100	22800	25100	
5" 127.00	15.00	0.296	5480	6080	6680	7020	7020	6060	6730	7400	7960	9600	10800	9600	10800	11800
		7.52	7430	8240	9060	9520	9520	8200	9100	10000	10800	12600	14400	12600	14400	15600
	18.00	0.362	7830	8700	9570	9700	10800	8780	9750	10720	11300	13000	15300	16800	13000	15300
		9.19	10620	11800	12980	13400	14700	11900	13220	14530	15300	17100	19400	21700	17100	19400
	20.30	0.408	9500	10500	11500	11850	12950	10850	11950	13050	13500	15800	18100	20400	13500	15800
	10.36	12880	14240	15590	16050	17550	14710	16200	17690	18300	20700	23000	25300	20700	23000	



**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi												135-140 ksi											
			Field				Mill & licensee				Field				Mill & licensee											
			lb/ft	in. mm	Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.	max.	Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.	max.	Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.	max.				
4 1/2" 114.30	10.50	0.224	3450	3830	4210	4630	5090	4630	5090	5450	5910	6370	6830	7290	3710	4120	4530	5140	5140	5650	5650					
		5.69	4700	5200	5700	6300	6900	6300	6900	7500	8100	8700	9300	9900	5000	5600	6200	7000	7000	7700	7700					
	11.60	0.250	4500	4990	5480	5930	6520	6510	6510	7000	7500	8000	8800	8800	4820	5350	5880	6510	6510	7160	7160					
		6.35	6100	6800	7500	8000	8800	8000	8800	9500	10200	11000	11800	12600	6600	7300	8000	8800	8800	9700	9700					
	12.60	0.271	5020	5570	6120	7020	7720	7020	7720	8420	9120	9820	10520	11220	5400	6000	6600	7740	7740	8510	8510					
		6.88	6800	7600	8400	9500	10500	9500	10500	11500	12500	13500	14500	15500	7300	8100	8900	10500	10500	11600	11600					
	13.50	0.290	5740	6370	7000	8030	8830	8030	8830	9630	10430	11230	12030	12830	6120	6800	7480	8800	8800	9680	9680					
		7.37	7700	8600	9500	10900	12000	10900	12000	13400	14500	15600	16700	17800	8300	9200	10100	12000	12000	13200	13200					
	15.10	0.337	7170	7960	8750	10050	11050	10050	11050	12350	13650	14950	16250	17550	7830	8700	9570	11000	11000	12100	12100					
		8.56	9700	10800	11900	13600	15000	13600	15000	17300	19000	20700	22400	24100	10600	11800	13000	14900	14900	16400	16400					
	17.00	0.380	8780	9750	10720	12000	13200	12000	13200	14800	16400	18000	19600	21200	9500	10500	11500	13150	13150	14450	14450					
		9.65	11900	13200	14500	16300	18100	16300	18100	20500	23000	25500	28000	30500	12800	14200	15600	17800	17800	19600	19600					
17.70	0.402	9500	10500	11500	13000	14300	13000	14300	16000	17700	19500	21200	23000	10100	11200	12300	14250	14250	15650	15650						
	10.21	12800	14200	15600	17700	19700	17700	19700	22500	25500	28500	31500	34500	13700	15200	16700	19300	19300	21200	21200						
18.90	0.430	10450	11550	12650	14250	15650	14250	15650	17600	19300	21200	23200	25200	11450	12650	13850	15600	15600	17100	17100						
	10.92	14100	15700	17300	19300	21200	19300	21200	24500	28000	31500	35000	38500	15500	17200	18900	21200	21200	23300	23300						
21.50	0.500	13050	14450	15850	17050	18750	17050	18750	21000	23400	25800	28200	30600	14050	15550	17050	18650	18650	20450	20450						
	12.70	17690	19590	21490	23100	25100	23100	25100	29000	33000	37000	41000	45000	19000	21100	23200	25300	25300	27800	27800						
23.70	0.560	15050	16650	18250	19000	20900	19000	20900	23800	26800	29800	32800	35800	15300	17000	18700	20900	20900	22900	22900						
	14.22	20410	22570	24740	25800	28400	25800	28400	33500	39000	44500	50000	55500	20740	23050	25350	28300	28300	31100	31100						
5"	0.296	6510	7230	7950	9050	9950	9050	9950	11150	12350	13550	14750	15950	7170	7960	8750	9800	9800	10700	10700						
	7.52	8800	9800	10800	11250	12350	11250	12350	14000	15750	17500	19250	21000	9700	10800	11900	13300	13300	14600	14600						
18.00	0.362	9500	10500	11500	13000	14300	13000	14300	16000	17800	19600	21400	23200	10450	11650	12850	13900	13900	15200	15200						
	9.19	12800	14200	15600	17650	19350	17650	19350	22500	25750	29000	32250	35500	14100	15700	17300	18850	18850	20650	20650						
20.30	0.408	11700	13000	14300	15100	16600	15100	16600	18500	20450	22400	24350	26300	12450	13750	15050	16600	16600	18200	18200						
	10.36	15860	17630	19390	20450	22450	20450	22450	26450	30450	34450	38450	42450	16880	18840	20410	22500	22500	25000	25000						

**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-150-155 ksi										Mill & licensee																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
			Tubing + Liner		Field		Tubing		Liner		min.	max.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
			min.	opt.	max.	min.	max.	min.	max.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
in. mm.	lb/ft	in. mm.	in. mm.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.	ft. N.m.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
4 1/2" 114.30	10.50	0.224	3970	4410	4850	5570	6120	6670	7220	7770	8320	8870	9420	9970	10520	11070	11620	12170	12720	13270	13820	14370	14920	15470	16020	16570	17120	17670	18220	18770	19320	19870	20420	20970	21520	22070	22620	23170	23720	24270	24820	25370	25920	26470	27020	27570	28120	28670	29220	29770	30320	30870	31420	31970	32520	33070	33620	34170	34720	35270	35820	36370	36920	37470	38020	38570	39120	39670	40220	40770	41320	41870	42420	42970	43520	44070	44620	45170	45720	46270	46820	47370	47920	48470	49020	49570	50120	50670	51220	51770	52320	52870	53420	53970	54520	55070	55620	56170	56720	57270	57820	58370	58920	59470	60020	60570	61120	61670	62220	62770	63320	63870	64420	64970	65520	66070	66620	67170	67720	68270	68820	69370	69920	70470	71020	71570	72120	72670	73220	73770	74320	74870	75420	75970	76520	77070	77620	78170	78720	79270	79820	80370	80920	81470	82020	82570	83120	83670	84220	84770	85320	85870	86420	86970	87520	88070	88620	89170	89720	90270	90820	91370	91920	92470	93020	93570	94120	94670	95220	95770	96320	96870	97420	97970	98520	99070	99620	100170	100720	101270	101820	102370	102920	103470	104020	104570	105120	105670	106220	106770	107320	107870	108420	108970	109520	110070	110620	111170	111720	112270	112820	113370	113920	114470	115020	115570	116120	116670	117220	117770	118320	118870	119420	119970	120520	121070	121620	122170	122720	123270	123820	124370	124920	125470	126020	126570	127120	127670	128220	128770	129320	129870	130420	130970	131520	132070	132620	133170	133720	134270	134820	135370	135920	136470	137020	137570	138120	138670	139220	139770	140320	140870	141420	141970	142520	143070	143620	144170	144720	145270	145820	146370	146920	147470	148020	148570	149120	149670	150220	150770	151320	151870	152420	152970	153520	154070	154620	155170	155720	156270	156820	157370	157920	158470	159020	159570	160120	160670	161220	161770	162320	162870	163420	163970	164520	165070	165620	166170	166720	167270	167820	168370	168920	169470	170020	170570	171120	171670	172220	172770	173320	173870	174420	174970	175520	176070	176620	177170	177720	178270	178820	179370	179920	180470	181020	181570	182120	182670	183220	183770	184320	184870	185420	185970	186520	187070	187620	188170	188720	189270	189820	190370	190920	191470	192020	192570	193120	193670	194220	194770	195320	195870	196420	196970	197520	198070	198620	199170	199720	200270	200820	201370	201920	202470	203020	203570	204120	204670	205220	205770	206320	206870	207420	207970	208520	209070	209620	210170	210720	211270	211820	212370	212920	213470	214020	214570	215120	215670	216220	216770	217320	217870	218420	218970	219520	220070	220620	221170	221720	222270	222820	223370	223920	224470	225020	225570	226120	226670	227220	227770	228320	228870	229420	229970	230520	231070	231620	232170	232720	233270	233820	234370	234920	235470	236020	236570	237120	237670	238220	238770	239320	239870	240420	240970	241520	242070	242620	243170	243720	244270	244820	245370	245920	246470	247020	247570	248120	248670	249220	249770	250320	250870	251420	251970	252520	253070	253620	254170	254720	255270	255820	256370	256920	257470	258020	258570	259120	259670	260220	260770	261320	261870	262420	262970	263520	264070	264620	265170	265720	266270	266820	267370	267920	268470	269020	269570	270120	270670	271220	271770	272320	272870	273420	273970	274520	275070	275620	276170	276720	277270	277820	278370	278920	279470	280020	280570	281120	281670	282220	282770	283320	283870	284420	284970	285520	286070	286620	287170	287720	288270	288820	289370	289920	290470	291020	291570	292120	292670	293220	293770	294320	294870	295420	295970	296520	297070	297620	298170	298720	299270	299820	300370	300920	301470	302020	302570	303120	303670	304220	304770	305320	305870	306420	306970	307520	308070	308620	309170	309720	310270	310820	311370	311920	312470	313020	313570	314120	314670	315220	315770	316320	316870	317420	317970	318520	319070	319620	320170	320720	321270	321820	322370	322920	323470	324020	324570	325120	325670	326220	326770	327320	327870	328420	328970	329520	330070	330620	331170	331720	332270	332820	333370	333920	334470	335020	335570	336120	336670	337220	337770	338320	338870	339420	339970	340520	341070	341620	342170	342720	343270	343820	344370	344920	345470	346020	346570	347120	347670	348220	348770	349320	349870	350420	350970	351520	352070	352620	353170	353720	354270	354820	355370	355920	356470	357020	357570	358120	358670	359220	359770	360320	360870	361420	361970	362520	363070	363620	364170	364720	365270	365820	366370	366920	367470	368020	368570	369120	369670	370220	370770	371320	371870	372420	372970	373520	374070	374620	375170	375720	376270	376820	377370	377920	378470	379020	379570	380120	380670	381220	381770	382320	382870	383420	383970	384520	385070	385620	386170	386720	387270	387820	388370	388920	389470	390020	390570	391120	391670	392220	392770	393320	393870	394420	394970	395520	396070	396620	397170	397720	398270	398820	399370	399920	400470	401020	401570	402120	402670	403220	403770	404320	404870	405420	405970	406520	407070	407620	408170	408720	409270	409820	410370	410920	411470	412020	412570	413120	413670	414220	414770	415320	415870	416420	416970	417520	418070	418620	419170	419720	420270	420820	421370	421920	422470	423020	423570	424120	424670	425220	425770	426320	426870	427420	427970	428520	429070	429620	430170	430720	431270	431820	432370	432920	433470	434020	434570	435120	435670	436220	436770	437320	437870	438420	438970	439520	440070	440620	441170	441720	442270	442820	443370	443920	444470	445020	445570	446120	446670	447220	447770	448320	448870	449420	449970	450520	451070	451620	452170	452720	453270	453820	454370	454920	455470	456020	456570	457120	457670	458220	458770	459320	459870	460420	460970	461520	462070	462620	463170	463720	464270	464820	465370	465920	466470	467020	467570	468120	468670	469220	469770	470320	470870	471420	471970	472520	473070	473620	474170	474720	475270	475820	476370	476920	477470	478020	478570	479120	479670	480220	480770	481320	481870	482420	482970	483520	484070	484620	485170	485720	486270	486820	487370	487920	488470	489020	489570	490120	490670	491220	491770	492320	492870	493420	493970	494520	495070	495620	496170	496720	497270	497820	498370	498920	499470	500020	500570	501120	501670	502220	502770	503320	503870	504420	504970	505520	506070	506620	507170	507720	508270	508820	509370	509920	510470	511020	511570	512120	512670	513220	513770	514320	514870	515420	515970	516520	517070	517620	518170	518720	519270	519820	520370	520920	521470	522020	522570	523120	523670	524220	524770	525320	525870	526420	526970	527520	528070	528620	529170	529720	530270	530820	531370	531920	532470	533020	533570	534120	534670	535220	535770	536320	536870	537420	537970	538520	539070	539620	540170	540720	541270	541820	542370	542920	543470	544020	544570	545120	545670	546220	546770	547320	547870	548420	548970	549520	550070	550620	551170	551720	552270	552820	553370	553920	554470	555020</

## VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi						75-80-85 ksi									
			Field			Mill & licensee			Field			Mill & licensee						
			Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl	max.	Tubing min.	max.	Liner Max.	Tubing + Liner min.	optl	max.	
5"	20.80	0.422	7830	8700	9570	10850	10850	11950	11150	13400	13400	14800	14800	18170	20070	20070	20070	
																		10.72
127.00	21.40	0.437	8460	9400	10340	11550	11550	12700	10500	14100	14100	15550	15550	19120	21080	21080	21080	21080
23.20	0.478	0.478	9500	10500	11500	13000	13000	14300	10850	13050	16250	17900	17900	22030	24270	24270	24270	24270
5 1/2"	17.00	0.304	5220	5790	6360	7230	7230	7960	6580	7230	8700	9500	9500	11800	12880	12880	12880	12880
139.70	20.00	0.361	6840	7590	8340	9750	9750	10800	8700	9570	11950	13100	13100	16200	17760	17760	17760	17760
23.00	0.415	0.415	8780	9750	10720	12300	12300	13500	9850	10850	11850	15200	15200	20610	22640	22640	22640	22640
26.00	0.476	0.476	10850	11950	13050	15550	15550	17100	12100	13400	14700	18800	18800	20700	20700	20700	20700	20700
6 5/8"	23.20	0.330	7830	8700	9570	11950	11950	13100	10150	11150	14800	16300	16300	20070	22100	22100	22100	22100
168.28	24.00	0.362	8780	9750	10720	13400	13400	14800	10100	11200	12300	16650	16650	22570	24810	24810	24810	24810
28.00	0.417	0.417	10100	11200	12300	17700	17700	19500	13050	14450	15850	21700	21700	23850	23850	23850	23850	23850
32.00	0.475	0.475	14050	15550	17050	22050	22050	24250	14400	15900	17400	27000	27000	29650	29650	29650	29650	29650
36.70	0.562	0.562	15650	17350	19050	27100	27100	30050	18000	19900	21800	33500	33500	37150	37150	37150	37150	37150
7"	26.00	0.362	9500	10500	11500	14100	14100	15500	10850	11950	13050	17350	17350	19100	19100	19100	19100	19100

**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi						105-110-115 ksi								
			Field			Mill & licensee			Field			Mill & licensee					
			in. mm	lb/ft	in. mm	Tubing + Liner min.	optl	Tubing max.	min.	max.	in. mm	lb/ft	in. mm	Tubing + Liner min.	optl	Tubing max.	min.
<b>5"</b> 127.00	20.80	0.422	11200	12300	12300	12300	13600	14100	14100	11100	12300	13600	14100	14100	15600	14100	15600
		10.72	13690	15190	16680	16700	16700	18300	19100	15050	16680	18300	19100	19100	21000	19100	21000
	21.40	0.437	10850	11950	13050	13050	14100	14800	14800	11700	13000	14300	14800	14800	16200	14800	16200
		11.10	14710	16200	17690	17690	19200	17690	19200	15860	17630	19390	20050	20050	22050	20050	22050
	23.20	0.478	13400	14700	14700	14700	16000	16500	16500	13450	14850	16250	16500	16500	18100	16500	18100
<b>5 1/2"</b> 139.70	17.00	0.304	6510	7230	7950	8700	8700	9570	10000	7470	8300	9130	10000	10000	11000	10000	11000
		7.72	8830	9800	10780	11800	11800	12900	13550	10200	11300	12400	13550	13550	14850	13550	14850
	20.00	0.361	8780	9750	10720	11200	11200	12300	12800	9850	10850	11850	12800	12800	14000	12800	14000
		9.17	11900	13220	14530	15200	15200	16700	17350	13350	14710	16070	17350	17350	19050	17350	19050
	23.00	0.415	11100	12300	13500	13750	15080	15080	16500	12450	13750	15050	15700	15700	17200	15700	17200
<b>6 5/8"</b> 168.28	26.00	0.476	13700	15200	16700	16700	17900	17900	18680	18640	20410	20410	21300	21300	23300	21300	23300
		12.09	18570	20610	22640	22640	24300	24300	26400	26400	28470	28470	29350	29350	32850	29350	32850
	23.20	0.330	10100	11200	12300	13500	13500	14800	15500	11450	12650	13850	15500	15500	17000	15500	17000
		8.38	13690	15190	16680	18300	18300	20100	21000	15500	17200	18900	21000	21000	23100	21000	23100
	24.00	0.362	11450	12650	13850	14900	14900	16300	16800	13050	14450	15850	17100	17100	18800	17100	18800
<b>6 7/8"</b> 177.80	28.00	0.417	13700	15200	16700	18450	18450	20250	20250	17600	19600	21600	23200	23200	25500	23200	25500
		10.59	18570	20610	22640	25000	25000	27500	27500	19900	22100	24300	28750	28750	31550	28750	31550
	32.00	0.475	16300	18100	19900	21700	21700	23800	18000	19900	21800	24900	24900	24900	23300	24900	23300
		12.07	22000	24500	27000	29400	29400	32300	29400	24300	27000	29700	33750	33750	37000	33750	37000
	36.70	0.562	20600	22800	25000	25350	25350	27900	25350	20850	23150	25450	28950	28950	31850	28950	31850
	14.27	27930	30910	33900	34400	34400	37800	34400	28270	31390	34510	39300	39300	43200	39300	43200	
	26.00	0.362	12450	13750	15050	15700	16700	17200	16700	13700	15200	16700	18000	18000	19800	18000	19800
	9.19	16880	18640	20410	21300	21300	23300	21300	18570	20610	22640	24400	24400	26800	24400	26800	



**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi						135-140 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner	opti	max.	min.	max.	max.	Tubing + Liner	opti	max.	min.	max.	max.
in. mm	lb/ft	in. mm	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
5" 127.00	20.80	0.422	13750	15050	15800	16800	17300	17300	13050	14450	15850	17300	17300	19000
		10.72	16880	18640	20470	21400	23500	23500	17690	19590	21490	23450	23450	25750
	21.40	0.437	13050	14450	15850	16600	16600	18200	14050	15550	17050	18100	18100	19900
		11.10	17690	19590	21490	22500	22500	24700	19050	21080	23120	24550	24550	26950
	23.20	0.478	14400	15900	17400	18500	18500	20300	15050	16650	18250	20200	20200	22200
		12.14	19520	21560	23590	25100	27600	20410	22570	24740	27400	27400	30100	
5 1/2" 139.70	17.00	0.304	8150	9050	9950	11300	12400	12400	8780	9750	10720	12300	12300	13500
		7.72	11100	12300	13500	15300	16800	15300	11900	13200	14500	16700	16700	18300
	20.00	0.361	10850	11950	13050	14400	14400	15800	11700	13000	14300	15800	15800	17300
		9.17	14600	16200	17800	19500	19500	21400	15860	17630	19390	21400	21400	23500
	23.00	0.415	13700	15200	16700	17600	17600	19300	14400	15900	17400	19400	19400	21300
		10.54	18570	20610	22640	23850	23850	26150	19520	21560	23590	26300	26300	28900
26.00	0.476	15650	17350	19050	21000	21000	23100	16300	18100	19900	23000	23000	25300	
		12.09	21220	23520	25830	28450	31250	27100	29450	31250	34300	34300	37300	
6 5/8" 168.28	23.20	0.330	12700	14100	15500	17500	19200	19200	13700	15200	16700	19200	19200	21100
		8.38	17200	19100	21000	23750	26050	22700	18500	20600	22700	26050	26050	28650
	24.00	0.362	14400	15900	17400	19400	21300	21300	15050	16650	18250	21350	21350	23450
		8.94	19400	21600	23800	26300	29900	26300	20300	22600	24900	28950	28950	31750
	28.00	0.417	16000	17700	19400	23900	26300	26300	17350	19150	21050	26250	26250	28850
		10.59	21600	24000	26400	32400	35650	23400	26000	28600	35600	35600	39100	
32.00	0.475	19850	22050	24250	28100	30900	30900	20850	23150	25450	30800	30800	33800	
		12.07	26900	29900	32900	38100	38100	28300	31400	34500	41750	41750	45850	
36.70	0.562	20850	23150	25450	32600	35900	35900	20850	23150	25450	35700	35700	39200	
		14.27	28300	31400	34500	44200	44200	28300	31400	34500	48400	48400	53200	
26.00	0.362	15050	16650	18250	20400	22400	22400	16000	17700	19400	22300	22300	24500	
		9.19	20410	22570	24740	27650	30350	21690	24000	26300	30250	30250	33250	

**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-150-155 ksi									
			Tubing + Liner		Field		Liner		Mill & licensee			
			min.	opt.	max.	min.	max.	min.	max.			
5" 127.00	20.80	0.422	14060	15550	17050	18800	18800	20600	18800	20600	18800	20600
			19000	21100	23200	25500	25500	28000	25500	28000		
			15050	16650	18250	19700	19700	21600	19700	21600		
			20410	22570	24740	26700	26700	29300	26700	29300		
			16000	17700	19400	21900	21900	24000	21900	24000		
5 1/2" 139.70	17.00	0.304	9500	10500	11500	13400	13400	14700	13400	14700	13400	14700
			12800	14200	15600	18150	18150	19950	18150	19950		
			12450	13750	15050	17100	17100	18800	17100	18800		
			16700	18600	20500	23200	23200	25500	23200	25500		
			15050	16650	18250	21000	21000	23100	21000	23100		
6 5/8" 168.28	23.20	0.476	17000	18800	20600	24950	24950	27350	24950	27350	24950	27350
			23050	25490	27930	33850	33850	37150	33850	37150		
			15050	16650	18250	20950	20950	22950	20950	22950		
			20300	22600	24900	28400	28400	31200	28400	31200		
			15650	17350	19050	23200	23200	25500	23200	25500		
6 3/4"	24.00	0.362	17100	23500	25900	31450	31450	34550	31450	34550	31450	34550
			18600	20600	22600	28650	28650	31450	28650	31450		
			25100	27900	30700	38850	38850	42650	38850	42650		
			20850	23150	25450	33500	33500	36800	33500	36800		
			28300	31400	34500	45400	45400	49900	45400	49900		
7"	26.00	0.562	20850	23150	25450	38800	38800	42600	38800	42600	38800	42600
			28300	31400	34500	52600	52600	57800	52600	57800		
			16300	18100	19900	24400	24400	26800	24400	26800		
			22100	24540	26980	33100	33100	36350	33100	36350		
			16300	18100	19900	24400	24400	26800	24400	26800		



**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi						75-80-85 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner min.	opti	max.	Liner Max.	min.	max.	Tubing + Liner min.	opti	max.	Liner Max.	min.	max.
in. mm.	lb/ft	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	in. mm.	ft. lb. N.m.	
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	<b>11700</b>	<b>13000</b>	<b>14300</b>	<b>1800</b>	<b>18100</b>	<b>19900</b>	<b>13450</b>	<b>14850</b>	<b>16250</b>	<b>22050</b>	<b>22050</b>	<b>24250</b>
			15860	17630	19390	2440	24540	26980	18240	20130	22030	29900	29900	32880
	<b>32.00</b>	<b>0.463</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>	<b>20600</b>	<b>20600</b>	<b>22700</b>	<b>14050</b>	<b>15550</b>	<b>17050</b>	<b>25450</b>	<b>25450</b>	<b>28000</b>
			17690	19590	21490	27930	27930	30780	19000	21100	23200	34510	34510	37960
	<b>35.00</b>	<b>0.498</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>25100</b>	<b>25100</b>	<b>27700</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>30600</b>	<b>30600</b>	<b>33750</b>
		19520	21560	23590	34030	34030	37560	22100	24540	26980	41490	41490	45760	
	<b>38.00</b>	<b>0.540</b>	<b>16300</b>	<b>18100</b>	<b>19900</b>	<b>27900</b>	<b>27900</b>	<b>31000</b>	<b>18600</b>	<b>20600</b>	<b>22600</b>	<b>35150</b>	<b>35150</b>	<b>38250</b>
			22100	24540	26980	37830	37830	42030	25220	27930	30640	47660	47660	51860
	<b>41.00</b>	<b>0.590</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	<b>31250</b>	<b>31250</b>	<b>34400</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>38450</b>	<b>38450</b>	<b>42600</b>
			24740	27460	30170	42370	42370	46640	28270	31390	34510	52130	52130	57760
<b>7 5/8"</b> 193.68	<b>29.70</b>	<b>0.375</b>	<b>11100</b>	<b>12300</b>	<b>13500</b>	<b>17950</b>	<b>17950</b>	<b>19900</b>	<b>13050</b>	<b>14450</b>	<b>15850</b>	<b>21980</b>	<b>21980</b>	<b>24380</b>
			15050	16680	18300	24340	24340	26980	17690	19590	21490	29800	29800	33050
	<b>33.70</b>	<b>0.430</b>	<b>13700</b>	<b>15200</b>	<b>16700</b>	<b>23130</b>	<b>23130</b>	<b>25650</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>28300</b>	<b>28300</b>	<b>31390</b>
			18570	20610	22640	31360	31360	34780	19520	21560	23590	38370	38370	42560



**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi						105-110-115 ksi					
			Field			Mill & licensee			Field			Mill & licensee		
			Tubing + Liner min.	optl	max.	Tubing min.	optl	max.	Tubing + Liner min.	optl	max.	Tubing min.	optl	max.
in. mm.	lb/ft	in. mm.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.		
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	15300	17000	18700	18800	18800	20600	16000	17700	19400	21600	21600	23700
		10.36	20740	23050	25350	25500	25500	28000	21690	24000	26300	29300	29300	32200
	<b>32.00</b>	<b>0.453</b>	16000	17700	19400	20900	20900	22900	17650	19650	21450	23950	23950	26250
		11.51	21600	24000	26400	28350	28350	31150	23800	26500	29200	32450	32450	35600
	<b>35.00</b>	<b>0.498</b>	18600	20600	22600	24000	24000	26400	20600	22800	25000	27500	27500	30200
		12.65	25220	27930	30640	32550	32550	35800	27800	30900	34000	37300	37300	41000
	<b>38.00</b>	<b>0.540</b>	20850	23150	25450	26050	26050	28650	20850	23150	25450	29800	29800	32700
		13.72	28270	31390	34510	35300	35300	38800	28300	31400	34500	40400	40400	44350
	<b>41.00</b>	<b>0.590</b>	20850	23150	25450	28000	28000	30800	20850	23150	25450	32100	32100	35300
		14.99	28300	31400	34500	37950	37950	41750	28300	31400	34500	43500	43500	47850
<b>7 5/8"</b> 193.68	<b>29.70</b>	<b>0.375</b>	14400	15900	17400	18800	18800	20700	15050	16650	18250	21650	21650	23800
		9.53	19520	21560	23590	25500	25500	28100	20410	22570	24740	29400	29400	32300
	<b>33.70</b>	<b>0.430</b>	16300	18100	19900	22800	22800	25100	18250	20250	22250	26200	26200	28800
		10.92	22000	24500	27000	30900	30900	34000	24700	27500	30300	35500	35500	39000

**VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS**

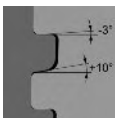
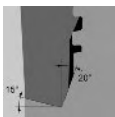
SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	120-125-130 ksi												135-140 ksi																	
			Field						Mill & licensee						Field						Mill & licensee											
			Tubing + Liner		Tubing		Liner		min.		max.		opti.		max.		Tubing + Liner		Tubing		Liner		min.		max.		opti.		max.			
in.	mm	lb/ft	in.	mm	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.	ft. lb.	N.m.				
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	16300	18100	19900	24400	24400	26800	17650	19650	21450	26750	26750	29350	23800	26500	29200	36250	36250	39850	20850	23150	25450	29650	29650	32650	28300	31400	34500	40200	40200	44200
			22000	24500	27000	33100	33100	36350	37100	36350	20850	23150	25450	29650	29650	32650	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32650	34000	34000	37400	
			19600	21700	23800	27100	27100	29800	29800	34100	20850	23150	25450	34000	34000	37400	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32650	34000	34000	37400	37400
			26500	29400	32300	36750	36750	40400	40400	46250	20850	23150	25450	34000	34000	37400	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32650	34000	34000	37400	37400
			20850	23150	25450	31000	31000	34100	34100	42050	20850	23150	25450	34000	34000	37400	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32650	34000	34000	37400	37400
<b>7 5/8"</b> 193.68	<b>29.70</b>	<b>0.375</b>	15650	17350	19050	24500	24500	27000	16900	18800	20700	27000	27000	29700	21220	23520	25830	33200	33200	36600	22900	25500	28100	32600	32600	36600	28300	31400	34500	44200	44200	48500
			21220	23520	25830	33200	33200	36600	36600	42000	20850	23150	25450	32600	32600	36600	28300	31400	34500	44200	44200	48500	20850	23150	25450	29650	29650	32600	32600	36600	36600	40300
			19600	21700	23800	27100	27100	29800	29800	34100	20850	23150	25450	34000	34000	37400	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32600	32600	36600	36600	40300
			26500	29400	32300	36750	36750	40400	40400	46250	20850	23150	25450	34000	34000	37400	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32600	32600	36600	36600	40300
			20850	23150	25450	31000	31000	34100	34100	42050	20850	23150	25450	34000	34000	37400	28300	31400	34500	40200	40200	44200	20850	23150	25450	29650	29650	32600	32600	36600	36600	40300

### VAM TOP HT TORQUE VALUE - FOR CRA MATERIALS

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-150-155 ksi									
			Tubing + Liner		Field		Tubing		Liner		Mill & licensee	
			min.	optl.	max.	max.	max.	Max.	min.	max.		
in. mm.	lb/ft	in. mm.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
<b>7"</b> 177.80	<b>29.00</b>	<b>0.408</b>	<b>18900</b>	<b>21000</b>	<b>23100</b>	<b>29150</b>	<b>29150</b>	<b>32050</b>	<b>29150</b>	<b>32050</b>	<b>39500</b>	<b>43450</b>
			25600	28400	31200	39500						
	<b>32.00</b>	<b>0.463</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>33250</b>	<b>33250</b>	<b>36550</b>	<b>33250</b>	<b>36550</b>	<b>45700</b>	<b>49550</b>
			28300	31400	34500	45100						
	<b>35.00</b>	<b>0.498</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>36900</b>	<b>36900</b>	<b>40600</b>	<b>36900</b>	<b>40600</b>	<b>50050</b>	<b>54900</b>
		28300	31400	34500	50050							
<b>7 5/8"</b> 193.68	<b>38.00</b>	<b>0.540</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>39900</b>	<b>39900</b>	<b>43800</b>	<b>39900</b>	<b>43800</b>	<b>54100</b>	<b>59400</b>
			28300	31400	34500	54100						
	<b>41.00</b>	<b>0.590</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>42950</b>	<b>42950</b>	<b>47150</b>	<b>42950</b>	<b>47150</b>	<b>58250</b>	<b>63900</b>
			28300	31400	34500	58250						
	<b>29.70</b>	<b>0.375</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>29400</b>	<b>29400</b>	<b>32300</b>	<b>29400</b>	<b>32300</b>	<b>39900</b>	<b>43800</b>
		28270	31390	34510	39900							
	<b>33.70</b>	<b>0.430</b>	<b>20850</b>	<b>23150</b>	<b>25450</b>	<b>35500</b>	<b>35500</b>	<b>39000</b>	<b>35500</b>	<b>39000</b>	<b>48100</b>	<b>52900</b>
			28300	31400	34500	48100						

## 3.4 VAM TOP HC

### Application



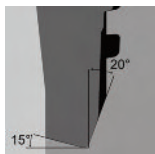
**VAM TOP HC (High Compression) is a Threaded and Coupled (T&C) connection for tubing and production casing applications where it is necessary to apply extreme compressive loads to the string.**

VAM TOP HC has been designed based on the main features of the VAM TOP product line. VAM TOP and VAM TOP HC are interchangeable; please refer to the dedicated rules for further details on performances.

VAM TOP HC product line covers diameters from 5" up to 7 3/4" on a wide range of wall thicknesses, for API material as well as for proprietary corrosion resistant material (Sour Service and CRA materials).

#### - Optimized Metal-to-Metal Seal:

VAM TOP HC metal-to-metal seal design is based on the same design rules as VAM TOP. It consequently benefit of excellent and constant gas-tight sealing under combined loads despite repeated make-ups and break-outs.



#### - Reverse Angle Torque Shoulder:

The torque shoulder of VAM TOP HC is significantly thicker than VAM TOP and enables the connection to provide extreme compression resistance.

## Running VAM TOP HC - Dope quantities

Nominal OD (in.)	Dope volume	
	(cm <sup>3</sup> )	(in <sup>3</sup> )
5	14	0.9
5 ½	16	1
6 5/8	19	1.2
7	25	1.5
7 5/8	27	1.7
7 ¾	28	1.7

**VAM TOP HC**

## VAM TOP HC TECHNICAL DATA

Size (OD)	inch	mm	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Yield Strength (10000 lb.)											
				inch	mm									65 ksi	75 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	120 ksi	125 ksi	135 ksi	140 ksi
5	127.00		15.00	0.296	7.52	4.283	5.470	4.346	4.191	10.394	4.374	4.462	2.135	284	328	350	372	394	416	437	481	525	547	590	612
			18.00	0.362	9.19	4.151	5.577	4.214	4.191	10.394	4.374	5.285	2.878	3.833	396	422	448	475	501	528	580	633	659	712	739
20.30			20.30	0.408	10.36	4.059	5.648	4.122	4.191	10.394	5.886	6.009	3.379	383	441	471	500	530	559	589	647	706	736	795	824
			20.80	0.422	10.72	4.031	5.669	4.093	4.191	10.394	6.069	6.202	3.528	3.94	455	486	516	546	577	607	668	728	759	819	850
21.40			21.40	0.437	11.10	4.001	5.691	4.063	4.191	10.394	6.264	6.395	3.685	407	470	501	532	564	595	626	689	752	783	846	877
			23.20	0.478	12.14	3.919	5.750	3.981	4.191	10.394	6.791	6.925	4.109	4.41	509	543	577	611	645	679	747	815	848	917	951
24.10			24.10	0.500	12.70	3.875	5.781	3.938	4.191	10.394	7.069	7.211	4.334	459	530	566	601	636	672	707	778	848	884	954	990
			15.50	0.275	6.99	4.825	5.929	4.868	4.382	10.748	4.514	4.608	2.030	2.93	339	361	384	406	429	451	497	542	564	609	632
139.70			17.00	0.304	7.72	4.767	5.978	4.811	4.382	10.748	4.962	5.069	2.396	323	372	397	422	447	471	496	546	595	620	670	695
			20.00	0.361	9.17	4.653	6.071	4.715	4.382	10.748	5.828	5.944	3.101	379	437	466	495	525	554	583	641	699	729	787	816
23.00			23.00	0.415	10.54	4.545	6.156	4.607	4.382	10.748	6.630	6.756	3.754	431	497	530	564	597	630	663	729	796	829	895	928
			26.00	0.476	12.09	4.423	6.248	4.485	4.382	10.748	7.513	7.659	4.471	488	563	601	639	676	714	751	826	902	939	1014	1052
26.80			26.80	0.500	12.70	4.375	6.283	4.438	4.382	10.748	7.854	8.007	4.746	511	589	628	668	707	746	785	864	942	982	1060	1100
			28.40	0.530	13.46	4.315	6.327	4.386	4.382	10.748	8.275	8.437	5.095	538	621	662	703	745	786	828	910	993	1034	1117	1159
29.70			29.70	0.562	14.27	4.251	6.372	4.335	4.382	10.748	8.718	8.888	5.454	567	654	697	741	785	828	872	959	1046	1090	1177	1221
			33.20	0.630	8.38	5.840	7.154	5.883	4.427	10.866	6.526	6.659	3.317	424	489	522	555	587	620	653	718	783	816	881	914
168.28			24.00	0.352	8.94	5.796	7.191	5.839	4.427	10.866	6.937	7.080	3.650	451	520	555	590	624	659	694	763	832	867	936	971
			28.00	0.417	10.59	5.666	7.297	5.725	4.427	10.866	8.133	8.289	4.615	529	610	651	691	732	773	813	895	976	1017	1098	1139
32.00			32.00	0.475	12.07	5.550	7.390	5.609	4.427	10.866	9.177	9.357	5.474	597	688	734	780	826	872	918	1009	1101	1147	1239	1285
			7	26.00	0.362	9.19	6.151	7.565	6.210	4.776	11.535	7.549	3.837	491	566	604	642	679	717	755	830	906	944	1019	1057
177.80			29.00	0.408	10.36	6.059	7.644	6.118	4.776	11.535	8.449	8.634	4.592	549	634	676	718	760	803	845	929	1014	1056	1141	1183
			32.00	0.453	11.51	6.000 A	7.717	6.059	4.776	11.535	9.317	9.512	5.297	606	699	745	792	839	885	932	1025	1118	1165	1258	1304
35.00			35.00	0.498	12.65	5.879	7.787	5.941	4.776	11.535	10.172	10.376	5.978	661	763	814	865	915	966	1017	1119	1221	1272	1373	1424
			38.00	0.540	13.72	5.795	7.852	5.857	4.776	11.535	10.959	11.172	6.617	712	822	877	932	986	1041	1096	1205	1315	1370	1479	1534
41.00	0.590	14.99	5.695	7.929	5.757	4.776	11.535	11.881	12.124	7.381	772	891	950	1010	1069	1129	1188	1307	1426	1485	1604	1663			

## VAM TOP HC TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Yield Strength (1000 lb.)											
		in	mm									65 ksi	75 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	120 ksi	125 ksi	135 ksi	140 ksi
7 5/8	29.70	0.375	9.53	6.750	8.213	6.809	4.868	11.732	8.541	8.716	4.400	555	641	683	726	769	811	854	940	1025	1068	1153	1196
193.68	33.70	0.430	10.92	6.640	8.305	6.700	4.868	11.732	9.720	9.917	5.355	632	729	778	826	875	923	972	1069	1166	1215	1312	1361
	35.80	0.465	11.81	6.570	8.362	6.644	4.868	11.732	10.460	10.664	5.952	680	785	837	889	941	994	1046	1151	1255	1308	1412	1464
	39.00	0.500	12.70	6.500	8.419	6.589	4.868	11.732	11.192	11.416	6.553	727	839	895	951	1007	1063	1119	1231	1343	1399	1511	1567
	42.80	0.562	14.27	6.376	8.518	6.479	4.868	11.732	12.470	12.726	7.606	811	935	998	1060	1122	1185	1247	1372	1496	1559	1683	1746
	45.30	0.595	15.11	6.310	8.569	6.424	4.868	11.732	13.141	13.412	8.154	854	986	1051	1117	1183	1248	1314	1446	1577	1643	1774	1840
	47.10	0.625	15.88	6.250	8.614	6.373	4.868	11.732	13.744	14.023	8.640	893	1031	1100	1168	1237	1306	1374	1512	1649	1718	1855	1924
7 3/4	46.10	0.595	15.11	6.435	8.693	6.558	4.915	11.850	13.374	13.642	8.268	869	1003	1070	1137	1204	1271	1337	1471	1605	1672	1805	1872
196.85																							

**VAM TOP HC TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		65 ksi			75-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
		in. mm	ft. lb. N.m	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
5" 127.00	15.00	0.296 7.52	ft. lb. N.m	4370	4850	5330	4950	5500	6050	5480	6080	6680	6060	6730	7400	6510	7230	7950
				5900	6600	7300	6170	7500	8300	7400	8200	9000	8200	9100	10000	8800	9800	10800
				8400	9300	10200	9700	10800	11900	10600	11800	13000	11900	13200	14500	12800	14200	15600
				10200	11300	12400	11400	12700	14000	12800	14200	15600	14600	16200	17800	15900	17700	19500
				10600	11800	13000	12300	13700	15100	13700	15200	16700	15000	16700	18400	16700	18600	20500
				8460	9400	10340	9500	10500	11500	10850	11950	13050	11700	13000	14300	13050	14450	15850
				11400	12700	14000	12800	14200	15600	14600	16200	17800	15900	17700	19500	17600	19600	21600
				12800	14200	15600	14600	16200	17800	16300	18100	19900	18100	20100	22100	19400	21600	23800
				10100	11200	12300	11700	13000	14300	13050	14450	15850	14400	15900	17400	15650	17350	19050
				13700	15200	16700	15900	17700	19500	17600	19600	21600	19400	21600	23800	21100	23500	25900
5 1/2" 139.70	15.50	0.275 6.99	ft. lb. N.m	4630	5140	5650	4880	5420	5960	5540	6150	6770	6180	6870	7560	6840	7590	8340
				6300	7000	7700	6570	7300	8000	7500	8300	9100	8400	9300	10200	9300	10300	11300
				8220	8900	9600	7900	8700	9500	8200	9100	9900	8800	9800	10800	10200	11300	12400
				10300	11300	12300	10600	11800	13000	11900	13200	14500	12800	14200	15600	14600	16200	17800
				11900	13200	14500	13200	14700	16200	15000	16700	18400	16700	18400	20500	18500	20600	22700
				10850	11950	13050	12100	13400	14700	13700	15200	16700	15050	16650	18250	16650	18250	20050
				14600	16200	17800	16300	18100	19900	18500	20600	22700	20300	22600	24900	21100	23500	25900
				11450	12650	13850	13050	14450	15850	14650	16250	17850	16300	18100	19900	18250	20250	22250
				15500	17200	18900	17600	19600	21600	19900	22100	24300	22000	24500	27000	24700	27500	30300



**VAM TOP HC TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	135-140 ksi			145-150-155 ksi					
			ft. lb.	in.	min.	optl.	max.	ft. lb.	min.	optl.	max.
in. mm	ft. lb.	in. mm	ft. lb.	in.	min.	optl.	max.	ft. lb.	min.	optl.	max.
5" 127.00	15.00	0.296	7170	7960	8750	7470	8300	9130	7470	8300	9130
			9700	10800	11900	10200	11300	12400			
	18.00	0.362	10450	11550	12650	11100	12300	13500			
			14100	15700	17300	15000	16700	18400			
	20.30	0.408	12450	13750	15050	13450	14850	16250			
			16700	18600	20500	18100	20100	22100			
	20.80	0.422	13050	14450	15850	14050	15550	17050			
			17600	19600	21600	19000	21100	23200			
	21.40	0.437	14050	15550	17050	15050	16650	18250			
			19000	21100	23200	20300	22600	24900			
5 1/2" 139.70	15.50	0.275	7170	7960	8750	7810	8680	9550			
			9700	10800	11900	10600	11800	13000			
	17.00	0.304	8780	9750	10720	9600	10500	11500			
			11900	13200	14500	12800	14200	15600			
	20.00	0.361	11700	13000	14300	12450	13750	15050			
			15900	17700	19500	16700	18600	20500			
	23.00	0.415	14400	15900	17400	15050	16650	18250			
			19400	21600	23800	20300	22600	24900			
	26.00	0.476	16300	18100	19900	17000	18800	20600			
			22000	24500	27000	22900	25500	28100			
26.80	0.500	19600	21700	23800	20850	23150	25450				
		26500	29400	32300	28300	31400	34500				

**VAM TOP HC TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		65 ksi			75-80.85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
		ft. lb.	in. mm.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in. mm.		ft. lb. N.m.		ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.		
5 1/2* 139.70	28.40	0.530	12450	13750	15050	14050	15550	17050	16000	17700	19400	17650	19550	21450	19600	21700	23800	
		13.46	16700	18600	20500	19000	21100	23200	21600	24000	26400	23800	26500	29200	26500	29400	32300	
	29.70	0.562	13050	14450	15850	15050	16650	18250	17000	18800	20600	18900	21000	23100	20850	23150	25450	
6 5/8* 168.28	23.20	0.330	7830	8700	9570	9150	10150	11150	10100	11200	12300	11450	12650	13850	12700	14100	15500	
		8.38	10600	11800	13000	12300	13700	15100	13700	15200	16700	15500	17200	18900	17200	19100	21000	
	24.00	0.352	8780	9750	10720	10100	11200	12300	11450	12650	13850	13050	14450	15850	14400	15900	17400	
28.00	0.417	11900	13200	14500	13700	15200	16700	15500	17200	18900	17600	19600	21600	19400	21600	23800		
	10.59	13700	15200	16700	17600	19600	21600	18500	20600	22700	19900	22100	24300	21600	24000	26400		
	32.00	0.475	14050	15550	17050	14400	15900	17400	16300	18100	19900	18000	19900	21800	19850	22050	24250	
7* 177.80	26.00	0.362	9600	10500	11500	10850	11950	13050	12450	13750	15050	13700	15200	16700	15050	17200	18900	
		9.19	12800	14200	15600	14600	16200	17800	16700	18600	20500	18500	20600	22700	20300	22600	24900	
	29.00	0.408	11700	13000	14300	13450	14850	16250	15300	17000	18700	16000	17700	19400	16300	18100	19900	
32.00	10.36	15900	17700	19500	18100	20100	22100	20700	23000	25300	21600	24000	26400	22000	24500	27000		
	0.453	13050	14450	15850	14050	15550	17050	16000	17700	19400	17650	19550	21450	19600	21700	23800		
	11.51	17600	19600	21600	19000	21100	23200	21600	24000	26400	23800	26500	29200	26500	29400	32300		
35.00	0.498	14400	15900	17400	16300	18100	19900	18600	20600	22600	20600	22800	25000	20850	23150	25450		
	12.65	19400	21600	23800	22000	24500	27000	25100	27900	30700	27800	30900	34000	28300	31400	34500		
	0.540	16300	18100	19900	18600	20600	22600	20850	23150	25450	20850	23150	25450	20850	23150	25450		
38.00	13.72	22000	24500	27000	25100	27900	30700	28300	31400	34500	28300	31400	34500	28300	31400	34500		
	0.590	18250	20250	22250	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450		
	14.99	24700	27500	30300	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		

### VAM TOP HC TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.
in. mm	ft. lb.	in. mm	ft. lb. N.m.		ft. lb. N.m.		ft. lb. N.m.	
5 1/2* 139.70	28.40	0.530	20850	23150	25450	20850	23150	25450
		13.46	28300	31400	34500	28300	31400	34500
	29.70	0.562	20850	23150	25450	20850	23150	25450
		14.27	28300	31400	34500	28300	31400	34500
6 5/8* 168.28	23.20	0.330	13700	15200	16700	15050	16650	18250
		8.38	18500	20600	22700	20300	22600	24900
	24.00	0.352	16050	16650	18250	15650	17350	19050
		8.94	20300	22600	24900	21100	23500	25900
	28.00	0.417	17250	19150	21050	18600	20600	22600
		10.59	23400	26000	28600	25100	27900	30700
	32.00	0.475	20850	23150	25450	20850	23150	25450
		12.07	28300	31400	34500	28300	31400	34500
7* 177.80	26.00	0.362	16000	17700	19400	16300	18100	19900
		9.19	21600	24000	26400	22000	24500	27000
	29.00	0.408	17650	19550	21450	18900	21000	23100
		10.36	23800	26500	29200	25600	28400	31200
	32.00	0.453	20850	23150	25450	20850	23150	25450
		11.51	28300	31400	34500	28300	31400	34500
	35.00	0.498	20850	23150	25450	20850	23150	25450
		12.65	28300	31400	34500	28300	31400	34500
	38.00	0.540	20850	23150	25450	20850	23150	25450
		13.72	28300	31400	34500	28300	31400	34500
	41.00	0.590	20850	23150	25450	20850	23150	25450
		14.99	28300	31400	34500	28300	31400	34500

**VAM TOP HC TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi					
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.			
in. mm	ft. lb.	in. mm	ft. lb. N. m.						ft. lb. N. m.						ft. lb. N. m.					
7 5/8* 193.68	29.70	0.375	11100	12300	13500	13050	14450	15850	15050	16650	18250	16650	18450	20250	18600	20600	22600			
		9.53	15000	16700	18400	17600	19600	21600	20300	22600	24900	22500	25000	27500	25100	27900	30700			
	33.70	0.430	14400	15900	17400	16650	18450	20250	18900	21000	23100	20850	23150	25450	20850	23150	25450			
		10.92	19400	21600	23800	22500	25000	27500	25600	28400	31200	28300	31400	34500	28300	31400	34500			
	35.80	0.465	16000	17700	19400	18600	20600	22600	20850	23150	25450	20850	23150	25450	20850	23150	25450			
		11.81	21600	24000	26400	25100	27900	30700	28300	31400	34500	28300	31400	34500	28300	31400	34500			
7 3/4* 196.85	39.00	0.500	17650	19550	21450	20600	22800	25000	20850	23150	25450	20850	23150	25450	20850	23150	25450			
		12.70	23800	26500	29200	27800	30900	34000	28300	31400	34500	28300	31400	34500	28300	31400	34500			
	42.80	0.562	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450			
		14.27	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500			
	45.30	0.595	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450			
		15.11	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500			
7 3/4* 196.85	47.10	0.625	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450			
		15.88	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500			
7 3/4* 196.85	46.10	0.595	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450	20850	23150	25450			
		15.11	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500			

### VAM TOP HC TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.
in. mm	ft. lb.	in. mm	ft. lb. N.m.		ft. lb. N.m.		ft. lb. N.m.	
7 5/8* 193.68	29.70	0.375	20200	22400	24600	20850	23150	25450
		9.53	27400	30400	33400	28300	31400	34500
	33.70	0.430	20850	23150	25450	20850	23150	25450
		10.92	28300	31400	34500	28300	31400	34500
	36.80	0.465	20850	23150	25450	20850	23150	25450
		11.81	28300	31400	34500	28300	31400	34500
	39.00	0.500	20850	23150	25450	20850	23150	25450
		12.70	28300	31400	34500	28300	31400	34500
	42.80	0.562	20850	23150	25450	20850	23150	25450
		14.27	28300	31400	34500	28300	31400	34500
7 3/4* 196.85	45.30	0.595	20850	23150	25450	20850	23150	25450
		15.11	28300	31400	34500	28300	31400	34500
	47.10	0.625	20850	23150	25450	20850	23150	25450
		15.88	28300	31400	34500	28300	31400	34500
	46.10	0.595	20850	23150	25450	20850	23150	25450
		15.11	28300	31400	34500	28300	31400	34500

## 3.5 VAM TOP FE

### Application



#### T&C

#### Threaded & Coupled

Casing Riser

7" - 16"OD

SAF 2.0

Make & Break up to 10

- Industry Reference
- Field proven



#### Inner Production Riser

Riser Tubing

SBOP Drilling Riser

#### Design features

- Fatigue Enhanced VAM TOP.
- Optimized coupling geometry.
- Gastight, internal metal to metal seal.
- Flexible coupling OD/swoosh design.



VAM TOP FE is a riser used in Top Tensioned Riser (TTR) systems, mainly for SBOP Drilling and Inner production riser. Other VAM RISER connections are listed in the following application guide:

Drilling Surface BOP		◇	VAM TOP FE
Production	◇	outer	VAM TTR
			VAM PDW1
	◇	inner	VAM TOP FE
Workover, Landing, Completion	◇	tubing	VAM TOP FE
			VAM LDR
			VAM DPR SR
			VAM DPR HP

Since 1999, threaded and coupled (T&C) riser connectors - in combination with high strength steels (HSS) - are designed for all types of Top Tensioned Riser systems (TTR). This T&C riser concept reached parity with the former standard weld on connector systems with the same reliability, field proven

history and highest fatigue performance. Higher grade risers in T&C allow for significant weight reduction of the riser and provide feasible solutions for development of deepwater & ultra deepwater or high-pressure fields, where surface production is preferred.

### Compatibility

Cases exist, where there is a need to assemble VAM TOP and VAM TOP FE threads, for example hydraulic test plugs (in the mill or in the field) or possibly accessories. This kind of assembly is to be considered very cautiously since the resulting fatigue performance can no longer be guaranteed: it is therefore not a recommended practice.

Due to the specificity of VAM TOP FE thread profile compared to VAM TOP, VAM TOP pin ends can be assembled with VAM TOP FE couplings, but VAM TOP FE pin ends can not be made up with VAM TOP box ends. See following compatibility chart. Compatibility chart between VAM TOP and VAM TOP FE connections.

	VAM TOP FE Pin	VAM TOP FE Box
VAM TOP Pin		Compatible
VAM TOP Box	NOT Compatible	

*Compatibility chart between VAM TOP and VAM TOP FE connections*

### Dope quantities

Thread compound quantities for make-up are the same for VAM TOP FE as for VAM TOP.

The recommended thread compound for standard VAM TOP FE products is TOTAL TIFORA PG (non metallic thread compound with specific gravity of 0.91 g/cm<sup>3</sup>).

The recommended thread compound repartition is 2/3 on box end and 1/3 on pin. Extreme acceptable repartition is 1/2 on box and 1/2 on pin. Thread compound shall be applied evenly in order to get a uniform coating on all parts of the connection.

The recommended thread compound quantities are indicated in the following table. The given values are to be considered as minimum ones.

Recommended quantity of thread compound for the assembly of VAM TOP FE

Nominal OD	Thread Compound Volume	Nominal OD	Thread Compound Volume	Nominal OD	Thread Compound Volume
	(cm <sup>3</sup> )		(cm <sup>3</sup> )		(cm <sup>3</sup> )
7	25	9 5/8	41	11 7/8	60
7 5/8	27	9 7/8	43	13 3/8	67
7 3/4	28	10 3/4	46	13 5/8	68
8	31	11 3/4	59	14	70
8 5/8	37				

*NB. 8" and 14" dimensions only exist as Isolated Products.*

To determine the quantity to apply in terms of weight, it is needed the specific gravity of the thread compound. It is given in the table below the specific gravity of TOTAL TIFORA PG, as well as BOL PTC and standard API thread compound.

Thread compound	Specific Gravity (g.cm-3)
TOTAL TIFORA PG	0.91
BOL PTC	1.10
Standard API 5A2 or 5A3	1.67

BOL PTC and standard API thread compound can be considered as acceptable though less preferred alternatives to TOTAL TIFORA PG. In all cases, it is recommended that the acceptability of the thread compound should be checked with the end user.

The following table gives the resulting corresponding weights for TOTAL TIFORA PG Isolated product

Nominal OD	Thread Compound Volume	Nominal OD	Thread Compound Volume	Nominal OD	Thread Compound Volume
	(cm <sup>3</sup> )		(cm <sup>3</sup> )		(cm <sup>3</sup> )
7	23	9 5/8	38	11 7/8	55
7 5/8	25	9 7/8	40	13 3/8	61
7 3/4	26	10 3/4	42	13 5/8	62
8	28	11 3/4	54	14	64
8 5/8	34				

An Isolated Product is created when there is a specific need from an end user which can not be met within the original standard product line unless design changes are achieved. A special Drawing is then issued.

The naming of the resulting product consists in the original connection name followed by the «-NX» suffix, where x is an incrementing letter (A, B,...). This complete name is marked on the product by the manufacturer or VAM Licensee.

For VAM TOP FE, isolated products are to be considered as not compatible with the standard product line and also not compatible between each other. Compatibility may however take place on a case to case basis.

You like to receive information about an isolated VAM TOP FE product - please contact Mr. Help at [www.vamservices.com](http://www.vamservices.com)



**VAM TOP FE TECHNICAL DATA**

Size (OD) Inch.	Nominal Weight lb./ft.	Plain End Weight lb./ft.	Wall Thickness		Drift Diameter Inch.	Coupling (O.D.) Inch.	Coupling ID Inch.	Make Up Loss Inch.	Weight gain lb./joint	Coupling Length Inch.	Pipe Body sq.in.	VAM TOP FE Regular Yield Strength (1000lb.)					External Pressure (psi)				
			mm	Inch.								80	95	101	110	125	80	95	110	125	
6 5/8 168.28	36.70	36.39	0.562	14.27	5.376	7.702	5.669	4.427	-	11.693	10.705	856	1017	1178	1338	12420	12450	17080	19410		
7	23.00	22.60	0.317	8.05	6.250	7.601	6.325	4.776	16.7	11.535	6.655	532	632	732	832	3830	4140	4440	4650		
177.80	26.00	25.70	0.362	9.19	6.151	7.691	6.325	4.776	18.8	11.535	7.549	604	717	830	944	5410	5890	6230	6450		
29.00	29.00	28.70	0.408	10.36	6.059	7.782	6.325	4.776	20.9	11.535	8.449	676	803	929	1056	7030	7840	8530	9110		
32.00	31.70	31.40	0.453	11.51	6.000	7.868	6.242	4.776	22.8	11.535	9.317	745	885	1025	1165	8600	9740	10780	11710		
35.00	34.60	34.30	0.498	12.65	5.879	7.952	6.161	4.776	24.7	11.535	10.172	814	966	1119	1272	10180	11650	13030	14310		
38.00	37.30	37.00	0.540	13.72	5.795	8.029	6.087	4.776	26.5	11.535	10.959	877	1041	1205	1370	11390	13430	15130	16740		
41.00	40.40	40.10	0.590	14.99	5.695	8.117	5.996	4.776	28.4	11.535	11.881	950	1129	1307	1485	12350	14660	16980	19300		
42.70	42.60	42.60	0.625	15.88	5.625	8.178	5.933	4.776	29.7	11.575	12.517	1001	1189	1377	1565	13010	15450	17890	20330		
7 5/8	26.40	25.60	0.328	8.33	6.844	8.248	6.919	4.868	19.1	11.732	7.519	602	714	827	940	3400	3710	3920	4050		
193.68	29.70	29.00	0.375	9.53	6.750	8.344	6.919	4.868	21.6	11.732	8.541	683	811	940	1068	4790	5130	5350	5670		
33.70	33.00	33.00	0.430	10.92	6.640	8.452	6.919	4.868	24.3	11.732	9.720	778	923	1069	1215	6560	7280	7870	8340		
35.80	35.60	35.60	0.465	11.81	6.570	8.520	6.856	4.868	26.1	11.732	10.460	837	994	1151	1308	7690	8640	9480	10200		
39.00	38.00	38.00	0.500	12.70	6.500	8.587	6.793	4.868	27.8	11.732	11.192	895	1063	1231	1399	8820	10000	11080	12060		
42.80	42.40	42.40	0.562	14.27	6.376	8.701	6.683	4.868	30.6	11.732	12.470	998	1185	1372	1559	10810	12410	13930	15350		
45.30	44.70	44.70	0.595	15.11	6.310	8.761	6.622	4.868	32.0	11.732	13.141	1051	1248	1446	1643	11510	13670	15440	17100		
47.10	46.70	46.70	0.625	15.88	6.250	8.815	6.567	4.868	33.3	11.732	13.744	1100	1306	1512	1718	12040	14300	16550	18700		
7 3/4 196.85	46.10	45.50	0.595	15.11	6.500	8.886	6.750	4.915	33.0	11.850	13.374	1070	1271	1471	1672	11340	13320	15000	16590		
8	32.00	30.54	0.375	9.53	7.125	8.719	7.194	4.915	-	11.850	8.983	719	853	988	1123	4220	4450	4800	5060		
203.20																					
8 5/8	36.00	35.10	0.400	10.16	7.700	9.406	7.980	5.604	31.1	13.189	10.336	827	982	1137	1292	4100	4350	4690	4930		
219.08	40.00	39.30	0.450	11.43	7.625	9.506	7.890	5.604	34.0	13.189	11.557	925	1098	1271	1445	5520	6020	6390	6630		
44.00	43.40	43.40	0.500	12.70	7.500	9.604	7.799	5.604	36.8	13.189	12.763	1021	1212	1404	1595	6950	7740	8420	8980		
49.00	48.00	48.00	0.557	14.15	7.386	9.713	7.697	5.604	40.0	13.189	14.118	1129	1341	1553	1765	8570	9700	10730	11660		
52.00	51.00	51.00	0.595	15.11	7.310	9.784	7.650	5.604	42.0	13.189	15.010	1201	1426	1651	1876	9650	11010	12280	13440		
9 5/8	40.00	38.90	0.395	10.03	8.750	10.404	8.998	5.589	34.4	13.189	11.454	916	1088	1260	1432	3090	3330	3470	3530		
244.48	43.50	42.70	0.435	11.05	8.599	10.486	8.925	5.589	37.1	13.189	12.559	1005	1193	1381	1570	3810	4130	4420	4620		



## VAM TOP FE TECHNICAL DATA

Size (OD) Inch	Nominal Weight lb./ft.	Plain End Weight lb./ft.	Wall Thickness		Minimum Internal Yield Pressure (psi)					Make-up Torque (ft.lb)						
			mm	inch	mm	inch	80	95	110	125	80	95	110	125		
6 5/8 168.28	36.70	36.39	0.562	14.27	11880	14100	16330	18560	18960	21010	23040	25130				
7 177.80	23.00	22.60	0.317	8.05	6340	7530	8720	9910	10200	11200	12180	13200				
	26.00	25.70	0.362	9.19	7240	8600	9960	11310	10870	11870	12860	13880				
	29.00	28.70	0.408	10.36	8160	9690	11220	12750	11380	12380	13370	14390				
	32.00	31.70	0.453	11.51	9060	10760	12460	14160	14200	15560	16900	18290				
	35.00	34.60	0.498	12.65	9960	11830	13700	15560	16740	18450	20130	21880				
	38.00	37.30	0.540	13.72	10800	12830	14850	16880	19090	21110	23120	25190				
	41.00	40.40	0.590	14.99	11800	14010	16230	18440	21870	24280	26680	29140				
	42.70	42.60	0.625	15.88	12500	14840	17190	19530	24050	26730	29390	32130				
7 5/8 193.68	26.40	25.60	0.328	8.33	6020	7150	8280	9410	12320	13690	15050	16450				
	29.70	29.00	0.375	9.53	6890	8180	9470	10760	13050	14420	15780	17190				
	33.70	33.00	0.430	10.92	7900	9380	10860	12340	13880	15250	16620	18020				
	35.80	35.60	0.465	11.81	8540	10140	11740	13340	16160	17850	19540	21280				
	39.00	38.00	0.500	12.70	9180	10900	12620	14340	18420	20440	22450	24530				
	42.80	42.40	0.562	14.27	10320	12250	14190	16120	22340	24940	27520	30170				
	45.30	44.70	0.595	15.11	10920	12970	15020	17070	24490	27400	30290	33260				
	47.10	46.70	0.625	15.88	11480	13630	15780	17930	26570	29770	32930	36190				
7 3/4 196.85	46.10	45.50	0.595	15.11	10750	12760	14780	16790	24950	27900	30820	33820				
8 203.20	32.00	30.54	0.375	9.53	6563	7793	9023	10254	16690	18650	20600	22600				
8 5/8 219.08	36.00	35.10	0.400	10.16	6490	7710	8930	10140	13290	14280	15260	16280				
	40.00	39.30	0.450	11.43	7300	8670	10040	11410	17510	19100	20670	22300				
	44.00	43.40	0.500	12.70	8120	9640	11160	12680	21740	23940	26110	28350				
	49.00	48.00	0.557	14.15	9040	10740	12430	14130	26520	29380	32240	35170				
	52.00	51.00	0.595	15.11	9660	11470	13280	15090	29630	32940	36240	39630				
9 5/8 244.48	40.00	38.90	0.395	10.03	5750	6820	7900	8980	12820	13780	14740	15720				
	43.50	42.70	0.435	11.05	6330	7510	8700	9890	16790	18340	19890	21480				

Please note and contact Mr. Help on VAM Services website to receive your VAM TOP FE running recommendations

VAM TOP FE is generally used on high fatigue applications, mainly two things to be taken care of

- 1 low marking mandatory
- 2 slip type elevator for hanging and lifting the string

**VAM TOP FE TECHNICAL DATA**

Size (OD) Inch. mm	Nominal Weight lb./ft.	Plain End Weight lb./ft.	Wall Thickness		Drift Diameter Inch.	Coupling (O.D.) Inch.	Coupling ID Inch.	Coupling Loss Inch.	Weight gain lb./joint	Coupling Length Inch.	Pipe Body sq.in.	VAM TOP FE Regular Yield Strength (10000lb.)					External Pressure (psi)				
			mm	Inch.								80	95	110	125	80	95	110	125		
9 5/8	47.00	46.10	0.472	11.99	8.525	10.561	8.858	5.589	39.5	13.189	13.572	1086	1289	1493	1697	4750	5090	5300	5630		
244.48	53.50	52.90	0.545	13.84	8.500	10.705	8.726	5.589	44.1	13.189	15.546	1244	1477	1710	1943	6620	7340	7950	8440		
	58.40	57.40	0.595	15.11	8.375	10.801	8.638	5.589	47.0	13.189	16.879	1350	1604	1857	2110	7890	8890	9770	10540		
9 7/8	62.80	61.70	0.625	15.88	8.500	11.118	8.835	5.484	48.9	12.953	18.162	1453	1725	1998	2270	8260	9320	10280	11140		
250.83	65.30	64.00	0.650	16.51	8.419	11.165	8.789	5.484	50.2	12.953	18.838	1507	1790	2072	2355	8880	10070	11170	12160		
	66.40	65.00	0.661	16.79	8.397	11.186	8.770	5.484	50.9	12.992	19.134	1531	1818	2105	2392	9150	10400	11560	12610		
	66.90	65.70	0.668	16.97	8.383	11.199	8.758	5.484	51.3	13.031	19.332	1546	1836	2125	2415	9320	10610	11810	12900		
	67.50	66.60	0.678	17.22	8.363	11.217	8.740	5.484	51.9	13.031	19.590	1567	1861	2155	2449	9570	10920	12160	13310		
	68.00	68.00	0.694	17.63	8.331	11.247	8.711	5.484	52.7	13.071	20.017	1601	1902	2202	2502	9970	11400	12730	13960		
	68.90	68.60	0.700	17.78	8.319	11.258	8.701	5.484	53.0	13.110	20.177	1614	1917	2219	2522	10120	11580	12940	14210		
	70.50	70.40	0.720	18.29	8.279	11.294	8.663	5.484	54.1	13.150	20.708	1657	1967	2278	2589	10620	12180	13650	15030		
	72.00	70.80	0.725	18.42	8.269	11.304	8.656	5.484	54.4	13.189	20.841	1667	1980	2293	2605	10740	12330	13830	15230		
10 3/4	45.50	44.20	0.400	10.16	9.875	11.544	10.122	5.634	39.2	13.268	13.006	1040	1236	1431	1626	2470	2590	2610	2610		
273.05	51.00	49.50	0.450	11.43	9.694	11.648	10.031	5.634	42.9	13.268	14.561	1165	1383	1602	1820	3220	3480	3660	3740		
	55.50	54.20	0.495	12.57	9.625	11.740	9.951	5.634	46.1	13.268	15.947	1276	1515	1754	1993	4020	4290	4610	4850		
	60.70	59.40	0.545	13.84	9.504	11.840	9.862	5.634	49.7	13.268	17.473	1398	1660	1922	2184	5160	5580	5880	6070		
	65.70	64.50	0.595	15.11	9.404	11.939	9.772	5.634	53.1	13.268	18.982	1519	1803	2088	2373	6300	6970	7500	7920		
	71.10	70.10	0.650	16.51	9.294	12.045	9.671	5.634	56.7	13.268	20.625	1650	1959	2269	2578	7560	8480	9290	9990		
	73.20	72.33	0.672	16.51	9.250	12.087	9.632	5.634	-	13.268	21.276	1702	2021	2340	2660	8070	9090	10010	10820		
11 3/4	54.00	52.60	0.435	11.05	10.724	12.618	11.067	5.713	46.4	13.425	15.463	1237	1469	1701	1933	2440	2550	2570	2570		
298.45	60.00	58.80	0.489	12.42	10.625	12.731	10.970	5.713	50.7	13.425	17.300	1384	1644	1903	2163	3180	3440	3610	3680		
	65.00	64.00	0.534	13.56	10.625	12.823	10.890	5.713	54.4	13.425	18.816	1505	1788	2070	2352	3870	4170	4480	4690		
	71.00	69.40	0.582	14.78	10.430	12.920	10.803	5.713	58.0	13.425	20.420	1634	1940	2246	2553	4880	5240	5470	5760		
11 7/8	67.80	66.50	0.550	13.97	10.619	12.982	10.986	5.713	56.2	13.425	19.568	1565	1859	2152	2446	4090	4340	4670	4920		
301.63	71.80	70.20	0.582	14.78	10.555	13.046	10.929	5.713	58.7	13.425	20.648	1659	1962	2271	2581	4750	5080	5290	5630		
13 3/8	61.00	59.40	0.430	10.92	12.359	14.241	12.715	5.698	52.2	13.386	17.487	1399	1661	1924	2186	1670	1670	1670	1670		
339.73	68.00	66.10	0.480	12.19	12.259	14.348	12.624	5.698	56.9	13.386	19.445	1556	1847	2139	2431	2260	2330	2330	2330		
	72.00	70.60	0.514	13.06	12.250	14.420	12.563	5.698	60.0	13.386	20.768	1661	1973	2284	2596	2670	2820	2880	2880		
	77.00	75.30	0.550	13.97	12.119	14.494	12.498	5.698	63.2	13.386	22.160	1773	2105	2438	2770	3100	3340	3490	3550		



## VAM TOP FE TECHNICAL DATA

Size (OD) Inch	Nominal Weight lb./ft.	Plain End Weight lb./ft.	Wall Thickness		Minimum Internal Yield Pressure (psi)					Make-up Torque (ft.lb)				
			mm	mm	inch.	mm	80	95	110	125	80	95	110	125
9 5/8	47.00	46.10	0.472	11.99	6870	8150	9440	10730	20480	22580	24680	26830		
244.48	53.50	52.90	0.545	13.84	7930	9410	10900	12390	27780	30990	34160	37450		
	58.40	57.40	0.595	15.11	8650	10280	11900	13520	32690	36640	40560	44590		
9 7/8	62.80	61.70	0.625	15.88	8860	10520	12180	13840	37830	42710	47550	50000		
250.83	65.30	64.00	0.650	16.51	9220	10940	12670	14400	40410	45690	50000	50000		
	66.40	65.00	0.661	16.79	9370	11130	12890	14640	41540	46990	50000	50000		
	66.90	65.70	0.668	16.97	9470	11250	13020	14800	42220	47780	50000	50000		
	67.50	66.60	0.678	17.22	9610	11410	13220	15020	43230	48940	50000	50000		
	68.00	68.00	0.694	17.63	9840	11680	13530	15370	44900	50000	50000	50000		
	68.90	68.60	0.700	17.78	9920	11780	13650	15510	45450	50000	50000	50000		
	70.50	70.40	0.720	18.29	10210	12120	14040	15950	47560	50000	50000	50000		
	72.00	70.80	0.725	18.42	10280	12210	14130	16060	48030	50000	50000	50000		
10 3/4	45.50	44.20	0.400	10.16	5210	6190	7160	8140	15130	16510	17880	19300		
273.05	51.00	49.50	0.450	11.43	5860	6960	8060	9160	21120	23430	25730	28100		
	55.50	54.20	0.495	12.57	6450	7660	8860	10070	26510	29670	32800	36040		
	60.70	59.40	0.545	13.84	7100	8430	9760	11090	32480	36570	40620	44820		
	65.70	64.50	0.595	15.11	7750	9200	10650	12110	38520	43570	48580	50000		
	71.10	70.10	0.650	16.51	8470	10050	11640	13230	45210	50000	50000	50000		
	73.20	72.33	0.672	16.51	8750	10390	12030	13670	47850	50000	50000	50000		
11 3/4	54.00	52.60	0.435	11.05	5180	6150	7130	8100	20090	22220	24340	26520		
298.45	60.00	58.80	0.489	12.42	5830	6920	8010	9100	27570	30900	34210	37610		
	65.00	64.00	0.534	13.56	6360	7560	8750	9940	33890	38220	42550	47000		
	71.00	69.40	0.582	14.78	6930	8230	9530	10840	40660	46090	50000	50000		
11 7/8	67.80	66.50	0.550	13.97	6480	7700	8920	10130	36100	40810	45500	50000		
301.63	71.80	70.20	0.582	14.78	6860	8150	9430	10720	40640	46080	50000	50000		
13 3/8	61.00	59.40	0.430	10.92	4500	5340	6190	7030	23890	26760	29620	32560		
339.73	68.00	66.10	0.480	12.19	5020	5970	6910	7850	32740	37090	41400	45870		
	72.00	70.60	0.514	13.06	5380	6390	7400	8410	38770	44130	49450	50000		
	77.00	75.30	0.550	13.97	5760	6840	7920	9000	45210	50000	50000	50000		

Please note and contact Mr. Help on VAM Services website to receive your VAM TOP FE running recommendations  
 VAM TOP FE is generally used on high fatigue applications, mainly two things to be taken care of

- 1 low marking mandatory
- 2 slip type elevator for hanging and lifting the string

### VAM TOP FE TECHNICAL DATA

Size (OD) Inch. mm	Nominal Weight lb./ft.	Plain End Weight lb./ft.	Wall Thickness		Drift Diameter Inch.	Coupling (O.D.) Inch.	Coupling ID Inch.	Make Up Loss Inch.	Weight gain lb./joint	Coupling Length Inch.	Pipe Body sq. in.	VAM TOP FE Regular Yield Strength (10000lb.)				External Pressure (psi)			
			mm	Inch.								80	95	110	125	80	95	110	125
13 3/8	80.70	79.30	0.580	14.73	12.059	14.556	12.443	5.698	65.9	13.386	23.314	1865	2215	2565	2914	3460	3770	4000	4140
339.73	85.00	82.90	0.608	15.44	12.003	14.613	12.394	5.698	68.3	13.386	24.386	1951	2317	2682	3048	3870	4180	4480	4690
	86.00	85.10	0.625	15.88	11.969	14.648	12.362	5.698	69.8	13.386	25.035	2003	2378	2754	3129	4190	4420	4770	5030
13 5/8	88.20	86.80	0.625	15.88	12.219	14.900	12.614	5.698	71.1	13.386	25.525	2042	2425	2808	3191	3980	4260	4570	4800
346.08																			
14	106.00	106.13	0.750	19.05	12.400	15.464	12.758	6.946	-	15.906	31.220	2498	2966	3434	3903	5870	6440	6880	7200
355.60																			

## VAM TOP FE TECHNICAL DATA

Size (OD) Inch	Nominal Weight lb./ft.	Plain End Weight		Wall Thickness			Minimum Internal Yield Pressure (psi)					Make-up Torque (ft.lb)			
		lb./ft.	lb./ft.	mm	inch.	mm	80	95	110	125	80	95	110	125	
13 3/8	80.70	79.30	0.580	14.73	6070	7210	8350	9490	50000	50000	50000	50000	50000		
339.73	85.00	82.90	0.608	15.44	6360	7560	8750	9940	50000	50000	50000	50000	50000		
	86.00	85.10	0.625	15.88	6540	7770	9000	10220	50000	50000	50000	50000	50000		
13 5/8	88.20	86.80	0.625	15.88	6420	7630	8830	10030	50000	50000	50000	50000	50000		
346.08															
14	106.00	106.13	0.750	19.05	7500	8910	10310	18748	50000	50000	50000	50000	50000		
355.60															

Please note and contact Mr. Help on VAM Services website to receive your VAM TOP FE running recommendations

VAM TOP FE is generally used on high fatigue applications, mainly two things to be taken care of

- 1 low marking mandatory
- 2 slip type elevator for hanging and lifting the string

## 3.6 DINO VAM

### Application



**DINO VAM is a cost effective T&C connection for surface and intermediate casing applications.**

DINO VAM was specifically designed to reduce rig operating costs by providing running reliability through deep stabbing, no cross-threading and quick make-up.

This connection provides sealing with coarse 3 TPI tapered hooked threads. It is immune to jump-in / jump-out.

DINO VAM product line covers a wide range of diameters and wall thicknesses, for API material as well as for Sour Service materials.



DINO VAM design allows faster make-up and provides more reliability during stabbing (no more cross-threading). These benefits were validated during offshore field trials supervised by different customers. Average cycle time for joint running is reduced by 25%!

#### - Make-up arrestor for torque control

A make-up arrestor positions the coupling accurately on the mill end. Pin to pin torque shoulder for positive torque stop on the field end allows both overtorque and compression resistance.

In addition, pin to pin contact provides a smooth bore ID to minimize turbulence and high compression resistance.

#### - Hooked thread profile:

3 Thread Per Inch for fast Make-Up.

Negative load flank of  $-9^\circ$  associated with a  $+20^\circ$  stabbing flank for optimal structural performances under combined loads.

DINO VAM thread profile was designed to prevent cross-threading: connec-

tion allow 40% more mis-alignment than Buttress connections.

### Running DINO VAM - Dope quantities

Nominal OD	Dope volume	
	(in.)	(cm <sup>3</sup> )
9 5/8	41	2.5
9 3/4	42	2.5
9 7/8	43	2.6
10 3/4	46	2.8
11 3/4	59	3.6
11 7/8	60	3.6
13 3/8	67	4.1
13 5/8	67	4.1
14	70	4.3
16	87	5.4

### Running DINO VAM – Acceptance criteria

No specific requirement for DINO VAM.

Torque/Turn chart monitoring is not mandatory. Nevertheless, clear evidence of shouldering is required during make-up to ensure proper positioning of the pin-to-pin shoulder.



**DINO VAM TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg.)	Coupling ID (reg.)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Efficiency	Yield Strength (1000 lb.)						
		mm	inch									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	
9 5/8" 244.48	36.00	0.352	8.94	8.765	10.626	9.166	4.746	9.493	10.254	18.451	180	564	820	923	974	1128	1282	
	40.00	0.395	10.03	8.750A	10.626	9.166	4.746	9.493	11.454	18.451	147	630	916	1031	1088	1260	1432	
	43.50	0.435	11.05	8.899		10.626	9.166	4.746	9.493	12.559	18.451	147	691	1005	1130	1193	1381	1570
	47.00	0.472	11.99	8.525		10.626	9.166	4.746	9.493	13.572	18.451	136	746	1086	1221	1289	1481	1697
	53.50	0.545	13.84	8.500A		10.626	9.166	4.746	9.493	15.546	18.451	119	855	1244	1399	1477	1710	1943
9 7/8" 250.83	58.40	0.595	15.11	8.375A	10.626	9.166	4.746	9.493	16.879	18.451	109	928	1350	1519	1604	1857	2110	
	59.40	0.609	15.47	8.251	10.626	9.001	4.578	9.156	17.250	20.401	118	949	1380	1553	1639	1898	2156	
	61.10	0.625	15.88	8.125	10.626	9.001	4.578	9.156	17.671	20.401	115	972	1414	1590	1679	1944	2203	
	64.90	0.672	17.07	8.219	10.626	9.001	4.578	9.156	18.901	20.401	108	1040	1512	1701	1796	2079	2363	
	70.30	0.734	18.64	8.001	10.626	9.001	4.578	9.156	20.502	20.401	100	1122	1632	1836	1938	2244	2550	
9 3/4" 247.65	71.80	0.750	19.05	7.969	10.626	9.001	4.578	9.156	20.911	20.401	98	1122	1632	1836	1938	2244	2550	
	59.20	0.595	15.11	8.404	10.626	9.179	4.155	8.310	17.113	17.785	104	941	1369	1540	1626	1882	2139	
	60.20	0.609	15.47	8.376	10.626	9.179	4.155	8.310	17.489	17.785	102	962	1399	1574	1661	1924	2186	
	62.80	0.625	15.88	8.469	10.870	9.263	4.488	8.976	18.162	20.655	114	999	1453	1635	1725	1998	2270	
	66.40	0.661	16.79	8.397	10.870	9.263	4.488	8.976	19.134	20.655	108	1052	1531	1722	1818	2105	2392	
10 3/4" 273.05	67.50	0.678	17.22	8.363	10.870	9.263	4.488	8.976	19.590	20.655	105	1077	1567	1763	1861	2155	2449	
	68.90	0.700	17.78	8.319	10.870	9.263	4.488	8.976	20.177	20.655	102	1110	1614	1816	1917	2219	2522	
	70.50	0.720	18.29	8.279	10.870	9.263	4.488	8.976	20.708	20.655	100	1136	1652	1859	1962	2272	2582	
	40.50	0.350	8.89	9.894	11.752	10.266	5.044	10.088	11.435	20.993	184	629	915	1029	1086	1258	1429	
	45.50	0.400	10.16	9.875A	11.752	10.266	5.044	10.088	13.006	20.993	161	715	1040	1171	1236	1431	1626	
11 3/4" 298.45	51.00	0.450	11.43	9.694	11.752	10.266	5.044	10.088	14.561	20.993	144	801	1165	1310	1383	1602	1820	
	55.50	0.495	12.57	9.625A	11.752	10.266	5.044	10.088	15.947	20.993	132	877	1276	1435	1515	1754	1993	
	60.70	0.545	13.84	9.504	11.752	10.266	5.044	10.088	17.473	20.993	120	961	1398	1573	1660	1922	2184	
	65.70	0.595	15.11	9.404	11.752	10.266	5.044	10.088	18.982	20.993	111	1044	1519	1708	1803	2088	2373	
	66.15	0.611	15.52	9.372	11.752	10.087	4.896	9.793	19.462	23.417	120	1070	1557	1752	1849	2141	2433	
13 3/8" 339.73	73.20	0.672	17.07	9.25	11.752	10.087	4.896	9.793	21.276	23.417	110	1170	1702	1915	2021	2340	2660	
	76.10	0.709	18.01	9.176	11.752	10.087	4.896	9.793	22.366	23.417	105	1230	1789	2013	2125	2460	2796	
	79.20	0.734	18.64	9.126	11.752	10.087	4.896	9.793	23.096	23.417	101	1270	1848	2079	2194	2541	2887	
	47.00	0.375	9.53	10.844	12.752	11.313	4.485	8.969	13.401	22.078	165	737	1072	1206	1273	1474	1675	
	54.00	0.435	11.05	10.724	12.752	11.313	4.485	8.969	15.463	22.078	143	850	1387	1592	1669	1901	2133	
13 3/8" 339.73	60.00	0.489	12.42	10.625A	12.752	11.153	4.365	8.729	17.300	24.388	141	952	1384	1557	1644	1903	2163	
	65.00	0.534	13.56	10.625A	12.752	11.153	4.365	8.729	18.816	24.388	130	1035	1505	1693	1788	2070	2352	
	71.00	0.582	14.78	10.43	12.752	11.153	4.365	8.729	20.420	24.388	119	1123	1634	1836	1940	2246	2553	
	54.50	0.380	9.65	12.459	14.374	12.915	4.761	9.523	15.513	25.502	164	853	1241	1396	1474	1706	1939	
	61.00	0.430	10.92	12.359	14.374	12.915	4.761	9.523	17.487	25.502	146	962	1399	1574	1661	1924	2186	



## DINO VAM TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Efficiency	Yield Strength (1000 lb.)					
		in	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
13 3/8" 339.73	68.00	0.480	12.19	12.259	14.374	12.915	4.761	9.523	19.445	25.502	131	1069	1556	1750	1847	2139	2431
	72.00	0.514	13.06	12.250A	14.374	12.915	4.761	9.523	20.768	25.502	123	1142	1661	1869	1973	2284	2596
	77.00	0.550	13.97	12.119	14.374	12.759	4.516	9.032	22.160	28.047	127	1219	1773	1994	2105	2438	2770
	80.70	0.580	14.73	12.059	14.374	12.759	4.516	9.032	23.314	28.047	120	1282	1865	2098	2215	2565	2914
	85.00	0.608	15.44	12.003	14.374	12.759	4.516	9.032	24.386	28.047	115	1341	1951	2195	2317	2682	3048
13 5/8" 346.08	86.00	0.625	15.88	11.969	14.374	12.759	4.516	9.032	25.035	28.047	112	1377	2003	2253	2378	2754	3129
	88.20	0.625	15.88	12.188	14.488	13.009	4.516	9.032	25.525	25.453	100	1400	2036	2291	2418	2800	3182
14" 355.60	82.50	0.562	14.27	12.689	15.043	13.257	5.528	11.056	23.726	33.094	139	1305	1898	2135	2254	2610	2966
	86.00	0.600	15.24	12.613	15.043	13.257	5.528	11.056	25.258	33.094	131	1389	2021	2273	2400	2778	3157
	93.00	0.650	16.51	12.513	15.043	13.257	5.528	11.056	27.261	33.094	121	1499	2181	2453	2590	2999	3408
	94.80	0.656	16.66	12.501	15.043	13.257	5.528	11.056	27.500	33.094	120	1513	2200	2475	2613	3025	3438
	99.00	0.688	17.48	12.437	15.043	13.257	5.528	11.056	28.773	33.094	115	1583	2302	2590	2733	3165	3597
16" 406.40	100.00	0.700	17.78	12.413	15.043	13.257	5.528	11.056	29.248	33.094	113	1609	2340	2632	2779	3217	3656
	106.00	0.750	19.05	12.313	15.043	13.257	5.528	11.056	31.220	33.094	106	1717	2498	2810	2966	3434	3903
	114.00	0.800	20.32	12.213	15.043	13.257	5.528	11.056	33.175	33.094	100	1820	2648	2978	3144	3640	4137
	65.00	0.375	9.53	15.063	17.000	15.502	5.212	10.424	18.408	31.414	171	1012	1473	1657	1749	2025	2301
	75.00	0.438	11.13	14.937	17.000	15.502	5.212	10.424	21.414	31.414	147	1178	1713	1927	2034	2356	2677
16" 406.40	84.00	0.495	12.57	14.823	17.000	15.502	5.212	10.424	24.112	31.414	130	1326	1929	2170	2291	2652	3014
	84.80	0.500	12.70	14.813	17.000	15.502	5.212	10.424	24.347	31.414	129	1339	1948	2191	2313	2678	3043
	94.50	0.562	14.27	14.689	17.000	15.218	5.843	11.686	27.257	37.602	138	1499	2181	2453	2589	2998	3407
	104.00	0.625	15.88	14.563	17.000	15.218	5.843	11.686	30.189	37.602	125	1660	2415	2717	2868	3321	3774
	109.00	0.656	16.66	14.501	17.000	15.218	5.843	11.686	31.622	37.602	119	1739	2530	2846	3004	3478	3953
128.00	0.781	19.84	14.251	17.000	15.218	5.843	11.686	37.341	37.602	101	2054	2987	3361	3547	4108	4668	

## DINO VAM TECHNICAL DATA (Option MS)

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		Coupling OD (MS) inch.	MS option Efficiency %	Yield Strength (1000 lb.)					
		inch	mm			55 Ksi	80 Ksi	90 Ksi	95 Ksi	110 Ksi	125 Ksi
9 5/8" 244.48	36.00	0.352	8.94	10.138	100	564	820	923	974	1128	1282
	40.00	0.395	10.03	10.213	100	630	916	1031	1088	1260	1432
	43.50	0.435	11.05	10.283	100	691	1005	1130	1193	1381	1570
	47.00	0.472	11.99	10.346	100	746	1086	1221	1289	1493	1697
	53.50	0.545	13.84	10.472	100	855	1244	1399	1477	1710	1943
	58.40	0.595	15.11	10.555	100	928	1350	1519	1604	1857	2110
	59.40	0.609	15.47	10.457	100	949	1380	1553	1639	1898	2156
	61.10	0.625	15.88	10.484	100	972	1414	1590	1679	1944	2209
	64.90	0.672	17.07	10.559	100	1040	1512	1701	1796	2079	2363
	70.30	0.734	18.64	10.657	100	1122	1632	1836	1938	2244	2550
9 3/4" 247.65	71.80	0.750	19.05	10.685	100	1122	1632	1836	1938	2244	2550
	59.20	0.595	15.11	10.606	100	941	1369	1540	1626	1882	2139
	60.20	0.609	15.47	10.630	100	962	1399	1574	1661	1924	2186
	62.80	0.625	15.88	10.748	100	999	1453	1635	1725	1998	2270
	66.40	0.661	16.79	10.803	100	1052	1531	1722	1818	2105	2392
	67.50	0.678	17.22	10.831	100	1077	1567	1763	1861	2155	2449
	68.90	0.700	17.78	10.866	100	1110	1614	1816	1917	2219	2522
	70.50	0.720	18.29	10.898	100	1136	1652	1859	1962	2272	2582
	40.50	0.350	8.89	11.236	100	629	915	1029	1086	1258	1429
	45.50	0.400	10.16	11.327	100	715	1040	1171	1236	1431	1626
7 7/8" 273.05	51.00	0.450	11.43	11.417	100	801	1165	1310	1383	1602	1820
	55.50	0.495	12.57	11.496	100	877	1276	1435	1515	1754	1993
	60.70	0.545	13.84	11.583	100	961	1398	1573	1660	1922	2184
	65.70	0.595	15.11	11.665	100	1044	1519	1708	1803	2088	2373
	66.15	0.611	15.52	11.559	100	1070	1557	1752	1849	2141	2433
	73.20	0.672	17.07	11.661	100	1170	1702	1915	2021	2340	2660
	76.10	0.709	18.01	11.720	100	1230	1789	2013	2125	2460	2796
	79.20	0.734	18.64	11.760	100	1270	1848	2079	2194	2541	2887
	47.00	0.375	9.53	12.327	100	737	1072	1206	1273	1474	1675
	54.00	0.435	11.05	12.437	100	850	1237	1392	1469	1701	1933
11 3/4" 298.45	60.00	0.489	12.42	12.413	100	952	1384	1557	1644	1903	2163
	65.00	0.534	13.56	12.492	100	1035	1505	1693	1788	2070	2352
	71.00	0.582	14.78	12.575	100	1123	1634	1838	1940	2246	2553



## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55-65 ksi						75-80-85 ksi						90-95-100 ksi									
			Mil Side			Field & Accessories			Mil Side			Field & Accessories			Mil Side			Field & Accessories						
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.				
9 5/8"	36.00	0.352	4690	5210	5730	4240	4990	5740	6060	6730	7400	5590	6580	7570	6510	7230	7950	8620	9300	10030	6460	7600	8740	
																								8.94
244.48	40.00	0.395	4950	5500	6050	5780	6800	7820	6510	7230	7950	7700	9050	10400	6840	7600	8360	9000	9700	10400	11100	8900	10500	12100
43.50	47.00	0.435	6120	6800	7480	7400	8700	10000	6840	7600	8360	9800	11550	13300	7470	8300	9130	11400	15400	17100	18100	15400	18100	20800
63.50	58.40	0.472	6320	7020	7720	8650	10150	11650	6840	7600	8360	11700	13750	15800	7470	8300	9130	11400	15400	17100	18100	15400	18100	20800
9 3/4"	247.65	0.545	6510	7230	7950	11060	13000	14950	7470	8300	9130	15400	18100	20800	7850	8700	9570	11900	15900	17600	18600	15900	18600	21400
260.83	59.40	0.595	7150	7950	8750	12600	14850	17100	7850	8700	9570	17850	21000	24150	8150	9050	9950	11900	13300	14500	15600	11900	13300	14500
64.90	70.30	0.625	7150	7950	8750	10750	12650	14850	8750	9750	10750	14750	17350	19950	9150	10150	11150	12300	13700	15100	16200	12300	13700	15100
247.65	64.20	0.672	7830	8700	9570	12300	14450	16600	9150	10150	11150	16900	19900	22900	9450	10500	11550	12300	13700	15100	16200	12300	13700	15100
9 1/8"	250.83	0.734	8150	9050	9950	14480	17000	19650	9450	10500	11650	18450	21700	24950	9850	10850	11850	13200	14700	16200	17200	13200	14700	16200
67.50	66.40	0.750	8150	9050	9950	14750	17350	19950	9850	10850	11850	18450	21700	24950	10100	11200	12300	13200	14700	16200	17200	13200	14700	16200
9 3/4"	247.65	0.595	6840	7600	8360	10750	12650	14850	7470	8300	9130	14750	17350	19950	8150	9050	9950	11900	13300	14500	15600	11900	13300	14500
260.83	60.20	0.609	7150	7950	8750	11050	13000	14950	7850	8700	9570	16400	18100	20800	8450	9400	10350	11400	12700	14000	15100	11400	12700	14000
9 7/8"	250.83	0.625	7470	8300	9130	11700	13750	15800	8750	9750	10750	16700	18600	21400	9150	10150	11150	12300	13700	15100	16200	12300	13700	15100
66.40	67.50	0.651	7830	8700	9570	12900	15200	17500	9150	10150	11150	17850	21000	24150	9450	10500	11550	12300	13700	15100	16200	12300	13700	15100
9 3/4"	247.65	0.678	7830	8700	9570	13200	15550	17900	9450	10500	11550	18450	21700	24950	9850	10850	11850	13200	14700	16200	17200	13200	14700	16200





DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi						120-125-130 ksi						135-140 ksi									
			Mil Side			Field & Accessories			Mil Side			Field & Accessories			Mil Side			Field & Accessories						
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.				
9 5/8"	36.00	0.352	7470	8300	9130	7050	8300	9650	8460	9400	10350	8000	9400	10800	9150	10150	11150	8650	10150	11650	8650	10150	11650	
																								8.94
244.48	40.00	0.395	7630	8700	9570	10150	11950	13750	8750	9750	10750	11400	13400	15400	9450	10500	11550	12300	9450	10500	11550	12300	13700	15100
43.50	47.00	0.435	8150	9050	9950	12900	15200	17500	9150	10150	11150	14750	17350	19950	9850	10850	11850	12650	9850	10850	11850	12650	14700	16200
58.40	59.40	0.472	8150	9080	9950	15700	18450	21200	9150	10150	11150	17500	20600	23700	9850	10850	11850	12650	9850	10850	11850	12650	14700	16200
63.50	58.40	0.545	8750	9750	10750	18450	21700	24950	9450	10450	11450	18450	21700	24950	10100	11200	12300	13000	10100	11200	12300	13000	14100	15700
71.80	61.10	0.595	9150	10150	11150	18450	21700	24950	9650	10650	11650	18450	21700	24950	10450	11450	12450	13150	10450	11450	12450	13150	14100	15700
9 3/4"	59.20	0.595	8750	9750	10750	18450	21700	24950	9450	10450	11450	18450	21700	24950	10100	11200	12300	13000	10100	11200	12300	13000	14100	15700
247.65	60.20	0.609	9150	10150	11150	18450	21700	24950	9650	10650	11650	18450	21700	24950	10450	11450	12450	13150	10450	11450	12450	13150	14100	15700
9 7/8"	62.80	0.625	9450	10450	11450	18450	21700	24950	9850	10850	11850	18450	21700	24950	10650	11650	12650	13350	10650	11650	12650	13350	14100	15700
250.83	66.40	0.651	9850	10850	11850	18450	21700	24950	10450	11450	12450	18450	21700	24950	11100	12300	13500	13850	11100	12300	13500	13850	14100	15700
67.50	61.10	0.678	10100	11200	12300	18450	21700	24950	10650	11650	12650	18450	21700	24950	11450	12450	13450	13850	11450	12450	13450	13850	14100	15700

## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		145-160-165 ksi				Field & Accessories			
		in.	mm.	Mill Side		ft. lb.		N.m.		N.m.	
				min.	opt.	max.	opt.	min.	opt.	max.	
<b>9 5/8"</b> 244.48	36.00	0.352	8.94	9850	10850	11850	9600	11200	12900	12900	12900
				13200	14700	16200	12950	15200	17450	17450	
40.00	0.395	10.03	10.03	10100	11200	12300	13600	15900	18300	18300	18300
				13700	15200	16700	16300	21600	24900	24900	
43.50	0.435	11.05	11.05	10450	11650	12650	17200	20250	23300	23300	23300
				14100	15700	17300	23300	27500	31700	31700	
47.00	0.472	11.99	11.99	10450	11550	12650	18450	21700	24950	24950	24950
				14700	15700	17300	25050	29400	33750	33750	
53.50	0.545	13.84	13.84	10850	11950	13050	18450	21700	24950	24950	24950
				14600	16200	17800	25050	29400	33750	33750	
58.40	0.595	15.11	15.11	11100	12300	13500	18450	21700	24950	24950	24950
				15000	16700	18400	25050	29400	33750	33750	
59.40	0.609	15.47	15.47	10850	11950	13050	18450	21700	24950	24950	24950
				14600	16200	17800	25050	29400	33750	33750	
61.10	0.625	15.88	15.88	11100	12300	13500	18450	21700	24950	24950	24950
				15000	16700	18400	25050	29400	33750	33750	
64.90	0.672	17.07	17.07	11450	12650	13850	18450	21700	24950	24950	24950
				15500	17200	18900	25050	29400	33750	33750	
70.30	0.734	18.64	18.64	11700	13000	14300	18450	21700	24950	24950	24950
				15900	17700	19500	25050	29400	33750	33750	
71.80	0.750	19.05	19.05	12100	13400	14700	18450	21700	24950	24950	24950
				16300	18100	19900	25050	29400	33750	33750	
<b>9 3/4"</b> 247.65	59.20	0.595	15.11	10850	11950	13050	18450	21700	24950	24950	24950
				14600	16200	17800	25050	29400	33750	33750	
60.20	0.609	15.47	15.47	11100	12300	13500	18450	21700	24950	24950	24950
				15000	16700	18400	25050	29400	33750	33750	
<b>9 7/8"</b> 250.83	62.80	0.625	15.88	11450	12650	13850	18450	21700	24950	24950	24950
				15500	17200	18900	25050	29400	33750	33750	
66.40	0.661	16.79	16.79	11700	13000	14300	18450	21700	24950	24950	24950
				15900	17700	19500	25050	29400	33750	33750	
67.50	0.678	17.22	17.22	12100	13400	14700	18450	21700	24950	24950	24950
				16300	18100	19900	25050	29400	33750	33750	



DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55-65 ksi												75-90.95 ksi												90.95-100 ksi											
			Mill Side				Field & Accessories				Mill Side				Field & Accessories				Mill Side				Field & Accessories															
			min.	optl.	max.	fl. lb.	min.	optl.	max.	N.m.	min.	optl.	max.	fl. lb.	min.	optl.	max.	N.m.	min.	optl.	max.	fl. lb.	min.	optl.	max.	N.m.												
9 7/8" 250.83	70.50	0.720	7830	8700	9570	14150	16650	19150	9460	10600	11850	18450	21700	24950	9850	10850	11850	18450	21700	24950	9850	10850	11850	18450	21700	24950												
			10600	11800	13000	19900	23600	27100	13200	14700	16200	20500	24000	33750	37500	13200	14700	16200	20500	24000	33750	37500	13200	14700	16200	20500	24000	33750										
10 3/4" 273.05	40.50	0.89	5860	6510	7160	11650	14250	16850	7470	8300	9130	14150	16650	19150	7470	8300	9130	14150	16650	19150	7470	8300	9130	14150	16650	19150												
			8800	9700	10600	16300	19900	23600	27100	10200	11300	12400	18450	21700	24950	10200	11300	12400	18450	21700	24950	10200	11300	12400	18450	21700	24950											
45.50	61.00	1.04	6510	7230	7950	12600	15200	17800	8150	9080	9980	14150	16650	19150	8150	9080	9980	14150	16650	19150	8150	9080	9980	14150	16650	19150												
			10600	11800	13000	20500	24000	27500	11700	12900	14100	20400	24000	27600	33200	37000	11700	12900	14100	20400	24000	27600	33200	37000	11700	12900	14100											
55.50	60.70	1.19	7830	8700	9570	14150	16650	19150	10100	11200	12300	18450	21700	24950	10100	11200	12300	18450	21700	24950	10100	11200	12300	18450	21700	24950												
			10600	11800	13000	20400	24000	27600	12300	13700	15100	22000	25600	29200	37000	12300	13700	15100	22000	25600	29200	37000	12300	13700	15100	22000	25600											
65.70	66.15	1.34	9460	10600	11850	18450	21700	24950	10100	11200	12300	18450	21700	24950	10100	11200	12300	18450	21700	24950	10100	11200	12300	18450	21700	24950												
			12800	14200	15600	24000	27600	31200	14100	15700	17300	24950	28600	32200	40000	14100	15700	17300	24950	28600	32200	40000	14100	15700	17300	24950	28600											
73.20	76.10	1.49	11850	13000	14200	21700	24950	28200	11850	13000	14200	21700	24950	28200	11850	13000	14200	21700	24950	28200	11850	13000	14200	21700	24950	28200												
			15200	16700	18200	27600	31200	34800	17000	18900	20800	29200	33000	36800	45200	17000	18900	20800	29200	33000	36800	45200	17000	18900	20800	29200	33000											
79.20	47.00	1.64	13000	14200	15400	23600	27100	30600	13000	14200	15400	23600	27100	30600	13000	14200	15400	23600	27100	30600	13000	14200	15400	23600	27100	30600												
			16700	18200	19700	29200	32800	36400	18450	20000	21550	30600	34200	37800	46200	18450	20000	21550	30600	34200	37800	46200	18450	20000	21550	30600	34200											
84.00	65.00	1.79	14200	15400	16600	24950	28200	31500	14200	15400	16600	24950	28200	31500	14200	15400	16600	24950	28200	31500	14200	15400	16600	24950	28200	31500												
			18200	19700	21200	31200	34800	38400	21700	23200	24700	34800	38400	42000	50400	21700	23200	24700	34800	38400	42000	50400	21700	23200	24700	34800	38400											
90.00	65.00	1.94	15400	16600	17800	26000	29500	33000	15400	16600	17800	26000	29500	33000	15400	16600	17800	26000	29500	33000	15400	16600	17800	26000	29500	33000												
			19400	20900	22400	32400	36000	39600	23400	24900	26400	36000	39600	43200	51600	23400	24900	26400	36000	39600	43200	51600	23400	24900	26400	36000	39600											
96.00	65.00	2.09	16600	17800	19000	27200	30700	34200	16600	17800	19000	27200	30700	34200	16600	17800	19000	27200	30700	34200	16600	17800	19000	27200	30700	34200												
			20600	22100	23600	33600	37200	40800	24600	26100	27600	37200	40800	44400	52800	24600	26100	27600	37200	40800	44400	52800	24600	26100	27600	37200	40800											
102.00	65.00	2.24	17800	19000	20200	28400	31900	35400	17800	19000	20200	28400	31900	35400	17800	19000	20200	28400	31900	35400	17800	19000	20200	28400	31900	35400												
			21800	23300	24800	34800	38400	42000	25800	27300	28800	38400	42000	45600	54000	25800	27300	28800	38400	42000	45600	54000	25800	27300	28800	38400	42000											
108.00	65.00	2.39	19000	20200	21400	29600	33100	36600	19000	20200	21400	29600	33100	36600	19000	20200	21400	29600	33100	36600	19000	20200	21400	29600	33100	36600												
			23000	24500	26000	36000	39600	43200	27000	28500	30000	39600	43200	46800	55200	27000	28500	30000	39600	43200	46800	55200	27000	28500	30000	39600	43200											
114.00	65.00	2.54	20200	21400	22600	30800	34300	37800	20200	21400	22600	30800	34300	37800	20200	21400	22600	30800	34300	37800	20200	21400	22600	30800	34300	37800												
			24200	25700	27200	37200	40800	44400	28200	29700	31200	40800	44400	48000	56400	28200	29700	31200	40800	44400	48000	56400	28200	29700	31200	40800	44400											
120.00	65.00	2.69	21400	22600	23800	32000	35500	39000	21400	22600	23800	32000	35500	39000	21400	22600	23800	32000	35500	39000	21400	22600	23800	32000	35500	39000												
			25400	26900	28400	38400	42000	45600	29400	30900	32400	42000	45600	49200	57600	29400	30900	32400	42000	45600	49200	57600	29400	30900	32400	42000	45600											
126.00	65.00	2.84	22600	23800	25000	33200	36700	40200	22600	23800	25000	33200	36700	40200	22600	23800	25000	33200	36700	40200	22600	23800	25000	33200	36700	40200												
			26600	28100	29600	39600	43200	46800	33600	35100	36600	46800	50400	54000	62400	33600	35100	36600	46800	50400	54000	62400	33600	35100	36600	46800	50400											
132.00	65.00	2.99	23800	25000	26200	34400	37900	41400	23800	25000	26200	34400	37900	41400	23800	25000	26200	34400	37900	41400	23800	25000	26200	34400	37900	41400												
			27800	29300	30800	40800	44400	48000	36800	38300	39800	48000	51600	55200	63600	36800	38300	39800	48000	51600	55200	63600	36800	38300	39800	48000	51600											
138.00	65.00	3.14	25000	26200	27400	35600	39100	42600	25000	26200	27400	35600	39100	42600	25000	26200	27400	35600	39100	42600	25000	26200	27400	35600	39100	42600												
			29000	30500	32000	42000	45600	49200	39600	41100	42600	51600	55200	58800	67200	39600	41100	42600	51600	55200	58800	67200	39600	41100	42600	51600	55200											
144.00	65.00	3.29	26200	27400	28600	36800	40300	43800	26200	27400	28600	36800	40300	43800	26200	27400	28600	36800	40300	43800	26200	27400	28600	36800	40300	43800												
			30200	31700	33200	43200	46800	50400	40800	42300	43800	52800	56400	60000	68400	40800	42300	43800	52800	56400	60000	68400	40800	42300	43800	52800	56400											
150.00	65.00	3.44	27400	28600	29800	38000	41500	45000	27400	28600	29800	38000	41500	45000	27400	28600	29800	38000	41500	45000	27400	28600	29800	38000	41500	45000												
			31400	32900	34400	44400	48000	51600	41400	42900	44400	53400	57000	60600	69000	41400	42900	44400	53400	57000	60600	69000	41400	42900	44400	53400	57000											
156.00	65.00	3.59	28600	29800	31000	39200	42700	46200	28600	29800	31000	39200	42700	46200	28600	29800	31000	39200	42700	46200	28600	29800	31000	39200	42700	46200												
			32600	34100	35600	45600	49200	52800	42400	43900	45400	54400	58000	61600	70000	42400	43900	45400	54400	58000	61600	70000	42400	43900	45400	54400	58000											
162.00	65.00	3.74	29800	31000	32200	40400	43900	47400	29800	31000	32200	40400	43900	47400	29800	31000	32200	40400	43900	47400	29800	31000	32200	40400	43900	47400												
			33800	35300	36800	46800	50400	54000	43400	44900	46400	55400	59000	62600	71000	43400	44900	46400	55400	59000	62600	71000	43400	44900	46400	55400	59000											
168.00	65.00	3.89	31000	32200	33400	41600	45100	48600	31000	32200	33400	41600	45100	48600	31000	32200	33400	41600	45100	48600	31000	32200	33400	41600	45100	48600												
			35000	36500	38000	48000	51600	55200	43800	453																												





**DINO VAM TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi						120-125-130 ksi						135-140 ksi						
			Mil Side		Field & Accessories		Mil Side		Field & Accessories		Mil Side		Field & Accessories		Mil Side		Field & Accessories				
in.	ft. lb.	in.	min.	opt.	max.	ft. lb.	min.	opt.	max.	ft. lb.	min.	opt.	max.	ft. lb.	min.	opt.	max.				
9 7/8" 250.83	68.90	0.700	10100	11200	12300	18460	21700	24950	10850	11950	13050	18450	21700	24950	11450	12650	13850	18450	21700	24950	
			13700	15200	16700	25050	29400	33750	14600	16200	17800	29050	29400	33750	16500	17200	18900	25050	29400	33750	
		70.50	0.720	10450	11650	12650	18460	21700	24950	11100	12300	13500	18450	21700	24950	11700	13000	14300	18450	21700	24950
10 3/4" 273.05	40.50	0.350	9450	10500	11550	7700	9050	10400	10650	11950	13050	8650	10150	11650	11450	12650	13850	9200	10650	12500	
			12800	14200	15600	10500	12300	14100	14600	16200	17800	11600	13700	15800	16500	17200	18900	12450	14700	16950	
		45.50	0.400	9850	10850	11850	12000	14100	16200	11100	12300	13500	13500	15900	18300	11700	13000	14300	14750	17350	19950
61.00	0.450	10100	11200	12300	16300	19150	22000	11450	12650	13850	18450	21700	24950	12100	13400	14700	18450	21700	24950		
			13700	15200	16700	27100	26000	29900	15500	17200	18900	29050	29400	33750	16300	18100	19900	25050	29400	33750	
		55.50	0.495	10450	11550	12650	18450	21700	24950	11700	13000	14300	18450	21700	24950	12450	13750	15050	18450	21700	24950
60.70	0.545	11100	12300	13500	18460	21700	24950	12100	13400	14700	18450	21700	24950	12700	14100	15500	18450	21700	24950		
			15000	16700	18400	25050	29400	33750	16300	18100	19900	29050	29400	33750	17200	19100	21000	25050	29400	33750	
		65.70	0.595	11700	13000	14300	18450	21700	24950	12450	13750	15050	18450	21700	24950	13000	14450	15900	18450	21700	24950
66.15	0.611	11450	12650	13850	18460	21700	24950	12450	13750	15050	18450	21700	24950	13000	14450	15900	18450	21700	24950		
			15900	17700	19500	25050	29400	33750	16700	18600	20500	29050	29400	33750	17600	19600	21600	25050	29400	33750	
		73.20	0.672	12100	13400	14700	18450	21700	24950	12700	14100	15500	18450	21700	24950	13350	14850	16350	18450	21700	24950
76.10	0.709	12700	14100	15500	18460	21700	24950	13000	14450	15900	18450	21700	24950	13700	15200	16700	18450	21700	24950		
			17200	19100	21000	26050	29400	33750	17600	19600	21600	29050	29400	33750	18500	20600	22700	25050	29400	33750	
		79.20	0.734	13000	14450	15900	18460	21700	24950	13700	15200	16700	18450	21700	24950	14000	15650	17100	18450	21700	24950
11 3/4" 295.45	47.00	0.375	11100	12300	13500	14150	16650	19150	12450	13750	15050	16700	18600	20500	18100	20100	22100	23300	25300	27500	31700
			15000	16700	18400	19150	22600	26050	16700	18600	20500	21250	25000	28950	18450	21000	23600	24250	28100	32400	37500
		54.00	0.435	11700	13000	14300	18460	21700	24950	13000	14450	15900	18450	21700	24950	14000	15650	17100	18450	21700	24950
60.00	0.489	11700	13000	14300	16900	19900	22900	13000	14450	15900	18450	21700	24950	14000	15650	17100	18450	21700	24950		
			15900	17700	19500	29050	29400	33750	17600	19600	21600	29050	29400	33750	19000	21100	23200	25050	29400	33750	
		65.00	0.534	12450	13750	15050	18460	21700	24950	13350	14850	16350	18450	21700	24950	14300	15900	17500	18450	21700	24950
			16700	18600	20500	29400	33750	18100	20100	22100	23300	25300	27500	19400	21600	23800	25050	29400	33750		

## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT		WALL THICKNESS		145-160-165 ksi				Field & Accessories				
	in.	ft. lb.	in.	mm.	Mill Side		N.m.		min.	opt.	max.	opt.	max.
					min.	opt.	min.	opt.					
9 7/8" 250.83	68.90	17.78	0.700	17.78	12100	13400	14700	18460	18460	21700	21700	24960	24960
					16300	18100	19900	25050	29400	33750	33750		
70.50	16.29	0.720	18.29	12460	13760	15060	18460	18460	21700	21700	24960	24960	
				16700	18660	20500	25050	29400	33750	33750			
10 3/4" 273.05	40.50	8.89	0.350	16.300	13400	13400	14700	9600	11550	13300	13300	16000	16000
					16300	18100	19900	13300	15700	18100	18100		
45.50	10.16	0.400	16.700	12460	13760	15060	16000	18800	21600	21600	24960	24960	
				16700	18660	20500	21600	25500	29400	29400			
51.00	11.43	0.450	17.200	12700	14100	15500	18460	18460	21700	21700	24960	24960	
				17200	19100	21000	25050	29400	33750	33750			
55.50	12.57	0.495	17.600	13000	14460	15900	18460	18460	21700	21700	24960	24960	
				19600	21600	25050	29400	33750	33750	33750			
60.70	13.84	0.545	18.100	13360	14860	16360	18460	18460	21700	21700	24960	24960	
				18100	20100	22100	25050	29400	33750	33750			
65.70	15.11	0.595	18.500	13700	15200	16700	18460	18460	21700	21700	24960	24960	
				20600	22700	25050	29400	33750	33750	33750			
66.15	16.52	0.611	18.500	13700	15200	16700	18460	18460	21700	21700	24960	24960	
				20600	22700	25050	29400	33750	33750	33750			
73.20	17.07	0.672	19.000	14000	15500	17100	18460	18460	21700	21700	24960	24960	
				21000	23200	25050	29400	33750	33750	33750			
76.10	18.01	0.709	19.400	14300	15900	17500	18460	18460	21700	21700	24960	24960	
				21600	23800	25050	29400	33750	33750	33750			
79.20	18.64	0.734	19.900	14600	16250	17900	18460	18460	21700	21700	24960	24960	
				22100	24300	25050	29400	33750	33750	33750			
11 3/4" 296.45	47.00	9.53	0.375	14300	15900	17500	18460	18460	21700	21700	24960	24960	
				19400	21600	23800	25050	29400	33750	33750			
54.00	11.05	0.435	20.300	16000	16650	18300	18460	18460	21700	21700	24960	24960	
				22600	24900	25050	29400	33750	33750	33750			
60.00	12.42	0.489	20.300	15000	16660	18300	18460	18460	21700	21700	24960	24960	
				22600	24900	25050	29400	33750	33750	33750			
65.00	13.56	0.534	20.700	15300	17000	18700	18460	18460	21700	21700	24960	24960	
				23000	25300	25050	29400	33750	33750	33750			

## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55-65 ksi						75-80-85 ksi						90-95-100 ksi																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			Mill Side			Field & Accessories			Mill Side			Field & Accessories			Mill Side			Field & Accessories																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
11 3/4* 289.45	71.00	0.582	14.78	10860	11850	14150	16650	19150	22600	26050	29500	33000	36450	40000	43450	47000	50450	54000	57450	61000	64450	68000	71450	75000	78450	82000	85450	89000	92450	96000	99450	103000	106450	110000	113450	117000	120450	124000	127450	131000	134450	138000	141450	145000	148450	152000	155450	159000	162450	166000	169450	173000	176450	180000	183450	187000	190450	194000	197450	201000	204450	208000	211450	215000	218450	222000	225450	229000	232450	236000	239450	243000	246450	250000	253450	257000	260450	264000	267450	271000	274450	278000	281450	285000	288450	292000	295450	299000	302450	306000	309450	313000	316450	320000	323450	327000	330450	334000	337450	341000	344450	348000	351450	355000	358450	362000	365450	369000	372450	376000	379450	383000	386450	390000	393450	397000	400450	404000	407450	411000	414450	418000	421450	425000	428450	432000	435450	439000	442450	446000	449450	453000	456450	460000	463450	467000	470450	474000	477450	481000	484450	488000	491450	495000	498450	502000	505450	509000	512450	516000	519450	523000	526450	530000	533450	537000	540450	544000	547450	551000	554450	558000	561450	565000	568450	572000	575450	579000	582450	586000	589450	593000	596450	600000	603450	607000	610450	614000	617450	621000	624450	628000	631450	635000	638450	642000	645450	649000	652450	656000	659450	663000	666450	670000	673450	677000	680450	684000	687450	691000	694450	698000	701450	705000	708450	712000	715450	719000	722450	726000	729450	733000	736450	740000	743450	747000	750450	754000	757450	761000	764450	768000	771450	775000	778450	782000	785450	789000	792450	796000	799450	803000	806450	810000	813450	817000	820450	824000	827450	831000	834450	838000	841450	845000	848450	852000	855450	859000	862450	866000	869450	873000	876450	880000	883450	887000	890450	894000	897450	901000	904450	908000	911450	915000	918450	922000	925450	929000	932450	936000	939450	943000	946450	950000	953450	957000	960450	964000	967450	971000	974450	978000	981450	985000	988450	992000	995450	999000	1002450	1006000	1009450	1013000	1016450	1020000	1023450	1027000	1030450	1034000	1037450	1041000	1044450	1048000	1051450	1055000	1058450	1062000	1065450	1069000	1072450	1076000	1079450	1083000	1086450	1090000	1093450	1097000	1100450	1104000	1107450	1111000	1114450	1118000	1121450	1125000	1128450	1132000	1135450	1139000	1142450	1146000	1149450	1153000	1156450	1160000	1163450	1167000	1170450	1174000	1177450	1181000	1184450	1188000	1191450	1195000	1198450	1202000	1205450	1209000	1212450	1216000	1219450	1223000	1226450	1230000	1233450	1237000	1240450	1244000	1247450	1251000	1254450	1258000	1261450	1265000	1268450	1272000	1275450	1279000	1282450	1286000	1289450	1293000	1296450	1300000	1303450	1307000	1310450	1314000	1317450	1321000	1324450	1328000	1331450	1335000	1338450	1342000	1345450	1349000	1352450	1356000	1359450	1363000	1366450	1370000	1373450	1377000	1380450	1384000	1387450	1391000	1394450	1398000	1401450	1405000	1408450	1412000	1415450	1419000	1422450	1426000	1429450	1433000	1436450	1440000	1443450	1447000	1450450	1454000	1457450	1461000	1464450	1468000	1471450	1475000	1478450	1482000	1485450	1489000	1492450	1496000	1499450	1503000	1506450	1510000	1513450	1517000	1520450	1524000	1527450	1531000	1534450	1538000	1541450	1545000	1548450	1552000	1555450	1559000	1562450	1566000	1569450	1573000	1576450	1580000	1583450	1587000	1590450	1594000	1597450	1601000	1604450	1608000	1611450	1615000	1618450	1622000	1625450	1629000	1632450	1636000	1639450	1643000	1646450	1650000	1653450	1657000	1660450	1664000	1667450	1671000	1674450	1678000	1681450	1685000	1688450	1692000	1695450	1699000	1702450	1706000	1709450	1713000	1716450	1720000	1723450	1727000	1730450	1734000	1737450	1741000	1744450	1748000	1751450	1755000	1758450	1762000	1765450	1769000	1772450	1776000	1779450	1783000	1786450	1790000	1793450	1797000	1800450	1804000	1807450	1811000	1814450	1818000	1821450	1825000	1828450	1832000	1835450	1839000	1842450	1846000	1849450	1853000	1856450	1860000	1863450	1867000	1870450	1874000	1877450	1881000	1884450	1888000	1891450	1895000	1898450	1902000	1905450	1909000	1912450	1916000	1919450	1923000	1926450	1930000	1933450	1937000	1940450	1944000	1947450	1951000	1954450	1958000	1961450	1965000	1968450	1972000	1975450	1979000	1982450	1986000	1989450	1993000	1996450	2000000	2003450	2007000	2010450	2014000	2017450	2021000	2024450	2028000	2031450	2035000	2038450	2042000	2045450	2049000	2052450	2056000	2059450	2063000	2066450	2070000	2073450	2077000	2080450	2084000	2087450	2091000	2094450	2098000	2101450	2105000	2108450	2112000	2115450	2119000	2122450	2126000	2129450	2133000	2136450	2140000	2143450	2147000	2150450	2154000	2157450	2161000	2164450	2168000	2171450	2175000	2178450	2182000	2185450	2189000	2192450	2196000	2199450	2203000	2206450	2210000	2213450	2217000	2220450	2224000	2227450	2231000	2234450	2238000	2241450	2245000	2248450	2252000	2255450	2259000	2262450	2266000	2269450	2273000	2276450	2280000	2283450	2287000	2290450	2294000	2297450	2301000	2304450	2308000	2311450	2315000	2318450	2322000	2325450	2329000	2332450	2336000	2339450	2343000	2346450	2350000	2353450	2357000	2360450	2364000	2367450	2371000	2374450	2378000	2381450	2385000	2388450	2392000	2395450	2399000	2402450	2406000	2409450	2413000	2416450	2420000	2423450	2427000	2430450	2434000	2437450	2441000	2444450	2448000	2451450	2455000	2458450	2462000	2465450	2469000	2472450	2476000	2479450	2483000	2486450	2490000	2493450	2497000	2500450	2504000	2507450	2511000	2514450	2518000	2521450	2525000	2528450	2532000	2535450	2539000	2542450	2546000	2549450	2553000	2556450	2560000	2563450	2567000	2570450	2574000	2577450	2581000	2584450	2588000	2591450	2595000	2598450	2602000	2605450	2609000	2612450	2616000	2619450	2623000	2626450	2630000	2633450	2637000	2640450	2644000	2647450	2651000	2654450	2658000



DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi						120-125-130 ksi						135-140 ksi						
			Mil Side			Field & Accessories			Mil Side			Field & Accessories			Mil Side			Field & Accessories			
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	
11 3/4" 289.45	71.00	0.582	14.78	13000	14450	15900	18450	21700	24950	13700	15200	16700	18450	21700	24950	14600	16250	17900	18450	21700	24950
				17600	19600	21600	25050	29400	33750	18500	20600	22700	25050	29400	33750	19900	22100	24300	25050	29400	33750
11 7/8" 307.625	71.80	0.582	14.78	12450	13750	15050	18450	21700	24950	13700	15200	16700	18450	21700	24950	14600	16250	17900	18450	21700	24950
				16700	18600	20500	25050	29400	33750	18500	20600	22700	25050	29400	33750	19900	22100	24300	25050	29400	33750
13 3/8" 339.73	54.50	0.380	9.65	14300	15900	17500	16900	19900	22900	16300	18100	19900	18450	21700	24950	17600	19550	21500	18450	21700	24950
				19400	21600	23800	22950	27000	31050	22000	24500	27000	25050	29400	33750	23800	26500	29200	25050	29400	33750
61.00	6.00	0.430	10.92	15000	16650	18300	18450	21700	24950	16600	18450	20300	18450	21700	24950	17900	19900	21900	18450	21700	24950
				20300	22600	24900	25050	29400	33750	22500	25000	27800	25050	29400	33750	24300	27000	29700	25050	29400	33750
68.00	72.00	0.480	12.19	15300	17000	18700	18450	21700	24950	16900	18800	20700	18450	21700	24950	18200	20250	22300	18450	21700	24950
				20700	23000	25300	25050	29400	33750	22900	25500	28100	25050	29400	33750	24700	27500	30300	25050	29400	33750
77.00	80.70	0.550	13.97	15600	17350	19100	18450	21700	24950	17250	19150	21050	18450	21700	24950	18550	20600	22650	18450	21700	24950
				21100	23500	25900	25050	29400	33750	23400	26000	28600	25050	29400	33750	25100	27900	30700	25050	29400	33750
85.00	86.00	0.608	15.44	16100	17700	19450	18450	21700	24950	17250	19150	21050	18450	21700	24950	18550	20600	22650	18450	21700	24950
				21600	24200	26400	25050	29400	33750	23400	26000	28600	25050	29400	33750	25100	27900	30700	25050	29400	33750
88.20	82.50	0.625	15.88	16600	18450	20300	18450	21700	24950	17900	19900	21900	18450	21700	24950	19200	21350	23500	18450	21700	24950
				22500	25000	27500	25050	29400	33750	24300	27000	29700	25050	29400	33750	26000	28900	31800	25050	29400	33750
13 5/8" 346.08	99.00	0.688	17.48	16300	18100	19900	18450	21700	24950	18200	20250	22300	18450	21700	24950	19550	21700	23850	18450	21700	24950
				22000	24600	27000	25050	29400	33750	24700	27500	30300	25050	29400	33750	26500	29400	32300	25050	29400	33750
14" 355.60	86.00	0.600	15.24	17600	19550	21500	18450	21700	24950	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
				23800	26500	29200	25050	29400	33750	26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	33750
93.00	94.80	0.655	16.51	18200	20250	22300	18450	21700	24950	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
				24700	27500	30300	25050	29400	33750	26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	33750
99.00	16.66	0.688	17.48	18900	21000	23100	18450	21700	24950	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
				25600	28400	31200	25050	29400	33750	26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	33750
14" 354.08	86.00	0.600	15.24	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
				26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	33750

## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		145-160-165 ksi				Field & Accessories							
		in.	mm.	Mill Side		ft. lb.		N.m.		min.		opt.		max.	
				min.	opt.	min.	opt.	min.	opt.	min.	opt.	min.	opt.	max.	
11 3/4" 299.45	71.00	0.582	16600	17350	19100	18460	21700	24950	18460	21700	24950				
		14.78	27100	23500	25900	25050	29400	33750							
11 7/8" 307.625	71.80	0.582	15600	17350	19100	18460	21700	24950	18460	21700	24950				
		14.78	27100	23500	25900	25050	29400	33750							
13 3/8" 339.73	54.50	0.380	18900	21000	23100	18460	21700	24950	18460	21700	24950				
		9.65	25400	28400	31200	25050	29400	33750							
14"	61.00	0.430	19200	21350	23500	18460	21700	24950	18460	21700	24950				
		10.92	26000	28900	31800	25050	29400	33750							
14"	68.00	0.480	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		12.19	26500	29400	32300	25050	29400	33750							
14"	72.00	0.514	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		13.06	26500	29400	32300	25050	29400	33750							
14"	77.00	0.550	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		13.97	26500	29400	32300	25050	29400	33750							
14"	80.70	0.580	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		14.73	26500	29400	32300	25050	29400	33750							
14"	85.00	0.608	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		15.44	26500	29400	32300	25050	29400	33750							
14"	86.00	0.625	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		15.88	26500	29400	32300	25050	29400	33750							
14"	88.20	0.625	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		15.88	26500	29400	32300	25050	29400	33750							
14"	82.50	0.562	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		14.27	26500	29400	32300	25050	29400	33750							
14"	86.00	0.600	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		15.24	26500	29400	32300	25050	29400	33750							
14"	93.00	0.650	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		16.51	26500	29400	32300	25050	29400	33750							
14"	94.80	0.656	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		16.66	26500	29400	32300	25050	29400	33750							
14"	99.00	0.688	19650	21700	23850	18460	21700	24950	18460	21700	24950				
		17.48	26500	29400	32300	25050	29400	33750							





**DINO VAM TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55-65 ksi						75-90-95 ksi						90-95-100 ksi								
			Mill Side			Field & Accessories			Mill Side			Field & Accessories			Mill Side			Field & Accessories					
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.			
14"	100.00	17.78	16600	18460	20300	21700	24950	18900	21000	23100	18450	21700	24950	19550	21700	23850	18450	21700	23850	18450	21700	24950	
			22500	25000	27500	29000	33750	25600	28400	31200	29050	29400	33750	26500	29400	32300	26500	29400	32300	25050	29400	32300	25050
355.60	106.00	0.750	16900	18800	20700	21700	24950	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	23850	18450	21700	24950	
			22900	25500	28100	29000	33750	26500	29400	32300	29050	29400	33750	26500	29400	32300	26500	29400	32300	25050	29400	32300	25050
114.00	0.800	19.05	16900	18800	20700	21700	24950	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	23850	18450	21700	24950	
			22900	25500	28100	29000	33750	26500	29400	32300	29050	29400	33750	26500	29400	32300	26500	29400	32300	25050	29400	32300	25050
16"	65.00	0.375	12460	13760	15080	10750	12650	14550	15600	17350	19100	14480	17000	19550	17600	19550	21600	16600	19550	21600	16600	19550	22600
			16700	18600	20500	14650	17200	19750	21100	23500	25900	19550	23000	26450	23800	26500	29200	22450	26500	29200	22450	26500	30550
406.40	75.00	0.438	13000	14460	15900	16600	19550	22600	16300	18100	19900	18450	21700	24950	18200	20250	22300	18450	21700	24950	18450	21700	24950
			17600	19600	21600	22450	26500	23000	24500	27000	29050	29400	33750	24700	27500	30300	24700	27500	30300	25050	29400	32300	25050
84.00	84.00	12.57	13700	15200	16700	18450	21700	24950	16900	18800	20700	18450	21700	24950	18900	21000	23100	18450	21700	24950	18450	21700	24950
			18500	20600	22700	25050	29400	33750	22900	25500	28100	29050	29400	33750	26600	29400	32300	29050	29400	32300	25050	29400	32300
84.80	94.50	12.70	14000	15560	17100	18460	21700	24950	17250	19150	21050	18450	21700	24950	19550	21700	23850	18450	21700	23850	18450	21700	24950
			19000	21100	23200	25050	29400	33750	23400	26000	28600	29050	29400	33750	26500	29400	32300	29050	29400	32300	25050	29400	32300
97.00	104.00	14.27	16900	18800	20700	16700	18460	21200	18900	21000	23100	18460	21700	24950	19550	21700	23850	18460	21700	23850	18460	21700	24950
			22900	25500	28100	21250	23000	26750	25600	28400	31200	29050	29400	33750	26500	29400	32300	29050	29400	32300	25050	29400	32300
109.00	128.00	16.66	16500	19400	22300	25050	29400	33750	26500	29400	32300	18460	21700	24950	19550	21700	23850	18460	21700	23850	18460	21700	24950
			23800	26500	29200	25050	29400	33750	26500	29400	32300	29050	29400	33750	26500	29400	32300	29050	29400	32300	25050	29400	32300
19.84	0.781	16.66	19550	21700	23850	18460	21700	24950	19550	21700	23850	18460	21700	24950	19550	21700	23850	18460	21700	23850	18460	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	29050	29400	33750	26500	29400	32300	29050	29400	32300	25050	29400	32300

## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi					
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.			
14"	100.00	0.700	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
355.60	106.00	0.750	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	114.00	0.800	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
406.40	65.00	0.375	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	75.00	0.438	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	84.00	0.495	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	84.80	0.500	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	94.50	0.562	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	97.00	0.575	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	104.00	0.625	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	109.00	0.656	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300
16"	128.00	0.781	19550	21700	23850	18450	21700	24950	19550	21700	23850	18450	21700	24950
			26500	29400	32300	25050	29400	33750	26500	29400	32300	25050	29400	32300

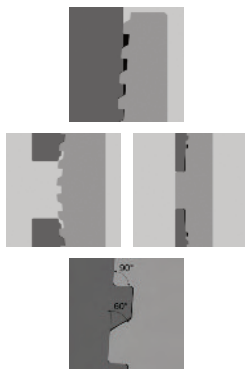
## DINO VAM TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	145-160-165 ksi								
			Mill Side			Field & Accessories					
			min.	opt.	max.	min.	opt.	max.			
	ft. lb.	in.	ft. lb. N.m.								
	mm	mm									
14" 355.60	100.00	0.700	19550	21700	23850	18460	21700	24950			
		17.78	26500	29400	32300	25050	29400	33750			
	106.00	0.750	19550	21700	23850	18460	21700	24950			
		19.05	26500	29400	32300	25050	29400	33750			
	114.00	0.800	19550	21700	23850	18460	21700	24950			
	20.32	26500	29400	32300	25050	29400	33750				
16" 406.40	65.00	0.375	19550	21700	23850	18460	21700	24950			
		9.53	26500	29400	32300	25050	29400	33750			
	75.00	0.438	19550	21700	23850	18460	21700	24950			
		11.13	26500	29400	32300	25050	29400	33750			
	84.00	0.495	19550	21700	23850	18460	21700	24950			
	12.57	26500	29400	32300	25050	29400	33750				
84.80	84.80	0.500	19550	21700	23850	18460	21700	24950			
		12.70	26500	29400	32300	25050	29400	33750			
	94.50	0.562	19550	21700	23850	18460	21700	24950			
		14.27	26500	29400	32300	25050	29400	33750			
	97.00	0.575	19550	21700	23850	18460	21700	24950			
	14.61	26500	29400	32300	25050	29400	33750				
104.00	104.00	0.625	19550	21700	23850	18460	21700	24950			
		15.88	26500	29400	32300	25050	29400	33750			
	109.00	0.656	19550	21700	23850	18460	21700	24950			
		16.66	26500	29400	32300	25050	29400	33750			
	128.00	0.781	19550	21700	23850	18460	21700	24950			
	19.84	26500	29400	32300	25050	29400	33750				



## 3.7 BIG OMEGA

### Application



### Design Principles

BIG OMEGA™ Casing can be delivered in OD's ranging from 14 in. to 26 in. and in lengths corresponding to API ranges 2 and 3 (including pup joints).

BIG OMEGA™ is a threaded & coupled connection. The pin thread is cut directly into the pipe, so any problems associated with weld-on connectors are eliminated.

Standard coupling OD complies with standard rules; it be increased for higher grades and / or thicker wall thicknesses if matching internal pressure resistance is required for pipe body vs. connection (-MS option).

An internal torque shoulder (-IS option) is available upon request for applications requiring high torque, bending and/or high axial compression performance.

BIG OMEGA™ Casing is a mill threaded pipe. It is available in normalized or quenched and tempered condition in both API and V&M proprietary grades.

BIG OMEGA™ Casing possesses the rugged V&M developed thread profile featuring:

- 3TPI versus Buttress 5TPI which avoids any cross-threading and considerably speeds up running time
- Taper 1:7.5 versus Buttress 1:12 for easier stabbing and quicker running
- Load flank perpendicular to thread cone
- Stabbing flank 30°
- Crests and roots parallel to cone
- Enhanced thread height 0.0846 in. (2,15 mm) versus Buttress which eliminates jump-out under highest tensile loads

## Outside diameter BIG OMEGA™

The outside diameter of the BIG OMEGA™ Casing according to API 5CT. (Exception 18 5/8"x 96.5 lb/ft and 16"x 94.5 lb/ft with alternate drift: in this case the outside diameter tolerance is increased to nominal diameter + 1.25%). The inside diameter of the auxiliary elevator with the picked up BIG OMEGA™ Casing should be fixed aligned with the axis of the casing already installed in the rotary table. The elevator should be hung up freely moving at a swivel, which turns easily during make-up.

## Dope Quantities

Big Omega casing in grades J 55 Through to L80 is usually made up with API modified thread compound. C-95 and higher grades require make up with Liquid – O – Ring 104 or equivalent.

100 % dope quantity should be applied to the pin or box end.

120g to 150g of dope should be applied for all dimensions independent of the dope type.

## Make up of BIG OMEGA™

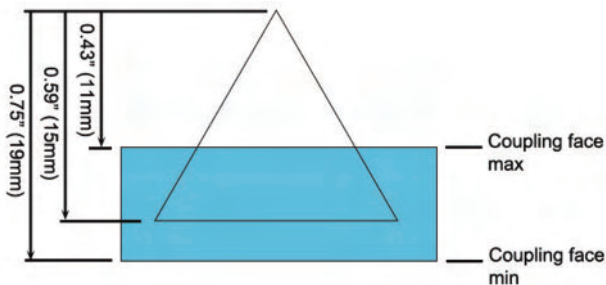
The capacity of the power tong must be at least 60% higher than the guiding torque to allow breaking of a connection or to make up joints with locking compound.

Stab casing carefully to avoid injuring threads. A good crew coordination is essential.

BIG OMEGA™ Connections must be made up with a certain torque value.

- A triangle is hard-stamped on each thread. The location is marked by a long white line on the pin-end side.
- To find the proper torque at least 10 power make-ups to the base of this triangle should be carried out on each running job. The average torque value of these make-ups is the proper torque to run the total casing string.
- Power make-up procedure should not be interrupted until the proper torque value is reached.
- Every connection should be checked for correct power make-up position (see sketch): the coupling face after power make-up must be within the tolerance area of 0.433"(11 mm) to 0.748"(19 mm) referred to the apex of triangle

## Make-up position.



## Make-up torque table as guide for choice of power tong capacity.

A guiding torque recommendation is listed in the table below for choice of power tong capacity.

O.D.		Guiding make-up torque values with API mod. thread compound All grades	
(in.)	(mm)	Ft.lbs	Nm
14	355.66	12000	16500
16	406.40	13000	17500
18 5/8	473.10	15000	20500
18.8	477.50	15000	20500
20	508.00	16000	22000
24	609.60	17000	23500
24 1/2	622.30	18000	25000
26	660.40	20000	27500

## Commonly experienced torque factors:

API modified thread compound : 1.0

Liquid-O-Ring 104 : 0.8

Jet LubeTF 15 : 0.9

Bakerlock : 1.3



### BIG OMEGA TECHNICAL DATA

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		Connection Leak Resistance (psi)					Pipe Body Yield Strength (lb)					Joint Strength (lbs)			
		inch	mm	K-55	N-80	C-95	P-110	K-55	N-80	C-95	P-110	K-55	N-80	C-95	P-110		
14" 355.60	82.50	0.562	14.27	4493	6144	8219	9054	1305	1898	2254	2610	1560	1918	2152	2523		
	94.80	0.656	16.66	4493	6144	8219	9054	1513	2200	2613	3025	1808	2224	2494	2924		
	94.80	0.656	16.66	5732	7833	--	--	1513	2200	--	--	1808	2224	--	--		
	99.30	0.688	17.48	4493	6144	8219	9054	1583	2302	2733	3165	1892	2326	2609	3060		
	99.30	0.688	17.48	5732	7833	--	11530	1583	2302	--	3165	1892	2326	--	3060		
16" 406.40	110.00	0.772	19.61	4493	6144	8219	9054	1765	2567	3048	3529	2109	2594	2910	3411		
	110.00	0.772	19.61	5732	7833	10471	11530	1765	2567	3048	3529	2109	2594	2910	3411		
	75.00	0.438	11.13	3724	--	--	--	1178	--	--	--	1321	--	--	--		
	84.00	0.495	12.57	3724	4884	--	--	1326	1929	--	--	1499	1898	--	--		
	94.50	0.562	14.27	4112	5392	6356	7649	1499	2181	2589	2998	1694	2146	2434	2846		
18 5/8" 473.08	109.00	0.656	16.66	4112	5392	6356	7649	1739	2530	3004	3478	1965	2489	2823	3302		
	109.00	0.656	16.66	--	6910	8142	9791	--	2530	3004	3478	--	2489	2823	3302		
	118.00	0.715	18.16	4112	5392	6356	7649	1888	2747	3262	3777	2134	2703	3065	3585		
	118.00	0.715	18.16	5273	6910	8142	9791	1888	2747	3262	3777	2134	2703	3065	3585		
	128.00	0.781	19.84	4112	5392	6356	7649	2054	2987	3547	4108	2321	2940	3334	3899		
20" 508.00	128.00	0.781	19.84	5273	6910	8142	9791	2054	2987	3547	4108	2321	2940	3334	3899		
	147.00	0.906	23.01	4112	5392	6356	7649	2363	3637	4081	4726	2670	3382	3807	4486		
	147.00	0.906	23.01	6339	8304	9781	11757	2363	3637	4081	4726	2670	3382	3807	4486		
	87.50	0.435	11.05	3727	--	--	--	1367	--	--	--	1427	--	--	--		
	96.50	0.485	12.32	3727	5073	--	--	1520	2211	--	--	1587	2099	--	--		
18 5/8" 473.08	114.00	0.579	14.71	4031	5486	6655	7537	1805	2626	3118	3611	1885	2492	2870	3346		
	136.00	0.693	17.60	4031	5486	6655	7537	2147	3123	3709	4294	2242	2964	3413	3979		
	139.00	0.720	18.29	4031	5486	6655	7537	2228	3240	3848	4455	2326	3075	3541	4128		
	94.00	0.438	11.13	2989	--	--	--	1480	--	--	--	1479	--	--	--		
	106.50	0.500	12.70	2989	4129	--	--	1685	2460	--	--	1683	2281	--	--		
18 5/8" 473.08	118.50	0.563	14.30	3927	4551	4551	5394	1891	2750	3266	3782	1889	2560	2973	3459		
	118.50	0.563	14.30	--	5873	6955	--	--	3266	3782	--	--	2973	3459			
	133.00	0.635	16.13	3927	4551	4551	5394	2125	3090	3670	4249	2123	2877	3340	3887		
	133.00	0.635	16.13	--	5873	6955	--	--	3670	4249	--	--	3340	3887			
	147.00	0.709	18.01	3927	4551	4551	5394	2363	3438	4082	4727	2361	3200	3715	4323		
169.00	147.00	0.709	18.01	4258	5873	5873	6955	2363	3438	4082	4727	2361	3200	3715	4323		
	169.00	0.812	20.62	3927	4551	4551	5394	2692	3916	4650	5384	2689	3645	4232	4925		
	169.00	0.812	20.62	4258	5873	--	--	2692	3916	--	--	2689	3645	--	--		
169.00	0.812	20.62	--	--	--	--	7105	8411	--	--	4650	5384	--	4232	4925		



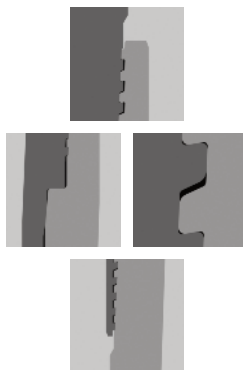


### BIG OMEGA TECHNICAL DATA

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		Connection Leak Resistance (psi)					Pipe Body Yield Strength (lb)					Joint Strength (lbs)				
		inch	mm	K-55	N-80	C-95	P-110	K-55	N-80	C-95	P-110	K-55	N-80	C-95	P-110			
24" 609.60	162.00	0.635	16.13	2608	4084	--	--	2564	3729	--	--	2315	3367	--	--	--	--	
	174.00	0.688	17.48	2608	4084	4084	4382	2771	4031	4787	5543	2502	3639	4322	5004	--	--	
	174.00	0.688	17.48	3384	5291	5291	5675	2771	4031	4787	5543	2502	3639	4322	5004	--	--	
	189.00	0.750	19.05	2608	4084	4084	4382	3013	4383	5204	6026	2720	3957	4699	5441	--	--	
	189.00	0.750	19.05	3384	5291	5291	--	3013	4383	5204	--	2720	3957	4699	--	--	--	
26" 660.40	182.00	0.709	18.01	2608	4084	4084	4382	3253	4732	5619	6507	2937	4273	5074	5875	--	--	
	182.00	0.709	18.01	3252	5086	5086	6430	2915	4239	5034	5829	2686	3907	4640	5373	--	--	
	207.00	0.812	20.62	2505	3923	3923	4209	3323	4834	5741	6647	3063	4456	5291	6126	--	--	
	207.00	0.812	20.62	3252	5086	--	--	3323	4834	--	--	3063	4456	--	--	--	--	
	207.00	0.812	20.62	--	--	6183	6630	--	--	5741	6647	--	3201	4655	5528	--	--	
26" 660.40	207.00	0.750	19.05	3226	4635	4635	--	3272	4760	5652	--	3201	4655	5528	--	--	--	
	207.00	0.750	19.05	--	--	5522	--	--	5652	--	--	--	5028	5971	--	--	--	
	223.00	0.812	20.62	3226	4635	5522	--	3534	5140	6104	--	3457	5028	5971	--	--	--	
	237.00	0.866	22.00	3226	4635	5522	--	--	5522	--	6104	--	--	5971	--	--	--	
	237.00	0.866	22.00	--	--	5522	--	3761	5470	6496	--	3679	5351	6354	--	--	--	
27.00 685.80	270.00	1.000	25.40	3226	4635	4635	5194	4320	6283	7461	8639	4225	6146	7298	8450	--	--	
	270.00	1.000	25.40	3931	5522	--	--	4320	6283	--	--	4225	6146	--	--	--	--	
	270.00	1.000	25.40	--	--	6458	7390	--	--	7461	8639	--	--	7298	8450	--	--	
	270.00	1.000	25.40	--	--	6458	7390	--	--	7461	8639	--	--	7298	8450	--	--	
	270.00	1.000	25.40	--	--	6458	7390	--	--	7461	8639	--	--	7298	8450	--	--	
BIG OMEGA-IS-NA		96.50	0.485	12.32	2667	2667	2667	2667	1520	2211	2626	3040	1587	2099	2417	2817	--	--
18 5/8" 473.08																		

## 3.8 VAM SG

### Application



#### Description:

Integral Semi-Flush  
Premium Joint  
4 ½" – 5" – 5 ½"

#### Applications:

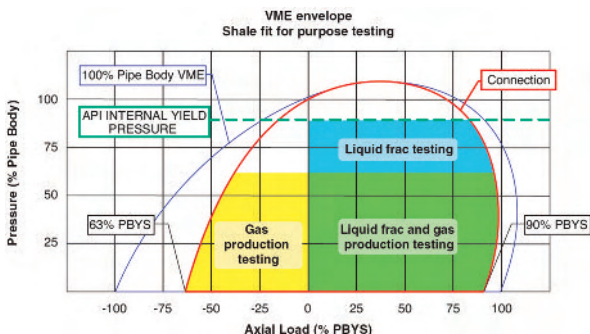
A single Semi-Flush  
premium solution for the full  
string length

Enhanced torque and  
tension resistance  
compared to current Semi-  
Flush connections

A highly competitive  
solution for Shale play  
economics

#### Main features:

- ⇒ Seal protected from rough handling
- ⇒ Enhanced torque resistance
- ⇒ Reliable running ability
- ⇒ Fit for Shale Rig handling systems
- ⇒ Deep stabbing dual step thread





### VAM SG TECHNICAL DATA

Size (OD)	Wall Thickness		Nominal ID	API Drift Diameter	Pipe Body Section	Box OD	Ph ID	Make-up Loss	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)		
	in.	mm.									C95 T95	C110 P110	O125
4 1/2	0.337	8.56	3.826	3.701	4.407	4.678	3.759	6.696	8	90.0	377	436	496
5	0.437	11.10	4.126	4.001	6.264	5.252	4.059	6.502	7	90.0	536	620	705
127.00	0.478	12.14	4.044	3.919	6.791	5.276	3.977	7.103	7	91.0	587	680	772
5 1/2	0.415	10.54	4.670	4.545	6.630	5.720	4.603	6.502	7	90.0	567	656	746
139.70	0.476	12.09	4.548	4.423	7.513	5.720	4.481	7.443	7	90.0	642	744	845

### VAM SG TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
		in.	mm.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
4 1/2	15.10	0.337	8.56	5200	5550	5900	5300	5900	6500	5400	6250	7100
114.30				7100	7500	7900	7200	7900	8800	7400	8400	9600
5	21.40	0.437	11.10	8700	9650	10600	8900	10250	11600	9100	10950	12800
127.00				11800	13000	14300	12100	13800	15700	12400	14800	17300
	23.20	0.478	12.14	10200	11050	11900	10500	11800	13100	10800	12550	14300
				13900	14900	16100	14300	15900	17700	14700	17000	19300
5 1/2	23.00	0.415	10.54	8700	9850	11000	8900	10550	12200	9100	11200	13300
139.70				11800	13300	14900	12100	14300	16500	12400	15100	18000
	26.00	0.476	12.09	11300	11900	12500	11600	12700	13800	11900	13450	15000
				15400	16100	16900	15800	17200	18700	16200	18200	20300



## 3.9 VAM FJL

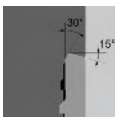
### Application



#### Integral Flush Design

VAM FJL is an integral connection threaded on plain-end pipe with the OD of the connection totally flush with the pipe body.

Sizes range from 2 3/8" to 11 7/8" for such clearance applications as tubing in small sizes, drilling liners and tie-backs in medium sizes, and contingency liner in larger casing diameters



#### External Torque Shoulder

A patented reverse angle external torque shoulder provides a positive torque stop and energizes the external metal-to-metal seal.

This shoulder also permits visual confirmation of power-tight make-up.

#### Multiple Seal System

An external seal and an internal seal work independently of each other to achieve sealing against annulus and bore pressures.

This multiple seal arrangement ensures gas-tight sealing integrity to 100% of the rated burst and collapse of the pipe body.

#### Interference Tapered Thread

In order to provide optimum strength, the VAM FJL is designed for 65% to 70% efficiency under tension in medium wall thickness.

Thread load flank has a 15° reverse angle to resist jump out.

Thread stabbing flank has a 45° angle for fast, trouble-free make-up.

The design of VAM FJL exhibits an exceptional bending resistance for a connection of this class.

### Streamlined Internal and External Profile

The O.D. and I.D. is 100% flush (there is no upset).

The I.D. is bored and recess-free for smooth, efficient flow.

The O.D. is turned to tight tolerance.

VAM FJL can be repaired by VAM licensed workshops. Only slight pin end swaging and slight box end expansion are needed for machining threads

### Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection.

If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

### Minimum make-up dope quantity

Nominal OD	Dope volume		
	(in.)	(cm <sup>3</sup> )	(in <sup>3</sup> )
2 3/8	9	0.5	
2 7/8	10	0.6	
3 1/2	13	0.8	
4	14	0.9	
4 1/2	16	1	
5	24	1.5	
5 1/2	26	1.6	
6 5/8	32	1.9	
7	42	2.6	
7 5/8	46	2.8	
8 1/8	57	3.48	
8 5/8	62	3.8	
9 3/8	67	4.1	
9 5/8	69	4.2	
9 7/8	71	4.3	
10 3/4	77	4.7	
11 3/4	99	6	
11 7/8	100	6.1	

## Running procedure

The VAM FJL connection can be run exactly as VAM tubing or casing when the special lifting plug has been set in the box of the joint to simulate a coupling face.

### Setting the lifting plug:

**Caution:** Be aware that VAM FJL of the same OD but different wall thickness (lb/ft) may have different thread tapers. Ensure that lifting plugs match thread taper requirements. In addition the use of slip type elevators is strongly recommended.

This lifting plug must be firmly tightened with a steel bar.

The joint can be used exactly as a normal coupled joint.

When the lifting plug is tightened:

Remove the lifting plug from the previous joint (the pipe in the slips shall be fitted with a safety clamp).

Stab as a VAM joint with a stabbing guide.

Engage the four or five first threads with a chain tong.

**Note:** During running when the joint turns make sure the lifting plug is free from the elevator and rotates with the pipe. Otherwise there is a risk of unscrewing the lifting plug, which could then fall onto the drill-floor.

When using the back-up tong, in order to avoid any ovalisation of the box end the back up tong shall be positioned at least 1 foot from the end of the pipe.

The lifting plug must be kept clean and checked every make up in order to verify the integrity of threads (risk of galling).

**Note:** a minimum of 3 lifting plugs is required (2 in process of running, at least 1 spare).

This will avoid slowing down the operation and avoid damaging the pipes threads if the plug is damaged itself. This will also allow time to carry out thread inspection of the lifting plug while running.

**VAM FJL TECHNICAL DATA**

Size O.D. Inch mm	Nominal Weight lb/ft	Pipe				Connection			Tensile Performance (10000lb.)							
		Plain End Weight lb/ft	Wall Thickness in. mm	I.D. Nominal in.	Drift Diameter in.	Pin I.D. in.	Pin Length in.	Joint critical cross section sq.in.	Joint Tensile Efficiency %	L80	N80	C95	P110	Q125	140	150
2 3/8" 60.33	4.60	4.43	0.190	4.83	1.901	1.933	1.890	0.586	P	56	59	62	73	79	88	94
	5.10	5.02	0.218	5.54	1.845	1.878	2.283	0.760	P	72	76	80	95	103	114	122
	5.80	5.75	0.254	6.45	1.867	1.811	2.992	0.936	B	89	94	98	117	126	140	150
	6.30	6.26	0.280	7.11	1.815	1.721	1.764	1.015	B	96	102	107	127	137	152	162
	7.35	7.32	0.336	8.53	1.703	1.654	3.701	1.183	B	112	118	124	148	160	177	189
2 7/8" 73.03	6.40	6.16	0.217	5.51	2.441	2.382	2.244	0.887	P	84	89	93	111	120	133	142
	7.80	7.66	0.276	7.01	2.323	2.276	2.913	1.172	B	111	117	123	146	158	176	188
	8.60	8.44	0.308	7.82	2.259	2.213	3.071	1.378	P	131	138	145	172	186	207	220
	9.80	9.72	0.362	9.19	2.151	2.057	3.819	1.573	B	149	157	165	197	212	236	252
	10.70	10.68	0.405	10.29	2.065	1.971	5.787	2.038	P	194	204	214	255	275	306	326
3 1/2" 88.90	7.70	7.58	0.216	5.49	3.068	2.943	2.126	1.059	P	101	106	111	132	143	159	169
	9.20	8.81	0.254	6.45	2.992	2.867	2.756	1.420	P	135	142	149	177	192	213	227
	10.20	9.91	0.289	7.34	2.922	2.797	3.307	1.598	B	152	160	168	200	216	240	256
	12.70	12.52	0.375	9.53	2.750	2.673	3.976	2.390	P	227	239	251	299	323	359	382
	13.70	13.62	0.413	10.49	2.674	2.549	4.449	2.713	B	258	271	285	339	366	407	434
4" 101.60	14.70	14.63	0.449	11.40	2.602	2.477	4.921	2.931	B	278	293	308	366	396	440	469
	15.50	15.37	0.476	12.09	2.548	2.423	5.236	3.075	B	292	308	323	384	415	461	492
	9.50	9.11	0.226	5.74	3.548	3.423	2.205	1.288	P	122	129	135	161	174	193	206
	10.90	10.46	0.262	6.65	3.476	3.398	2.795	1.685	P	160	168	177	211	227	253	270
	11.30	11.34	0.286	7.26	3.428	3.303	3.180	1.837	B	174	184	193	230	248	276	294
4 1/2" 114.30	13.20	12.93	0.330	8.38	3.340	3.215	2.992	2.093	P	199	209	220	262	282	314	335
	14.80	14.69	0.380	9.65	3.240	3.165	3.780	2.610	P	248	261	274	326	352	392	418
	16.50	16.39	0.430	10.92	3.140	3.063	4.409	3.111	P	296	311	327	389	420	467	498
	11.60	11.35	0.250	6.35	4.000	3.917	2.559	1.533	P	146	153	161	192	207	230	245
	12.60	12.24	0.271	6.88	3.958	3.833	2.559	1.796	P	171	180	189	225	243	269	287
13.50	13.04	0.290	7.37	3.920	3.795	3.843	2.559	2.031	P	193	203	213	254	274	305	325
	15.10	14.98	0.337	8.56	3.826	3.701	3.189	2.602	P	247	260	273	325	351	390	416



**VAM FJL TECHNICAL DATA**

Size O.D. Inch mm	Nominal Weight lb/ft	Pipe				Connection		Tensile Performance (10,000lb.)							
		Plain End Weight lb/ft	Wall Thickness in. mm	I.D. Nominal in.	Drift Diameter in.	Pin I.D. in.	Pin Length in.	Joint critical cross section sq.in.	Joint Tensile Efficiency %	L80	N80	C95	P110	Q125	140
4 1/2" 114.30	17.00	16.72	0.380	9.65	3.615	3.701	3.112	P	296	311	327	389	420	467	498
	18.90	18.69	0.430	10.92	3.640	4.291	3.577	B	340	358	376	447	483	572	
	21.50	21.36	0.500	12.70	3.500	3.453	5.118	B	388	409	429	511	552	613	654
	23.70	23.56	0.560	14.22	3.380	3.335	5.827	B	429	451	474	564	609	677	722
	13.00	12.83	0.253	6.43	4.494	4.417	2.795	B	197	208	218	260	281	312	333
5" 127.00	15.00	14.87	0.296	7.52	4.408	4.431	3.504	B	229	241	253	301	325	361	385
	18.00	17.93	0.362	9.19	4.276	4.209	3.425	P	305	321	337	401	433	481	513
	20.30	20.01	0.408	10.36	4.184	4.059	4.213	P	363	382	401	477	515	573	611
	20.80	20.63	0.422	10.72	4.156	4.031	4.213	B	380	400	420	500	540	600	640
	21.40	21.30	0.437	11.10	4.126	4.001	4.079	B	388	408	429	510	551	612	653
5 1/2" 139.70	23.20	23.08	0.478	12.14	4.044	3.919	5.039	B	435	457	480	572	617	686	732
	24.10	24.03	0.500	12.70	4.000	3.957	5.039	B	435	457	480	572	617	686	732
	15.50	15.35	0.275	6.99	4.950	4.874	2.874	P	236	249	261	311	336	373	398
	17.00	16.87	0.304	7.72	4.892	4.767	3.346	B	260	274	287	342	369	410	438
	20.00	19.81	0.361	9.17	4.778	4.653	3.386	P	325	342	359	427	461	512	547
6 5/8" 168.28	23.00	22.54	0.415	10.54	4.670	4.545	4.252	P	401	422	443	527	569	633	675
	26.00	25.54	0.476	12.09	4.548	4.423	4.843	B	478	503	528	629	679	755	805
	28.40	28.13	0.530	13.46	4.440	4.315	5.315	B	512	539	566	674	728	809	863
	29.70	29.64	0.562	14.27	4.376	4.217	5.709	B	541	569	597	711	768	854	910
	32.00	31.95	0.612	15.54	4.276	4.151	6.135	B	583	614	644	767	828	920	982
7" 177.80	23.20	23.58	0.330	8.94	5.965	5.898	2.953	P	340	358	376	447	483	537	573
	24.00	23.58	0.352	8.94	5.921	5.796	2.953	B	379	399	419	499	539	599	639
	28.00	27.65	0.417	10.59	5.791	5.666	3.976	P	493	519	545	648	700	778	830
	32.00	31.20	0.475	12.07	5.550	5.630	4.724	B	574	604	634	755	815	906	966
	35.00	34.20	0.525	13.34	5.575	5.450	5.528	B	644	678	712	847	915	1017	1084
7" 177.80	23.00	22.63	0.317	8.05	6.366	6.299	2.638	P	323	340	357	425	459	510	544
	26.00	25.66	0.362	9.19	6.276	6.151	3.150	P	408	430	451	537	580	645	688

**VAM FJL TECHNICAL DATA**

Size O.D. Inch mm	Nominal Weight lb/ft	Pipe			Connection			Tensile Performance (10,000lb.)									
		Plain End Weight lb/ft	Wall Thickness in. mm	I.D. Nominal in.	Drift Diameter in.	Pin I.D. in.	Pin Length in.	Joint critical cross section sq.in.	Joint Tensile Efficiency %	L80	N80	C95	P110	Q125	140	150	
7" 177.80	32.00	28.72	0.408	6.184	6.059	6.122	3.701	5.199 P	62%	494	520	546	650	710	780	832	
	39.00	31.67	0.453	6.094	6.000 A	6.035	4.291	6.064 P	65%	576	606	637	758	819	970	970	
	35.00	34.58	0.498	6.004	5.879	5.957	4.843	6.642 B	65%	631	664	697	830	897	996	1063	
	38.00	37.26	0.540	5.920	5.795	5.874	5.354	7.152 B	65%	679	715	751	894	965	1073	1144	
7 5/8" 193.68	41.00	40.39	0.590	5.820	5.695	5.772	5.945	7.735 B	65%	735	773	812	967	1044	1160	1238	
	26.40	25.56	0.328	6.969	6.844	6.906	2.638	3.892 P	52%	370	389	409	487	525	584	623	
	29.70	29.04	0.375	6.875	6.750	6.815	3.228	4.910 P	57%	466	491	516	614	663	737	786	
	33.70	33.04	0.430	6.765	6.640	6.709	3.937	6.092 P	63%	579	609	640	761	822	914	975	
8 1/8" 208.28	35.80	35.56	0.465	6.695	6.570	6.646	4.370	6.822 B	65%	648	682	716	853	921	1023	1092	
	39.00	38.05	0.500	6.625	6.500	6.575	4.803	7.297 B	65%	693	730	766	912	985	1095	1168	
	42.80	42.39	0.562	6.501	6.376	6.453	5.551	8.114 B	65%	771	811	852	1014	1095	1217	1298	
	45.30	44.67	0.595	6.435	6.310	6.386	6.063	8.669 B	66%	824	867	910	1084	1170	1300	1387	
8 1/2" 212.73	47.10	46.73	0.625	6.375	6.250	6.323	5.906	9.063 B	66%	861	906	952	1133	1223	1359	1450	
	32.50	31.75	0.375	7.375	7.250	7.323	3.858	5.185 B	0.57	493	519	544	648	700	778	830	
	32.00	31.10	0.352	8.94	7.921	7.875 A	2.874	4.985 P	54%	474	498	523	623	673	748	798	
	36.00	35.14	0.400	10.16	7.825	7.700	7.768	3.583	6.167 P	60%	586	617	648	771	833	925	987
8 3/4" 219.08	40.00	39.29	0.450	11.43	7.725	7.625 A	4.370	7.389 P	64%	702	739	776	924	997	1108	1182	
	44.00	43.39	0.500	12.70	7.625	7.500	7.583	4.803	8.347 B	65%	793	835	876	1043	1127	1252	1336
	49.00	47.99	0.557	14.15	7.511	7.386	7.469	5.945	9.768 B	69%	928	977	1026	1221	1319	1465	1563
	52.00	51.03	0.595	15.11	7.435	7.310	7.394	5.945	9.768 B	65%	928	977	1026	1221	1319	1465	1563
9 3/8" 238.13	39.00	0.400	10.16	8.575	8.450	8.524	4.331	6.501 B	0.58	618	650	683	813	878	975	1040	
	40.00	0.420	10.67	8.535	8.410	8.571	4.803	6.915 B	0.59	657	692	726	864	934	1037	1106	
9 5/8" 244.48	36.00	34.86	0.352	8.94	8.921	8.921	2.992	5.484 P	53%	521	548	576	685	740	823	877	
	40.00	38.94	0.395	10.03	8.835	8.750 A	3.780	6.681 P	58%	635	668	701	835	902	1002	1069	
	43.50	42.69	0.435	11.05	8.755	8.599	4.370	7.784 P	62%	739	778	817	973	1051	1168	1245	
	47.00	46.14	0.472	11.99	8.681	8.525	4.370	8.798 P	65%	836	880	924	1100	1188	1320	1408	



**VAM FJL TECHNICAL DATA**

Size O.D. Inch mm	Nominal Weight lb/ft	Pipe			Connection		Tensile Performance (10,000lb.)										
		Plain End Weight lb/ft	Wall Thickness in. mm	I.D. Nominal in.	Drift Diameter in.	Pin I.D. in.	Pin Length in.	Joint critical cross section sq.in.	Joint Tensile Efficiency %	L80	N80	C95	P110	Q125	140	150	
9 5/8" 244.48	53.50	52.85	0.545	13.84	8.535	8.500 A	8.567	5.276	10.126 B	65%	962	1013	1063	1266	1367	1519	1620
	58.40	57.38	0.595	15.11	8.435	8.375 A	8.362	6.260	11.499 B	68%	1092	1150	1207	1437	1552	1725	1840
9 7/8" 250.83	59.40	58.64	0.609	15.47	8.407	8.251	8.362	6.626	11.499 B	67%	1092	1150	1207	1437	1552	1725	1840
	61.10	60.08	0.625	15.88	8.375	8.219	8.362	6.260	11.499 B	65%	1092	1150	1207	1437	1552	1725	1840
10 3/4" 273.05	62.80	61.74	0.625	15.88	8.625	8.469	8.579	6.260	12.372 B	68%	1175	1237	1299	1547	1670	1856	1980
	66.40	65.05	0.661	16.79	8.553	8.397	8.579	6.260	12.372 B	65%	1175	1237	1299	1547	1670	1856	1980
11 7/8" 301.63	67.50	66.60	0.678	17.22	8.519	8.363	8.457	6.732	13.042 B	67%	1239	1304	1369	1650	1761	1956	2087
	40.50	38.88	0.350	8.89	10.050	9.894	9.969	2.874	5.981 P	52%	568	598	628	748	807	897	957
11 3/4" 298.45	45.50	44.22	0.400	10.16	9.950	9.875 A	9.866	3.858	7.553 P	58%	718	755	793	944	1020	1133	1208
	51.00	49.50	0.450	11.43	9.850	9.694	9.768	4.606	9.108 P	63%	865	911	956	1138	1230	1366	1457
11 7/8" 301.63	55.50	54.21	0.495	12.57	9.760	9.625 A	9.685	4.606	10.401 B	65%	988	1040	1092	1300	1404	1560	1664
	60.70	59.40	0.545	13.84	9.660	9.504	9.587	5.276	11.461 B	66%	1089	1146	1203	1433	1547	1719	1834
11 3/4" 298.45	65.70	64.53	0.595	15.11	9.560	9.404	9.488	5.906	12.451 B	66%	1183	1245	1307	1556	1681	1868	1992
	47.00	45.56	0.375	9.53	11.000	10.844	10.961	3.386	7.488 B	56%	711	749	786	936	1011	1123	1198
11 7/8" 301.63	54.00	52.57	0.435	11.05	10.880	10.724	10.835	4.961	9.233 B	60%	877	923	970	1154	1247	1385	1477
	60.00	58.81	0.489	12.42	10.772	10.625 A	10.717	4.252	10.985 B	63%	1044	1098	1153	1373	1483	1648	1758
11 7/8" 301.63	65.00	63.97	0.534	13.56	10.682	10.625 A	10.701	4.921	12.152 B	65%	1154	1215	1276	1519	1641	1823	1944
	71.80	70.19	0.582	14.78	10.711	10.555	10.740	5.630	13.514 B	65%	1284	1351	1419	1689	1824	2027	2162



VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT		WALL THICKNESS		5k ksi			7k-8.95 ksi			90-95-100 ksi			105-110-118 ksi			120-125-130 ksi						
	in.	ft. lb.	in.	mm.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.				
2 3/8" 60.33	4.60	0.190	4.60	11.93	460	510	560	530	580	630	590	650	710	630	690	750	650	720	790				
					4.83	620	690	760	720	780	860	790	880	930	840	930	1020	880	980	1080			
					0.218	490	540	590	590	650	710	630	690	750	720	800	880	930	1020	880	980	1080	
					5.54	670	740	810	790	880	970	840	930	1020	970	1080	1190	1020	1130	1240	1130	1240	
					0.254	490	540	590	650	720	790	720	800	880	790	870	960	870	960	1050	940	1030	
					6.45	670	740	810	880	960	1080	970	1080	1190	1060	1180	1300	1140	1270	1400	1280	1420	1560
					0.280	650	720	790	720	800	880	790	870	960	880	940	1030	910	1010	1110	1060	1160	1270
					7.11	880	980	1080	970	1080	1190	1060	1180	1300	1140	1270	1400	1230	1370	1510	1410	1570	1730
					0.336	720	800	880	790	870	960	850	940	1030	910	1010	1110	1060	1160	1270	1180	1300	1430
					8.53	970	1080	1190	1060	1180	1300	1140	1270	1400	1230	1370	1510	1410	1570	1730	1620	1800	1990
2 7/8" 73.03	6.40	0.217	6.40	16.01	650	720	790	790	870	960	850	940	1030	890	980	1070	980	1080	1180				
					5.57	880	980	1080	1060	1180	1300	1140	1270	1400	1190	1320	1460	1320	1470	1620			
					0.276	760	830	910	910	1010	1110	1060	1160	1270	1170	1300	1430	1310	1460	1600			
					7.07	1020	1130	1240	1230	1370	1510	1410	1570	1730	1590	1770	1960	1760	1960	2160			
					0.308	980	1080	1180	1170	1300	1430	1310	1460	1600	1600	1660	1820	1630	1810	1990			
					7.82	1320	1470	1620	1590	1770	1960	1760	1960	2160	2030	2260	2490	2200	2450	2700			
					0.362	1010	1120	1230	1370	1520	1670	1600	1660	1820	1630	1810	1990	1830	2030	2230			
					9.19	1370	1520	1670	1850	2060	2270	2030	2260	2490	2200	2450	2700	2470	2750	3030			
					0.405	1050	1160	1270	1500	1660	1820	1630	1810	1990	1760	1960	2140	1960	2170	2380			
					10.29	1410	1570	1730	2020	2260	2490	2200	2450	2700	2380	2650	2920	2650	2940	3230			
3 1/2" 86.92	7.70	0.216	7.70	19.51	850	940	1030	980	1080	1180	1050	1160	1270	1170	1300	1430	1310	1460	1600				
					5.49	1140	1270	1400	1320	1470	1620	1470	1620	1770	1590	1770	1960	1760	1960	2160			
					0.254	960	1060	1160	1110	1230	1350	1170	1300	1430	1240	1370	1500	1370	1520	1670			
					6.45	1320	1470	1620	1540	1700	1840	1590	1770	1960	1670	1860	2050	1850	2060	2270			
					0.289	1050	1160	1270	1240	1370	1500	1310	1460	1600	1440	1600	1740	1500	1660	1820			
					7.34	1410	1570	1730	1670	1860	2050	1760	1960	2160	1940	2160	2380	2030	2260	2490			
					0.375	1170	1300	1430	1570	1740	1910	1760	1960	2140	1960	2170	2380	2160	2390	2620			
					9.53	1590	1770	1950	2110	2350	2590	2380	2650	2920	2650	2940	3230	2920	3240	3560			
					0.413	1240	1370	1500	1700	1880	2060	1890	2100	2310	2160	2390	2620	2340	2600	2860			
					10.49	1670	1860	2050	2290	2550	2810	2560	2840	3120	2920	3240	3560	3180	3530	3880			
14.70	0.449	13.70	14.70	36.87	1310	1480	1650	1830	2030	2230	2020	2240	2460	2280	2530	2780	2640	2820	3100				
					11.40	1760	1960	2160	2470	2750	3030	2740	3040	3340	3090	3430	3770	3440	3820	4200			
					0.476	1370	1520	1670	1960	2170	2380	2160	2390	2620	2480	2750	3020	2740	3040	3340			
					12.09	1850	2060	2270	2600	2940	3280	2920	3240	3560	3360	3730	4100	3710	4120	4530			



### VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		1.5-140 ksi			145-150-155 ksi		
		in.	mm.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.			ft. lb.			N.m.		
<b>2 3/8"</b> 60.33	4.60	0.190	690	760	830	910	750	830	910
		4.83	930	1030	1130	1240	1020	1130	1240
	5.10	0.218	790	870	960	1030	850	940	1030
		5.54	1060	1180	1300	1400	1140	1270	1400
	5.80	0.254	890	980	1070	1120	1010	1120	1230
		6.45	1190	1320	1450	1520	1370	1520	1670
	6.30	0.280	980	1080	1180	1170	1300	1430	1430
		7.11	1320	1470	1620	1590	1770	1950	1950
	7.35	0.336	1170	1300	1430	1310	1480	1650	1650
		8.53	1590	1770	1950	1760	1960	2160	2160
<b>2 7/8"</b> 73.03	6.40	0.217	1080	1160	1270	1110	1230	1360	1360
		5.51	1410	1570	1730	1500	1670	1840	1840
	7.80	0.276	1370	1520	1670	1500	1660	1820	1820
		7.01	1850	2060	2270	2030	2260	2490	2490
	8.60	0.308	1700	1880	2060	1830	2030	2230	2230
		7.82	2290	2550	2810	2470	2750	3030	3030
	9.80	0.362	1890	2100	2310	2080	2310	2640	2640
		9.19	2560	2840	3120	2830	3140	3450	3450
	10.70	0.405	2080	2310	2540	2340	2600	2860	2860
		10.29	2830	3140	3450	3180	3530	3880	3880
<b>3 1/2"</b> 86.92	7.70	0.216	1370	1520	1670	1500	1660	1820	1820
		5.49	1850	2060	2270	2030	2260	2490	2490
	9.20	0.254	1440	1590	1740	1570	1740	1910	1910
		6.45	1940	2160	2380	2110	2350	2590	2590
	10.20	0.289	1570	1740	1910	1700	1880	2060	2060
		7.34	2110	2350	2590	2290	2550	2810	2810
	12.70	0.375	2280	2530	2780	2480	2760	3020	3020
		9.53	3090	3430	3770	3360	3730	4100	4100
	13.70	0.413	2480	2750	3020	2740	3040	3340	3340
		10.49	3360	3730	4100	3710	4120	4530	4530
14.70	0.449	2680	2970	3260	2870	3180	3490	3490	
	11.40	3620	4020	4420	3880	4310	4740	4740	
15.60	0.476	2870	3180	3490	3130	3470	3810	3810	
	12.09	3860	4310	4740	4240	4710	5180	5180	

VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi				
			min.	optil.	max.	min.	optil.	max.	min.	optil.	max.	min.	optil.	max.	min.	optil.	max.		
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.			ft. lb.				
mm.		mm.	N.m.			N.m.			N.m.			N.m.			N.m.				
4" 107.60	9.50	0.226	910	1010	1110	1170	1300	1450	1370	1520	1670	1670	1740	1910	1700	1880	2060		
			5.74	1230	1370	1510	1590	1770	1950	1650	2060	2270	2110	2350	2590	2290	2550	2810	
		10.90	0.262	1060	1160	1270	1310	1450	1690	1440	1690	1740	1630	1810	1990	1830	2030	2230	
				6.65	1410	1570	1730	1760	1960	1740	2160	2380	2200	2450	2700	2470	2750	3030	
		11.30	0.286	1310	1480	1690	1370	1520	1670	1500	1660	1820	1700	1880	2060	1890	2100	2310	
				7.26	1760	1960	2160	1850	2060	2270	2030	2280	2490	2290	2550	2810	2560	2840	3120
		13.20	0.330	1760	1960	2140	2020	2240	2460	2280	2630	2780	2480	2750	3020	2680	2970	3260	
				8.38	2380	2650	2920	2740	3040	3340	3090	3420	3770	3260	3720	4100	3620	4020	4420
		14.80	0.380	2020	2240	2460	2340	2600	2860	2640	2820	3100	2740	3040	3340	2920	3250	3570	
				7.40	2740	3040	3340	3180	3530	3880	3440	3820	4200	3710	4120	4530	3970	4410	4850
		16.50	0.430	2160	2390	2620	2610	2890	3170	2800	3110	3420	3000	3330	3660	3260	3620	3980	
				10.92	2920	3240	3560	3530	3920	4310	3800	4220	4640	4060	4510	4960	4400	4900	5400
	4 1/2" 114.30	11.60	0.250	1570	1740	1910	1960	2170	2380	2160	2390	2620	2420	2680	2940	2680	2970	3260	
				6.35	2110	2350	2590	2650	2940	3230	2920	3240	3560	3270	3630	3990	3620	4020	4420
			12.60	0.271	1630	1810	1990	2020	2240	2460	2220	2460	2700	2480	2750	3020	2740	3040	3340
				6.68	2200	2450	2700	2740	3040	3340	3000	3320	3660	3260	3730	4100	3710	4120	4530
		13.50	0.290	1700	1880	2060	2080	2310	2540	2280	2530	2780	2640	2820	3100	2800	3110	3420	
				7.37	2290	2550	2810	2830	3140	3450	3090	3430	3770	3440	3820	4200	3800	4220	4640
		15.10	0.337	1960	2170	2380	2280	2530	2780	2480	2750	3020	2740	3040	3340	3000	3330	3660	
				8.56	2650	2940	3230	3090	3430	3770	3360	3720	4100	3710	4120	4530	4060	4510	4960
		17.00	0.380	2080	2310	2540	2480	2750	3020	2740	3040	3340	3000	3330	3660	3260	3620	3980	
				9.65	2830	3140	3450	3360	3730	4100	3710	4120	4530	4060	4510	4960	4400	4900	5400
		18.90	0.430	2220	2460	2700	2680	2970	3260	2930	3250	3570	3330	3690	4050	3590	3980	4370	
				10.92	3000	3330	3660	3620	4020	4420	4820	5200	4500	5000	5500	4900	5400	5900	
		21.50	0.500	2340	2600	2860	3000	3330	3660	3260	3620	3980	3650	4050	4450	3910	4340	4770	
				12.70	3180	3530	3880	4000	4510	4960	4400	4920	5400	4900	5500	6100	5300	5900	6500
		23.70	0.560	2480	2760	3020	3000	3330	3660	3520	3910	4300	3910	4340	4770	4230	4700	5170	
			14.22	3360	3730	4100	4060	4510	4960	4800	5300	5800	5300	5900	6500	5800	6400	7000	
5" 127.00	13.00	0.253	1310	1460	1690	1630	1810	1990	1890	2100	2310	2160	2390	2620	2420	2680	2940		
			6.43	1760	1960	2160	2200	2450	2700	2560	2840	3120	2920	3240	3560	3270	3630	3990	
		15.00	0.296	1760	1960	2140	1760	1960	2140	2020	2240	2460	2280	2530	2780	2480	2750	3020	
				7.52	2380	2650	2920	2380	2650	2920	2740	3040	3340	3090	3430	3770	3360	3730	4100
		18.00	0.362	2160	2390	2620	2870	3180	3490	3000	3330	3660	3260	3620	3980	3590	3980	4370	
				9.19	2920	3240	3560	3880	4310	4740	4060	4510	4960	4400	4900	5400	4900	5400	



## VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		1.5-140 ksi			145-150-155 ksi		
		in. mm.	in. mm.	min.	opt.	max.	min.	opt.	max.
4" 107.60	9.50	0.226		1830	2030	2230	2020	2240	2460
		5.74	2470	2750	3030	3340	2740	3040	3340
	10.90	0.262		1960	2170	2380	2160	2390	2620
		6.65	2650	2940	3230	3560	2920	3240	3560
	11.30	0.286		2020	2240	2460	2220	2460	2700
		7.26	2740	3040	3340	3660	3000	3330	3660
	13.20	0.330		2740	3040	3340	3130	3470	3810
		8.38	3710	4120	4530	4940	4240	4710	5180
	14.80	0.380		3060	3400	3740	3330	3690	4050
		9.65	4150	4610	5070	5500	4500	5000	5500
	16.50	0.430		3390	3760	4130	3590	3980	4370
		10.92	4600	5100	5600	6100	4900	5400	5900
4 1/2" 114.30	11.60	0.250		2930	3250	3570	3190	3540	3890
		6.35	3970	4410	4850	4330	4810	5290	
	12.60	0.271		3000	3330	3660	3260	3620	3980
		6.88	4060	4510	4960	4400	4900	5400	
	13.50	0.290		3060	3400	3740	3330	3690	4050
		7.37	4150	4610	5070	4500	5000	5500	
	15.10	0.337		3190	3540	3890	3520	3910	4300
		8.56	4330	4810	5290	4800	5300	5800	
	17.00	0.380		3520	3910	4300	3850	4270	4690
		9.65	4800	5300	5800	5200	5800	6400	
	18.90	0.430		3850	4270	4690	4230	4700	5170
		10.92	5200	5800	6400	5800	6400	7000	
21.50	0.500		4300	4770	5240	4560	5060	5560	
	12.70	5800	6500	7200	6200	6900	7600		
23.70	0.560		4560	5060	5560	4880	5420	5960	
	14.22	6200	6900	7600	6700	7400	8100		
5" 127.00	13.00	0.253		2610	2890	3170	2800	3110	3420
		6.43	3530	3920	4310	3800	4220	4640	
	15.00	0.296		2680	2970	3260	2930	3250	3570
		7.52	3620	4020	4420	3970	4410	4850	
	18.00	0.362		3850	4270	4690	4170	4630	5090
		9.19	5200	5800	6400	5700	6300	6900	

## VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	5k ksi			7k-8.9-9.5 ksi			90-95-100 ksi			105-110-118 ksi			120-125-130 ksi		
			min.	optil.	max.	min.	optil.	max.	min.	optil.	max.	min.	optil.	max.	min.	optil.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.			ft. lb.		
mm.	N.m.	mm.	N.m.			N.m.			N.m.			N.m.			N.m.		
6"	127.00	0.408	2340	2460	2860	3190	3540	3890	3390	3760	4130	3590	3960	4370	3780	4200	4620
			3180	3530	3980	4330	4810	5290	4600	5100	5600	4910	5400	5900	5100	5700	6300
			2420	2680	2940	3460	3830	4210	3690	3980	4370	3710	4120	4530	3850	4270	4690
			3270	3630	3990	4780	5200	5700	4920	5400	5900	5000	5600	6200	5200	5800	6400
			2480	2760	3020	3520	3910	4300	3780	4200	4620	3910	4340	4770	4040	4480	4920
			3360	3730	4100	4800	5300	5800	5100	5700	6300	5300	5900	6500	5500	6100	6700
			N/A	N/A	N/A	3590	3980	4370	3910	4340	4770	4230	4700	5170	4630	5140	5650
			N/A	N/A	N/A	4800	5400	5900	5300	5900	6500	5800	6400	7000	6200	6800	7400
			0.600			3650	4050	4450	4040	4480	4920	4430	4920	5410	4760	5280	5800
			12.70			4900	5500	6100	4900	5500	6100	5500	6100	6700	6500	7200	7900
6 1/2"	139.70	0.275	1890	2100	2310	2420	2680	2940	2740	3040	3340	3130	3470	3810	3450	3830	4210
			2560	2840	3120	3270	3630	3990	3710	4120	4530	4240	4710	5180	4700	5200	5700
			2020	2240	2460	2540	2820	3100	2870	3180	3490	3190	3540	3890	3590	3960	4370
			2740	3040	3340	3440	3820	4200	3880	4310	4740	4330	4810	5290	4900	5400	5900
			2480	2760	3020	3190	3540	3890	3650	4050	4450	4040	4480	4920	4500	4990	5480
			3560	3730	4100	4330	4810	5290	4920	5300	6100	5500	6100	6700	6500	7200	7900
			3130	3470	3810	3850	4270	4690	3970	4410	4850	4370	4850	5330	4760	5280	5800
			4240	4710	5180	5200	5800	6400	5400	6000	6600	5900	6600	7300	6500	7200	7900
			4430	4920	5410	4170	4630	5090	4430	4920	5410	4690	5210	5730	5080	5640	6200
			5200	5700	6200	5700	6300	6900	6000	6700	7400	6400	7100	7800	6800	7600	8400
6 5/8"	169.28	0.562	N/A	N/A	N/A	5080	5640	6200	5340	5930	6520	5670	6290	6910	5860	6510	7160
			4760	5280	5800	5930	6580	7230	6120	6800	7480	6510	7230	7950	7170	7960	8750
			6500	7200	7900	8000	8900	9800	8300	9200	10100	8800	9800	10800	9700	10800	11900
			3130	3470	3810	4230	4700	5170	4680	5420	5960	4840	5650	6260	6190	6870	7650
			4240	4710	5180	5800	6400	7000	6700	7400	8100	7500	8300	9100	8400	9300	10200
			3330	3690	4050	4370	4850	5330	5020	5570	6120	5670	6290	6910	6320	7020	7720
			4500	5000	5500	5900	6600	7300	6800	7600	8400	7600	8500	9400	8500	9500	10500
			3590	3980	4370	4690	5210	5730	5340	5930	6520	5990	6650	7310	6510	7230	7950
			4050	4500	5000	5400	6000	6700	6200	7000	7800	7200	8000	8800	8000	8900	9800
			4560	5060	5560	5020	5570	6120	5670	6390	6910	6320	7020	7720	6840	7590	8340
6200	6900	7600	6800	7600	8400	7600	8500	9400	8500	9500	10500	9500	10500	11500			

VAM FJL

**VAM FJL TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		1.5-140 ksi			145-150-155 ksi		
		in.	mm.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	ft. lb.		ft. lb.			ft. lb.		
mm.	N.m.	N.m.		N.m.			N.m.		
6"	127.00	0.408	4040	4480	4920	4370	4850	5330	
		10.36	5500	6100	6700	5900	6600	7300	
	20.80	0.422	4110	4560	5010	4430	4920	5410	
		10.72	5600	6200	6800	6000	6700	7400	
	21.40	0.437	4230	4700	5170	4500	4990	5480	
		11.10	5800	6400	7000	6100	6800	7500	
	23.20	0.478	4760	5280	5800	4680	5420	5960	
		12.14	6500	7200	7900	6700	7400	8100	
	24.10	0.500	4880	5420	5960	5020	5570	6120	
		12.70	6700	7400	8100	6800	7600	8400	
6 1/2"	15.50	0.275	3780	4200	4620	4040	4480	4920	
		6.99	5100	5700	6300	5500	6100	6700	
	17.00	0.304	3860	4270	4690	4170	4630	5090	
		7.72	5200	5800	6400	5700	6300	6900	
	20.00	0.361	4680	5420	5960	5340	5930	6520	
		9.17	6700	7400	8100	7200	8000	8800	
	23.00	0.415	5140	5710	6280	5540	6150	6760	
		10.54	6900	7700	8500	7500	8300	9100	
	26.00	0.476	5480	6080	6680	5860	6510	7160	
		12.09	7400	8200	9000	7900	8800	9700	
28.40	0.530	5800	6440	7080	6190	6870	7550		
	13.46	7800	8700	9600	8400	9300	10200		
29.70	0.562	6190	6870	7550	6510	7230	7950		
	14.27	8400	9300	10200	8800	9800	10800		
32.00	0.610	7830	8700	9750	8460	9400	10340		
	15.50	10600	11600	13000	11400	12700	14000		
6 5/8"	168.28	0.300	6840	7590	8340	7470	8300	9130	
		8.38	9300	10300	11300	10200	11300	12400	
	24.00	0.352	6840	7590	8340	7470	8300	9130	
		8.94	9300	10300	11300	10200	11300	12400	
	28.00	0.417	7170	7960	8750	7830	8700	9670	
		10.59	9700	10800	11900	10600	11800	13000	
	32.00	0.475	7470	8300	9130	8150	9050	9950	
		12.07	10200	11300	12400	11100	12300	13500	

VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 kpsi			75-80-85 kpsi			90-95-100 kpsi			105-110-115 kpsi			120-125-130 kpsi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.			ft. lb.		
mm.	N.m.	mm.	N.m.			N.m.			N.m.			N.m.			N.m.		
6 5/8" 168.28	35.00	0.525	4630	5140	5650	5340	5930	6520	5990	6650	7310	6510	7230	7950	7170	7960	8750
		13.34	6000	7000	7700	7200	8000	8800	8100	9000	9900	8800	9800	10800	9700	10800	11900
	23.00	0.317	3520	3910	4300	5280	5860	6440	6060	6730	7400	6840	7590	8340	7470	8300	9130
		8.05	4800	5300	5800	7100	7900	8700	8200	9100	10000	9300	10300	11300	10200	11300	12400
	26.00	0.362	3780	4200	4620	5480	6080	6680	6280	6940	7630	7170	7960	8750	7830	8700	9570
		9.19	5100	5700	6300	8200	9000	9800	9500	10400	11300	10600	11600	12600	11400	12700	14000
	29.00	0.408	4040	4480	4920	5740	6370	7000	6510	7230	7950	7300	8080	8870	8150	9050	9950
	10.36	5500	6100	6700	8700	9600	10500	9800	10800	11800	11100	12200	13300	12000	13300	14500	
32.00	0.453	4300	4770	5240	6060	6730	7400	6940	7690	8340	7470	8300	9130	8150	9050	9950	
	11.51	5800	6500	7200	8200	9100	10000	9300	10300	11300	10200	11300	12400	11100	12300	13500	
35.00	0.498	4950	5480	6000	6900	7790	8680	8170	9060	9950	9060	10000	11000	9950	11000	12100	
	12.65	6700	7500	8300	8800	9600	10600	9700	10800	11900	10600	11800	13000	11900	13200	14500	
38.00	0.540	5540	6150	6760	7660	8560	9460	8940	9840	10740	9840	10840	11940	10840	12040	13140	
	13.72	7500	8300	9100	9300	10300	11300	10200	11300	12400	11100	12300	13500	12300	13700	15100	
41.00	0.590	5600	6220	6840	7170	7960	8750	8170	9060	9950	9060	10000	11000	9950	11000	12100	
	14.99	7600	8400	9200	9200	10200	11200	10100	11200	12300	11000	12300	13500	12300	13700	15100	
46 5/8" 193.68	26.40	0.328	4300	4770	5240	6390	7090	7790	7470	8300	9130	8460	9400	10340	9600	10500	11500
	8.33	5800	6500	7200	8600	9600	10600	10200	11300	12400	11400	12700	14000	12800	14200	15600	
49 7/8" 193.68	29.70	0.375	4800	4990	5480	6510	7230	7950	7470	8300	9130	8460	9400	10340	9600	10500	11500
	9.53	6100	6800	7500	8800	9800	10800	10200	11300	12400	11400	12700	14000	12800	14200	15600	
53 1/2" 193.68	33.70	0.430	4820	5360	5880	6840	7590	8340	7830	8700	9670	8780	9750	10720	9850	10850	11850
	10.92	6600	7300	8000	9300	10300	11300	10600	11800	13000	11900	13200	14500	13200	14700	16200	
57 1/2" 193.68	35.80	0.465	5020	5570	6120	7170	7960	8750	8150	9050	9950	9150	10150	11150	10100	11200	12300
	11.81	6800	7600	8400	9700	10800	11900	11100	12300	13600	12300	13700	15100	13700	15200	16700	
61 3/4" 193.68	39.00	0.500	5340	5930	6520	7470	8300	9130	8460	9400	10340	9600	10600	11600	10450	11550	12650
	12.70	7200	8000	8800	10300	11300	12400	11400	12700	14000	12800	14200	15600	14100	15700	17300	
65 1/2" 193.68	42.80	0.562	6260	6940	7630	7830	8700	9670	8780	9750	10720	9850	10850	11850	10850	11950	13050
	14.27	8500	9400	10300	10600	11800	13000	11900	13300	14500	13200	14700	16200	14600	16200	17800	
69 1/2" 193.68	45.30	0.595	7170	7960	8750	7830	8700	9670	9150	10150	11150	10100	11200	12300	11450	12650	13850
	15.11	9700	10800	11900	10600	11800	13000	12300	13700	15100	13700	15200	16700	15500	17200	18900	
73 1/2" 193.68	47.10	0.625	7830	8700	9670	9600	10500	11500	11100	12300	13500	12450	13750	15050	13700	15200	16700
	15.68	10600	11800	13000	12800	14200	15600	15000	16700	18400	16700	18600	20500	18500	20600	22700	
77 1/2" 193.68	50.40	0.675	8040	8910	9780	8910	9880	10850	10640	11880	13120	12000	13320	14600	13200	14600	16200
	16.11	10900	12200	13500	13000	14500	16000	15000	17000	19000	17000	19000	21000	19000	21000	23000	



### VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		1.5-140 ksi			145-150-155 ksi			
		in. mm.	in. mm.	min.	opt.	max.	min.	opt.	max.	
				ft. lb. N.m.			ft. lb. N.m.			
<b>6 5/8"</b> 162.28	35.00	0.525	7830	8700	9570	8460	9400	10340	10340	
		13.34	10600	11800	13000	11400	12700	14000	14000	
		7"	0.317	8460	9400	10340	9150	10150	11150	11150
			8.05	11400	12700	14000	12300	13700	15100	15100
		177.80	0.362	8460	9400	10340	9150	10150	11150	11150
			9.19	11400	12700	14000	12300	13700	15100	15100
		29.00	0.408	8780	9750	10720	9500	10500	11500	11500
			10.36	11900	13200	14500	12800	14200	15600	15600
		32.00	0.453	9150	10150	11150	9850	10850	11850	11850
			11.51	12300	13700	15100	13200	14700	16200	16200
35.00	0.498	9500	10500	11500	10100	11200	12300	12300		
	12.65	12800	14200	15600	13700	15200	16700	16700		
38.00	0.540	9850	10850	11850	10450	11550	12650	12650		
	13.72	13200	14700	16200	14100	15700	17300	17300		
41.00	0.590	10100	11200	12300	10850	11950	13050	13050		
	14.99	13700	15200	16700	14600	16200	17800	17800		
<b>7 5/8"</b> 193.68	26.40	0.328	10100	11200	12300	11100	12300	13500	13500	
		8.33	13700	15200	16700	15000	16700	18400	18400	
		29.70	0.375	10450	11550	12650	11450	12650	13850	13850
			9.53	14100	15700	17300	15500	17200	18900	18900
		33.70	0.430	10850	11950	13050	11450	12650	13850	13850
			10.92	14600	16200	17800	15500	17200	18900	18900
		35.80	0.465	10850	11950	13050	11700	13000	14300	14300
			11.81	14600	16200	17800	15900	17700	19500	19500
		39.00	0.500	11100	12300	13500	12100	13400	14700	14700
			12.70	15000	16700	18400	16300	18100	19900	19900
42.80	0.562	11700	13000	14300	12450	13750	15050	15050		
	14.27	15900	17700	19500	16700	18600	20500	20500		
45.30	0.595	12450	13750	15050	13050	14450	15850	15850		
	15.11	16700	18600	20500	17600	19600	21600	21600		
47.10	0.625	14000	15900	17400	15050	16650	18250	18250		
	15.68	19400	21600	23800	20300	22600	24900	24900		
<b>8 1/8"</b> 206.38	32.50	0.375	10850	11950	13050	11700	13000	14300	14300	
		9.53	14600	16200	17800	15900	17700	19500	19500	



VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	5k ksi			7k-8.9-9.5 ksi			90-95-100 ksi			105-110-118 ksi			120-125-130 ksi			
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
in.	fl. lb.	in.	fl. lb.			fl. lb.			fl. lb.			fl. lb.			fl. lb.			
mm.		mm.	N.m.			N.m.			N.m.			N.m.			N.m.			
8 5/8" 219.08	32.00	0.352	5480	6080	6480	8150	9050	9950	9600	10500	11500	10850	11950	13050	12100	13400	14700	
		8.94	7400	8200	9000	11100	12300	13500	12800	14200	15600	14600	16200	17800	16300	18200	19900	
		36.00	0.400	5740	6370	7000	8460	9400	10340	9850	10850	11850	11100	12300	12450	13750	15050	
			10.16	7700	8600	9500	11400	12700	14000	13200	14700	16200	15000	16700	18400	16700	18600	20500
		40.00	0.450	5990	6650	7310	8780	9750	10720	10100	11200	12300	11100	12300	13500	12450	13750	15050
			11.43	8100	9000	9900	11900	13200	14500	13700	15200	16700	15000	16700	18400	16700	18600	20500
		44.00	0.500	6390	7090	7790	9150	10150	11150	10450	11550	12650	11700	13000	14300	13050	14450	15850
			12.70	8600	9600	10600	12300	13700	15100	14100	15700	17300	15900	17700	19200	17600	19600	21600
		49.00	0.557	6840	7590	8340	9850	10850	11850	10850	11950	13050	12100	13400	14700	13050	14450	15850
			14.15	9300	10300	11300	13200	14700	16200	14600	16200	17800	16300	18100	19900	17600	19600	21600
9 3/8" 238.13	52.00	0.595	7170	7960	8750	10100	11200	12300	11450	12650	13850	12700	14100	15500	13700	15200	16700	
		15.11	9700	10800	11900	13700	15200	16700	15500	17200	18900	17200	19100	21000	18500	20600	22700	
	39.00	0.400	6840	7600	8360	9150	10150	11150	10450	11550	12650	11700	13000	14300	13400	14850	16300	
		10.16	9300	10300	11300	12300	13700	15100	14100	15700	17300	16400	18200	20000	18100	20100	22100	
	40.00	0.420	6840	7600	8360	9150	10150	11150	10450	11550	12650	11700	13000	14300	13400	14850	16300	
		10.67	9200	10200	11200	12200	13700	15100	14100	15700	17300	16500	18300	20100	18100	20100	22100	
	36.00	0.352	7170	7960	8750	10100	11200	12300	11450	12650	13850	12700	14100	15500	14400	15900	17400	
		8.94	9700	10800	11900	13700	15200	16700	15900	17700	19500	18500	20600	22700	19400	21600	23800	
	40.00	0.395	7470	8300	9130	10450	11550	12650	12100	13400	14700	13700	15200	16700	14400	15900	17400	
		10.03	10200	11300	12400	14100	15700	17300	16300	18100	19900	18500	20600	22700	19400	21600	23800	
9 5/8" 244.48	43.50	0.435	7830	8700	9570	10850	11950	13050	12450	13750	15050	13700	15200	16700	14400	15900	17400	
		11.05	10600	11800	13000	14600	16200	17800	16700	18600	20500	18500	20600	22700	19400	21600	23800	
	47.00	0.472	8150	9050	9950	11100	12300	13500	12700	14100	15500	14400	15900	17400	14400	15900	17400	
		11.99	11100	12300	13500	15000	16700	18400	17200	19100	21000	19400	21600	23800	19400	21600	23800	
	53.50	0.545	8460	9400	10340	11700	13000	14300	13050	14450	15850	14400	15900	17400	14400	15900	17400	
		13.94	11400	12700	14000	15900	17700	19500	17600	19600	21600	19400	21600	23800	19400	21600	23800	
	58.40	0.595	8780	9750	10720	12100	13400	14700	13700	15200	16700	14400	15900	17400	14400	15900	17400	
		15.11	11900	13200	14500	16300	18100	19900	18500	20600	22700	19400	21600	23800	19400	21600	23800	
	59.40	0.609	8780	9750	10720	12100	13400	14700	13700	15200	16700	14400	15900	17400	14400	15900	17400	
		15.47	11900	13200	14500	16300	18100	19900	18500	20600	22700	19400	21600	23800	19400	21600	23800	
9 7/8" 250.83	61.10	0.625	9150	10150	11150	12450	13750	15050	13700	15200	16700	14400	15900	17400	14400	15900	17400	
		15.88	12300	13700	15100	16700	18600	20500	18500	20600	22700	19400	21600	23800	19400	21600	23800	
	62.80	0.625	9850	10850	11850	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400	
		15.88	13200	14700	16200	17600	19600	21600	19400	21600	23800	19400	21600	23800	19400	21600	23800	



## VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		1.5-140 ksi			145-150-155 ksi		
		ft. lb.	in. mm.	min.	opt.	max.	min.	opt.	max.
in. mm.	ft. lb.	in. mm.	ft. lb. N.m.						
8 5/8" 219.08	32.00	0.352	13050	14450	15850	14400	15900	17400	
		8.94	17600	19600	21600	19400	21600	23800	
	36.00	0.400	13050	14450	15850	14400	15900	17400	
		10.16	17600	19600	21600	19400	21600	23800	
	40.00	0.450	13700	15200	16700	14400	15900	17400	
		11.43	18500	20600	22700	19400	21600	23800	
	44.00	0.500	13700	15200	16700	14400	15900	17400	
		12.70	18500	20600	22700	19400	21600	23800	
	49.00	0.557	14400	15900	17400	14400	15900	17400	
		14.15	19400	21600	23800	19400	21600	23800	
9 3/8" 238.13	52.00	0.595	14400	15900	17400	14400	15900	17400	
		15.11	19400	21600	23800	19400	21600	23800	
	39.00	0.400	14700	16300	17900	15900	17700	19500	
		10.16	19900	22100	24300	21600	24000	26400	
	40.00	0.420	14700	16300	17900	15650	17350	19050	
		10.67	19900	22100	24300	21100	23500	25900	
	36.00	0.352	14400	15900	17400	14400	15900	17400	
		8.94	19400	21600	23800	19400	21600	23800	
	40.00	0.395	14400	15900	17400	14400	15900	17400	
		10.03	19400	21600	23800	19400	21600	23800	
9 7/8" 244.48	43.50	0.435	14400	15900	17400	14400	15900	17400	
		11.05	19400	21600	23800	19400	21600	23800	
	47.00	0.472	14400	15900	17400	14400	15900	17400	
		11.99	19400	21600	23800	19400	21600	23800	
	53.50	0.545	14400	15900	17400	14400	15900	17400	
		13.94	19400	21600	23800	19400	21600	23800	
	58.40	0.595	14400	15900	17400	14400	15900	17400	
		15.11	19400	21600	23800	19400	21600	23800	
	59.40	0.609	14400	15900	17400	14400	15900	17400	
		15.47	19400	21600	23800	19400	21600	23800	
9 7/8" 250.83	61.10	0.625	14400	15900	17400	14400	15900	17400	
		15.68	19400	21600	23800	19400	21600	23800	
	62.80	0.625	14400	15900	17400	14400	15900	17400	
		15.68	19400	21600	23800	19400	21600	23800	

VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 kpsi			75-80-85 kpsi			90-95-100 kpsi			105-110-115 kpsi			120-125-130 kpsi		
			min.	optil.	max.	min.	optil.	max.	min.	optil.	max.	min.	optil.	max.	min.	optil.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.			ft. lb.		
mm.	N.m.	mm.	N.m.			N.m.			N.m.			N.m.			N.m.		
9 7/8" 250.83	65.30	0.650	10450	11650	12660	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400
		16.51	14100	15700	17300	19300	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800
	66.40	0.661	10450	11650	12650	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400
		16.79	14100	15700	17300	19300	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800
67.50	0.678	10850	11950	13050	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400
		17.22	14600	16200	17800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
	40.50	0.350	8460	9400	10340	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400
		8.89	11400	12700	14000	17600	19600	21600	19400	21600	23800	19400	21600	23800	19400	21600	23800
45.50	0.400	8780	9750	10720	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400
		10.16	11900	13200	14500	17600	19600	21600	19400	21600	23800	19400	21600	23800	19400	21600	23800
	51.00	0.450	9150	10150	11150	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400
		11.43	12300	13700	15100	17600	19600	21600	19400	21600	23800	19400	21600	23800	19400	21600	23800
55.50	0.495	9500	10500	11500	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400
		12.57	12900	14200	15600	19300	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800
	60.70	0.545	9850	10850	11850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400
		13.64	13200	14700	16200	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
65.70	0.595	10450	11550	12650	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400
		15.11	14100	15700	17300	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
	47.00	0.375	10100	11200	12300	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400
		9.53	13700	15200	16700	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
54.00	0.435	10450	11550	12650	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400
		11.05	14100	15700	17300	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
	60.00	0.489	11100	12300	13500	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400
		12.42	15000	16700	18400	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
65.00	0.534	11450	12650	13850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400
		13.56	15500	17200	18900	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
	71.80	0.582	11700	13000	14300	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400
		14.78	15900	17700	19500	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
11 3/4" 298.45																	
11 7/8" 301.63																	

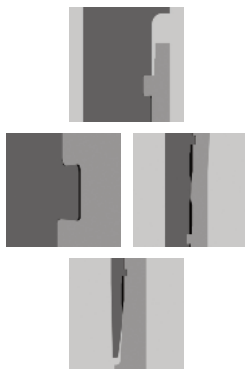


### VAM FJL TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS			1.5-140 ksi			145-150-155 ksi				
		in.	ft. lb.	min.	opt.	max.	min.	opt.	max.			
in.	mm.	in.	mm.	ft. lb.						N.m.		
<b>9 7/8"</b> 250.83	<b>65.30</b>	<b>0.650</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		16.51	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.661</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		16.79	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.678</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
17.22	19400	21600	23800	19400	21600	23800	19400	21600	23800			
<b>10 3/4"</b> 273.05	<b>40.50</b>	<b>0.350</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		8.89	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		10.16	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.450</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
11.43	19400	21600	23800	19400	21600	23800	19400	21600	23800			
<b>11 3/4"</b> 298.45	<b>55.50</b>	<b>0.495</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		12.57	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.545</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		13.64	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.595</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
15.11	19400	21600	23800	19400	21600	23800	19400	21600	23800			
<b>11 3/4"</b> 298.45	<b>47.00</b>	<b>0.375</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		9.53	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.435</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		11.05	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.489</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
12.42	19400	21600	23800	19400	21600	23800	19400	21600	23800			
<b>11 7/8"</b> 301.63	<b>65.00</b>	<b>0.534</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		13.56	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.582</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
		14.78	19400	21600	23800	19400	21600	23800	19400	21600	23800	
		<b>0.634</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	
16.19	19400	21600	23800	19400	21600	23800	19400	21600	23800			

## 3.10 VAM HTF

### Application



#### Streamlined internal and external profile

- ⇒ The connection OD and ID are 100% flush to the pipe body.
- ⇒ The ID is bored.
- ⇒ The OD is turned to flush OD dimension.
- ⇒ Repairable by VAM® licensed workshops with minor pin-end swaging and box-end expansion prior to threading.
- ⇒ VAM® HTF (High Torque Flush) is a true flush OD and ID integral connection providing maximum clearance.

#### Integral flush design

- ⇒ VAM® HTF is an integral connection threaded on plain-end pipe where the OD of the connection totally flush with the pipe body.
- ⇒ Current available sizes range from 4-1/2" to 9-5/8" for applications such as drilling with casing, production liners, drilling liners and liners requiring rotation.

#### Maximum torque strength

The high torque strength of VAM® HTF permits pipe rotation in deviated holes without fear of structural failure.

#### Multiple metal-to-metal seal system

An external and internal metal-to-metal seal work independently of each other to achieve 100% sealability against annular and well bore pressures.

The gas-tight sealing integrity has been tested and proven under the most severe qualification, ISO13679 CAL-IV.

Size (OD)	Nominal Weight	Wall Thickness		Pipe		API Drift			Connection				Tensile Performance (1000 lbs.)						External Pressure (psi)							
		lb/ft	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	Pin ID	Make-up Loss	CCS*	Tensile Eff.	Thread per inch	Parting Load						80 ksi	95 ksi	110 ksi
4 1/2" 114.30	15.10	0.337	8.56	3.701	3.749	inch	3.749	4.542	2.784	sq.in.	2.784	63	%	L80	N80	C95	P110	O125	140	11090	12770	14350	15840	17240		
5" 127.00	18.00	0.362	9.19	4.151	4.200	inch	4.200	4.769	3.371	sq.in.	3.371	64	%	L80	N80	C95	P110	O125	140	10500	12030	13470	14830	16080		
5 1/2" 139.70	17.00	0.304	7.72	4.892	4.816	inch	4.816	4.073	3.023	sq.in.	3.023	61	%	L80	N80	C95	P110	O125	140	6290	6940	7480	7890	8180		
7" 177.80	20.00	0.361	9.17	4.778	4.653	inch	4.653	4.702	3.492	sq.in.	3.492	60	%	L80	N80	C95	P110	O125	140	8830	10010	11100	12080	12950		
7 1/8" 184.15	23.00	0.415	10.54	4.670	4.545	inch	4.545	5.289	4.162	sq.in.	4.162	63	%	L80	N80	C95	P110	O125	140	11160	12940	14540	16070	17500		
7 1/2" 188.00	23.00	0.317	8.05	6.366	6.250	inch	6.250	4.356	3.977	sq.in.	3.977	60	%	L80	N80	C95	P110	O125	140	3830	4140	4440	4650	4760		
7 3/4" 195.25	26.00	0.362	9.19	6.276	6.151	inch	6.151	5.091	4.638	sq.in.	4.638	61	%	L80	N80	C95	P110	O125	140	5410	5880	6230	6450	6690		
7 7/8" 200.17	29.00	0.408	10.36	6.184	6.125	inch	6.125	5.555	5.115	sq.in.	5.115	61	%	L80	N80	C95	P110	O125	140	7020	7830	8530	9100	9560		
8" 203.20	32.00	0.453	11.51	6.094	6.000	inch	6.000	6.364	5.837	sq.in.	5.837	63	%	L80	N80	C95	P110	O125	140	8610	9750	10780	11720	12540		
8 1/4" 210.18	35.00	0.498	12.65	6.004	5.879	inch	5.879	5.929	6.776	sq.in.	6.776	65	%	L80	N80	C95	P110	O125	140	10180	11650	13020	14310	15490		
8 1/2" 215.91	26.40	0.328	8.33	6.969	6.844	inch	6.844	4.535	4.424	sq.in.	4.424	59	%	L80	N80	C95	P110	O125	140	3400	3710	3920	4050	1080		
8 3/4" 221.64	33.70	0.430	10.92	6.765	6.640	inch	6.640	5.722	6.008	sq.in.	6.008	62	%	L80	N80	C95	P110	O125	140	6560	7280	7870	8350	8690		
9" 228.60	39.00	0.500	12.70	6.625	6.500	inch	6.500	7.099	7.214	sq.in.	7.214	65	%	L80	N80	C95	P110	O125	140	8820	10000	11080	12060	12930		
9 1/2" 241.30	40.00	0.395	10.03	8.835	8.750	inch	8.750	5.591	6.601	sq.in.	6.601	58	%	L80	N80	C95	P110	O125	140	3090	3320	3470	3530	3530		
244.48	43.50	0.435	11.05	8.755	8.599	inch	8.599	6.354	7.815	sq.in.	7.815	62	%	L80	N80	C95	P110	O125	140	3810	4120	4420	4620	4730		
47.00	47.00	0.472	11.99	8.681	8.575	inch	8.575	6.984	8.700	sq.in.	8.700	64	%	L80	N80	C95	P110	O125	140	4760	5090	5300	5640	5890		
53.50	53.50	0.545	13.84	8.535	8.500	inch	8.500	7.811	9.297	sq.in.	9.297	60	%	L80	N80	C95	P110	O125	140	6620	7340	7950	8440	8800		

\* Critical Cross Section

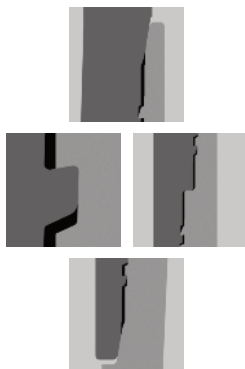
SIZE (OD)	NOMINAL WEIGHT	Make Up Torque ft. Lbs. All grades from 80 to 140 ksi.		
		Min.	Opt.	Max.
in. mm	ft.lb.	ft.lb. N.m.		
<b>4 1/2"</b> <i>114.30</i>	<b>15.10</b>	<b>7450</b> <i>10100</i>	<b>8750</b> <i>11900</i>	<b>10050</b> <i>13700</i>
<b>5"</b> <i>127.00</i>	<b>18.00</b>	<b>8400</b> <i>11400</i>	<b>9900</b> <i>13400</i>	<b>11400</b> <i>15400</i>
<b>5 1/2"</b> <i>139.70</i>	<b>17.00</b>	<b>6880</b> <i>9400</i>	<b>8100</b> <i>11000</i>	<b>9320</b> <i>12600</i>
	<b>20.00</b>	<b>8550</b> <i>11600</i>	<b>10050</b> <i>13600</i>	<b>11550</b> <i>15600</i>
	<b>23.00</b>	<b>11000</b> <i>15000</i>	<b>12950</b> <i>17600</i>	<b>14900</b> <i>20200</i>
<b>7"</b> <i>177.80</i>	<b>23.00</b>	<b>8250</b> <i>11100</i>	<b>9700</b> <i>13100</i>	<b>11150</b> <i>15100</i>
	<b>26.00</b>	<b>10150</b> <i>13800</i>	<b>11950</b> <i>16200</i>	<b>13750</b> <i>18600</i>
	<b>29.00</b>	<b>11050</b> <i>15100</i>	<b>13000</b> <i>17700</i>	<b>14950</b> <i>20300</i>
	<b>32.00</b>	<b>15550</b> <i>21100</i>	<b>18300</b> <i>24800</i>	<b>21050</b> <i>28500</i>
	<b>35.00</b>	<b>18600</b> <i>25200</i>	<b>21900</b> <i>29700</i>	<b>25200</b> <i>34200</i>
<b>7 5/8"</b> <i>193.68</i>	<b>26.40</b>	<b>7850</b> <i>10700</i>	<b>9250</b> <i>12600</i>	<b>10650</b> <i>14500</i>
	<b>33.70</b>	<b>15450</b> <i>20900</i>	<b>18150</b> <i>24600</i>	<b>20850</b> <i>28300</i>
	<b>39.00</b>	<b>20150</b> <i>27400</i>	<b>23700</b> <i>32200</i>	<b>27250</b> <i>37000</i>
<b>9 5/8"</b> <i>244.48</i>	<b>40.00</b>	<b>11450</b> <i>15500</i>	<b>13450</b> <i>18200</i>	<b>15450</b> <i>20900</i>
	<b>43.50</b>	<b>17650</b> <i>23900</i>	<b>20750</b> <i>28100</i>	<b>23850</b> <i>32300</i>
	<b>47.00</b>	<b>19000</b> <i>25800</i>	<b>22350</b> <i>30300</i>	<b>25700</b> <i>34800</i>
	<b>53.50</b>	<b>21200</b> <i>28700</i>	<b>24950</b> <i>33800</i>	<b>28700</b> <i>38900</i>

SIZE (OD)	NOMINAL WEIGHT	Yield Torque ft. lbs.				
		80 ksi	C95	P110	Q125	140 ksi
in. mm	ft.lb.	ft.lb N.m.				
<b>4 1/2"</b> <i>114.30</i>	<b>15.10</b>	<b>15500</b>	<b>18000</b>	<b>20500</b>	<b>23000</b>	<b>25500</b>
		<i>21000</i>	<i>24000</i>	<i>28000</i>	<i>31000</i>	<i>35000</i>
<b>5"</b> <i>127.00</i>	<b>18.00</b>	<b>21000</b>	<b>24500</b>	<b>28000</b>	<b>32000</b>	<b>35500</b>
		<i>29000</i>	<i>33000</i>	<i>38000</i>	<i>43000</i>	<i>48000</i>
<b>5 1/2"</b> <i>139.70</i>	<b>17.00</b>	<b>18500</b>	<b>21500</b>	<b>24500</b>	<b>28000</b>	<b>31000</b>
		<i>25000</i>	<i>29000</i>	<i>33000</i>	<i>38000</i>	<i>42000</i>
	<b>20.00</b>	<b>23500</b>	<b>27500</b>	<b>31500</b>	<b>35500</b>	<b>39500</b>
		<i>32000</i>	<i>37000</i>	<i>43000</i>	<i>48000</i>	<i>54000</i>
		<b>23.00</b>	<b>27500</b>	<b>32000</b>	<b>37000</b>	<b>41500</b>
<i>37000</i>	<i>44000</i>	<i>50000</i>	<i>56000</i>	<i>63000</i>		
<b>7"</b> <i>177.80</i>	<b>23.00</b>	<b>31000</b>	<b>36500</b>	<b>42000</b>	<b>47500</b>	<b>53000</b>
		<i>42000</i>	<i>49000</i>	<i>57000</i>	<i>64000</i>	<i>72000</i>
	<b>26.00</b>	<b>40500</b>	<b>48000</b>	<b>55000</b>	<b>62000</b>	<b>69500</b>
		<i>55000</i>	<i>65000</i>	<i>75000</i>	<i>84000</i>	<i>94000</i>
	<b>29.00</b>	<b>47500</b>	<b>56000</b>	<b>64000</b>	<b>72500</b>	<b>81000</b>
		<i>64000</i>	<i>76000</i>	<i>87000</i>	<i>98000</i>	<i>110000</i>
<b>32.00</b>	<b>57500</b>	<b>67500</b>	<b>78000</b>	<b>88000</b>	<b>98000</b>	
	<i>78000</i>	<i>92000</i>	<i>106000</i>	<i>119000</i>	<i>133000</i>	
<b>35.00</b>	<b>61500</b>	<b>72000</b>	<b>83000</b>	<b>93500</b>	<b>104000</b>	
	<i>83000</i>	<i>98000</i>	<i>112000</i>	<i>127000</i>	<i>141000</i>	
<b>7 5/8"</b> <i>193.68</i>	<b>26.40</b>	<b>42500</b>	<b>50000</b>	<b>57500</b>	<b>65000</b>	<b>72500</b>
		<i>57000</i>	<i>68000</i>	<i>78000</i>	<i>88000</i>	<i>98000</i>
	<b>33.70</b>	<b>57500</b>	<b>68000</b>	<b>78000</b>	<b>88000</b>	<b>98500</b>
		<i>78000</i>	<i>92000</i>	<i>106000</i>	<i>120000</i>	<i>133000</i>
<b>39.00</b>	<b>66500</b>	<b>78000</b>	<b>90000</b>	<b>101500</b>	<b>113000</b>	
	<i>90000</i>	<i>106000</i>	<i>122000</i>	<i>138000</i>	<i>153000</i>	
<b>9 5/8"</b> <i>244.48</i>	<b>40.00</b>	<b>72000</b>	<b>85000</b>	<b>98000</b>	<b>110500</b>	<b>123500</b>
		<i>98000</i>	<i>115000</i>	<i>133000</i>	<i>150000</i>	<i>168000</i>
	<b>43.50</b>	<b>87000</b>	<b>103000</b>	<b>118500</b>	<b>134000</b>	<b>149500</b>
		<i>118000</i>	<i>139000</i>	<i>161000</i>	<i>182000</i>	<i>203000</i>
	<b>47.00</b>	<b>101500</b>	<b>120000</b>	<b>138000</b>	<b>156000</b>	<b>174500</b>
<i>138000</i>		<i>162000</i>	<i>187000</i>	<i>212000</i>	<i>237000</i>	
<b>53.50</b>	<b>120500</b>	<b>142000</b>	<b>163500</b>	<b>185500</b>	<b>207000</b>	
<i>163000</i>	<i>193000</i>	<i>222000</i>	<i>251000</i>	<i>281000</i>		



## 3.11 VAM SLIJ-II

### Application



#### Integral Flush Design

VAM SLIJ II is an integral connection threaded on plain-end pipe with the OD of the connection near flush with the pipe body.

Sizes range from 4 1/2" to 16" for such clearance applications as tubing in small sizes, drilling liners and tie-backs in medium sizes, and contingency liner in larger casing diameters

#### Multiple Seal System

An external seal and an internal seal work independently of each other to achieve sealing against annulus and bore pressures.

This multiple seal arrangement ensures gas-tight sealing integrity to 100% of the rated burst and collapse of the pipe body.

#### Interference Tapered Thread

In order to provide optimum strength, the VAM SLIJ II is designed for 70% to 80% efficiency under tension in medium wall thickness.

Thread load flank has a 10° reverse angle to resist jump out.

Thread stabbing flank has a 25° angle for fast, trouble-free make-up.

The design of VAM SLIJ II exhibits an exceptional bending resistance for a connection of this class.

#### Streamlined Internal and External Profile

The O.D. and I.D. is near flush (there is no upset).

The I.D. is bored and recess-free for smooth, efficient flow.

The O.D. is turned to tight tolerance.

VAM SLIJ II can be repaired by VAM licensed workshops.

## Dope quantities

Special care should be taken not to over dope the connection. A thin, even layer of thread compound has to be applied using a moustache brush, either equally distributed between pin and box (general case) or on pin only (optional field practice).

In any case, there should not be any excess of thread compound: the thread profile should be clearly visible; no heavy patch of compound should be present adjacent to the shoulder.

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection.

If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

## Minimum make-up dope quantity

Nominal OD (in.)	Weight (lb.ft.)	Minimum dope volume		Maximum dope volume		Nominal OD (in.)	Weight (lb.ft.)	Minimum dope volume		Maximum dope volume	
		ml	US fluid ounce	ml	US fluid ounce			ml	US fluid ounce	ml	US fluid ounce
4 1/2	≤ 17.00	8	0.271	10	0.338	9 3/4	59.2	31	1.048	42	1.42
	> 17.00	10	0.338	13	0.44	9 7/8	≥ 62.80 and ≤ 68.90	33	1.116	46	1.556
5	≤ 21.40	11	0.372	15	0.507	10	≥ 67.20 and ≤ 68.70	33	1.116	46	1.556
	> 21.40	12	0.406	16.5	0.558	10 3/4	≤ 65.70	33	1.116	46	1.556
5 1/2	≤ 26.00	13	0.44	17.5	0.592		intermediate	37	1.251	53	1.792
	> 26.00	15	0.507	19	0.643		> 97.10	42	1.42	60	2.029
6 5/8	≤ 36.70	18	0.609	23	0.778	11 3/4	≤ 75.40	38	1.285	54	1.826
	> 36.70	20	0.676	26	0.879		> 75.40	42	1.42	60	2.029
6 7/8	32.7	19	0.643	25	0.845	11 7/8	71.8	42	1.42	61	2.063
7	≤ 41.00	18	0.609	24	0.812	12 1/8	87.7	42	1.42	61	2.063
	> 41.00	21	0.71	28	0.947	12 3/4	86.7	45	1.522	62	2.097
7 5/8	≤ 45.30	20	0.676	27	0.913	13 3/8	≤ 80.70	43	1.454	62	2.097
	> 45.30	24	0.812	32	1.082		> 80.70	47	1.589	66	2.232
7 3/4	24	0.812	32	1.082	13 5/8	88.2	47	1.589	66	2.232	
8 5/8	≤ 36.00	24	0.812	32	1.082	14	≤ 100	50	1.691	66	2.232
	> 36.00	27	0.913	37	1.251		> 100	58	1.961	77	2.604
9 5/8	≤ 58.40	28	0.947	39	1.319	16	≤ 97	53	1.792	70	2.367
	> 58.40	33	1.116	46	1.556		> 97	61	2.063	81	2.739

**VAM SLUJ-II TECHNICAL DATA**

Size (OD)	inch	mm	Nominal Weight lb./ft.	Wall Thickness		Inside Diameter inch.	Drift Diameter inch.	Pipe body section sq.in.	Box O.D. inch.	Pin I.D. inch.	Make up Loss inch.	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)					
				inch	mm									L80 N80	C90	C95 T95	C110 P110	Q125	
4 1/2" 114.30			15.10	0.337	8.56	3.826	3.701	4.407	4.646	3.765	4.440	8	70.9	250	281	297	344	390	
			17.00	0.380	9.65	3.740	4.918	4.646	3.679	4.473	3.679	4.473	8	73.7	290	326	344	399	453
			18.90	0.430	10.92	3.640	3.515	5.498	4.654	3.579	5.243	3.579	5.243	7	74.2	326	367	388	449
5" 127.00			18.00	0.362	9.19	4.276	4.151	5.275	5.098	4.216	4.557	7	71.6	302	340	359	415	472	
			20.30	0.408	10.36	4.184	4.059	5.886	5.136	4.124	4.810	7	75.1	354	398	420	486	553	
			20.80	0.422	10.72	4.156	4.031	6.069	5.146	4.096	4.857	7	76.1	370	416	439	508	577	
21.40			21.40	0.437	11.10	4.126	4.001	6.264	5.158	4.066	5.050	7	77.1	386	435	459	531	604	
			23.20	0.478	12.14	4.044	3.919	6.791	5.190	3.984	5.155	6	77.2	419	472	498	577	655	
			24.10	0.500	12.70	4.000	3.875	7.069	5.193	3.940	5.213	6	77.4	437	492	519	601	684	
5 1/2" 139.70			26.70	0.562	14.27	3.876	3.751	7.836	5.203	3.816	5.505	6	77.6	486	547	578	669	760	
			29.20	0.625	15.88	3.750	3.625	8.590	5.214	3.690	5.813	6	77.8	535	602	635	735	836	
			20.00	0.361	9.17	4.778	4.653	5.828	5.594	4.719	4.539	7	70.8	330	371	392	454	516	
6 5/8" 168.28			23.00	0.415	10.54	4.670	4.545	6.630	5.635	4.611	4.861	7	74.8	397	446	471	545	620	
			23.80	0.437	11.10	4.626	4.501	6.951	5.653	4.567	5.076	7	76.3	424	477	504	583	663	
			26.00	0.476	12.09	4.548	4.423	7.513	5.678	4.489	5.346	7	77.6	467	525	554	642	729	
26.80			26.80	0.500	12.70	4.500	4.375	7.854	5.706	4.441	5.420	6	78.1	491	552	583	675	767	
			28.40	0.530	13.46	4.440	4.315	8.275	5.719	4.381	5.495	6	78.6	520	585	618	716	813	
			29.70	0.562	14.27	4.376	4.251	8.718	5.733	4.317	5.579	6	79.2	552	621	656	760	863	
6 7/8" 174.63			32.00	0.612	15.54	4.276	4.151	9.398	5.742	4.217	5.854	6	79.3	596	671	708	820	932	
			32.60	0.625	15.88	4.250	4.125	9.572	5.748	4.191	5.886	6	79.6	610	686	724	838	953	
			28.00	0.417	10.59	5.791	5.666	8.133	6.751	5.735	5.061	7	73.4	478	537	567	657	746	
33.00			32.00	0.475	12.07	5.675	5.550	9.177	6.795	5.619	5.422	7	77.0	565	636	671	777	883	
			33.00	0.500	12.70	5.625	5.500	9.621	6.822	5.569	5.480	6	76.9	592	666	703	814	925	
			34.50	0.525	13.34	5.575	5.450	10.061	6.841	5.519	5.557	6	94.2	758	852	900	1042	1184	
40.20			36.70	0.562	14.27	5.501	5.376	6.869	6.869	5.444	5.823	6	79.5	681	766	809	937	1064	
			40.20	0.625	15.88	5.375	5.250	11.781	6.920	5.319	6.107	5	80.3	757	852	899	1041	1183	
			43.70	0.687	17.45	5.251	5.126	12.816	6.948	5.194	6.455	5	81.2	833	937	989	1145	1301	
6 7/8" 174.63			32.70	0.478	12.14	5.919	5.794	9.606	7.061	5.864	5.250	6	75.5	580	653	689	798	906	



**VAM SLU-III TECHNICAL DATA**

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness inch mm	Inside Diameter inch. mm	Drift Diameter inch. mm	Pipe body section sq.in. mm <sup>2</sup>	Box O.D. inch.	Pin I.D. inch.	Make up Loss inch.	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)					
											L80 N80	C90	C95 T95	C110 P110	Q125	
7" 177.80	26.00	0.362	6.276	6.151	7.549	7.084	6.220	4.580	7	68.9	416	468	494	572	650	
	29.00	0.408	6.184	6.059	8.449	7.119	6.128	5.050	7	72.6	491	552	583	675	767	
	32.00	0.453	6.094	5.969	9.317	7.162	6.053	5.176	6	74.2	553	622	657	761	864	
	35.00	0.498	6.004	5.879	10.172	7.198	5.948	5.473	6	76.8	625	703	742	860	977	
	38.00	0.540	13.72	5.920	5.795	10.959	7.231	5.864	5.776	6	79.0	692	779	822	952	1082
	41.00	0.590	14.99	5.820	5.695	11.881	7.264	5.764	5.917	6	80.0	761	856	903	1046	1188
	42.70	0.625	15.88	5.750	5.625	12.517	7.299	5.694	6.128	5	80.6	807	908	958	1110	1261
	44.00	0.640	16.26	5.720	5.595	12.788	7.309	5.664	6.157	5	80.8	827	930	982	1137	1292
	45.40	0.670	17.02	5.660	5.535	13.324	7.318	5.604	6.428	5	81.0	863	971	1025	1186	1348
	46.40	0.687	17.45	5.626	5.501	13.625	7.323	5.570	6.472	5	80.9	882	993	1048	1213	1378
	49.50	0.730	18.54	5.540	5.415	14.379	7.333	5.484	6.562	5	80.9	931	1047	1105	1280	1454
	7 5/8"	29.70	0.375	6.875	6.750	8.541	7.711	6.820	4.822	7	69.2	473	532	562	650	739
193.68	33.70	0.430	10.92	6.640	9.720	7.754	6.711	5.169	7	73.2	569	641	676	783	890	
7 3/4"	39.00	0.500	12.70	6.625	6.500	11.192	7.818	6.570	5.525	6	76.2	682	767	810	938	1065
	42.80	0.562	14.27	6.501	6.376	12.470	7.866	6.446	5.887	6	79.0	788	887	936	1084	1232
	45.30	0.595	15.11	6.435	6.310	13.141	7.889	6.380	6.157	6	80.1	842	948	1000	1158	1316
	47.10	0.625	15.88	6.375	6.250	13.744	7.920	6.320	6.168	5	80.1	881	991	1046	1211	1376
	51.20	0.687	17.45	6.251	6.126	14.974	7.962	6.196	6.539	5	81.4	975	1097	1158	1341	1524
	52.10	0.700	17.78	6.225	6.100	15.229	7.967	6.170	6.770	5	81.6	994	1118	1180	1366	1553
	52.80	0.712	18.08	6.201	6.076	15.463	7.976	6.146	6.802	5	82.0	1014	1141	1204	1394	1584
	55.30	0.750	19.05	6.125	6.000	16.199	7.989	6.070	6.899	5	82.4	1068	1201	1268	1468	1668
	59.20	0.812	20.62	6.001	5.876	17.380	7.991	5.946	7.214	5	81.3	1130	1271	1342	1554	1766
	46.10	0.595	15.11	6.560	6.435	13.374	8.019	6.555	6.128	5	78.8	843	948	1001	1159	1317
	46.90	0.615	15.62	6.520	6.395	13.785	8.036	6.465	6.154	5	79.5	877	987	1041	1206	1370
	47.60	0.625	15.88	6.500	6.375	13.990	8.045	6.446	6.167	5	80.0	895	1007	1063	1230	1398
48.60	0.640	16.26	6.470	6.345	14.296	8.056	6.415	6.413	5	80.5	921	1036	1094	1266	1439	
36.00	0.400	10.16	7.825	7.700	10.336	8.721	7.772	5.083	7	70.0	579	651	687	796	904	
219.08	44.00	0.450	11.43	7.725	7.600	11.557	8.767	7.681	5.424	6	72.1	667	750	792	917	1042
8 5/8"	44.00	0.500	12.70	7.625	7.500	12.763	8.809	7.572	5.535	6	75.0	766	862	910	1053	1197
	49.00	0.557	14.15	7.511	7.386	14.118	8.855	7.457	5.880	6	77.8	879	989	1044	1209	1374

**VAM SLU-II TECHNICAL DATA**

Size (OD)	inch	mm	Nominal Weight	Wall Thickness		Inside Diameter	Drift Diameter	Pipe body section	Box O.D.	Pin I.D.	Make up Loss	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)				
				inch	mm									L80 N80	C90	C95 T95	C110 P110	Q125
8.5/8"	219.08		49.10	0.562	14.27	7.501	7.376	14.236	8.857	7.448	5.909	6	78.0	888	999	1054	1221	1387
			52.00	0.595	15.11	7.435	7.310	15.010	8.880	7.381	6.176	6	78.6	944	1062	1121	1298	1475
			54.00	0.625	15.88	7.375	7.250	15.708	8.913	7.322	6.383	5	78.9	992	1116	1178	1364	1550
			58.70	0.687	17.45	7.251	7.126	17.132	8.955	7.198	6.545	5	80.6	1105	1243	1312	1519	1726
			63.50	0.750	19.05	7.125	7.000	18.555	8.982	7.072	6.916	5	81.2	1205	1356	1431	1657	1883
9.5/8"	244.48		43.50	0.435	11.05	8.755	8.599	12.559	9.748	8.673	5.180	6	69.4	697	785	828	959	1090
			47.00	0.472	11.99	8.681	8.525	13.572	9.777	8.599	5.488	6	71.9	781	878	927	1073	1220
			53.50	0.545	13.84	8.535	8.379	15.546	8.855	8.558	6.039	5	74.6	927	1043	1101	1275	1449
			58.40	0.595	15.11	8.435	8.279	16.879	8.882	8.433	6.135	5	76.8	1037	1167	1231	1426	1620
			59.40	0.609	15.47	8.407	8.251	17.250	8.994	8.325	6.378	5	77.4	1068	1202	1268	1469	1669
9.3/4"	247.65		61.10	0.625	15.88	8.375	8.219	17.671	9.905	8.293	6.423	5	77.8	1100	1238	1307	1513	1719
			64.90	0.672	17.07	8.281	8.125	18.901	9.941	8.199	6.554	5	79.3	1198	1348	1423	1648	1873
			71.80	0.750	19.05	8.125	7.969	20.911	9.985	8.043	7.174	5	81.0	1354	1524	1608	1862	2116
			75.60	0.797	20.24	8.031	7.875	22.704	10.013	7.949	7.315	5	81.8	1446	1627	1718	1989	2260
			80.80	0.859	21.82	7.907	7.751	23.656	9.961	7.825	7.613	5	80.0	1514	1703	1798	2081	2365
10"	254.00		59.20	0.595	15.11	8.560	8.404	17.113	10.006	8.559	6.134	5	76.6	1049	1180	1245	1442	1638
			62.80	0.625	15.88	8.625	8.469	18.162	10.151	8.559	6.421	5	77.6	1128	1269	1339	1551	1762
			66.30	0.650	16.51	8.575	8.419	18.838	10.174	8.559	6.509	5	78.6	1185	1333	1407	1630	1852
			66.90	0.668	16.97	8.539	8.383	19.322	10.188	8.457	6.562	5	79.2	1225	1378	1455	1684	1914
			67.50	0.678	17.22	8.519	8.363	19.498	10.181	8.559	6.517	5	76.3	1196	1345	1420	1644	1869
10 3/4"	273.05		68.90	0.700	17.78	8.475	8.319	20.177	10.207	8.393	6.861	5	79.5	1284	1444	1524	1765	2006
			67.20	0.672	17.07	8.656	8.500	19.693	10.312	8.574	6.568	5	79.3	1249	1405	1483	1717	1951
			68.70	0.688	17.48	8.624	8.468	20.127	10.325	8.559	6.821	5	79.9	1286	1447	1527	1768	2009
			51.00	0.450	11.43	9.850	9.694	14.561	10.878	9.770	5.457	6	69.8	813	915	966	1118	1271
			55.50	0.495	12.57	9.760	9.604	15.947	10.913	9.886	5.785	6	72.6	926	1041	1099	1273	1446
10 1/2"	282.00		60.70	0.545	13.84	9.660	9.504	17.473	10.962	9.580	6.025	5	73.9	1032	1161	1226	1420	1613
			65.70	0.595	15.11	9.560	9.404	18.982	11.002	9.561	6.376	5	76.2	1157	1301	1374	1590	1807
11"	282.00		71.10	0.650	16.51	9.450	9.294	20.625	11.045	9.370	6.557	5	78.4	1293	1454	1535	1778	2020



**VAM SLU-II TECHNICAL DATA**

Size (OD)	inch mm	Nominal Weight lb./ft.	Wall Thickness		Inside Diameter inch.	Drift Diameter inch.	Pipe body section sq.in.	Box O.D. inch.	Pin I.D. inch.	Make up Loss inch.	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)				
			inch	mm									L80 N80	C90	C95 T95	C110 P110	Q125
10 3/4"	273.05	73.20	0.672	17.07	9.406	9.250	21.276	11.063	9.326	6.820	5	79.2	1347	1516	1600	1852	2105
		75.90	0.700	17.78	9.350	9.194	22.101	11.081	9.270	6.886	5	79.3	1402	1577	1664	1927	2190
		79.20	0.734	18.64	9.282	9.126	23.096	11.102	9.202	6.962	5	79.5	1469	1652	1744	2019	2295
		80.80	0.750	19.05	9.250	9.094	23.562	11.114	9.170	7.220	5	79.9	1505	1693	1787	2070	2352
		85.30	0.797	20.24	9.156	9.000	24.921	11.144	9.076	7.368	5	81.0	1614	1816	1917	2220	2523
10 7/8"	276.23	97.10	0.922	23.42	8.906	8.750	28.467	11.187	8.826	8.125	5	81.8	1862	2095	2211	2560	2909
		72.00	0.656	16.66	9.563	9.407	21.060	11.165	9.484	6.549	5	76.9	1296	1458	1539	1782	2025
		54.00	0.435	11.05	10.880	10.724	15.463	11.858	10.804	5.476	6	67.6	837	941	994	1150	1307
2 9/8 45		60.00	0.489	12.42	10.772	10.616	17.300	11.900	10.689	5.843	6	71.2	986	1109	1170	1355	1540
		65.00	0.534	13.56	10.682	10.526	18.816	11.943	10.689	6.043	5	72.3	1088	1224	1292	1495	1699
		71.00	0.582	14.78	10.586	10.430	20.420	11.981	10.509	6.393	5	74.6	1218	1370	1447	1675	1903
		74.60	0.618	15.70	10.514	10.358	21.613	12.006	10.437	6.519	5	76.1	1316	1481	1563	1810	2057
		75.40	0.625	15.88	10.500	10.344	21.844	12.011	10.424	6.543	5	76.4	1335	1502	1586	1836	2086
		78.80	0.656	16.66	10.438	10.282	22.863	12.035	10.361	6.845	5	77.6	1419	1596	1685	1951	2217
		80.50	0.672	17.07	10.406	10.250	23.387	12.048	10.330	6.900	5	78.1	1462	1644	1736	2010	2284
		82.60	0.691	17.55	10.368	10.212	24.007	12.063	10.291	6.963	5	78.8	1513	1702	1797	2081	2364
		87.40	0.734	18.64	10.282	10.126	25.402	12.097	10.206	7.289	5	80.2	1629	1833	1935	2240	2546
11 7/8"	301.63	71.80	0.582	14.78	10.711	10.555	20.648	12.096	10.689	6.454	5	74.2	1225	1379	1455	1685	1915
12"	304.80	78.08	0.640	16.26	10.783	10.627	22.967	12.328	10.707	6.796	5	76.2	1401	1576	1663	1926	2189
12 1/8"	307.98	87.70	0.720	18.29	10.685	10.529	25.798	12.451	10.689	7.248	5	78.8	1626	1829	1930	2235	2540
12 3/4"	323.85	86.70	0.672	17.07	11.406	11.250	25.498	13.013	11.314	6.891	5	74.3	1516	1705	1800	2084	2369
13 3/8"	339.73	68.00	0.480	12.19	12.415	12.259	19.445	13.513	12.341	5.767	5	67.7	1054	1185	1251	1449	1646
		72.00	0.514	13.06	12.347	12.191	20.768	13.542	12.317	5.976	5	69.9	1161	1307	1379	1597	1815
		77.00	0.550	13.97	12.275	12.119	22.160	13.573	12.201	6.057	5	71.9	1274	1434	1513	1752	1991
		80.70	0.580	14.73	12.215	12.059	23.314	13.590	12.141	6.164	5	73.2	1366	1537	1622	1878	2134

**VAM SLU-II TECHNICAL DATA**

Size (OD) inch mm	Nominal Weight lb./ft.	Wall Thickness		Inside Diameter inch.	Drift Diameter inch.	Pipe body section sq.in.	Box O.D. inch.	Pin I.D. inch.	Make up Loss inch.	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)				
		inch	mm									L80 N80	C90	C95 T95	C110 P110	Q125
13.3/8" 339.73	85.00	0.608	15.44	12.159	12.003	24.386	13.611	12.085	6.465	5	74.4	1451	1633	1723	1995	2268
	86.00	0.625	15.88	12.125	11.969	25.035	13.625	12.051	6.532	5	75.1	1505	1693	1787	2069	2352
	92.00	0.672	17.07	12.031	11.875	26.818	13.661	11.957	6.896	5	76.9	1649	1856	1959	2268	2577
13.5/8" 346.08	98.00	0.719	18.26	11.937	11.781	28.587	13.698	11.863	7.246	5	78.4	1793	2018	2130	2466	2802
	88.20	0.625	15.88	12.375	12.188	25.525	13.875	12.317	6.519	5	75.0	1531	1723	1818	2105	2392
14" 355.60	82.50	0.562	14.27	12.876	12.689	23.726	14.199	12.772	6.406	5	71.8	1362	1533	1618	1873	2129
	93.00	0.650	16.51	12.700	12.513	27.261	14.263	12.596	6.901	5	74.9	1634	1838	1940	2246	2553
	100.00	0.700	17.78	12.600	12.413	29.248	14.301	12.496	7.275	5	76.6	1792	2016	2128	2464	2800
16" 406.40	106.00	0.750	19.05	12.500	12.313	31.220	14.332	12.396	7.628	5	77.1	1924	2165	2285	2646	3007
	115.00	0.812	20.62	12.376	12.189	33.642	14.381	12.318	8.054	5	76.7	2065	2323	2452	2839	3226
	84.00	0.495	12.57	14.910	14.823	24.112	16.250	15.010	5.985	5	66.3	1278	1438	1518	1757	1997
16" 406.40	97.00	0.575	14.61	14.823	14.663	27.864	16.250	14.850	6.495	5	70.8	1577	1774	1873	2169	2465
	104.00	0.625	15.88	14.650	14.563	30.189	16.250	14.750	6.888	5	73.0	1763	1984	2094	2425	2755
	109.00	0.656	16.66	14.673	14.501	31.622	16.250	14.688	7.199	5	73.9	1870	2103	2220	2571	2922
118.00	0.715	18.16	14.470	14.383	34.334	16.250	14.570	7.630	5	76.3	2096	2357	2488	2881	3274	



**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT ft. lb.	WALL THICKNESS in. mm.	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
			ft. lb. N.m.														
4 1/2"	15.10	0.337 8.56	6210	6900	7590	6390	7100	7810	6570	7300	8030	6750	7500	8250	-	-	-
			8500	9400	10300	8600	9600	10600	8900	9900	10900	9200	10200	11200	-	-	-
			6840	7600	8360	7110	7900	8690	7290	8100	8910	7560	8400	9240	-	-	-
			9300	10300	11300	9600	10700	11800	9900	11000	12100	10300	11400	12500	-	-	-
			8640	9600	10560	8910	9900	10890	9240	10300	11220	9540	10600	11660	-	-	-
			11700	13000	14300	12100	13400	14800	12400	13800	15200	13000	14400	15800	-	-	-
			10530	11700	12870	10890	12100	13310	11250	12500	13750	11610	12900	14190	-	-	-
			14300	15900	17500	14800	16400	18000	15200	16900	18600	15800	17500	19300	-	-	-
			4400	4900	5400	4700	5200	5700	4900	5400	5900	5100	5700	6300	-	-	-
			6000	6700	7400	6300	7000	7700	6700	7400	8100	6900	7700	8500	-	-	-
5"	127.00	0.408	5100	5700	6300	5500	6100	6700	5800	6500	7200	6100	6800	7500	-	-	-
			7000	7800	8600	7500	8300	9100	7900	8800	9700	8400	9300	10200	-	-	-
			5500	6100	6700	5800	6500	7200	6200	6900	7600	6600	7300	8000	-	-	-
			7500	8300	9100	7900	8800	9700	8400	9300	10200	8900	9900	10900	-	-	-
			8800	9600	10400	8300	9200	10100	8800	9800	10800	9400	10400	11400	-	-	-
			7800	8700	9600	6700	7500	8300	7200	8000	8800	7600	8500	9400	-	-	-
			9100	10100	11000	9700	10800	11900	10300	11500	12700	10900	12100	13300	-	-	-
			10100	11000	12000	11000	12200	13400	11700	13000	14300	12400	13800	15200	-	-	-
			8500	9500	10500	9200	10200	11200	9700	10800	11900	10300	11500	12700	-	-	-
			11600	12900	14200	12400	13800	15200	13200	14700	16200	14000	15600	17200	-	-	-
5 1/2"	139.70	0.361	5300	5900	6500	5600	6200	6800	5800	6500	7200	6100	6800	7500	-	-	-
			7200	8000	8800	7600	8400	9200	7900	8800	9700	8300	9200	10100	-	-	-
			6500	7200	7900	6800	7600	8400	7300	8100	8900	7700	8600	9500	-	-	-
23.00	10.54	0.415	8800	9800	10800	9400	10400	11400	9900	11000	12100	10400	11600	12800	-	-	-



**VAM SLU-II TORQUE VALUES**

SIZE (OD)	WALL THICKNESS	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
		min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in. mm.	in. mm.	ft. lb. N.m.												ft. lb. N.m.		
5 1/2* 139.70	0.437	6900	7700	8500	7400	8200	9000	7900	8800	9700	8400	9300	10200	-	-	-
	11.10	9400	10500	11600	10100	11200	12300	10700	11900	13100	11200	12500	13800	-	-	-
	0.476	7800	8700	9600	8400	9300	10200	8900	9900	10900	9400	10500	11600	-	-	-
	12.09	10600	11800	13000	11300	12600	13900	12100	13400	14700	12800	14200	15600	-	-	-
	0.500	8300	9200	10100	8800	9800	10800	9400	10400	11400	9900	11000	12100	-	-	-
	12.70	11200	12400	13600	12000	13300	14600	12700	14100	15500	13400	14900	16400	-	-	-
	0.530	8800	9800	10800	9400	10500	11600	10100	11200	12300	10700	11900	13100	-	-	-
	13.46	12000	13300	14600	12800	14200	15600	13700	15200	16700	14500	16100	17700	-	-	-
	0.562	9400	10500	11600	10200	11300	12400	10800	12000	13200	11500	12800	14100	-	-	-
	14.27	12900	14300	15700	13800	15300	16800	14700	16300	17900	15600	17300	19000	-	-	-
6 5/8* 165.28	0.612	10900	11600	12800	11200	12400	13600	11900	13200	14500	12600	14000	15400	-	-	-
	15.54	14700	15700	17300	15100	16600	18500	16100	17900	19700	17100	19000	20900	-	-	-
	0.625	10700	11900	13100	11400	12700	14000	12200	13600	15000	13000	14400	15800	-	-	-
	15.88	14500	16100	17700	15500	17200	18900	16600	18400	20200	17500	19500	21500	-	-	-
	0.417	8600	9600	10600	9200	10200	11200	9800	10900	12000	10300	11500	12700	-	-	-
	10.59	11700	13000	14300	12500	13900	15300	13300	14800	16300	14100	15700	17300	-	-	-
	0.475	10400	11600	12800	11200	12400	13600	12000	13300	14600	12700	14100	15500	-	-	-
	12.07	14100	15700	17300	15200	16900	18600	16200	18000	19800	17200	19100	21000	-	-	-
	0.500	11000	12200	13400	11800	13100	14400	12600	14000	15400	13400	14900	16400	-	-	-
	12.70	14900	16600	18300	16000	17800	19600	17100	19000	20900	18200	20200	22200	-	-	-
6 3/4	0.525	11800	13100	14400	12600	14000	15400	13500	15000	16500	14400	16000	17600	-	-	-
	13.34	15900	17700	19500	17100	19000	20900	18300	20300	22300	19400	21600	23800	-	-	-
	0.562	12900	14300	15700	13900	15400	16900	14800	16500	18200	15800	17600	19400	-	-	-
	14.27	17500	19400	21300	18800	20900	23000	20200	22400	24600	21500	23900	26300	-	-	-
	0.625	14800	16400	18000	15900	17700	19500	17100	19000	20900	18200	20200	22200	-	-	-
	15.88	20100	22300	24500	21600	24000	26400	23100	25700	28300	24700	27400	30100	-	-	-
	0.687	16600	18400	20200	17800	19800	21800	19200	21300	23400	20400	22700	25000	-	-	-
	17.45	22500	25000	27500	24200	26900	29600	25900	28800	31700	27600	30700	33800	-	-	-



**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi		90-95-100 ksi		105-110-115 ksi		120-125-130 ksi		135-140-145 ksi			
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm.	ft. lb.	in. mm.	ft. lb. N.m.						ft. lb. N.m.					
<b>6 7/8"</b> 174.63	32.70	0.478	10700	11900	13100	11400	12700	14000	12100	13500	14900	13000	14400	15800
		12.13	14490	16100	17710	15600	17300	19000	16500	18300	20700	17500	19500	21500
<b>7"</b> 177.80	26.00	0.362	8700	9700	10700	9100	10100	11100	9600	10600	11700	9900	11000	12100
		9.19	11800	13100	14400	12300	13700	15100	12900	14300	15700	13500	15000	16500
29.00	0.408	10400	11600	12800	10900	12100	13300	11400	12700	14000	12000	13300	14600	
	10.36	14100	15700	17300	14800	16500	18200	15500	17200	18900	16200	18000	19800	
32.00	0.453	11900	13200	14500	12600	14000	15400	13400	14900	16400	14100	15700	17300	
	11.57	16100	17900	19700	17100	19000	20900	18200	20200	22200	19200	21300	23400	
35.00	0.498	13600	15100	16600	14600	16200	17800	15500	17200	18900	16400	18200	20000	
	12.65	18400	20500	22600	19700	21900	24100	21000	23300	25600	22100	24600	27100	
38.00	0.540	15300	17000	18700	16300	18100	19900	17400	19300	21200	18400	20400	22400	
	13.72	20700	23000	25300	22100	24600	27100	23600	26200	28800	24900	27700	30500	
41.00	0.590	17100	19000	20900	18400	20400	22400	19600	21800	24000	20800	23100	25400	
	14.99	23200	25800	28400	24900	27700	30500	26500	29500	32500	28300	31400	34500	
42.70	0.625	18500	20600	22700	19800	22000	24200	21100	23500	25900	22800	25300	27800	
	15.88	25200	28000	30800	26900	29900	32900	28700	31900	35100	30900	34300	37700	
44.00	0.640	19100	21200	23300	20400	22700	25000	21100	23500	25900	22800	25300	27800	
	16.26	25900	28900	31700	27700	30800	33900	28700	31900	35100	30900	34300	37700	
45.40	0.670	20200	22400	24600	21100	23500	25900	22800	25300	27800	24400	27100	29800	
	17.02	27000	30300	33300	28700	31900	35100	30900	34300	37700	33100	36800	40500	
46.40	0.687	20800	23100	25400	22800	25300	27800	24400	27100	29800	26000	28900	31800	
	17.45	28200	31300	34400	30900	34300	37700	33100	36800	40500	35300	39200	43100	
49.50	0.730	22800	25300	27800	24400	27100	29800	26000	28900	31800	27600	30700	33800	
	18.54	30900	34300	37700	33100	36800	40500	35300	39200	43100	37500	41700	45900	
<b>7 5/8"</b> 193.68	29.70	0.375	10300	11400	12500	10800	12000	13200	11300	12600	13900	11900	13200	14500
		9.53	13900	15500	17100	14700	16300	17900	15400	17100	18800	16100	17900	19700
33.70	0.430	12600	14000	15400	13200	14700	16200	13900	15500	17100	14700	16300	17900	
	10.92	17000	18900	20800	18000	20000	22000	18900	21000	23100	19900	22100	24300	

**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi			
			in.	ft. lb.	N.m.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
7 5/8" 193.68	39.00	0.500 12.70	15400	17100	18800	16500	18300	20100	17500	19400	21300	18500	20600	22700	-	-	-	
			20900	23200	25500	22300	24800	27300	23700	26300	28900	25100	27900	30700	-	-	-	
			18100	20100	22100	19400	21600	23800	20800	23100	25400	22800	25300	27800	-	-	-	
			24600	27300	30000	26400	29300	32200	28200	31300	34400	30900	34300	37700	-	-	-	
			19600	21800	24000	21100	23500	25900	22800	25300	27800	24400	27100	29800	-	-	-	
			26500	29500	32500	28700	31900	35100	30900	34300	37700	33100	36800	40500	-	-	-	
			28700	31900	35100	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-	
			24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-	
			33100	36800	40500	35300	39200	43100	37500	41700	45900	39700	44100	48500	-	-	-	
			33100	36800	40500	35300	39200	43100	37500	41700	45900	39700	44100	48500	-	-	-	
7 3/4" 196.85	46.10	0.595 15.11	19400	21600	23800	20800	23100	25400	22800	25300	27800	24400	27100	29800	-	-	-	
			26400	29300	32200	28200	31300	34400	30900	34300	37700	33100	36800	40500	-	-	-	
			20500	22800	25100	22800	25300	27800	24400	27100	29800	26000	28900	31800	-	-	-	
			27800	30900	34000	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-	
			21100	23500	25900	20800	23500	27800	24400	27100	29800	26000	28900	31800	-	-	-	
			28700	31900	35100	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-	
			21100	23500	25900	22800	25300	27800	24400	27100	29800	26000	28900	31800	-	-	-	
			28700	31900	35100	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-	
			11500	12800	14100	12300	13700	15100	13000	14500	16000	17600	19600	21600	23600	25600	27600	29600
			15700	17400	19100	16600	18500	20400	17600	19600	21600	23600	25600	27600	29600	31600	33600	35600
8 5/8" 219.08	36.00	0.400 10.16	11500	12800	14100	12300	13700	15100	13000	14500	16000	17600	19600	21600	23600	25600	27600	
			15700	17400	19100	16600	18500	20400	17600	19600	21600	23600	25600	27600	29600	31600	33600	
			11500	12800	14100	12300	13700	15100	13000	14500	16000	17600	19600	21600	23600	25600	27600	
			15700	17400	19100	16600	18500	20400	17600	19600	21600	23600	25600	27600	29600	31600	33600	
			11500	12800	14100	12300	13700	15100	13000	14500	16000	17600	19600	21600	23600	25600	27600	
			15700	17400	19100	16600	18500	20400	17600	19600	21600	23600	25600	27600	29600	31600	33600	
			11500	12800	14100	12300	13700	15100	13000	14500	16000	17600	19600	21600	23600	25600	27600	
			15700	17400	19100	16600	18500	20400	17600	19600	21600	23600	25600	27600	29600	31600	33600	
			11500	12800	14100	12300	13700	15100	13000	14500	16000	17600	19600	21600	23600	25600	27600	
			15700	17400	19100	16600	18500	20400	17600	19600	21600	23600	25600	27600	29600	31600	33600	





**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
		in. mm.	in. mm.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
				ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.		
8 5/8" 219.08	40.00	0.480	13600	15100	16600	14700	16300	17900	15700	17400	19100	16600	18500	20400	-	-	-	
		11.43	18400	20500	22600	19800	22000	24200	21200	23600	26000	22600	25100	27600	-	-	-	
	44.00	0.500	15700	17500	19300	17100	19000	20900	18400	20400	22400	19700	21900	24100	-	-	-	
		12.70	21300	23700	26100	23100	25700	28300	24900	27700	30500	26700	29700	32700	-	-	-	
	49.00	0.557	18300	20300	22300	19900	22100	24300	21100	23500	25900	22800	25300	27800	-	-	-	
		14.15	24700	27500	30300	27000	30000	33000	28700	31900	35100	30900	34300	37700	-	-	-	
	49.10	0.562	18500	20600	22700	20200	22500	24800	21100	23500	25900	22800	25300	27800	-	-	-	
		14.27	25200	28000	30800	27400	30500	33600	28700	31900	35100	30900	34300	37700	-	-	-	
	52.00	0.595	20100	22300	24500	21100	23500	25900	22800	25300	27800	24400	27100	29800	-	-	-	
		15.11	27200	30200	33200	28700	31900	35100	30900	34300	37700	33100	36800	40500	-	-	-	
	54.00	0.625	21100	23500	25900	22800	25300	27800	24400	27100	29800	26000	28900	31800	-	-	-	
		15.88	28700	31900	35100	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-	
	58.70	0.687	24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-	
		17.45	33100	36800	40500	35300	39200	43100	37900	41700	45900	39200	44100	48500	-	-	-	
	63.50	0.750	27600	30700	33800	29200	32500	35800	31000	34400	37800	32600	36200	39800	-	-	-	
		19.05	37500	41700	45900	39700	44100	48500	41900	46600	51300	44100	49000	53900	-	-	-	
43.50	0.435	13400	14900	16400	14400	16000	17600	15500	17200	18900	16500	18300	20100	-	-	-		
	11.05	18200	20200	22200	19600	21800	24000	21000	23300	25600	22400	24900	27400	-	-	-		
47.00	0.472	15100	16800	18500	16400	18200	20000	17500	19500	21500	18700	20800	22900	-	-	-		
	11.99	20500	22800	25100	22100	24600	27100	23800	26400	29000	25500	28300	31100	-	-	-		
53.50	0.545	18300	20300	22300	20000	22200	24400	21100	23500	25900	22800	25300	27800	-	-	-		
	13.84	24700	27500	30300	27200	30200	33200	28700	31900	35100	30900	34300	37700	-	-	-		
58.40	0.595	20700	23000	25300	22800	25300	27800	24400	27100	29800	26000	28900	31800	-	-	-		
	15.11	28000	31100	34200	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-		
59.40	0.609	21100	23500	25900	22800	25300	27800	24400	27100	29800	26000	28900	31800	-	-	-		
	15.47	28700	31900	35100	30900	34300	37700	33100	36800	40500	35300	39200	43100	-	-	-		
61.10	0.625	22800	25300	27800	24400	27100	29800	26000	28900	31800	27600	30700	33800	-	-	-		
	15.88	30900	34300	37700	33100	36800	40500	35300	39200	43100	37500	41700	45900	-	-	-		

**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in. mm.	ft. lb.	in. mm.	ft. lb. N.m.									ft. lb. N.m.					
<b>9 5/8"</b> 244.48	<b>64.90</b>	<b>0.672</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	-	-	-
		<i>17.07</i>	<i>33700</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43700</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	-	-	-
<b>70.30</b>	<b>70.30</b>	<b>0.734</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32600</b>	<b>35800</b>	<b>31000</b>	<b>34400</b>	<b>37800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	-	-	-
		<i>18.64</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	<i>41900</i>	<i>46600</i>	<i>51300</i>	<i>44100</i>	<i>49000</i>	<i>53900</i>	-	-	-
<b>71.80</b>	<b>71.80</b>	<b>0.760</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	<b>31000</b>	<b>34400</b>	<b>37800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	<b>34200</b>	<b>38000</b>	<b>41800</b>	-	-	-
		<i>19.05</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	<i>41900</i>	<i>46600</i>	<i>51300</i>	<i>44100</i>	<i>49000</i>	<i>53900</i>	<i>46300</i>	<i>51500</i>	<i>56700</i>	-	-	-
<b>75.60</b>	<b>75.60</b>	<b>0.797</b>	<b>31000</b>	<b>34400</b>	<b>37800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	<b>34200</b>	<b>38000</b>	<b>41800</b>	<b>36300</b>	<b>39800</b>	<b>43800</b>	-	-	-
		<i>20.24</i>	<i>41900</i>	<i>46600</i>	<i>51300</i>	<i>44100</i>	<i>49000</i>	<i>53900</i>	<i>46300</i>	<i>51500</i>	<i>56700</i>	<i>48500</i>	<i>53900</i>	<i>59300</i>	-	-	-
<b>80.80</b>	<b>80.80</b>	<b>0.859</b>	<b>34200</b>	<b>38000</b>	<b>41800</b>	<b>35800</b>	<b>39800</b>	<b>43800</b>	<b>37400</b>	<b>41600</b>	<b>45800</b>	<b>39000</b>	<b>43400</b>	<b>47800</b>	-	-	-
		<i>21.82</i>	<i>46300</i>	<i>51500</i>	<i>56700</i>	<i>48600</i>	<i>54000</i>	<i>59400</i>	<i>50800</i>	<i>56400</i>	<i>62000</i>	<i>52900</i>	<i>58800</i>	<i>64700</i>	-	-	-
<b>9 3/4"</b> 247.65	<b>59.20</b>	<b>0.595</b>	<b>20700</b>	<b>23000</b>	<b>25300</b>	<b>22800</b>	<b>26300</b>	<b>27800</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	-	-	-
		<i>15.11</i>	<i>28100</i>	<i>31200</i>	<i>34300</i>	<i>30900</i>	<i>34300</i>	<i>37700</i>	<i>33100</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	-	-	-
<b>9 7/8"</b> 250.83	<b>62.80</b>	<b>0.625</b>	<b>22800</b>	<b>26300</b>	<b>27800</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	-	-	-
		<i>15.88</i>	<i>30900</i>	<i>34300</i>	<i>37700</i>	<i>33100</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	-	-	-
<b>65.30</b>	<b>65.30</b>	<b>0.650</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	-	-	-
		<i>16.51</i>	<i>33100</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	-	-	-
<b>66.90</b>	<b>66.90</b>	<b>0.668</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	-	-	-
		<i>16.97</i>	<i>33100</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	-	-	-
<b>67.50</b>	<b>67.50</b>	<b>0.678</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	-	-	-
		<i>17.22</i>	<i>33100</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	-	-	-
<b>68.90</b>	<b>68.90</b>	<b>0.700</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	<b>31000</b>	<b>34400</b>	<b>37800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	-	-	-
		<i>17.78</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	<i>41900</i>	<i>46600</i>	<i>51300</i>	<i>44100</i>	<i>49000</i>	<i>53900</i>	-	-	-
<b>10"</b> 254.00	<b>67.20</b>	<b>0.672</b>	<b>24400</b>	<b>27100</b>	<b>29800</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	-	-	-
		<i>17.07</i>	<i>33100</i>	<i>36800</i>	<i>40500</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	-	-	-
<b>68.70</b>	<b>68.70</b>	<b>0.688</b>	<b>26000</b>	<b>28900</b>	<b>31800</b>	<b>27600</b>	<b>30700</b>	<b>33800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	<b>31000</b>	<b>34400</b>	<b>37800</b>	-	-	-
		<i>17.48</i>	<i>35300</i>	<i>39200</i>	<i>43100</i>	<i>37500</i>	<i>41700</i>	<i>45900</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>	<i>41900</i>	<i>46600</i>	<i>51300</i>	-	-	-
<b>10 3/4"</b> 273.05	<b>51.00</b>	<b>0.450</b>	<b>14800</b>	<b>16400</b>	<b>18000</b>	<b>16200</b>	<b>18000</b>	<b>19800</b>	<b>17700</b>	<b>19700</b>	<b>21700</b>	<b>19200</b>	<b>21300</b>	<b>23400</b>	-	-	-
		<i>11.43</i>	<i>20000</i>	<i>22200</i>	<i>24400</i>	<i>22000</i>	<i>24400</i>	<i>26800</i>	<i>24000</i>	<i>26700</i>	<i>29400</i>	<i>26000</i>	<i>28900</i>	<i>31800</i>	-	-	-



**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		75-80.85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
		in. mm.	in. mm.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
				ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.		
10 3/4" 273.05	55.50	0.495	16900	18800	20700	18700	20800	22900	20400	22700	25000	22800	25300	27800	-	-	-	
		12.57	22900	25500	28100	25400	28200	31000	27700	30800	33900	30900	34300	37700	-	-	-	
	60.70	0.545	19400	21600	23800	21100	23500	25900	22800	25300	27900	24400	27100	29800	-	-	-	
		13.84	26400	29300	32200	28700	31900	35100	30900	34300	37700	33700	36800	40500	-	-	-	
	66.70	0.595	21100	23500	25900	22800	25300	27800	24400	27100	29800	26000	28900	31800	-	-	-	
		15.11	28700	31900	35100	30900	34300	37700	33700	36800	40500	35300	39200	43100	-	-	-	
	71.10	0.650	24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-	
		16.57	33100	36800	40500	35300	39200	43100	37500	41700	45900	39700	44100	48500	-	-	-	
	72.00	0.656	24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-	
		16.66	33100	36800	40500	35300	39200	43100	37500	41700	45900	39700	44100	48500	-	-	-	
73.20	0.672	26000	28900	31800	27600	30700	33800	29200	32500	35800	31000	34400	37800	-	-	-		
	17.07	35300	39200	43100	37500	41700	45900	39700	44100	48500	41900	46600	51300	-	-	-		
75.90	0.700	27600	30700	33800	29200	32500	35800	31000	34400	37800	32600	36200	39800	-	-	-		
	17.78	37500	41700	45900	39700	44100	48500	41900	46600	51300	44700	49000	53900	-	-	-		
79.20	0.734	29200	32500	35800	31000	34400	37800	32600	36200	39800	34200	38000	41800	-	-	-		
	18.64	39700	44100	48500	41900	46600	51300	44700	49000	53900	46300	51500	56700	-	-	-		
80.80	0.750	29200	32500	35800	31000	34400	37800	32600	36200	39800	34200	38000	41800	-	-	-		
	19.05	39700	44100	48500	41900	46600	51300	44700	49000	53900	46300	51500	56700	-	-	-		
85.30	0.797	32600	36200	39800	34200	38000	41800	35800	39800	43800	37400	41600	45800	-	-	-		
	20.24	44100	49000	53900	46300	51500	56700	48500	53900	59300	50800	56400	62000	-	-	-		
97.10	0.922	39100	43400	47700	40700	45200	49700	42300	47000	51700	43900	48800	53700	-	-	-		
	23.42	52900	58800	64700	55200	61300	67400	57300	63700	70100	59600	66200	72800	-	-	-		
10 7/8"	0.656	24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-		
	16.66	33100	36800	40500	35300	39200	43100	37500	41700	45900	39700	44100	48500	-	-	-		
11 3/4"	0.435	14800	16400	18000	16300	18100	19900	17700	19700	21700	19300	21400	23500	-	-	-		
	11.05	20000	22200	24400	22000	24500	27000	24000	26700	29400	26100	29000	31900	-	-	-		
298.45	0.489	17500	19400	21300	19300	21500	23700	21100	23500	25900	22800	25300	27800	-	-	-		
	12.42	23700	26300	28900	26200	29100	32000	28700	31900	35100	30900	34300	37700	-	-	-		

**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
			in.	ft. lb.	N.m.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
11 3/4* 298.45	65.00	0.534 13.56	19300	21500	23700	21100	23500	25900	22800	25300	27700	24400	27100	29800	-	-	-
			26200	29100	32000	28700	31900	35700	30900	34300	37700	33700	36800	40500	-	-	-
71.00	71.00	0.582 14.78	22800	25300	27800	24400	27100	29800	26000	28900	31800	27600	30700	33800	-	-	-
			30900	34300	37700	33700	36800	40500	35300	39200	43700	37500	41700	45900	39700	44100	48500
74.60	74.60	0.618 15.70	24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-
			33700	36800	40500	35300	39200	43700	37500	41700	45900	39700	44100	48500	39700	44100	48500
75.40	75.40	0.625 15.88	24400	27100	29800	26000	28900	31800	27600	30700	33800	29200	32500	35800	-	-	-
			33700	36800	40500	35300	39200	43700	37500	41700	45900	39700	44100	48500	39700	44100	48500
78.80	78.80	0.656 16.66	26000	28900	31800	27600	30700	33800	29200	32500	35800	31000	34400	37800	-	-	-
			35300	39200	43700	37500	41700	45900	39700	44100	48500	41900	46600	51300	41900	46600	51300
80.50	80.50	0.672 17.07	27600	30700	33800	29200	32500	35800	31000	34400	37800	32600	36200	39800	-	-	-
			37500	41700	45900	39700	44100	48500	41900	46600	51300	44100	49000	53900	44100	49000	53900
82.60	82.60	0.691 17.55	29200	32500	35800	31000	34400	37800	32600	36200	39800	34200	38000	41800	-	-	-
			39700	44100	48500	41900	46600	51300	44700	49000	53900	46300	51500	56700	46300	51500	56700
87.40	87.40	0.734 18.64	31000	34400	37800	32600	36200	39800	34200	38000	41800	35800	39800	43800	-	-	-
			41900	46600	51300	44700	49000	53900	46300	51500	56700	48500	53900	59300	48500	53900	59300
11 7/8* 301.63	71.80	0.582 14.78	22800	25300	27800	24400	27100	29800	26000	28900	31800	27600	30700	33800	-	-	-
			30900	34300	37700	33700	36800	40500	35300	39200	43700	37500	41700	45900	37500	41700	45900
12 1/16* 306.40	78.08	0.640 16.26	26000	28900	31800	27600	30700	33800	29200	32500	35800	31000	34400	37800	-	-	-
			35300	39200	43700	37500	41700	45900	39700	44100	48500	41900	46600	51300	41900	46600	51300
12 1/8* 307.98	87.70	0.720 18.29	29200	32500	35800	31000	34400	37800	32600	36200	39800	34200	38000	41800	-	-	-
			39700	44100	48500	41900	46600	51300	44700	49000	53900	46300	51500	56700	46300	51500	56700
12 3/4* 323.85	86.70	0.672 17.07	27600	30700	33800	29200	32500	35800	31000	34400	37800	32600	36200	39800	-	-	-
			37500	41700	45900	39700	44100	48500	41900	46600	51300	44100	49000	53900	44100	49000	53900
13 3/8* 339.73	68.00	0.480 12.19	18100	20100	22100	20300	22600	24900	22800	25300	27800	24400	27100	29800	-	-	-
			24600	27300	30000	27500	30600	33700	30900	34300	37700	33100	36800	40500	33100	36800	40500
	72.00	0.514 13.06	19300	21400	23500	21100	23500	25900	22800	25300	27800	24400	27100	29800	-	-	-
			26100	29000	31900	28700	31900	35100	30900	34300	37700	33100	36800	40500	33100	36800	40500





**VAM SLU-II TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi		90-95-100 ksi		105-110-115 ksi		120-125-130 ksi		135-140-145 ksi						
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.			
in. mm.	ft. lb.	in. mm.	ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.			ft. lb. N.m.					
13 3/8" 339.73	77.00	0.560 13.97	21100 28700	23500 31900	25900 35100	22800 30900	25300 34300	27800 37700	24400 33700	27100 36800	29800 39200	26000 35300	28900 39200	31800 43100	-	-	-
	80.70	0.580 14.73	22800 30900	25300 34300	27800 37700	24400 33700	29800 36800	31800 40500	26000 35300	28900 39200	30700 43100	27600 37500	30700 41700	33800 45900	-	-	-
	85.00	0.608 15.44	24400 33700	27100 36800	29800 40500	26000 35300	28900 39200	31800 43100	29200 39700	32500 44100	35800 48500	31000 41900	34400 46600	37800 51300	-	-	-
	86.00	0.625 15.88	26000 35300	28900 39200	31800 43100	27600 37500	30700 41700	33800 45900	29200 39700	32500 44100	35800 48500	31000 41900	34400 46600	37800 51300	-	-	-
	92.00	0.672 17.07	29200 39700	32500 44100	35800 48500	31000 41900	34400 46600	37800 51300	34200 46300	38000 50900	41800 56700	34200 46300	38000 50900	41800 56700	-	-	-
13 5/8" 346.08	98.00	0.719 18.26	31000 41900	34400 46600	37800 51300	32600 44100	36200 49000	39800 53900	34200 46300	38000 50900	41800 56700	34200 46300	38000 50900	41800 56700	-	-	-
	88.20	0.625 15.88	26000 35300	28900 39200	31800 43100	27600 37500	30700 41700	33800 45900	29200 39700	32500 44100	35800 48500	31000 41900	34400 46600	37800 51300	-	-	-
	116.00	0.850 21.59	42300 57300	47000 63700	51700 70100	43900 59600	48800 66200	53700 72800	44900 60900	49900 67700	54900 74500	44900 60900	49900 67700	54900 74500	-	-	-
14" 355.60	82.50	0.562 14.27	26000 35300	28900 39200	31800 43100	27600 37500	30700 41700	33800 45900	29200 39700	32500 44100	35800 48500	31000 41900	34400 46600	37800 51300	32600 44100	36200 49000	39800 53900
	93.00	0.650 16.51	32600 44100	36200 49000	39800 53900	34200 46300	38000 51500	41800 56700	35800 48500	39800 53900	43800 59300	37400 50800	41600 55200	45800 62000	39000 52900	43400 58800	47700 64700
100.00	0.700 17.78	35800 48500	39800 53900	43800 59300	37400 50800	41600 55200	45800 62000	48500 64700	39000 52900	43400 58800	47700 64700	42300 57300	45200 61300	49700 67400	42300 57300	47000 63700	51700 70100
	104.20	0.734 18.64	37400 50800	41600 55200	45800 62000	39000 52900	43400 58800	47700 64700	42300 57300	45200 61300	49700 70100	42300 57300	47000 63700	51700 70100	43900 59600	48800 66200	53700 72800
106.00	0.750 19.05	39000 52900	43400 58800	47700 64700	40700 55200	45200 61300	49700 70100	42300 57300	45200 61300	49700 70100	54900 74500	42300 57300	47000 63700	51700 70100	44900 60900	49900 67700	54900 74500
	112.60	0.797 20.24	43900 59600	48800 66200	53700 72800	44900 60900	49900 67700	54900 74500	44900 60900	49900 67700	54900 74500	44900 60900	49900 67700	54900 74500	44900 60900	49900 67700	54900 74500



### VAM SLU-II TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm	ft. lb. N.m	in. mm	ft. lb. N.m						ft. lb. N.m						ft. lb. N.m		
14* 355.60	115.00	0.812	44900	49900	54900	44900	49900	54900	44900	49900	54900	44900	49900	54900	44900	49900	54900
		20.62	60900	67700	74500	60900	67700	74500	60900	67700	74500	60900	67700	74500	60900	67700	74500
16* 406.40	84.00	0.495	31000	34400	37800	32600	36200	39800	34200	38000	41800	36800	39800	43800	-	-	-
		12.57	41900	46600	51300	44700	49000	53900	46300	51500	56700	48500	53900	59300	-	-	-
	97.00	0.575	35800	39800	43800	37400	41600	45800	39000	43400	47700	40700	45200	49700	-	-	-
		14.60	48500	53900	59300	50800	56400	62000	52900	58800	64700	55200	61300	67400	-	-	-
	104.00	0.625	40700	45200	49700	42300	47000	51700	43900	48800	53700	44900	49900	54900	-	-	-
		15.87	55200	61300	67400	57300	63700	70100	59600	66200	72800	60900	67700	74500	-	-	-
	109.00	0.656	42300	47000	51700	43900	48800	53700	44900	49900	54900	44900	49900	54900	-	-	-
		16.66	57300	63700	70100	59600	66200	72800	60900	67700	74500	60900	67700	74500	-	-	-
	118.00	0.715	44900	49900	54900	44900	49900	54900	44900	49900	54900	44900	49900	54900	-	-	-
		18.16	60900	67700	74500	60900	67700	74500	60900	67700	74500	60900	67700	74500	-	-	-



## 3.12 VAM MUST

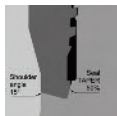
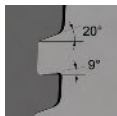
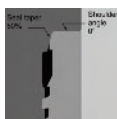
### Application



#### Integral Flush Design

VAM® MUST is a fully flush integral connection threaded on heavy weight casing.

Basic application is to run this pipe in salt or other floating formations (high collapse !) in certain sections of the casing string, where high collapse performance is mandatory. Typically 10 3/4" VAM MUST is used for 9 5/8" / 9 7/8" or even 10" casing sections, or 7 5/8" VAM MUST for 7" casing string sections, where the bigger VAM MUST about equals the coupling OD and tension efficiency of the smaller T&C section



#### Multiple Seal System

An external seal and an internal seal work independently of each other to achieve sealing against internal pressure and external pressure up to 100% of the rated internal and external pressure resistance of the pipe body.

#### Interference Tapered Thread

Thread load flank has a 9° reverse angle to avoid jump-out.

Thread stabbing flank has a 20° angle for easy stabbing and fast, trouble-free make-up.

#### Streamlined Internal and External Profile

The O.D. and I.D. is 100% flush (there is no upset).

The I.D. is bored and recess-free for smooth, efficient flow.

The O.D. is turned to tight tolerance.

VAM MUST can be repaired by VAM licensed workshops.

#### Internal reverse angle torque shoulder

The reverse angle torque shoulder provides a positive torque stop, which allows accurate power-tight make-up.

The reverse angle of the shoulder increases the internal seal contact pressure achieving excellent gas-tightness under internal pressure.

The combination of the reverse angle torque shoulder and the 9° load flank of the threads creates a “wedge” effect which improves the structural strength of the connection.

### Streamlined internal and external profile

The OD and ID is 100% flush (no upset).

The ID is bored and recess-free for smooth, efficient flow.

The OD is turned to tight tolerance.

### Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection. If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

### Minimum make-up dope quantity

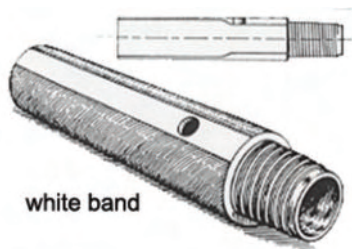
Nominal OD	Dope volume	
	(in.)	(cm <sup>3</sup> )
7 5/8	24	1.5
10 3/4	42	2.6

### Running procedure

The VAM MUST connection can be run exactly as VAM tubing or casing when the special lifting plug has been set in the box of the joint to simulate a coupling face.

(moved upwards from below:) When using the back-up tong, in order to avoid any ovalisation of the box end the back up tong shall be positioned at least 1 foot from the end of the pipe.

Setting the lifting plug:



This lifting plug must be firmly tightened with a steel bar.

The joint can be used exactly as a normal coupled joint.

When the lifting plug is tightened:

Remove the lifting plug from the previous joint (the pipe in the slips shall be fitted with a safety clamp).

Stab as a VAM joint with a stabbing guide.

Engage the four or five first turns with a chain tong.

Note: During running, when the joint rotates during make-up make sure the lifting plug is free from the elevator and can rotate with the pipe. Otherwise there is a risk of unscrewing the lifting plug, which could then fall onto the drill-floor.

The lifting plug must be kept clean and checked before every make up in order to

verify the integrity of threads (risk of damaging the pipe threads and galling).

Note: it is highly recommended to have at least 3 lifting plugs available at the rig site: 2 in process of running, and at least 1 spare.

This will avoid slowing down the operation and avoid damaging the pipes threads if the plug is damaged itself.

### VAM MUST TECHNICAL DATA

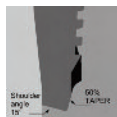
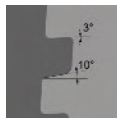
Size (OD)	Nominal Weight		Pipe				Pin		Joint		Connection Yield Strength (1000 lb.)			
	inch	mm	lb./ft.	Wall Thickness		API Drift	Pin ID	Pin Length	CCS	sq. in.	80 ksi		110 ksi	
				inch	mm						inch	mm	95 ksi	110 ksi
7 5/8"	55.30	0.750	19.050	6.125	6.000	6.315	5.294	9.153 P	732	870	1007			
193.68	59.20	0.812	20.620	6.001	5.876	6.201	5.857	10.029 P	802	953	1103			
10 3/4"	109.00	1.033	26.240	8.684	8.528	8.397	6.289	17.723 P	1418	1684	1950			
273.05														

### VAM MUST TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		75-80.85 ksi		90-95-100 ksi		105-110-115 ksi		120-125-130 ksi		135-140-145 ksi		
		in.	mm.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.
7 5/8"	55.30	0.750	14900	16600	18300	17280	19200	21120	19900	22100	24300	20850	23150	25450
		19.05	20300	22600	14900	23400	26000	28600	26900	29900	32900	28300	31400	34500
		0.812	16650	18450	20250	18270	20300	22330	20850	23150	25450	22800	25320	27900
10 3/4"	109.00	1.033	22500	25000	27500	24800	27500	30300	28300	31400	34500	30900	34300	37700
		26.24	42700	47500	52300	42800	47500	52300	42700	47500	52300	42700	47500	52300
			31500	36000	38500	31500	35000	38500	31500	35000	38500	31500	35000	38500

## 3.13 VAM HW ST

### Application



### VAM Metal To Metal Seal and Reverse Angle Torque Shoulder

A reverse angle torque shoulder energizes a 50% taper metal-to-metal seal, and is self energized by internal pressure.

The rugged design of the pin nose makes for a rugged connection that is able to withstand the high combined loads that are encountered in deep, high-pressure wells.

VAM HW ST is the solution for a connection to withstand pressures as high as the burst and the collapse ratings of the heavy wall casing.

### Hook Thread Design

A coarse thread pitch with a  $-3^\circ$  reverse load flank angle gives the connection superior tension strength and eliminates the risk of jump out.

Precision machining in the threads contributes to reduce hoop stresses in the coupling

A steep thread taper allows for easy stabbing and fast make-up. Making-up heavy wall casing with VAM HW ST is as easy as with standard wall casing, with virtually no danger of cross threading.

### Extra Strength Coupling

The coupling size is calculated to provide in excess of 100% tensile efficiency on heavy weight casing.

The coupling design minimizes hoop stresses, and is ideal for use with controlled yield materials in high-pressure high temperature wells where sour gas or other corrosive environments may be encountered.

The thread form has a taper of 1:8 or 1:5.5

On diameters 5" to 14", there is 4 TPI.

## Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection.

If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

## Minimum make-up dope quantity

Nominal OD	Dope volume	
	(in.)	(cm <sup>3</sup> )
5	14	0.9
5 ½	16	1
6 5/8	19	1.2
7	25	1.5
7 5/8	27	1.7
8 5/8	37	2.3
9 1/8	39	2.4
9 5/8	41	2.5
10	43	2.6
10 ¾	46	2.8
11 ¾	59	3.6
13 3/8	67	4.1
14	70	4.3

**VAM HW ST TECHNICAL DATA**

Size (OD)	Inch mm	Nominal Weight lb./ft.	Wall Thickness		API Drift Diameter Inch.	Coupling OD (reg) Inch.	Coupling ID Inch.	Make-up Loss Inch.	Coupling Length Inch.	Pipe Body Section sq. in.	Coupling CCS sq. in.	Yield Strength (1000 lb.)						
			Inch	mm								55 ksi	80 ksi	90 ksi	110 ksi	125 ksi		
127.00	5"	28.20	0.600	15.24	3.675	3.938	4.382	10.732	8.294	8.474	8.474	NA	NA	746	788	912	1 037	
		30.20	0.650	16.51	3.575	3.848	4.568	11.105	8.883	9.080	9.080	NA	NA	799	844	977	1 110	
		32.15	0.700	17.78	3.475	3.758	4.754	11.477	9.650	9.650	9.650	NA	NA	851	898	1 040	1 182	
		34.00	0.750	19.05	3.375	3.668	4.941	11.850	10.014	10.225	10.225	10.225	NA	NA	901	951	1 102	1 252
		35.88	0.800	20.32	3.275	3.578	5.126	12.221	10.556	10.804	10.804	10.804	NA	NA	950	1 003	1 161	1 320
139.70	5 1/2"	31.40	0.600	15.24	4.175	4.442	4.706	11.380	9.236	9.455	9.455	NA	NA	831	877	1 016	1 155	
		32.60	0.625	15.88	4.125	4.396	4.706	11.380	9.572	9.767	9.767	NA	NA	861	909	1 053	1 196	
		33.67	0.650	16.51	4.075	4.352	4.706	11.380	9.904	10.118	10.118	NA	NA	792	891	1 089	1 238	
		35.30	0.687	17.45	4.001	4.285	4.706	11.380	10.388	10.630	10.630	NA	NA	831	935	1 143	1 299	
		35.88	0.700	17.78	3.975	4.261	4.754	11.477	10.556	10.799	10.799	NA	NA	844	950	1 063	1 230	
		38.00	0.750	19.05	3.875	4.172	4.941	11.850	11.192	11.427	11.427	11.427	NA	NA	895	1 007	1 063	1 231
		40.16	0.800	20.32	3.775	4.081	5.126	12.221	11.812	12.056	12.056	12.056	NA	NA	945	1 063	1 122	1 299
		40.50	0.812	20.62	3.751	4.060	5.170	12.309	11.959	12.220	12.220	12.220	NA	NA	957	1 076	1 136	1 315
		42.21	0.850	21.59	3.675	3.992	5.313	12.594	12.417	12.687	12.687	12.687	NA	NA	1 118	1 180	1 366	1 552
		43.22	0.875	22.23	3.625	3.946	5.406	12.781	12.714	12.984	12.984	12.984	NA	NA	1 144	1 208	1 398	1 589
168.28	6 5/8"	44.22	0.900	22.86	3.575	3.902	5.499	12.966	13.006	13.280	13.280	NA	NA	1 171	1 236	1 431	1 626	
		41.48	0.650	16.51	5.200	5.483	4.568	11.105	12.201	12.481	12.481	671	976	1 098	1 159	1 342	1 525	
		47.10	0.750	19.05	5.000	5.303	4.941	11.850	13.843	14.161	14.161	761	1 107	1 246	1 315	1 523	1 730	
		49.77	0.800	20.32	4.900	5.213	5.126	12.221	14.930	14.959	14.959	NA	1 171	1 318	1 401	1 610	1 830	
		52.43	0.850	21.59	4.800	5.123	5.628	13.225	15.421	15.767	15.767	NA	1 234	1 388	1 465	1 696	1 928	
177.80	7"	55.03	0.900	22.86	4.700	5.033	5.628	13.225	16.187	16.531	16.531	NA	NA	1 295	1 457	1 538	1 781	
		57.58	0.950	24.13	4.600	4.943	5.628	13.225	16.937	17.300	17.300	NA	1 355	1 524	1 609	1 863	2 107	
		60.08	1.000	25.40	4.500	4.853	5.522	13.072	17.671	18.053	18.053	NA	1 414	1 590	1 679	1 944	2 219	
		44.08	0.650	16.51	5.575	5.859	5.009	11.986	12.967	13.237	13.237	NA	1 037	1 167	1 232	1 426	1 621	
		46.00	0.670	17.02	5.535	5.823	5.097	12.162	13.324	13.595	13.595	NA	1 066	1 199	1 266	1 466	1 666	
184.1	7 1/2"	46.40	0.687	17.45	5.501	5.792	5.171	12.311	13.625	13.936	13.936	NA	1 090	1 226	1 294	1 499	1 703	
		47.10	0.700	17.78	5.475	5.769	5.228	12.425	13.854	14.158	14.158	NA	1 108	1 247	1 316	1 524	1 732	
		49.50	0.730	18.54	5.415	5.715	5.360	12.689	14.379	14.672	14.672	NA	1 150	1 294	1 366	1 582	1 797	
		50.10	0.750	19.05	5.375	5.679	5.448	12.865	14.726	15.033	15.033	NA	1 178	1 325	1 399	1 620	1 841	



### VAM HW ST TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift	Coupling OD (reg)	Coupling ID	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Yield Strength (1000 lb.)																																																																																																																																	
		inch	mm								55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi																																																																																																																												
7"	52.97	0.800	20.32	5.275	7.996	5.589	5.669	13.306	15.582	15.911	NA	1.247	1.402	1.480	1.714	1.948																																																																																																																												
																	177.80	53.60	0.812	20.62	8.008	5.568	5.720	13.409	15.785	16.126	NA	1.263	1.421	1.500	1.736	1.973																																																																																																												
																																	55.83	0.850	21.59	8.043	5.499	5.889	13.746	16.423	16.791	NA	1.314	1.478	1.560	1.806	2.053																																																																																													
																																																57.24	0.875	22.23	8.063	5.454	5.999	13.967	16.837	17.182	NA	1.347	1.515	1.600	1.852	2.105																																																																														
																																																															58.63	0.900	22.86	8.067	5.409	6.109	14.186	17.247	17.624	NA	1.380	1.552	1.638	1.897	2.156																																																															
																																																																														60.67	0.937	23.80	8.118	5.342	6.271	14.511	17.847	18.233	NA	1.428	1.606	1.695	1.963	2.231																																																
																																																																																													61.38	0.950	24.13	8.130	5.319	6.328	14.625	18.056	18.457	NA	1.444	1.625	1.715	1.986	2.257																																	
																																																																																																												64.08	1.000	25.40	8.091	5.229	5.752	13.472	18.850	19.239	NA	1.508	1.697	1.791	2.074	2.356																		
																																																																																																																											75/8"	48.42	0.650	16.51	6.200	8.488	6.410	5.009	11.986	14.243	14.545	783	1.139	1.282	1.353	1.567	1.780	
																																																																																																																																												193.68
52.10	0.700	17.78	8.539	6.399	5.228	12.425	15.229	15.545	NA	1.218	1.371	1.447	1.675	1.904																																																																																																																														
															52.80	0.712	18.08	6.076	6.378	5.280	12.529	15.463	15.777	NA	1.237	1.392	1.469	1.701	1.933																																																																																																															
																														55.30	0.750	19.05	8.591	6.309	5.448	12.865	16.199	16.548	NA	1.296	1.458	1.539	1.782	2.025																																																																																																
																																													58.31	0.800	20.32	8.638	6.219	5.669	13.306	17.153	17.501	NA	1.372	1.544	1.630	1.887	2.144																																																																																	
																																																												59.20	0.812	20.62	8.650	6.198	5.720	13.409	17.380	17.734	NA	1.390	1.564	1.651	1.912	2.173																																																																		
																																																																											61.50	0.850	21.59	8.685	6.129	5.889	13.746	18.092	18.456	NA	1.447	1.628	1.719	1.990	2.262																																																			
																																																																																										64.64	0.900	22.86	8.732	6.039	6.109	14.186	19.014	19.411	NA	1.046	1.521	1.711	1.806	2.092	2.377																																			
																																																																																																										64.95	0.905	22.99	8.736	5.690	5.690	14.231	19.106	19.496	NA	1.051	1.528	1.720	1.815	2.102	2.388																			
																																																																																																																										67.72	0.950	24.13	8.780	5.949	6.328	14.625	19.922	20.370	NA	1.096	1.594	1.793	1.893	2.191	2.490			
																																																																																																																																										70.76	1.000	25.40
73.73	1.050	26.67	8.780	5.769	5.937	13.843	21.689	22.148	NA	1.735	1.952	2.060	2.386	2.711																																																																																																																														
															76.66	1.100	27.94	8.815	5.679	6.122	14.213	22.549	23.007	NA	1.804	2.029	2.142	2.480	2.819																																																																																																															
																														79.53	1.150	29.21	8.850	5.589	6.307	14.583	23.393	23.865	NA	1.871	2.105	2.222	2.573	2.924																																																																																																
																																													82.34	1.200	30.48	8.886	5.499	6.492	14.953	24.222	24.724	NA	1.938	2.180	2.301	2.664	3.028																																																																																	
																																																												85.11	1.250	31.75	8.921	5.409	6.677	15.323	25.035	25.583	NA	2.003	2.253	2.378	2.754	3.129																																																																		
																																																																											85/8"	59.25	0.700	17.78	7.000	9.567	7.404	5.546	13.061	17.428	18.087	959	1.394	1.569	1.656																																																			
																																																																																										219.08	63.50	0.750	19.05	7.000	9.618	7.314	5.767	13.502	18.555	18.961	1.021	1.484	1.670	1.763	2.041																																			
																																																																																																										66.86	0.800	20.32	6.900	9.669	7.224	13.942	19.666	20.093	NA	1.082	1.573	1.770	1.868	2.163	2.458																			
																																																																																																																										70.58	0.850	21.59	6.800	9.720	7.134	14.382	20.762	21.227	NA	1.142	1.661	1.869	1.972	2.284	2.595			



**VAM HW ST TECHNICAL DATA**

Size (OD) Inch mm	Nominal Weight lb./ft.	Wall Thickness		API Drift Diameter Inch.	Coupling OD (reg) Inch.	Coupling ID Inch.	Make-up Loss Inch.	Coupling Length Inch.	Pipe Body Section sq. in.	Coupling CCS sq. in.	Yield Strength (1000 lb.)						
		inch	mm								55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	
8 5/8" 219.08	72.70	0.875	22.23	6.750	9.744	7.089	6.317	14.603	21.304	21.767	NA	1704	1917	2024	2343	2663	
	74.25	0.900	22.86	6.700	9.768	7.044	6.427	14.822	21.842	22.305	1201	1747	1966	2075	2403	2730	
	77.87	0.950	24.13	6.600	9.815	6.954	6.646	15.261	22.906	23.383	1260	1832	2062	2176	2520	2863	
	81.44	1.000	25.40	6.500	9.776	6.864	6.752	13.472	23.955	24.473	1318	1916	2156	2276	2635	2994	
	84.95	1.050	26.67	6.400	9.815	6.774	5.937	13.843	24.987	25.502	1374	1999	2249	2374	2749	3123	
	88.40	1.100	27.94	6.300	9.854	6.684	6.122	14.213	26.005	26.533	1430	2080	2340	2470	2861	3251	
	91.81	1.150	29.21	6.200	9.894	6.594	6.307	14.583	27.006	27.562	1485	2160	2431	2566	2971	3376	
	95.16	1.200	30.48	6.100	9.933	6.504	6.492	14.953	27.992	28.594	1540	2239	2519	2659	3079	3499	
	98.46	1.250	31.75	6.000	9.969	6.414	6.677	15.323	28.962	29.563	1593	2317	2607	2751	3186	3620	
	9 5/8" 244.48	64.90	0.672	17.07	8.125	10.551	8.424	5.424	12.816	18.901	19.341	1040	1512	1701	1796	2079	2363
		66.72	0.700	17.78	8.069	10.579	8.410	5.546	13.061	19.627	20.023	1079	1570	1766	1865	2159	2453
		70.30	0.734	18.64	8.001	10.618	8.349	5.696	13.360	20.502	20.951	1128	1640	1845	1948	2255	2563
71.80		0.750	19.05	7.969	10.634	8.320	5.767	13.502	20.911	21.344	1150	1673	1882	1987	2300	2614	
75.60		0.797	20.24	7.865	10.685	8.235	5.973	13.914	22.104	22.576	1216	1768	1989	2100	2431	2763	
75.90		0.800	20.32	7.869	10.689	8.230	5.987	13.942	22.180	22.667	1220	1774	1996	2107	2440	2773	
79.66		0.850	21.59	7.769	10.740	8.140	6.207	14.382	23.432	23.926	1289	1875	2109	2226	2578	2929	
83.86		0.900	22.86	7.669	10.791	8.050	6.427	14.822	24.669	25.188	1357	1974	2220	2344	2714	3084	
88.02		0.950	24.13	7.569	10.843	7.960	6.646	15.261	25.891	26.454	1424	2071	2330	2460	2848	3236	
92.12		1.000	25.40	7.469	10.803	7.870	5.752	13.472	27.096	27.689	1490	2168	2439	2574	2981	3387	
96.16		1.050	26.67	7.369	10.846	7.780	5.937	13.843	28.286	28.903	1556	2263	2546	2687	3111	3487	
100.15		1.100	27.94	7.269	10.886	7.690	6.122	14.213	29.460	30.050	1620	2357	2651	2799	3241	3683	
104.09	1.150	29.21	7.169	10.929	7.600	6.307	14.583	30.619	31.264	1684	2450	2756	2909	3368	3827		
107.97	1.200	30.48	7.069	10.969	7.510	6.492	14.953	31.762	32.412	1747	2541	2859	3017	3494	3970		
111.81	1.250	31.75	6.969	11.008	7.420	6.677	15.323	32.889	33.559	1809	2631	2960	3124	3618	4111		
10" 254.00	68.70	0.688	17.48	8.468	10.949	8.807	5.494	12.957	20.127	20.595	1107	1610	1811	1912	2214	2516	
	69.20	0.700	17.78	8.444	10.961	8.785	5.546	13.061	20.452	20.899	1125	1636	1841	1943	2250	2557	
	71.80	0.732	18.59	8.380	10.996	8.728	5.687	13.343	21.313	21.774	1172	1705	1918	2025	2344	2664	
	74.09	0.750	19.05	8.344	11.016	8.696	5.767	13.502	21.795	22.267	1199	1744	1962	2071	2397	2724	
78.60	0.800	20.32	8.244	11.071	8.606	5.987	13.942	23.122	23.639	1272	1850	2081	2196	2543	2890		

**VAM HW ST TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift	Coupling OD (reg)	Coupling ID	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Yield Strength (1000 lb.)					
		inch	mm								55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
10" 254.00	83.06	0.850	21.59	8.144	11.122	8.515	6.207	14.382	24.434	24.946	1.344	1.955	2.199	2.321	2.688	3.054
	87.47	0.900	22.86	8.044	11.173	8.426	6.427	14.822	25.730	26.257	1.415	2.058	2.316	2.444	2.830	3.216
	91.82	0.950	24.13	7.944	11.224	8.335	6.646	15.261	27.010	27.568	1.486	2.161	2.431	2.566	2.971	3.376
	96.12	1.000	25.40	7.844	11.185	8.246	6.752	13.472	28.274	28.858	1.555	2.262	2.545	2.686	3.110	3.534
	100.37	1.050	26.67	7.744	11.228	8.156	6.937	13.843	29.523	30.118	1.624	2.362	2.657	2.805	3.248	3.690
	104.56	1.100	27.94	7.644	11.272	8.065	7.122	14.213	30.756	31.377	1.692	2.460	2.768	2.922	3.383	3.845
	108.70	1.150	29.21	7.544	11.315	7.976	7.307	14.583	31.974	32.638	1.759	2.558	2.878	3.037	3.517	3.997
	112.78	1.200	30.48	7.444	11.358	7.885	7.492	14.953	33.175	33.899	1.825	2.654	2.986	3.152	3.649	4.147
	116.81	1.250	31.75	7.344	11.398	7.796	7.677	15.323	34.361	35.092	1.890	2.749	3.092	3.264	3.788	4.295
	120.84	1.300	33.02	7.244	11.441	7.700	7.806	15.693	35.533	36.273	1.954	2.852	3.204	3.383	3.928	4.440
10 3/4" 273.05	65.70	0.595	15.11	9.404	11.579	9.728	5.263	12.494	18.982	19.423	1.044	1.519	1.708	1.803	2.088	2.373
	71.10	0.650	16.51	9.294	11.642	9.629	5.522	13.012	20.625	21.103	1.134	1.650	1.856	1.959	2.269	2.578
	73.20	0.672	17.07	9.250	11.665	9.589	5.625	13.219	21.276	21.748	1.170	1.702	1.915	2.021	2.340	2.660
	75.90	0.700	17.78	9.194	11.697	9.539	5.757	13.482	22.101	22.593	1.216	1.768	1.989	2.100	2.431	2.763
	79.20	0.734	18.64	9.126	11.732	9.478	5.916	13.800	23.096	23.571	1.270	1.848	2.079	2.194	2.541	2.887
	80.80	0.750	19.05	9.094	11.752	9.449	5.992	13.952	23.562	24.087	1.296	1.885	2.121	2.238	2.592	2.945
	85.01	0.800	20.32	8.994	11.803	9.359	6.227	14.422	25.007	25.513	1.371	1.994	2.243	2.367	2.751	3.115
	85.30	0.797	20.24	9.000	11.803	9.365	6.212	14.392	24.921	25.482	1.375	2.001	2.251	2.376	2.741	3.126
	90.30	0.850	21.59	8.894	11.858	9.269	6.461	14.891	26.437	27.012	1.454	2.115	2.379	2.512	2.908	3.305
	91.20	0.859	21.82	8.876	11.866	9.253	6.504	14.977	26.692	27.246	1.468	2.135	2.402	2.536	2.936	3.337
94.68	0.900	22.86	8.794	11.909	9.179	6.696	15.361	27.850	28.443	1.532	2.228	2.507	2.646	3.064	3.481	
99.70	0.950	24.13	8.694	11.961	9.089	6.931	15.831	29.248	29.875	1.609	2.340	2.632	2.779	3.217	3.656	
100.40	0.960	24.38	8.674	11.969	9.071	6.978	15.924	29.526	30.118	1.624	2.362	2.657	2.805	3.248	3.691	
102.63	0.984	24.99	8.594	11.996	9.028	7.091	16.150	30.190	30.862	1.660	2.415	2.717	2.868	3.321	3.774	
104.13	1.000	25.40	8.594	11.898	8.999	7.122	16.172	30.631	31.273	1.685	2.450	2.757	2.910	3.369	3.829	
108.78	1.050	26.67	8.494	11.941	8.909	7.307	16.578	31.997	32.668	1.760	2.560	2.880	3.040	3.520	4.000	
114.80	1.100	27.94	8.394	11.984	8.819	7.492	16.983	33.348	34.061	1.834	2.668	3.001	3.168	3.668	4.169	
117.91	1.150	29.21	8.294	12.024	8.729	7.677	17.387	34.683	35.382	1.908	2.775	3.121	3.295	3.815	4.335	
122.39	1.200	30.48	8.194	12.067	8.639	7.862	17.793	36.003	36.775	1.980	2.880	3.240	3.420	3.960	4.500	
126.83	1.250	31.75	8.094	12.106	8.549	8.049	18.198	37.306	38.098	2.052	2.984	3.358	3.544	4.104	4.663	



**VAM HW ST TECHNICAL DATA**

Size (OD)	Nominal Weight	Wall Thickness		API Drift	Coupling OD (reg)	Coupling ID	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS		Yield Strength (1000 lb.)				
		inch	mm							sq. in.	sq. in.	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi
11 3/4" 298.45	77.06	0.650	16.51	10.294	12.650	10.635	5.522	13.012	22.667	23.173	1.247	1.813	2.040	2.153	2.493	2.833
	82.61	0.700	17.78	10.194	12.705	10.544	5.757	13.482	24.300	24.795	1.337	1.944	2.187	2.309	2.673	3.038
	88.11	0.750	19.05	10.094	12.764	10.455	5.992	13.952	25.918	26.502	1.425	2.073	2.333	2.462	2.851	3.240
	93.56	0.800	20.32	9.994	12.819	10.365	6.227	14.422	27.520	28.134	1.514	2.202	2.477	2.614	3.027	3.440
	98.95	0.850	21.59	9.894	10.275	12.874	10.275	6.461	14.891	29.768	1.601	2.329	2.620	2.765	3.202	3.638
12 3/4" 323.85	104.29	0.900	22.86	9.794	12.925	10.185	6.696	15.361	30.678	31.327	1.687	2.454	2.761	2.914	3.375	3.835
	109.58	0.950	24.13	9.694	12.976	10.094	6.931	15.831	32.233	32.886	1.773	2.579	2.901	3.062	3.546	4.029
	119.72	0.984	24.99	10.626	14.098	11.041	6.451	14.871	36.373	37.132	2.001	2.910	3.274	3.455	4.001	4.547
	88.34	0.650	16.51	11.919	14.287	12.270	5.522	13.012	25.985	26.589	1.429	2.079	2.339	2.469	2.858	3.248
	94.76	0.700	17.78	11.819	14.346	12.180	5.757	13.482	27.874	28.517	1.533	2.230	2.509	2.648	3.066	3.484
14" 355.60	101.13	0.750	19.05	11.719	14.402	12.090	5.992	13.952	29.747	30.361	1.636	2.380	2.677	2.826	3.272	3.718
	107.44	0.800	20.32	11.619	14.461	12.000	6.227	14.422	31.604	32.299	1.738	2.528	2.844	3.002	3.476	3.951
	113.70	0.850	21.59	11.519	14.516	11.910	6.461	14.891	33.446	34.150	1.840	2.676	3.010	3.177	3.679	4.181
	119.91	0.900	22.86	11.419	14.571	11.820	6.696	15.361	35.272	36.005	1.940	2.822	3.174	3.351	3.880	4.409
	122.01	0.917	23.29	11.385	14.591	11.790	6.776	15.520	35.889	36.658	1.974	2.871	3.230	3.409	3.948	4.486
14" 355.60	126.06	0.950	24.13	11.319	14.626	11.730	6.931	15.831	37.083	37.863	2.040	2.967	3.337	3.523	4.079	4.635
	86.00	0.600	15.24	12.613	14.854	12.988	5.287	12.542	25.258	25.815	1.389	2.021	2.273	2.400	2.778	3.157
	93.00	0.650	16.51	12.513	14.913	12.898	5.522	13.012	27.261	27.826	1.499	2.181	2.453	2.590	2.999	3.408
	100.00	0.700	17.78	12.413	14.972	12.807	5.757	13.482	29.248	29.844	1.609	2.340	2.632	2.779	3.217	3.656
	106.00	0.750	19.05	12.313	15.031	12.718	5.992	13.952	31.220	31.863	1.717	2.498	2.810	2.966	3.434	3.903
14" 355.60	114.00	0.800	20.32	12.213	15.091	12.628	6.227	14.422	33.175	33.888	1.825	2.654	2.986	3.152	3.649	4.147
	120.00	0.850	21.59	12.113	15.146	12.538	6.461	14.891	35.115	35.824	1.931	2.809	3.160	3.336	3.863	4.389
	125.92	0.900	22.86	12.013	15.205	12.448	6.696	15.361	37.039	37.854	2.037	2.963	3.334	3.519	4.074	4.630
	132.41	0.950	24.13	11.913	15.260	12.357	6.931	15.831	38.948	39.798	2.142	3.116	3.505	3.700	4.284	4.869

### VAM HW ST TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi				
			in.	ft. lb.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
5"	127.00	0.600	15.24	-	-	-	-	-	-	-	-	-	9400	10400	11400	
			16.51	-	-	-	-	-	-	-	-	-	-	12700	14100	15500
			17.78	-	-	-	-	-	-	-	-	-	-	10700	11900	13100
			19.05	-	-	-	-	-	-	-	-	-	-	14600	16200	17800
			20.32	-	-	-	-	-	-	-	-	-	-	12100	13500	14900
			21.59	-	-	-	-	-	-	-	-	-	-	16500	18300	20100
			22.86	-	-	-	-	-	-	-	-	-	-	13500	15000	16500
			24.13	-	-	-	-	-	-	-	-	-	-	18300	20300	22300
			25.40	-	-	-	-	-	-	-	-	-	-	14800	16500	18200
			26.67	-	-	-	-	-	-	-	-	-	-	20200	22400	24600
			27.94	-	-	-	-	-	-	-	-	-	-	-	-	-
			29.21	-	-	-	-	-	-	-	-	-	-	-	-	-
5 1/2"	139.70	0.600	15.24	-	-	-	-	-	-	-	-	-	9900	11000	12100	
			16.51	-	-	-	-	-	-	-	-	-	-	13400	14900	16400
			17.78	-	-	-	-	-	-	-	-	-	-	10900	12100	13300
			19.05	-	-	-	-	-	-	-	-	-	-	14800	16400	18000
			20.32	-	-	-	-	-	-	-	-	-	-	10700	11900	13100
			21.59	-	-	-	-	-	-	-	-	-	-	14500	16100	17700
			22.86	-	-	-	-	-	-	-	-	-	-	12000	13300	14600
			24.13	-	-	-	-	-	-	-	-	-	-	16300	18100	19900
			25.40	-	-	-	-	-	-	-	-	-	-	12300	13700	15100
			26.67	-	-	-	-	-	-	-	-	-	-	16700	18600	20500
			27.94	-	-	-	-	-	-	-	-	-	-	18600	20700	22800
			29.21	-	-	-	-	-	-	-	-	-	-	-	-	-





**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
5"	127.00	0.600	10300	11400	12500	11200	12400	13600	11900	13200	14500	12700	14100	15500
		15.24	13900	15400	16900	15100	16800	18500	16100	17900	19700	17200	19100	21000
		0.650	11700	13000	14300	12800	14200	15600	13700	15200	16700	14500	16100	17700
		16.51	15900	17700	19500	17400	19300	21200	18500	20600	22700	19700	21900	24100
		0.700	13200	14700	16200	14400	16000	17600	15400	17100	18800	16400	18200	20000
		17.78	18000	20000	22000	19500	21700	23900	20900	23200	25500	22100	24600	27100
		0.750	14800	16400	18000	16000	17800	19600	17100	19000	20900	18200	20200	22200
		19.05	20000	22200	24400	21700	24100	26500	23200	25800	28400	24700	27400	30100
		0.800	16200	18000	19800	17600	19600	21600	18800	20900	23000	20000	22200	24400
		20.32	22000	24500	27000	23900	26600	29300	25500	28300	31100	27100	30100	33100
5 1/2"	139.70	0.850	17700	19700	21700	19300	21400	23500	20400	22700	25000	20800	23100	25400
		21.59	24000	26700	29400	26000	28900	31800	27700	30800	33900	28300	31400	34500
		0.900	19200	21300	23400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		22.86	26000	28900	31800	28200	31300	34400	28300	31400	34500	28300	31400	34500
		0.950	20600	22900	25200	22300	24800	27300	22800	25300	27800	24700	27500	30300
		24.13	28000	31100	34200	30300	33700	37100	30900	34300	37700	33600	37300	41000
		0.600	10900	12100	13300	11900	13200	14500	12700	14100	15500	13500	15000	16500
		15.24	14800	16400	18000	16000	17800	19600	17200	19100	21000	18300	20300	22300
		0.625	12000	13300	14600	13000	14500	16000	14000	15600	17200	14900	16600	18300
		15.88	16200	18000	19800	17700	19700	21700	19000	21100	23200	20200	22500	24800
5 1/2"	139.70	0.650	13000	14500	16000	14300	15900	17500	15300	17000	18700	16400	18200	20000
		16.51	17700	19700	21700	19300	21500	23700	20800	23100	25400	22100	24600	27100
		0.687	14800	16400	18000	16100	17900	19700	17300	19200	21100	18400	20500	22600
		17.45	20000	22200	24400	21900	24300	26700	23400	26000	28600	25000	27800	30600
		0.700	15100	16800	18500	16600	18400	20200	17700	19700	21700	19000	21100	23200
		17.78	20500	22800	25100	22500	25000	27500	24100	26800	29500	25700	28600	31500

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
5 1/2" 139.70	0.750	-	-	-	-	13800	15300	16800	15300	17000	18700	15300	17000	18700
	19.05	-	-	-	-	18700	20800	22900	20800	23100	25400	20800	23100	25400
	0.800	-	-	-	-	15200	16900	18600	16900	18800	20700	16900	18800	20700
	20.32	-	-	-	-	20700	23000	25300	22900	25500	28100	22900	25500	28100
	0.812	-	-	-	-	15700	17400	19100	17300	19200	21100	17300	19200	21100
	20.62	-	-	-	-	21100	23500	25900	23500	26100	28700	23500	26100	28700
	0.850	-	-	-	-	-	-	-	18400	20500	22600	18400	20500	22600
	21.59	-	-	-	-	-	-	-	25000	27800	30600	25000	27800	30600
	0.875	-	-	-	-	-	-	-	19300	21400	23500	19300	21400	23500
	22.23	-	-	-	-	-	-	-	26100	29000	31900	26100	29000	31900
0.900	-	-	-	-	-	-	-	20100	22300	24500	20100	22300	24500	
22.86	-	-	-	-	-	-	-	27200	30200	33200	27200	30200	33200	
0.925	-	-	-	-	-	-	-	20800	23100	25400	20800	23100	25400	
23.50	-	-	-	-	-	-	-	28300	31400	34500	28300	31400	34500	
0.950	-	-	-	-	-	-	-	20800	23100	25400	20800	23100	25400	
24.13	-	-	-	-	-	-	-	28300	31400	34500	28300	31400	34500	
6 5/8" 168.28	0.650	11200	12400	13600	12300	13700	15100	14100	15700	17300	15900	17700	19500	
	16.51	15100	16800	18500	16700	18600	20500	19200	21300	23400	21700	24100	26500	
	0.700	12700	14100	15500	14000	15600	17200	16100	17900	19700	18100	20100	22100	
	17.78	17200	19100	21000	19000	21100	23200	21800	24200	26600	24600	27300	30000	
	0.750	14200	15800	17400	15700	17500	19300	18000	20000	22000	20300	22600	24900	
	19.05	19300	21400	23500	21300	23700	26100	24400	27100	29800	27500	30600	33700	
	0.800	-	-	-	17500	19400	21300	19900	22100	24300	20800	23100	25400	
	20.32	-	-	-	23700	26300	28900	27000	30000	33000	28300	31400	34500	
	0.850	-	-	-	18500	20600	22700	20800	23100	25400	20800	23100	25400	
	21.59	-	-	-	25100	27900	30700	28300	31400	34500	28300	31400	34500	



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
5 1/2" 139.70	0.750	16800	18700	20600	18400	20500	22600	19800	22000	24200	20800	23100	25400	
	19.05	22900	25400	27900	25000	27800	30600	26800	29800	32800	28300	31400	34500	
	0.800	18600	20700	22800	20300	22600	24900	20800	23100	25400	20800	23100	25400	
	20.32	25200	28000	30800	27500	30600	33700	28300	31400	34500	28300	31400	34500	
	0.812	19100	21200	23300	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	20.62	25800	28700	31600	28200	31300	34400	28300	31400	34500	28300	31400	34500	
	0.850	20300	22600	24900	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	21.59	27500	30600	33700	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.875	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	22.23	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.900	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	22.86	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
0.925	22800	25300	27800	24700	27500	30300	24700	27500	30300	24700	27500	30300		
23.50	30900	34300	37700	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.950	22800	25300	27800	24700	27500	30300	24700	27500	30300	24700	27500	30300		
24.13	30900	34300	37700	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.650	17800	19800	21800	19700	21900	24100	20800	23100	25400	20800	23100	25400		
16.51	24200	26900	29600	26700	29700	32700	28300	31400	34500	28300	31400	34500		
0.700	20200	22500	24800	20800	23100	25400	20800	23100	25400	20800	23100	25400		
17.78	27400	30500	33600	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.850	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
21.59	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.			
6 5/8" 168.28	-	0.900	-	20600	22900	25200	22800	25300	27800	24700	27500	30300	24700	27500	30300
	-	22.86	-	28000	31100	34200	30900	34300	37700	33600	37300	41000	33600	37300	41000
	-	0.950	-	22800	25300	27800	24700	27500	30300	24700	27500	30300	24700	27500	30300
	-	24.13	-	30900	34300	37700	33600	37300	41000	33600	37300	41000	33600	37300	41000
	-	1.000	-	-	-	-	20800	23100	25400	22800	25300	27800	22800	25300	27800
	-	25.40	-	-	-	-	28200	31300	34400	30900	34300	37700	30900	34300	37700
	-	1.050	-	-	-	-	22400	24900	27400	24700	27500	30300	24700	27500	30300
	-	26.67	-	-	-	-	30400	33800	37200	33600	37300	41000	33600	37300	41000
	-	1.100	-	-	-	-	24000	26700	29400	26700	29700	32700	26700	29700	32700
	-	27.94	-	-	-	-	32600	36200	39800	36200	40200	44200	36200	40200	44200
	-	1.125	-	-	-	-	24800	27600	30400	27000	30000	33000	27000	30000	33000
	-	28.58	-	-	-	-	33700	37400	41100	33700	37400	41100	33700	37400	41100
-	1.150	-	-	-	-	25600	28500	31400	27000	30000	33000	27000	30000	33000	
-	29.21	-	-	-	-	34700	38600	42500	36600	40700	44800	36600	40700	44800	
-	1.200	-	-	-	-	27300	30300	33300	29200	32500	35800	29200	32500	35800	
-	30.48	-	-	-	-	36900	41000	45100	39700	44100	48500	39700	44100	48500	
7" 177.80	-	0.650	-	12300	13700	15100	14000	15600	17200	15800	17600	19400	15800	17600	19400
	-	16.51	-	16700	18600	20500	19100	21200	23300	21500	23900	26300	21500	23900	26300
	-	0.670	-	13000	14500	16000	14900	16600	18300	16600	18500	20400	16600	18500	20400
	-	17.02	-	17600	19600	21600	20300	22600	24900	22600	25100	27600	22600	25100	27600
	-	0.687	-	13700	15200	16700	15700	17400	19100	17500	19500	21500	17500	19500	21500
	-	17.45	-	18500	20600	22700	21100	23500	25900	23800	26500	29200	23800	26500	29200
	-	0.700	-	14100	15700	17300	16100	17900	19700	18200	20200	22200	18200	20200	22200
	-	17.78	-	19200	21300	23400	21900	24300	26700	24600	27300	30000	24600	27300	30000
	-	0.730	-	15200	16900	18600	17400	19300	21200	19500	21700	23900	19500	21700	23900
	-	18.54	-	20600	22900	25200	23600	26200	28800	26500	29400	32300	26500	29400	32300



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi			
			in.	ft. lb.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.
6 5/8" 168.28			0.90	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			22.86	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			0.95	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			24.13	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			1.00	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			1.05	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			26.67	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			1.10	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
			27.94	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
			1.125	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
			28.58	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
			1.150	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
			29.21	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
			1.200	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
30.48	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500			
7" 177.80			0.650	17600	19600	21600	19400	21600	23800	20800	23100	25400	20800	23100	25400
			16.51	23900	26600	29300	26400	29300	32200	28300	31400	34500	28300	31400	34500
			0.670	18500	20600	22700	20160	22400	24600	20800	23100	25400	20800	23100	25400
			17.02	25200	28000	30800	27300	30400	33400	28300	31400	34500	28300	31400	34500
			0.687	19500	21700	23900	20800	23100	25400	20800	23100	25400	20800	23100	25400
			17.45	26500	29400	32300	28300	31400	34500	28300	31400	34500	28300	31400	34500
			0.700	20200	22400	24600	20800	23100	25400	20800	23100	25400	20800	23100	25400
			17.78	27400	30400	33400	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.730	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400			
18.54	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500			

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
7"	177.80	0.750	-	-	-	16900	17700	19500	18200	20200	22200	20400	22700	25000
		19.05	-	-	-	27600	24000	26400	24700	27400	30100	27700	30800	33900
		0.800	-	-	-	17700	19700	21700	20200	22500	24800	20800	23100	25400
		20.32	-	-	-	24100	26800	29500	27400	30500	33600	28300	31400	34500
		0.812	-	-	-	18200	20200	22200	20700	23000	25300	20800	23100	25400
		20.62	-	-	-	24700	27400	30100	28100	31200	34300	28300	31400	34500
		0.850	-	-	-	19600	21800	24000	20800	23100	25400	20800	23100	25400
		21.59	-	-	-	26500	29500	32500	28300	31400	34500	28300	31400	34500
		0.875	-	-	-	20600	22800	25100	22800	25300	27800	24700	27500	30300
		22.23	-	-	-	27800	30900	34000	30900	34300	37700	33600	37300	41000
		0.900	-	-	-	21400	23800	26200	22800	25300	27800	24700	27500	30300
		22.86	-	-	-	29100	32300	35500	30900	34300	37700	33600	37300	41000
		0.937	-	-	-	22800	25300	27800	24700	27500	30300	24700	27500	30300
		23.80	-	-	-	30900	34300	37700	33600	37300	41000	33600	37300	41000
		0.950	-	-	-	23300	25900	28500	24700	27500	30300	27000	30000	33000
		24.13	-	-	-	31600	35100	38600	33600	37300	41000	36600	40700	44800
1.000	-	-	-	-	-	-	22000	24400	26800	22800	25300	27800		
25.40	-	-	-	-	-	-	29800	33100	36400	30900	34300	37700		
1.050	-	-	-	-	-	-	23800	26400	29000	24700	27500	30300		
26.67	-	-	-	-	-	-	32200	35800	39400	33600	37300	41000		
1.062	-	-	-	-	-	-	24200	26900	29600	24700	27500	30300		
26.97	-	-	-	-	-	-	32800	36400	40000	33600	37300	41000		
1.100	-	-	-	-	-	-	25600	28300	31100	27000	30000	33000		
27.94	-	-	-	-	-	-	34500	38300	42100	36600	40700	44800		
1.150	-	-	-	-	-	-	27300	30300	33300	29200	32500	35800		
29.21	-	-	-	-	-	-	36900	41000	45100	39700	44100	48500		



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
7" 177.80	0.750	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.800	0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.812	0.812	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.62	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.850	0.850	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		21.59	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.875	0.875	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		22.23	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
	0.900	0.900	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		22.86	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
	0.937	0.937	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		23.80	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
	0.950	0.950	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		24.13	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
	1.000	1.000	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
	1.050	1.050	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		26.67	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
1.062	1.062	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	26.97	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
1.100	1.100	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	27.94	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
1.150	1.150	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	29.21	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
<b>7"</b> <i>177.80</i>	-	<b>1.175</b>	-	-	-	-	-	-	<b>28100</b>	<b>31200</b>	<b>34300</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>
	-	<i>29.85</i>	-	-	-	-	-	-	<i>38000</i>	<i>42200</i>	<i>46400</i>	<i>39700</i>	<i>44100</i>	<i>48500</i>
	-	<b>1.200</b>	-	-	-	-	-	-	<b>28900</b>	<b>32100</b>	<b>36300</b>	<b>31200</b>	<b>34700</b>	<b>38200</b>
	-	<i>30.48</i>	-	-	-	-	-	-	<i>39200</i>	<i>43600</i>	<i>48000</i>	<i>42400</i>	<i>47100</i>	<i>51800</i>
	-	<b>1.250</b>	-	-	-	-	-	-	<b>30700</b>	<b>34100</b>	<b>37500</b>	<b>34000</b>	<b>37800</b>	<b>41600</b>
	-	<i>31.75</i>	-	-	-	-	-	-	<i>41700</i>	<i>46300</i>	<i>50900</i>	<i>46200</i>	<i>51300</i>	<i>56400</i>
<b>7 5/8"</b> <i>193.68</i>	-	<b>0.650</b>	<b>12300</b>	<b>13700</b>	<b>15100</b>	<b>13700</b>	<b>15200</b>	<b>16700</b>	<b>15700</b>	<b>17600</b>	<b>19300</b>	<b>17900</b>	<b>19900</b>	<b>21900</b>
	-	<i>16.51</i>	<i>16700</i>	<i>18600</i>	<i>20500</i>	<i>18500</i>	<i>20600</i>	<i>22700</i>	<i>21400</i>	<i>23800</i>	<i>26200</i>	<i>24200</i>	<i>26900</i>	<i>29600</i>
	-	<b>0.687</b>	<b>13700</b>	<b>15200</b>	<b>16700</b>	<b>15200</b>	<b>16900</b>	<b>18600</b>	<b>17600</b>	<b>19500</b>	<b>21500</b>	<b>19900</b>	<b>22100</b>	<b>24300</b>
	-	<i>17.45</i>	<i>18500</i>	<i>20600</i>	<i>22700</i>	<i>20600</i>	<i>22900</i>	<i>25200</i>	<i>23800</i>	<i>26400</i>	<i>29000</i>	<i>26900</i>	<i>29900</i>	<i>32900</i>
	-	<b>0.700</b>	<b>14100</b>	<b>15700</b>	<b>17300</b>	<b>15700</b>	<b>17400</b>	<b>19100</b>	<b>18100</b>	<b>20100</b>	<b>22100</b>	<b>20600</b>	<b>22800</b>	<b>25100</b>
	-	<i>17.78</i>	<i>19200</i>	<i>21300</i>	<i>23400</i>	<i>21200</i>	<i>23600</i>	<i>26000</i>	<i>24600</i>	<i>27300</i>	<i>30000</i>	<i>27800</i>	<i>30900</i>	<i>34000</i>
	-	<b>0.712</b>	<b>14400</b>	<b>15900</b>	<b>17400</b>	<b>15700</b>	<b>17400</b>	<b>19100</b>	<b>18250</b>	<b>20250</b>	<b>22250</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>
	-	<i>18.08</i>	<i>19400</i>	<i>21600</i>	<i>23800</i>	<i>21200</i>	<i>23600</i>	<i>26000</i>	<i>24700</i>	<i>27500</i>	<i>30300</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
	-	<b>0.750</b>	<b>16000</b>	<b>17800</b>	<b>19600</b>	<b>17700</b>	<b>19700</b>	<b>21700</b>	<b>20400</b>	<b>22700</b>	<b>25000</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>
	-	<i>19.05</i>	<i>21700</i>	<i>24100</i>	<i>26500</i>	<i>24000</i>	<i>26700</i>	<i>29400</i>	<i>27700</i>	<i>30800</i>	<i>33900</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
	-	<b>0.800</b>	<b>17800</b>	<b>19800</b>	<b>21800</b>	<b>19800</b>	<b>22000</b>	<b>24200</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>
	-	<i>20.32</i>	<i>24200</i>	<i>26900</i>	<i>29600</i>	<i>26800</i>	<i>29800</i>	<i>32800</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>
-	<b>0.812</b>	<b>18300</b>	<b>20300</b>	<b>22300</b>	<b>20200</b>	<b>22500</b>	<b>24800</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	
-	<i>20.62</i>	<i>24700</i>	<i>27500</i>	<i>30300</i>	<i>27400</i>	<i>30500</i>	<i>33600</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	
-	<b>0.850</b>	<b>19700</b>	<b>21900</b>	<b>24100</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	
-	<i>21.59</i>	<i>26700</i>	<i>29700</i>	<i>32700</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	<i>28300</i>	<i>31400</i>	<i>34500</i>	
-	<b>0.900</b>	<b>21600</b>	<b>24000</b>	<b>26400</b>	<b>22800</b>	<b>25300</b>	<b>27800</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	
-	<i>22.86</i>	<i>29300</i>	<i>32600</i>	<i>35900</i>	<i>30900</i>	<i>34300</i>	<i>37700</i>	<i>33600</i>	<i>37300</i>	<i>41000</i>	<i>33600</i>	<i>37300</i>	<i>41000</i>	
-	<b>0.905</b>	<b>21800</b>	<b>24200</b>	<b>26600</b>	<b>22800</b>	<b>25300</b>	<b>27800</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	
-	<i>22.99</i>	<i>29500</i>	<i>32800</i>	<i>36100</i>	<i>30900</i>	<i>34300</i>	<i>37700</i>	<i>33600</i>	<i>37300</i>	<i>41000</i>	<i>33600</i>	<i>37300</i>	<i>41000</i>	



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
7"	177.80	1.175	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		29.85	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		1.200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		30.48	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		1.250	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100
		31.75	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200
		0.650	20000	22200	24400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		16.51	27200	30200	33200	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.687	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.45	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.712	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
18.08	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.812	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
20.62	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.850	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
21.59	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.900	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300		
22.86	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.905	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300		
22.99	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000		

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
7 5/8" 193.68	0.950	23500	26100	28700	26000	28900	31800	27000	30000	33000	27000	30000	33000	
	24.13	31900	35400	38900	35300	39200	43100	36600	40700	44800	36600	40700	44800	
	1.000	-	-	-	21700	24100	26500	22800	25300	27800	24700	27500	30300	
	25.40	-	-	-	29300	32600	35900	30900	34300	37700	33600	37300	41000	
	1.050	-	-	-	23400	26000	28600	24700	27500	30300	24700	27500	30300	
	26.67	-	-	-	31700	35200	38700	33600	37300	41000	33600	37300	41000	
	1.100	-	-	-	25200	28000	30800	27000	30000	33000	27000	30000	33000	
	27.94	-	-	-	34200	38000	41800	36600	40700	44800	36600	40700	44800	
	1.150	-	-	-	26900	29900	32900	29200	32500	35800	29200	32500	35800	
	29.21	-	-	-	36500	40600	44700	39700	44100	48500	39700	44100	48500	
8 5/8" 219.08	1.200	-	-	-	-	-	-	31200	34700	38200	31200	34700	38200	
	30.48	-	-	-	-	-	-	42400	47100	51800	42400	47100	51800	
	1.250	-	-	-	-	-	-	34500	38300	42100	34500	38300	42100	
	31.75	-	-	-	-	-	-	46800	52000	57200	46800	52000	57200	
	0.700	15600	17300	19000	17400	19300	21200	20800	23100	25400	20800	23100	25400	
	17.78	21100	23500	25900	23600	26200	28800	28300	31400	34500	28300	31400	34500	
	0.750	17800	19800	21800	19900	22100	24300	20800	23100	25400	20800	23100	25400	
	19.05	24100	26800	29500	26900	29900	32900	28300	31400	34500	28300	31400	34500	
	0.800	20100	22300	24500	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	20.32	27200	30200	33200	28300	31400	34500	28300	31400	34500	28300	31400	34500	
0.850	22200	24700	27200	24700	27500	30300	24700	27500	30300	24700	27500	30300		
21.59	30200	33600	37000	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.875	-	-	-	24700	27500	30300	24700	27500	30300	24700	27500	30300		
22.23	-	-	-	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.900	24500	27200	29900	24700	27500	30300	24700	27500	30300	24700	27500	30300		
22.86	33200	36900	40600	33600	37300	41000	33600	37300	41000	33600	37300	41000		



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
7 5/8" 193.68	0.950	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	24.13	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.000	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
	1.050	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	26.67	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
	1.100	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	27.94	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.150	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	29.21	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	
1.200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200		
30.48	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800		
1.250	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100		
31.75	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200		
0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300		
21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.875	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300		
22.23	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000		
0.900	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300		
22.86	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000		



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
8 5/8" 219.08	0.950	26800	29800	32800	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	24.13	36400	40400	44400	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.000	24700	27600	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
	1.025	24700	27600	30300	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	26.04	33600	37300	41000	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.050	25200	28000	30800	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	26.67	34100	37900	41700	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.100	27200	30200	33200	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	27.94	36900	41000	45100	39700	44100	48500	39700	44100	48500	39700	44100	48500	
	1.125	27200	30200	33200	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	28.58	36900	41000	45100	39700	44100	48500	39700	44100	48500	39700	44100	48500	
1.150	29200	32400	35600	31200	34700	38200	31200	34700	38200	31200	34700	38200		
29.21	39500	43900	48300	42400	47100	51800	42400	47100	51800	42400	47100	51800		
1.200	31100	34600	38100	34500	38300	42100	34500	38300	42100	34500	38300	42100		
30.48	42300	47000	51700	46800	52000	57200	46800	52000	57200	46800	52000	57200		
1.250	32800	36500	40200	36600	40700	44800	36600	40700	44800	36600	40700	44800		
31.75	44500	49500	54500	49600	55100	60600	49600	54900	60400	49600	54900	60400		
0.672	16600	18500	20400	18700	20800	22900	20800	23100	25400	20800	23100	25400		
17.07	22500	25000	27500	25400	28200	31000	28300	31400	34500	28300	31400	34500		
0.700	18100	20100	22100	20300	22600	24900	20800	23100	25400	20800	23100	25400		
17.78	24500	27200	29900	27500	30600	33700	28300	31400	34500	28300	31400	34500		
0.734	20000	22200	24400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
18.64	27000	30000	33000	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.750	20700	23000	25300	20800	23100	25400	20800	23100	25400	20800	23100	25400		
19.05	28000	31100	34200	28300	31400	34500	28300	31400	34500	28300	31400	34500		



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
8 5/8" 219.08	0.950	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	24.13	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.000	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
	1.025	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	26.04	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.050	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
	26.67	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.100	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	27.94	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	
	1.125	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	28.58	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	
1.150	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200		
29.21	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800		
1.200	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100		
30.48	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200		
1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600		
31.75	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400		
0.672	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
17.07	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.734	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
18.64	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		
0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400		
19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500		

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
9 5/8" 244.48		0.797	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.24	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.900	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		22.86	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.950	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		24.13	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		1.000	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
1.050	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000		
26.67	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800		
1.100	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800		
27.94	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500		
1.150	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800		
29.21	44100	49000	53900	44100	49000	53900	44100	49000	53900	44100	49000	53900		
1.200	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100		
30.48	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200		
1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600		
31.75	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400		
10" 254.00		0.688	18500	20600	22700	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.48	25100	27900	30700	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.700	19300	21500	23700	20800	23100	25400	20800	23100	25400	20800	23100	25400
17.78	26200	29100	32000	28300	31400	34500	28300	31400	34500	28300	31400	34500		



## VAM HW ST TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi			
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
9 5/8" 244.48		in.	0.797	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
			20.24	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
			0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
			20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
			0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			0.900	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			22.86	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			0.950	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			24.13	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
			1.000	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			25.40	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
10"		in.	1.050	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
			26.67	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
			1.100	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
			27.94	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
			1.150	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800
			29.21	44100	49000	53900	44100	49000	53900	44100	49000	53900	44100	49000	53900
			1.200	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100
			30.48	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200
			1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
			31.75	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400
			0.688	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
			17.48	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400			
17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500			

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
10"	254.00	0.732	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		18.59	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.32	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		22.86	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
0.950	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800		
24.13	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500		
1.000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000		
25.40	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800		
1.050	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800		
26.67	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500		
1.100	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200		
27.94	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800		
1.150	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800		
29.21	44100	49000	53900	44100	49000	53900	44100	49000	53900	44100	49000	53900		
1.200	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600		
30.48	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400		
1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600		
31.75	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400		
10 3/4"			13900	15400	16900	15600	17300	19000	18300	20300	22300	20800	23100	25400
273.05			18700	20800	22900	21100	23500	25900	24700	27500	30300	28300	31400	34500



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
10* 254.00	0.732	18.59	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.750	19.05	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.800	20.32	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
			28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
	0.850	21.59	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
			33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
	0.900	22.86	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
			36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
	0.950	24.13	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
			39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
1.000	25.40	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
		36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
1.050	26.67	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
		39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	
1.100	27.94	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	
		42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800	
1.150	29.21	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	
		44100	49000	53900	44100	49000	53900	44100	49000	53900	44100	49000	53900	
1.200	30.48	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	
		49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400	
1.250	31.75	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	
		49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400	
10 3/4* 273.05	0.895	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
		28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
10 3/4"		0.650	17200	19100	21000	19400	21600	23800	20800	23100	25400	20800	23100	25400
	273.05	16.51	23300	25900	28500	26300	29200	32100	28300	31400	34500	28300	31400	34500
		0.672	18800	20900	23000	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.06	25500	28300	31100	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.700	20200	22400	24600	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.78	27400	30400	33400	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.734	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		18.64	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.797	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.24	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.859	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.82	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		22.86	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
		0.950	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
		24.13	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
		0.960	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.38	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		0.984	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.99	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800



## VAM HW ST TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
10 3/4"	273.05	0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.672		0.672	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.06	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.700		0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.734		0.734	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		18.64	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.750		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.797		0.797	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		20.24	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
0.800		0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
0.850		0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
0.859		0.859	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.82	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
0.900		0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		22.86	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
0.950		0.950	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
		24.13	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
0.960		0.960	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.38	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
0.984		0.984	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.99	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
10 3/4" 273.05	1.000	27000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	25.40	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.050	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	26.67	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	
	1.100	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	
	27.94	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800	
	1.150	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	
	29.21	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200	
	1.200	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	
	30.48	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400	
11 3/4" 298.45	1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	
	31.75	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400	
	0.650	19300	21500	23700	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	16.51	26200	29100	32000	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300		
	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000		
	21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300		
	0.860	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000		
0.860	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800		
	21.84	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700		
	0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000		
	22.86	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700		



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
10 3/4" 273.05	1.000	27000	30000	33000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	25.40	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	1.050	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	
	26.67	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500	
	1.100	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	
	27.94	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800	
	1.150	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	
	29.21	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200	
	1.200	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	
	30.48	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400	
11 3/4" 298.45	1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	
	31.75	49400	54900	60400	49400	54900	60400	49400	54900	60400	49400	54900	60400	
	0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	
	19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500	
	0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	
	20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	24700	27500	
	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	33600	37300	
	21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000	
	0.860	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	
0.900	21.84	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	
	22.86	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800	

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
11 3/4" 298.45		0.950	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.13	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		0.984	34600	38300	42100	34600	38300	42100	34600	38300	42100	34600	38300	42100
12 3/4" 323.85		24.99	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200
		0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8" 339.73		0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
14" 355.60		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
14" 355.60		0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.900	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
14" 355.60		22.86	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
		0.917	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
		23.29	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
14" 355.60		0.950	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.13	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		0.600	19600	21800	24000	19600	21800	24000	19600	21800	24000	19600	21800	24000
14" 355.60		15.24	26600	29600	32600	26600	29600	32600	26600	29600	32600	26600	29600	32600
		0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
14" 355.60		0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400



**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
11 3/4" 298.45		0.950	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.13	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		0.984	34600	38300	42100	34600	38300	42100	34600	38300	42100	34600	38300	42100
12 3/4" 323.85		24.99	46800	52000	57200	46800	52000	57200	46800	52000	57200	46800	52000	57200
		0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
13 3/8" 339.73		0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
14" 355.60		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
14" 355.60		0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		21.59	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.900	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
14" 355.60		22.86	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
		0.917	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
		23.29	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
14" 355.60		0.950	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
		24.13	42400	47100	51800	42400	47100	51800	42400	47100	51800	42400	47100	51800
		0.600	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
14" 355.60		15.24	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		16.51	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
14" 355.60		0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		17.78	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400

**VAM HW ST TORQUE VALUES**

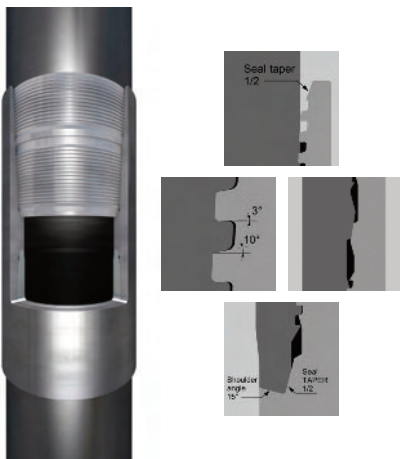
SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
<b>14"</b> 355.60		<b>0.750</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>	<b>20800</b>	<b>23100</b>	<b>25400</b>
		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		<b>0.800</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>	<b>24700</b>	<b>27500</b>	<b>30300</b>
		20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		<b>0.850</b>	<b>27000</b>	<b>30000</b>	<b>33000</b>	<b>27000</b>	<b>30000</b>	<b>33000</b>	<b>27000</b>	<b>30000</b>	<b>33000</b>	<b>27000</b>	<b>30000</b>	<b>33000</b>
		21.59	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
		<b>0.900</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>	<b>29200</b>	<b>32500</b>	<b>35800</b>
		22.86	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
		<b>0.950</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>	<b>32600</b>	<b>36200</b>	<b>39800</b>
		24.13	44100	49000	53900	44100	49000	53900	44100	49000	53900	44100	49000	53900

**VAM HW ST TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in.	ft. lb.	in.	ft. lb.			ft. lb.			ft. lb.			ft. lb.		
14" 355.60		0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
		19.05	28300	31400	34500	28300	31400	34500	28300	31400	34500	28300	31400	34500
		0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
		20.32	33600	37300	41000	33600	37300	41000	33600	37300	41000	33600	37300	41000
		0.850	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
		21.59	36600	40700	44800	36600	40700	44800	36600	40700	44800	36600	40700	44800
		0.900	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
		22.86	39700	44100	48500	39700	44100	48500	39700	44100	48500	39700	44100	48500
		0.950	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800
		24.13	44100	49000	53900	44100	49000	53900	44100	49000	53900	44100	49000	53900

## 3.14 VAM HP

### Application



### Dual VAM Metal To Metal Seal, Reverse Angle Torque Shoulder and Slim-Line Couplings

VAM HP has been designed for, and used in, the world's most extreme High Pressure, High Temperature (HPHT) oilfields. An additional external-pressure seal, located in between the threaded areas, gives the connection an industry-leading 100% External Pressure rating that has been successfully proven through ISO 13679 CAL IV physical qualification testing.

A reverse angle torque shoulder energizes a 50% taper metal-to-metal seal, and leads to a 100% Internal Pressure rating, while the shallow thread taper produces a high compression rating of 60%.

The long threaded area gives the connection its excellent tensile characteristics and resistance to bending.

### Hook Thread Design

A coarse thread pitch with a  $-3^\circ$  reverse load flank angle gives the connection superior tension strength and eliminates the risk of jump out.

Precision machining in the threads contributes to reduce hoop stresses in the coupling.

## Slim-Line Coupling

The coupling diameter for each size of VAM HP has been designed with a specific HPHT project in mind. In general, the couplings are slim-line in order to allow them to fit inside intermediate casing strings that maintain a given drift size and the slim-line nature minimizes cementing difficulties.

The coupling design minimizes hoop stresses, and is ideal for use with controlled yield materials in high-pressure high temperature wells where sour gas or other corrosive environments may be encountered.

The thread form has a taper of 1:8, 1:10 or 1:12, depending on the size of the casing.

In general, the connection uses 5 TPI.

## Dope quantities

The minimum quantity of compound should be applied on the Pin end only. Dope should be applied evenly in order to get a uniform coating on all parts of the connection.

If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

## Minimum make-up dope quantity

Nominal OD (in.)	Weight lb/ft	Dope volume	
		(cm <sup>3</sup> )	(in <sup>3</sup> )
7 5/8	51.20	21	1.3
7 5/8	55.30	25	1.5
10 3/4	71.10	21	1.3
10 3/4	73.20	21	1.3
10 3/4	79.20	21	1.3
10 3/4	85.30	21	1.3
10 3/4	100.40	31	1.9
10 3/4	110.20	34	2.1

## Make-up procedure / Acceptance criteria

No special requirements see general running procedure 2. for information.



## VAM HP TECHNICAL DATA

Size (OD)	Nominal Weight		Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Regular Yield Strength (1000 lb.)									
	inch	mm	lb./ft.	mm								inch	mm	inch	mm	inch	sq.in.	sq.in.	55 ksi	80 ksi	85 ksi
7 5/8"	193.68		51.20	0.687	6.126	8.094	6.309	6.957	15.906	14.975	11.675	642	934	992	1051	1109	1167	1284	1459	1634	1751
10 1/8"			55.30	0.750	6.000	8.120	6.124	7.311	16.614	16.199	12.436	684	995	1057	1119	1181	1244	1368	1555	1741	1865
257.18				0.800	8.500	11.070	8.593	8.028	18.071	23.436	23.563	1296	1885	2003	2121	2238	2356	2592	2945	3299	3534
10 3/4"			71.10	0.650	9.294	11.437	9.631	7.535	17.047	20.624	18.555	1021	1484	1577	1670	1763	1856	2041	2319	2598	2783
273.05			73.20	0.672	9.250	11.470	9.616	7.535	17.047	21.275	19.156	1054	1533	1628	1724	1820	1916	2107	2395	2682	2873
			79.20	0.734	9.126	11.344	9.337	7.937	17.874	23.097	19.308	1062	1545	1641	1738	1834	1931	2124	2414	2703	2896
			85.30	0.797	9.000	11.470	9.352	8.006	18.012	24.921	21.674	1192	1734	1842	1951	2059	2167	2384	2709	3034	3251
			100.40	0.960	8.674	11.470	9.085	8.226	18.425	29.526	23.510	1293	1881	1998	2116	2233	2351	2586	2939	3291	3527
			110.20	1.050	8.494	11.491	8.871	8.409	18.819	31.997	25.598	1408	2048	2176	2304	2432	2560	2816	3200	3584	3840
11 7/8"				0.930	9.859	12.900	10.124	9.108	20.197	31.983	31.977	1759	2558	2718	2878	3038	3198	3517	3997	4477	4796
301.63																					

**VAM HP TORQUE VALUES**

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			140 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in. mm	ft. lb.	in. mm	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	ft. lb. N.m.	
7.58" 193.68	51.20	0.687	-	-	27000	30000	33000	-	-	27000	30000	33000	-	
		17.45	-	-	36500	40600	44700	-	-	36500	40600	44700	-	
		0.750	-	-	27000	30000	33000	-	-	27000	30000	33000	-	
10.3/4" 273.05	71.10	19.05	-	-	36500	40600	44700	-	-	36500	40600	44700	-	
		0.650	38700	43000	47300	38700	43000	47300	38700	43000	47300	-	-	
		16.57	52400	58300	64100	52400	58300	64100	52400	58300	64100	-	-	
73.20	73.20	0.672	38700	43000	47300	38700	43000	47300	38700	43000	47300	-	-	
		17.07	52400	58300	64100	52400	58300	64100	52400	58300	64100	-	-	
		0.734	-	-	40600	45000	49400	-	-	40600	45000	49400	-	
79.20	79.20	18.64	-	-	55000	61000	67000	-	-	55000	61000	67000	-	
		0.797	41400	46000	50600	41400	46000	50600	41400	46000	50600	-	-	
		20.24	56100	62400	68600	56100	62400	68600	56100	62400	68600	-	-	
100.40	100.40	0.960	45000	50000	55000	45000	50000	55000	45000	50000	55000	-	-	
		24.38	60900	67700	74470	60900	67700	74470	60900	67700	74470	-	-	
		1.050	48600	54000	59400	48600	54000	59400	48600	54000	59400	-	-	
110.20	110.20	26.67	65900	73200	80500	65900	73200	80500	65900	73200	80500	-	-	
		1.050	48600	54000	59400	48600	54000	59400	48600	54000	59400	-	-	
		26.67	65900	73200	80500	65900	73200	80500	65900	73200	80500	-	-	

## 4 Additional Information

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### 4.1 VAM copy warning

Since granting the first VAM license in the mid-1960s, we have believed that a strong, global licensee network is a key aspect of offering top-of-the-range OCTG products. The combination of this network with our extensive design, testing and manufacturing experience, has allowed us to both meet and exceed the expectations of our worldwide customer base over the last 40 years.

Unfortunately, as a consequence of this continuing success, several manufacturers have copied VAM designs and are competing directly against genuine VAM products. The genuine VAM product lines are exhaustively listed into our website [www.vamservices.com](http://www.vamservices.com)

We would like to draw your attention to the significant risks of using such VAM copies, especially when mixing them with genuine VAM connections. Despite claims of interchangeability by copy manufacturers, we are aware that considerable problems have been experienced in the field.

#### **No access to VAM drawings and technical information**

VAM copy manufacturers do not have access to genuine drawings and technical information which are dispatched to our licensee network through a “controlled document” system and which are regularly updated to take into consideration the latest developments.

#### **No access to VAM gauges system**

All VAM manufacturers adhere to a very stringent system of gauge calibration which is under the exclusive control of VAM Services.

In order to ensure compatibility of VAM joints manufactured worldwide, these joints are inspected to VAM gauging procedures specifying the use of specific setting blocks calibrated under the control of VAM Services. As VAM copy manufacturers do not have access to this sophisticated gauging system, it is impossible for them to manufacture copy threads and to claim that they are compatible with VAM joints.

#### **No technical assistance from VAM Service Network**

VAM copies are not supported by the VAM licensee workshop network. Neither will it be possible to obtain technical assistance, nor field service or trouble shooting support from our worldwide representatives of VAM Field Service International.

## Conclusion

Due to the differences in tolerances, make-up torque, gauging criteria and lack of access to VAM approved quality control system, VAM copies mixed with genuine VAM joints may lead to failures such as: thread or seal galling, ineffective sealing, thread jump out, tensile failures at loads substantially lower than theoretical minimum, connection back off, ID restriction...

VAM copies are not compatible or interchangeable with genuine VAM joints. Only with VAM can you manage operational risks efficiently. Please note that, when using those copies, V & M TUBES in no case can be held responsible for leakage, accidents or any other problem that may arise and damage your reputation.

Besides, taking into consideration the lifecycle cost of such products, though they might appear cheaper in the first instance, copies will be more expensive because of failure risks, repairs, cross-over, etc. May you require any further information or assistance, please do not hesitate to contact VAM Services.

## 4.2 Blanking dimensions / CDS

Blanking dimensions are one page technical documents that provide the necessary information required by Original Equipment Manufacturers (OEM) to design and pre-machine parts to accept VAM premium connections.

Connection Data Sheets (CDS) are one page technical documents that provide all the dimensions, strengths and performances of a given OCTG {pipe, grade and connection} mix.

You can find the Connection Data Sheets and the Blanking dimensions in our website [www.vamservices.com](http://www.vamservices.com).

## 4.3 VAM Field Service International

For more than 20 years the "VAM guys" have demonstrated the value of the services they provide to the VAM customers throughout the world.

Our Service Specialists enjoy a strong track record of safety, reliability and independence within the drilling operations of the majors and independent companies. This is achieved through the supervision of connection make-up at the rig site, pipe inspection on the deck or at the yard, pre-assembly inspection, audits, training or trouble shooting.

Whether it's HP-HT well architecture, CRA materials, Duoline , 13 Cr completions, expandable tubulars, custom made accessories: our qualified teams contribute to Quality Control, Inspection or Quality Assurance bringing their unique VAM connection expertise to the industry.

As drilling activity continues to expand, VAM is following customers along their international development. Field Service centres are available in the main Oil bases in Scotland, Texas, Mexico, Canada, West Africa, Middle-East, Singapore and China to make sure well engineering or completion teams can call off when needed.

For premium value think VAM, close to you, well run and well done.

For more information on VAM Products and Service please visit - [www.vamservices.com](http://www.vamservices.com)

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fax: +86 10 6438 6402  
email: [china@vamfieldservice.com](mailto:china@vamfieldservice.com)

## 4.4 VAM Services

VAM Services, a division of VALLOUREC MANNESMANN OIL & GAS FRANCE, gives our OCTG customers and Drilling customers access to a world-wide network of more than 140 accessories and repair shops licensed to cut threads of the VAM product line. These shops are strategically located near all major oil and gas fields.

In co-ordination with the technical sales and marketing departments, VAM Services manages this network by providing technical support, training, dispatch of documentation and gauges, and regular audits (at least once a year) to ensure that VAM connections are manufactured at the same quality level around the world.

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For any enquiry regarding VAM connections please refer to our website [www.vamservices.com](http://www.vamservices.com) the [Mr Help](#) area

## 4.5 V & M TUBES

### 4.5.1 Company profile

**VALLOUREC & MANNESMANN TUBES** is a Vallourec Group company.

**Vallourec** is world leading manufacturer of seamless steel tubes.

Specializing in the most complex and highly demanding industrial applications (extreme temperatures, pressure and corrosion), notably in the energy sector (Oil & Gas and Power Generation), Vallourec offers a portfolio of diversified, innovative and high value-added tubular products. The Group is a leading supplier worldwide with manufacturing and sales operations on the global stage.

The Oil & Gas Division is recognized worldwide as specialist of extreme drilling conditions. The high-tech products designed and developed by the Oil & Gas Division meet the reliability requirements of even the most demanding customers, and are suited to the harsh operating conditions of the oil industry and gas wells from the oil well to refinery. They include drilling products, plain-end or threaded seamless tubes for casing or oil and gas production tubing, standard or premium joints (with the VAM® product line)



for a variety of applications. Product grades are engineered to withstand specific, sometimes extreme operating conditions (corrosion, temperature, pressure).

#### 4.5.2 Contact

##### **VALLOUREC MANNESMANN OIL & GAS FRANCE**

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Westhill, Aberdeenshire  
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fax: +44 (0) 1224 279341  
[www.vmog.co.uk](http://www.vmog.co.uk)

**VAM CANADA**

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fax: +1 403 266 2332  
[www.vam-can.com](http://www.vam-can.com)

**VAM MEXICO**

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Cd. ind. Bruno Pagliai  
Tejeria, Vera Cruz  
CP 91697 Mexico  
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fax: +52 229 981 03 49  
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fax: +65 6 235 11 26

**V & M DO BRASIL**

Rua Lauro Müller, 116-sala 1.906  
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phone: +55 21 3873 8300  
fax: +55 21 2541 7261  
[www.vmtubes.com.br](http://www.vmtubes.com.br)

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PO Box 9405  
Dubai - U.A.E.  
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fax: +971 4329 1622

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**VAM NORGE**

Finnestadjordet 14  
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Norway  
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fax: +47 51 54 50 11

## 4.6 SUMITOMO METAL INDUSTRIES, LTD.

### 4.6.1 Company profile

For more than five decades, Sumitomo Metals has been serving the needs of the Oil & Gas industry. The supply records for the most severe drilling environments indicate that Sumitomo Metals is the Leader in Tubular Technologies. Field developments where it was impossible to drill yesterday become a reality with Sumitomo's tubular products today.

Customer satisfaction and reliability are the key words for our product development.

Sumitomo Metals Product line covers most if not all applications from Carbon steel to Nickel based alloy, along with advanced sealing systems such as VAM Premium connections. As a result of continuous R&D efforts, Sumitomo Metals not only has the widest material grades range for OCTG products, but is also able to offer fit-for-purpose solutions.

### 4.6.2 Contact

#### Head office

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Fax: +65-6224-0386

##### London

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Fax: +44-20-8748-8350

##### Dubai

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Elk Grove, IL 60007, U.S.A.

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Fax: +1-847-290-2666

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Houston, TX 77024, U.S.A.

Phone: +1-713-654-7111

Fax: +1-713-654-1261

web: <http://www.sumitomo-tubulars.com>

## 4.7 Miscellaneous

### 4.7.1 Bibliography norms applicable for VAM connections

**API 5CT, 9<sup>th</sup> Ed. / ISO 11960**, Steel pipes for use as casing or tubing in wells

**API Spec 5B**, Specification For Threading, Gauging And Thread Inspection Of Casing, Tubing And Line Pipe Threads

**API RP 5B1**, Gauging and inspection of casing, tubing and line pipe threads

**ANSI-NACE MR0175/ISO 15156-2**, Materials for use in H<sub>2</sub>S-containing environments in oil and gas production - Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons - (identical to ISO 15156-2)

**API RP 5A3 / ISO 13678**, Recommended Practice On Thread Compounds For Casing, Tubing And Line Pipe

**API RP 5A5 / ISO 15463**, Field inspection of new casing, tubing, and plain-end drill pipe

**API RP 5C1 / ISO 10405**, Recommended practice for care and use of casing and tubing

**API Bull 5C2**, Bulletin on performance properties of casing, tubing and drill pipe

**API TR 5C3 / ISO TR 10400**, Technical report On equations and Calculations For Casing, Tubing and Line Pipe used as casing and tubing; and performance properties tables for casing and tubing (plus Supplement 1)

**API RP 5C5 / ISO 13679**, Recommended practice on procedures for testing casing and tubing connections

**API Std 5T1**, Imperfection terminology

**IADC/SPE 11396**, B.A. Dale, M.C. Moyer, T.W. Sampson, A Test Program for the Evaluation of Oilfield Thread Protectors, IADC/SPE Drilling Conference, New Orleans, LA, 20-23 February 1983

#### **4.7.2 Conversion Factor**

As detailed on the following page.

### Conversion Factors for U.S./British and Metric Units

U.S./British Unit	S.I. Unit
<b>Linear Measures</b>	
1 inch (in.)	= 25.4 mm
1 foot (ft) 1ft = 12 in.	= 0.3048 m
1 Yard (yd) = 3 ft	= 0.9144 m
1 English Mile	= 1.6093 km
0.039370 in.	= 1 millimeter (mm)
0.393701 in.	= 1 centimeter (cm)
3.280840 ft = 1.093613 yd	= 1 meter (m)
0.6214 English Mile	= 1 kilometer (km)

<b>Square Measures</b>	
1 square inch ( sq.in.)	= 645.160 sq.mm
1 square inch ( sq.in.)	= 6.45160 sq.cm
1 square foot ( sq.ft)	= 9.2903 sq.dm
1 square yard ( sq.yd)	= 0.836127 sq.m
1 sq.ft = 144 sq.in.	= 0.092903 sq.m
0.001550 sq.in.	= 1 square millimeter (sq.mm)
0.155000 sq.in.	= 1 square centimeter (sq.cm)
10.763910 sq.ft	= 1 square meter (sq.m)
1.195990 sq.yd	= 1 square meter (sq.m)

<b>Volume</b>	
1 cubic inch (cu.in.)	= 16.387064 cu.cm
1 cubic foot (cu.ft)	= 28.316847 cu.dm
1 ft = 1728 cu.in.	= 0.028317 cu.m
1 gallon (U.S.)	= 3.7854 cu.dm
1 gallon (U.K.)	= 4.546 cu.dm
1 barrel (U.S.)	= 158.987 cu.dm
0.061024 cu.in.	= 1 cubic centimeter (cu.cm)
0.035315 cu.ft	= 1 cubic decimeter (cu.dm)
35.31467 cu.ft	= 1 cubic meter (cu.m)

<b>Weights</b>	
1 ounce (oz)	= 28.3495 g
1 pound (lb) = 16 ounces	= 0.45359237 kg
1 long ton ( l ton) = 2240 lb	= 1016.04706 kg
1 short ton ( sh ton) = 2000 lb	= 907.185 kg
0.035274 oz	= 1 gramm (g)
2.204622 lb	= 1 kilogramm (kg)
0.984206 l ton	= 1 metric ton ( t) = 1000 kg
1.10231 sh ton	= 1 metric ton ( t)

### Conversion Factors for U.S./British and Metric Units

U.S./British Unit	S.I. Unit
<b>Weights per Length</b>	
1 lb / ft	= 1.488164 kg / m
1 lb / yd	= 0.496054 kg / m
0.671969 lb / ft = 2.015907 lb / yd	= 1 kg / m
<b>Force *</b>	
1 pound-force (lbf)	= 4.448222 Newton ( N )
0.224809 lbf	= 1 N
<b>Pressure / Stress *</b>	
1 pound - force per square inch ( psi )	= 0.06895 bar
1 lbf / sq.in. ( psi ) ~ 1 lb / sq.in.	= 0.006895 N / sq.mm ( MPa )
1 lbf / sq.ft	= 47.88 N / sq.mm
14.5038 lbf / sq.in.	= 1 bar
145.038 lbf / sq.in.	= 1 N / sq.mm ( MPa )
<b>Density</b>	
1 lb / ft	= 0.016018 kg / dm
62.427952 lb / ft	= 1 kg / dm
<b>Torque *</b>	
1 foot pound - force ft - lbf ~ 1 ft - lb	= 1.3558 Nm
0.7376 ft - lbf	= 1 Nm
<b>Flow Rate</b>	
1 barrel per day	= 0.158987 m / day
1 cubic foot per minute ( ft / min )	= 0.02831685 m / min 40.776192 m / day
<b>Temperature</b>	
Conversion formula °F to °C = 5 / 9 ( °F - 32 )	
1 degree Fahrenheit ( °F )	= 0.5556 °C
32 °F	= 0 °C
212 °F	= 100 °C

\* Note: 1 pound-force ( lbf ) ~ 1 pound ( lb )



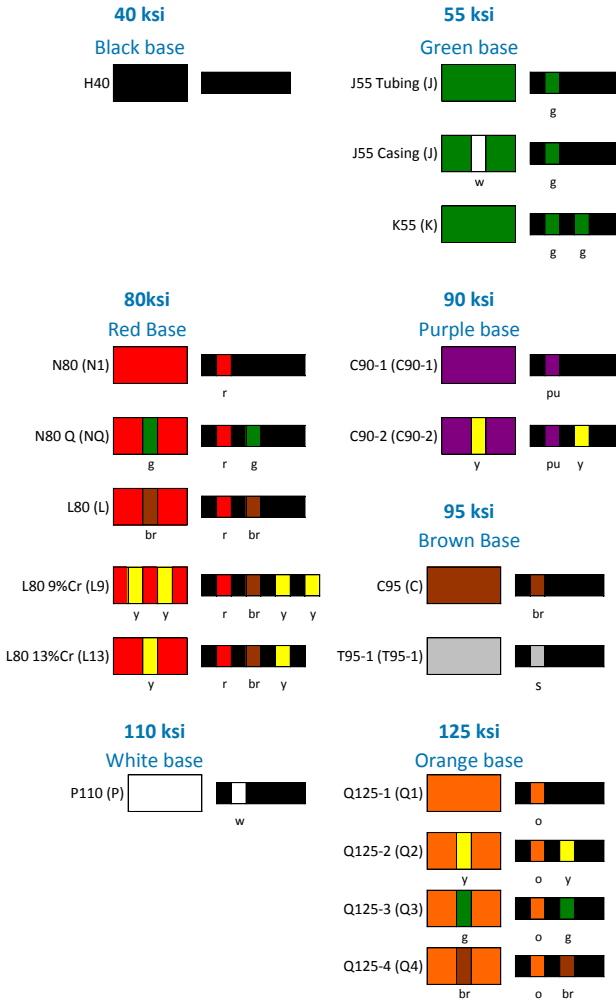
## 4.8 Color code

The following pages show the colour codes that identify the steel type. The colour code will either be painted on the coupling or in the case of pipe with integral connections it will be close to the box end. In some countries there are additional colour codes to identify the thread type and weight per foot. Please refer to the local colour code charts for these countries.

Note that a black band around the centre of the coupling will identify it as having a special clearance option. Steel grades with 22% Chrome and above may be offered without any colour bands.

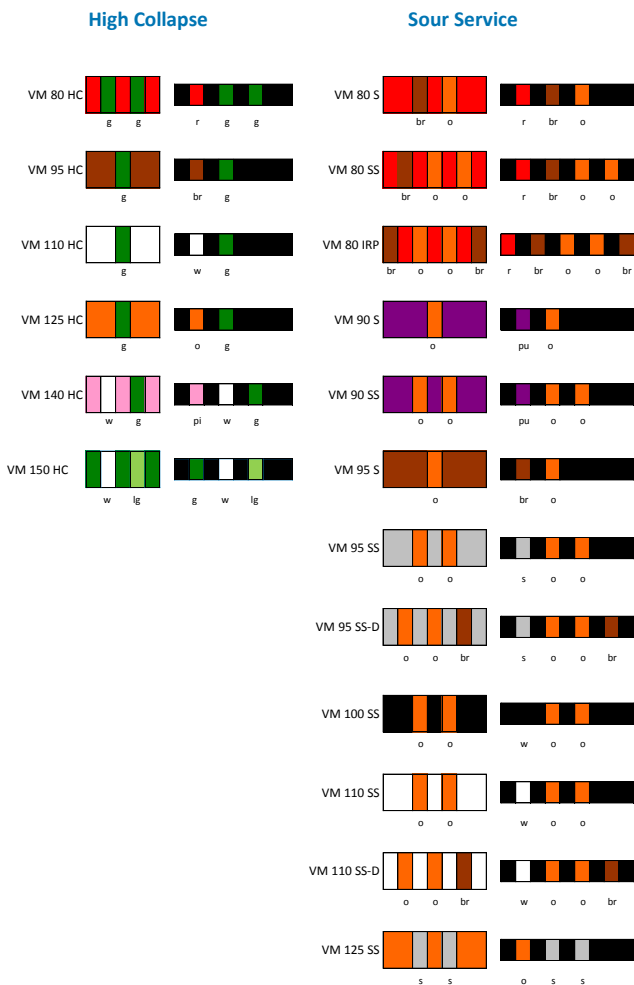
Key, r = red, y = yellow, o = orange, s = silver, g = green, w = white, bl = blue, br = brown, pu = purple, pi = pink, dg = dark green.

## 4.8.1 API



The letter in brackets after the grade is the API abbreviation for the grade. It is the letter that is stenciled on the pipe body.

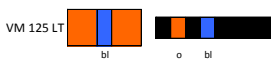
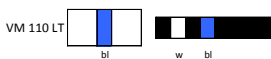
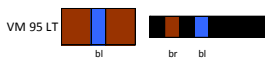
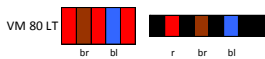
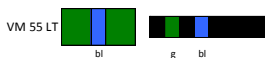
## 4.8.2 V &amp; M TUBES Proprietary Steel Grades



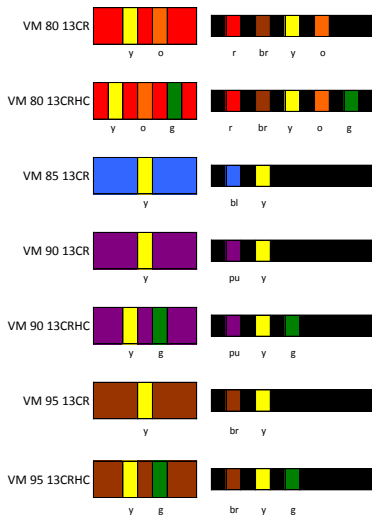
## High Collapse and Sour Service



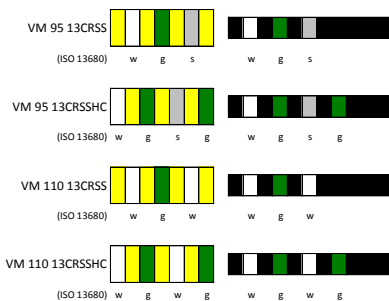
## Low Temperature



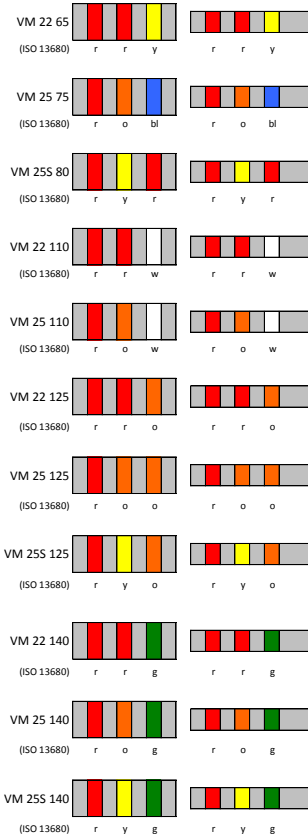
## Martensitic Stainless Steel 13%Cr



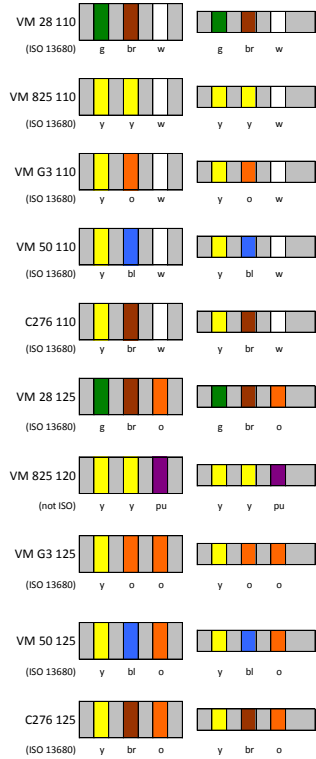
## Martensitic Stainless Steel Super 13%Cr



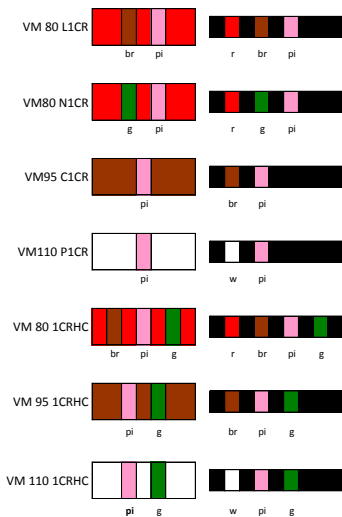
## Duplex and Super Duplex Stainless Steel



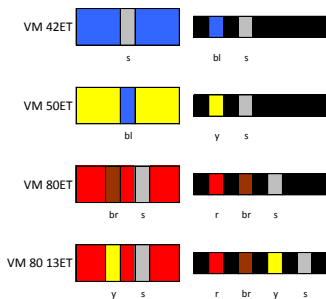
## Super Austenetic and Nickel Based Alloy



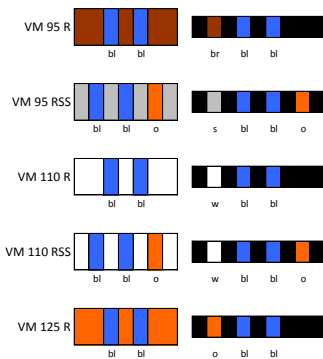
## 1% Chrome



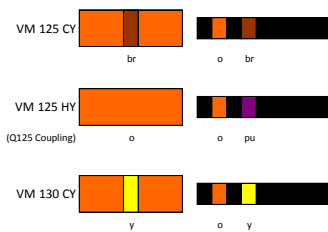
## Expandable



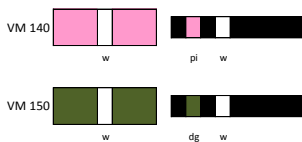
## Riser



## Restricted Yield

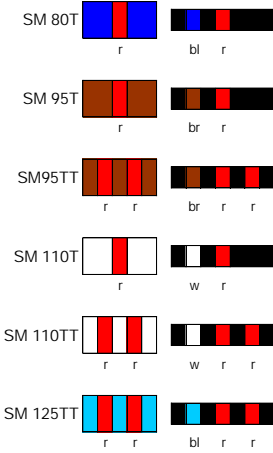


## Deep Well

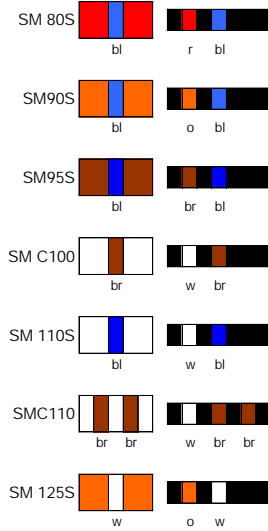


## 4.8.2 SUMITOMO Proprietary Steel Grades

## High Collapse

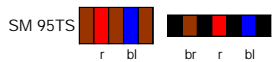
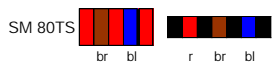


## Sour Service

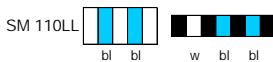
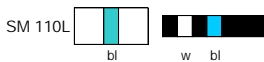
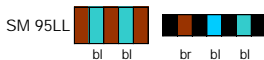
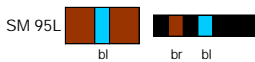
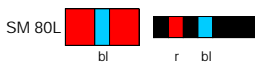




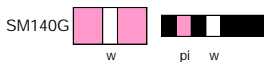
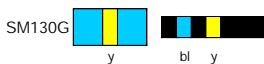
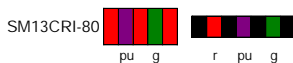
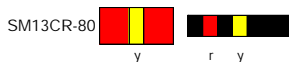
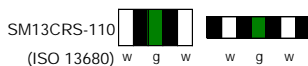
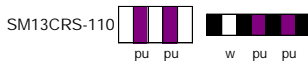
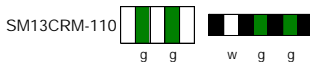
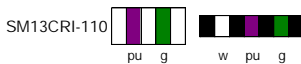
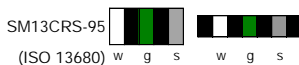
## High Collapse and Sour Service



## Low Temperature



## Deep Well

Martensitic Stainless Steel  
13%CrMartensitic Stainless Steel  
Super 13%Cr

## Duplex Stainless Steel

SM22CR-110 (ISO 13680)		r r w r r w
SM25CR-110 (ISO 13680)		r o w r o w
SM22CR-125 (ISO 13680)		r r o r r o
SM25CR-125 (ISO 13680)		r o o r o o
SM25CRW-125 (ISO 13680)		r y o r y o

## Austenitic Stainless Steel

SM2535-110 (ISO 13680)		g o w g o w
SM2242-110 (ISO 13680)		y y w y y w
SM2550-110 (ISO 13680)		y g w y g w
SM2050-110 (ISO 13680)		y bl w y bl w
SMC276-110 (ISO 13680)		y br w y br w
SM2535-125 (ISO 13680)		g o o g o o
SM2242-125 (ISO 13680)		y y o y y o
SM2550-125 (ISO 13680)		y g o y g o
SM2050-125 (ISO 13680)		y bl o y bl o
SMC276-125 (ISO 13680)		y br o y br o

## 5. VAM Drilling Proprietary Drill Stem Connections



Within Vallourec growth strategy, drilling products is a cornerstone. Taking advantage of Vallourec & Mannesmann Tubes leading position in the Oil & Gas market for premium casing and tubing products, as well as its fully integrated operations from iron ore to tailor made finished goods and services, VAM Drilling has inherited strong fundamentals.

VAM Drilling is a consolidated business unit that combines the experience and expertise of V&M Tubes Drill Pipe Division, OMSCO, Inc. (now named VAM Drilling USA, Inc.), SMF-International (now VAM Drilling France) and VAM Drilling Middle East located in Dubai.

VAM Drilling offers a complete range of high quality and high performance drilling products including drill pipe, heavyweight drill pipe, drill collars, non-magnetic drill collars, MWD/LWD housings, safety valves, subs and BHA accessories for a broad range of drilling applications.

VAM Drilling is dedicated to bringing the latest enabling technology to our clients. Whether it is higher grades for ultra deep wells, NACE tested Sour Service grades for H<sub>2</sub>S wells or Ultra High Torque connections for extended reach wells, we have field proven products.

VAM Drilling's innovative R&D and Marketing group is dedicated to developing unique tubular solutions and services to improve drilling efficiency and maintain higher safety margins in the most challenging drilling environments.

Worldwide sales offices and Technical Support engineers are available in every sales location to provide assistance with drill string design, review of product specifications, product selection, and on-site assistance in resolving important client issues in a timely manner.

VAM Drilling's commitment to customer service continues long after the product leaves the plant. Supported by a worldwide network of VAM Services accessory and repair shops that are strategically situated near all major oil and gas centers, the Company ensures there is always a reliable and readily available licensed facility to cut your VAM Drilling connections.

## 5.1 VAM Drilling Products Description

The connections described hereafter have been designed to be used with drill pipes, heavy weight drill pipes, HydroClean™ product family, and various other accessories.

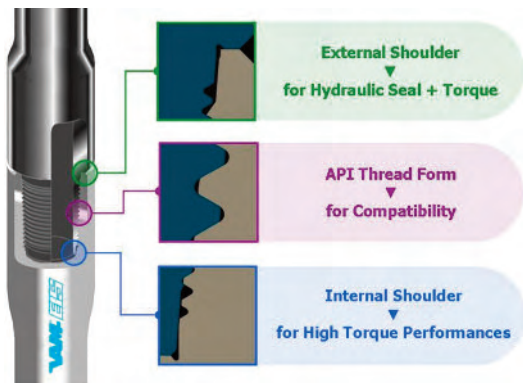
### 5.1.1 VAM® EIS

VAM EIS (External Internal Shoulder) is a double shoulder tool joint designed for high torque drilling applications. It features an API thread profile, with the addition of an internal shoulder that allows more torque to be applied to the connection.

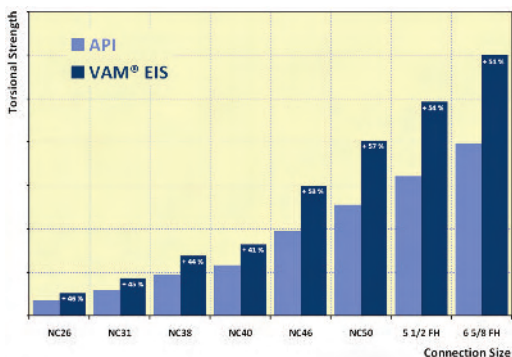
VAM EIS tool joints can be made up to equivalent API connections, ie “4 ½” IF (NC50)” can be assembled with “NC50 VAM EIS” connection, and vice versa. This is why all references to VAM EIS connections are preceded by the equivalent API thread name.

When a VAM EIS connection is made up to another VAM EIS connection, the torque to be applied is provided in the performance data sheet that can be obtained through your local VAM Drilling contact or on [www.vamdrilling.com](http://www.vamdrilling.com). Whenever VAM EIS is used in combination with a standard (single shoulder) equivalent API connection, the torque to be applied is the lesser of both computed make up torque values.

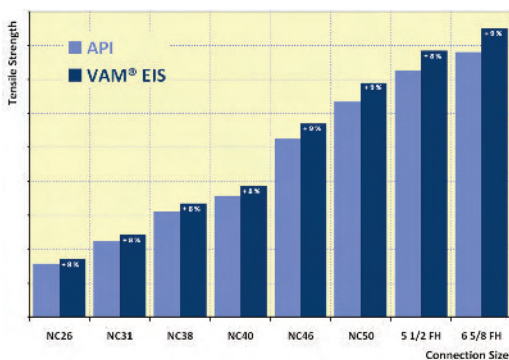
VAM EIS connections outperform API connections even with lower strength steel. This means that they are ideal for Sour Service conditions. To date, tool joints are available for drilling operations in 120 ksi and above material, or for Sour Service in 105 to 110 ksi material.



*VAM EIS general presentation*



Torsional strength comparison: API vs VAM EIS tool joints



Tensile strength comparison: API vs VAM EIS tool joints

The following table presents compatibility between VAM EIS and standard API rotary shouldered connections:

VAM EIS Compatibility with API Shouldered Connections								
VAM EIS	NC26	✓						
	NC31		✓					
	NC38			✓				
	NC40				✓			
	NC46					✓		
	NC50						✓	
	5 1/2 FH							✓
	6 5/8 FH							
	NC26	NC31	NC38	NC40	NC46	NC50	5 1/2 FH	6 5/8 FH
	API							

VAM EIS - API compatibility chart

### 5.1.2 VAM® CDS

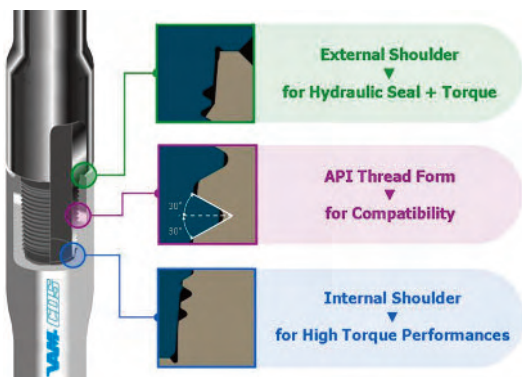
VAM CDS (Compatible Double Shoulder) is a double shoulder tool joint designed for high torque drilling applications. It features an API thread profile, with the addition of an internal shoulder that allows more torque to be applied to the connection.

VAM CDS is not only compatible with API connections, but also with some other 1st generation double shoulder connections. For compatibility with connections from other vendors please contact your VAM Drilling local representative. However, VAM CDS and VAM EIS cannot be made up to one another.

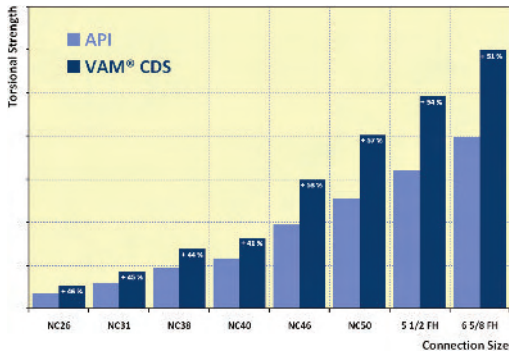
All references to VAM CDS connections are preceded by the equivalent API thread name, for example '5 1/2" FH VAM CDS' or 'NC38 VAM CDS'.

When a VAM CDS connection is made up to another VAM CDS connection, the torque to be applied is provided in the performance data sheet that can be obtained through your local VAM Drilling contact or on [www.vamdrilling.com](http://www.vamdrilling.com). Whenever VAM CDS is used in combination with compatible connection, the torque to be applied is the lesser of both computed make up torque values.

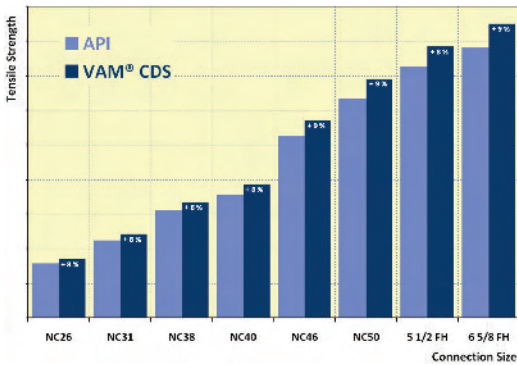
VAM CDS connections outperform API connections even with lower strength steel. This means that they are ideal for Sour Service conditions. To date, tool joints are available for drilling operations in 120 ksi and above material, or for Sour Service in 105 to 110 ksi material.



VAM CDS general presentation



Torsional strength comparison: API vs VAM CDS tool joints



Tensile strength comparison: API vs VAM CDS tool joints

The following table presents compatibility between VAM CDS and standard API rotary shouldered connections:

VAM CDS Compatibility with API Shouldered Connections								
VAM CDS	NC26	✓						
	NC31		✓					
	NC38			✓				
	NC40				✓			
	NC46					✓		
	NC50						✓	
	5 1/2 FH							✓
	6 5/8 FH							
	NC26	NC31	NC38	NC40	NC46	NC50	5 1/2 FH	6 5/8 FH
	API							

VAM CDS – API compatibility charts

For compatibility with connections from other vendors please contact your VAM Drilling local representative.



### 5.1.3 VAM® EXPRESS

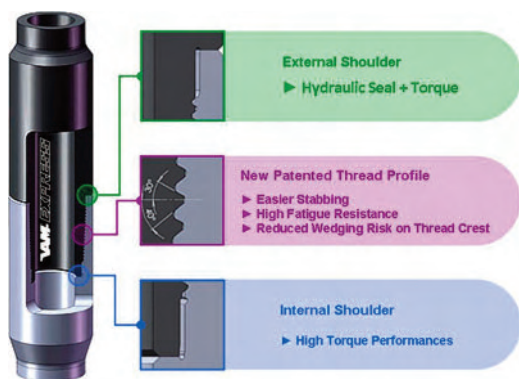
VAM Express is a best in class 2nd generation double shoulder drill pipe connection. The higher torque capability is achieved by increasing the area of the torque shoulder via the reduction of the thread taper compared to VAM EIS, VAM CDS or API drill pipe connections. As a matter of fact, by changing the thread taper the tool joint is no longer compatible with other pipe connections.

The thread taper is optimized to allow larger torque shoulders. In addition, VAM Express features the latest VAM Drilling technical improvements, among which a proprietary thread profile for better stress distribution and minimized wedging effect while stabbing.

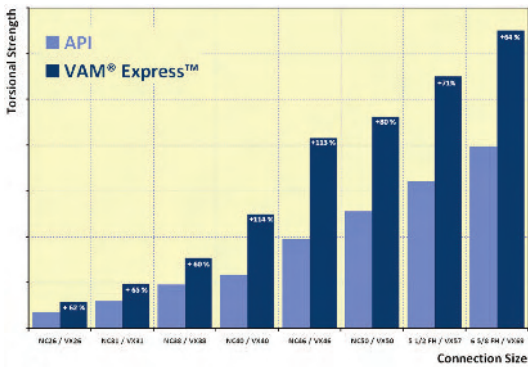
VAM Express was designed to perform in the most challenging environments, without reducing the operational benefits of conventional API connections. Measured key performance indicators of this highly innovative approach are:

- ⇒ Connection repair rate below 5%
- ⇒ VAM Express does not require the use of stabbing guide, and can be made up just as fast as an API connection.

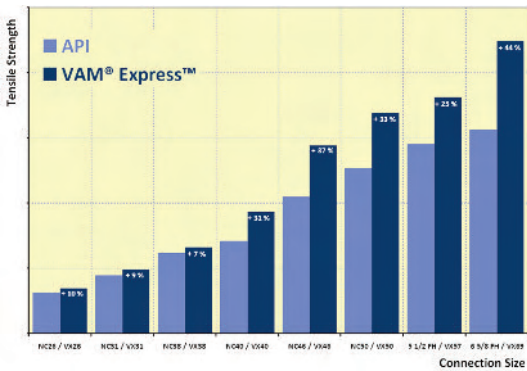
VAM Express connections outperform API connections even with lower strength steel. This means that they are ideal for Sour Service conditions in most OD/ID combinations. To date, tool joints are available for drilling operations in 120 ksi and above material, or for Sour Service in 105 to 110 ksi material.



*VAM EXPRESS general presentation*



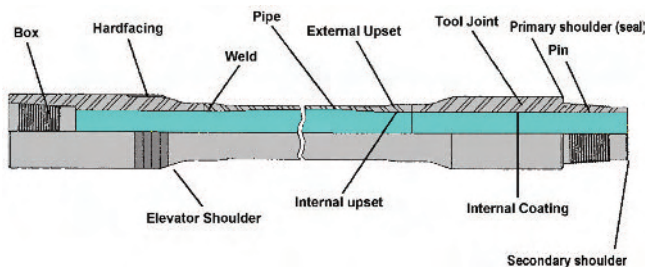
*Torsional strength comparison between API vs. VAM® EXPRESS tool joints*



*Tensile strength comparison between API vs. VAM® EXPRESS tool joints*

## 5.2 Field Procedures

The words used in this procedure are shown on the following sketch:



*Drill pipe description*

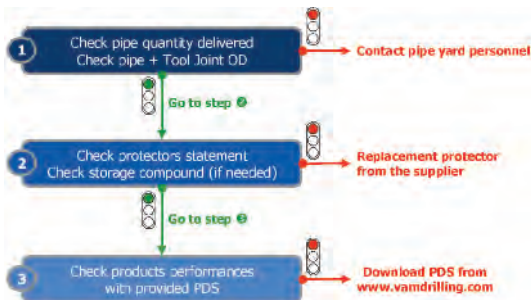
Note: Primary shoulder is also called external shoulder; secondary shoulder is also called internal shoulder.

### 5.2.1 Inspection on arrival at rig site of new drill pipe

At arrival at the rig site, it is good practice to first check that the pipes delivered are of expected type and quantity. This can be done by counting the pipes and quickly checking outer diameters (OD) on pipe body and tool joints. In case the received pipes are not of the correct type or quantity, please contact your logistics representative immediately.

Next, check that all the protectors are in place and have not been damaged or lost during transportation. In case of lost or damaged protectors, please perform a quick inspection of the connections as described below. If protectors are found to be missing or damaged, then replacement should be sought from the supplier. For stacked pipe that are not expected to be used shortly, it is recommended to ensure that connections are coated with a storage compound to prevent corrosion on the tool joint.

It is recommended to check the Performance Data Sheet (PDS) for the product that you have at the rig site rather than wait until you are about to use it. The PDS file features dimensional, performance and make-up torque values for your product. To find out about more about your product and download the up to date PDS for your VAM Drilling product, please visit [www.vamdrilling.com](http://www.vamdrilling.com) or contact your local representative.



*Inspection on arrival at rig site of new pipe*

### 5.2.2 Handling of drill pipe on location

Like most pipe used at a rig site, care must be taken when handling to avoid injuries and pipe damage. The risk of damage is reduced by handling pipe at all times with thread protectors on. Only remove the thread protectors on the drill floor immediately prior to making up the connections.

VAM Drilling tool joints are primarily intended for use with conventional 18° bottleneck elevators.

### 5.2.3 Application of thread compound (running dope)

VAM Drilling recommends either an API SPEC7 zinc based thread compound, or a high quality copper based thread compound for use with the VAM Express, VAM CDS and VAM EIS connections. This should have a friction factor of 1.0 per API RP 7A1. Please refer to chapter 4.2.4 when using a different friction factor.

Before applying the thread compound to the connections, ensure that the threads and shoulders are clean, free from dirt or other foreign material. Drilling fluids and/or additives may affect the frictional properties of the thread compound. They may also increase the chance of corrosion within the connection, so it is important to rinse all foreign material off the connection prior to applying thread compound.

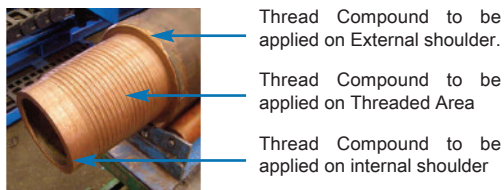
In order to ease the application of thread compound in cold climates it may be necessary to heat the thread compound before application. Never add solvents to thin the thread compound.

Apply a uniform layer of thread compound:

- ⇒ on the pin threads,
- ⇒ on both pin shoulders.

It is not necessary to apply thread compound to the box connection. If thread compound is used on boxes, separate thread compound buckets may be used for box and pin to reduce mud contamination to one set of doped threads.

The thread compound should be applied evenly but sparingly so that the thread profile is still visible as shown in the following pictures:



*The correct application of thread compound*



*Too little thread compound*



*Too much thread compound*

It is important that the correct amount of thread compound is applied on connections. VAM Drilling is concerned about the use of its products on the field and their environmental impact. Please follow VAM Drilling recommendations regarding quantities and application procedure for thread compounds.

After the thread compound has been applied, the lid should be set over the bucket in order to prevent foreign material or water from entering the bucket and contaminating the compound.

#### 5.2.4 Make-up & Break-out

Proper make-up of connections by engaging both external and internal shoulders with sufficient preloading is the most important factor in prevention of fatigue failure and leaks. As with any drill pipe connection, making up tool joints with rig tongs can put high bending loads in the pipe. It is therefore necessary to ensure that the pipe is set in slips in such a way that the connection seats at a convenient height above the rotary table.

It is also important to ensure good alignment between pin and box

connections when making up, to avoid galling of threads and other damage that can occur during stabbing and spinning in.

A stand of drill pipe can weigh more than 2,500 lbs. If poorly stabbed the entire weight of the stand could be supported by the sharp edge of just one thread. This can cause high contact stresses or damage to the threads and inadvertently remove the phosphate coating or the thread compound. The whipping action of spinning pipe can also cause high loads on threads when handling pipe in stands. As a result, care must be taken during stabbing.

The tong capacity should be 140% to 150% of the recommended make-up torque of the connection to allow trouble-free break-out even after drilling operations.

When running VAM Express connections, drillers are recommended to closely monitor the break out torque value. If this torque is more than 20% higher than the specified make up torque, then the connection should be inspected for mechanical damage such as box swelling, thread galling or pin stretching potentially caused by downhole over-torque. In such case, refer to the inspection program described in section 4.3. Avoid banging the pin threads or pin nose surface while disengaging the connection.



Slip and tong dies can cause damage to the tool joint, so every possible effort should be made to keep such damage to a minimum by using low marking die inserts if available. It is recommended to place the tong dies as far from the external shoulder as possible (minimum 2") while staying above the hardbanding.

It is essential that a record be kept of the range of make up torque values used for the string. This can be done either by keeping a paper record or using a computer to record each value. Individual make-up torque values for each connection are not required.

The make-up torque values are available on the Performance Data Sheets (PDS) that are supplied with the product. These are also available by going

to [www.vamdrilling.com](http://www.vamdrilling.com) website and selecting the correct PDS for the drill pipe connection.

Published make-up torque values must be corrected by multiplying them by the thread compound friction factor(\*).

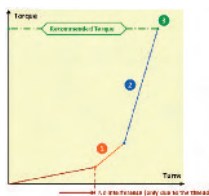
### Example:

⇒ Published recommended make-up torque = 20 000 ft.lbs

⇒ Thread compound friction factor = 1.12

⇒ **Final make-up torque = 20 000 x 1.12 = 22 400 ft.lbs**

(\* ) VAM Drilling declines any responsibility if thread compounds do not meet supplier specifications.



A typical make up torque graph should show the following characteristics:

1 Slope change is due to first shoulder contact (either the external or internal shoulder),

2 Slope change is due to second shoulder contact (either the internal or the external shoulder),

3 Make-up value of the connector.

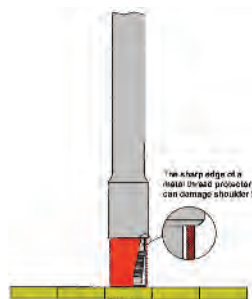
### 5.2.5 Accessories

The junction between accessories and pipes shall be performed using the same type of connections on either end. Therefore it is recommended to use VAM Express, VAM CDS and VAM EIS connections on accessories designed to be run with VAM Express, VAM CDS and VAM EIS drill pipes respectively.

### 5.2.6 Standing (racking) pipe back

It is not recommended to use pressed steel protectors as they may allow the weight of the stand to be supported by the primary make-up shoulder of the connection on the sharp edge of the thread protector. It is preferable to use heavy duty plastic protectors instead.

When racking the pipes back in the derrick, it is important to apply oil, grease, or thread



compound to the connections to avoid the risk of corrosion.

### 5.3 Inspection of used pipe

VAM EIS, VAM CDS and VAM Express tool joints shall be inspected in accordance with common drill pipe inspection procedures (ie API RP 7G, NS-2, DS-1® ), and should follow the guidelines listed below additionally.

People performing inspection shall be familiar with their inspection practices and have all necessary certifications prior to the inspection.

#### 5.3.1 Cleaning of the connections

Prior to inspection, remove thread protectors and clean connections thoroughly by using a non-metallic brush or steam cleaner. All thread and shoulder sections shall be cleaned to allow for visual inspection and dimensional checks.

### 5.4 Visual inspection

The same rules apply as in section 4.2.1. In addition, visually inspect the internal surfaces of the tool joint, pin and box threads, and torque shoulders in accordance with specified drill pipe inspection procedures.

All connections and tool joint bodies shall be free of visible cracks. Hairline cracks in the hard facing are acceptable if they do not extend into base metal. Specialized companies can check this and repair the hardbanding as required.

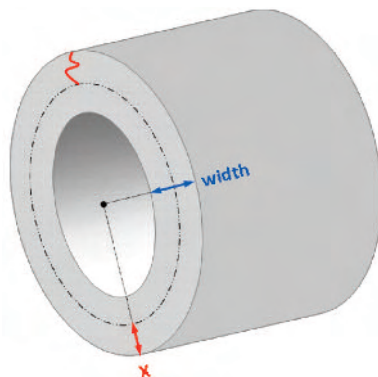
#### 5.4.1 Shoulder damage acceptance

The pin and box shoulders shall be free from nicks, fins, galls and other damage in accordance with recommended practice API RP 7G.

External shoulder damage (pitting or interruptions) that does not exceed 0.8 mm (1/32") in depth and crosses less than 30% of the radial width of the shoulder is acceptable (see following sketch). If the damage exceeds these limits, re-facing is required to repair the shoulder surface, see section 4.7.

All rejects shall be documented on an inspection report.





*External shoulder damage acceptance*

If  $\frac{x}{\text{width}} > 30\%$  the connection must be rejected.

The internal shoulder is not a seal, it is a mechanical shoulder. No raised metal or imperfections that could prevent proper make-up are permitted. This shoulder, if damaged, can be hand filed

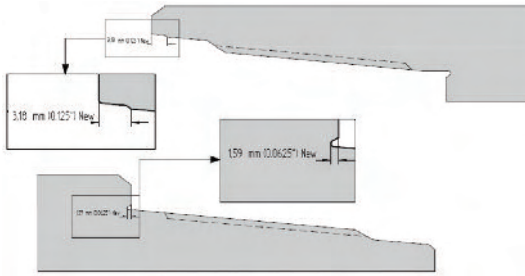
#### 5.4.2 Control of refacing:

For drill pipe with VAM EIS, VAM CDS and VAM Express connections, inspect benchmarks on pin and box external shoulders, to check whether the connection can be still refaced or not.

Pin benchmark is a groove cut inside the external shoulder that has the same depth as allowed refacing depth (1/16"). When pin benchmark is no longer visible, the connection cannot be refaced anymore. It will have to be recut if repair is needed.

On the box tool joint, the benchmark is a recess on the counterbore diameter of the external shoulder. This benchmark has twice the depth of allowed refacing depth (1/32" - 0.794mm). When box benchmark depth is equal to or smaller than 1/16" (1.58mm), the connection cannot be refaced anymore.

Measurement of box benchmark depth is also an indicator of how much refacing was already carried out on the box part.

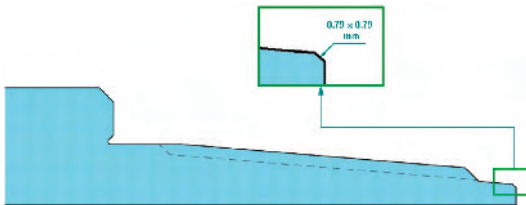


*Pin end and Box end benchmark*

### 5.4.3 Pin Nose Chamfer

#### 5.4.3.1 VAM® CDS

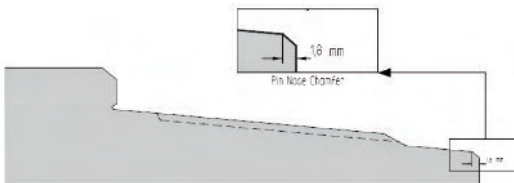
VAM CDS design includes a 0.79 x 0.79 mm pin nose chamfer to be fully interchangeable with API connections. This chamfer must be remade while refacing or recutting a VAM CDS pin tool joint.



*Pin nose chamfer*

#### 5.4.3.2 VAM® EIS

VAM EIS new design includes a 1.8mm pin nose chamfer so as to become fully compatible with API connections. This chamfer must be remade while refacing or recutting a VAM EIS pin connection



*Pin nose chamfer*

#### 5.4.4 Threads

Check that the threads have not been damaged or galled during handling or make-up. Thread surfaces shall be free of pits or other imperfections that appear to exceed 1.6 mm (1/16") in depth or 3.2mm (1/8") in diameter, that penetrate below the thread root, or that occupy more than 40mm (1-1/2") in length along the thread helix.

If damage is found the connection must be re-cut by a VAM® licensee

#### 5.4.5 Box counter-bore

Make sure that the box counter-bore radius is free from 'rag' or other sharp edged defects caused by poor handling or stabbing. Such defects must be removed by grinding prior to reusing the connection.

#### 5.4.6 Phosphate Coating

VAM CDS, VAM EIS and VAM Express should always have phosphate coating applied on both the pin and box tool joints, on the threads and shoulder areas. The phosphate coating may be slightly worn in some areas, this is still acceptable. However, if the coating is removed completely or if re-facing has been carried out, the connection shall undergo phosphate coating again, or may be repaired using a molybdenum disulfide (MoS<sub>2</sub>) repair kit (like "Molykote®" spray products).

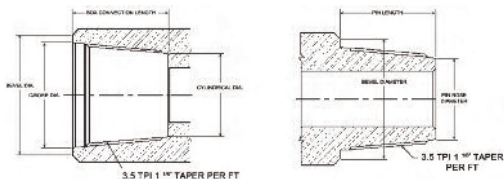
### 5.5 Dimensional checks

Specific to VAM EIS and VAM CDS: Since both these connections feature API thread profiles, the dimensional checks for the threads are the same as for API drill pipe connections. Ensure that all inspection equipment is in calibration. The drawings below show the dimensions that are specific to VAM CDS and VAM EIS connections.



*Main dimensions checked*

The drawings below show the dimensions that are specific to VAM Express connections.



Main dimensions checked

## 5.5.1 Pin & box connection length field tolerances:

### 5.5.1.1 VAM® EIS Field Tolerances

The following table lists the nominal distance between shoulders for VAM EIS connections, further called make-up loss (MUL):

Connection Type	Distance between Shoulders (MUL)	
	inch	mm
NC26 VAM EIS	3.626	92.10
NC38 VAM EIS	4.626	117.50
NC40 VAM EIS	5.126	130.20
NC46 VAM EIS	5.126	130.20
NC50 VAM EIS	5.126	130.20
5 1/2 FH VAM EIS	5.626	142.90
6 5/8 FH VAM EIS	5.626	142.90

VAM EIS make-up loss

The field tolerance on the above Make-up loss is different depending on the steel grade as detailed in the table below.

Grade (ksi)	Box shoulder to shoulder length (MUL) tolerance (mm)		Pin shoulder to shoulder length (MUL) tolerance (mm)	
	Max.	Min.	Max.	Min.
120 and above	+ 0.150	- 0.025	+ 0.025	- 0.150
95 to < 120	+ 0.090	- 0.000	+ 0.000	- 0.090

VAM EIS field tolerances

### 5.5.1.2 VAM® CDS Field Tolerances

The following tables list the common make-up loss (MUL) and field tolerances for VAM CDS connections:

Connection	Make-up Loss		120 ksi and above - Field Tolerance							
			Pin Length				Box Length			
			Min.		Max.		Min.		Max.	
			inch	mm	inch	mm	inch	mm	inch	mm
NC26 VAM CDS	3.384	85.95	3.382	85.90	3.387	86.03	3.385	85.98	3.391	86.13
NC31 VAM CDS	3.891	98.83	3.888	98.76	3.894	98.91	3.894	98.91	3.900	99.06
NC38 VAM CDS	4.403	111.84	4.400	111.76	4.406	111.91	4.406	111.91	4.412	112.06
NC40 VAM CDS	4.915	124.84	4.912	124.76	4.918	124.92	4.918	124.92	4.924	125.07
NC46 VAM CDS	4.915	124.84	4.912	124.76	4.918	124.92	4.918	124.92	4.926	125.12
NC50 VAM CDS	4.915	124.84	4.912	124.76	4.918	124.92	4.918	124.92	4.924	125.07
5 1/2 FH VAM CDS	5.427	137.85	5.424	137.77	5.430	137.92	5.430	137.92	5.436	138.07
6 5/8 FH VAM CDS	5.425	137.80	5.421	137.69	5.429	137.90	5.430	137.92	5.436	138.07

*Shoulder to shoulder field tolerances for 120 ksi and above VAM CDS connections*

Connection	Make-up Loss		95 to < 120 ksi - Field Tolerance							
			Pin Length				Box Length			
			Min.		Max.		Min.		Max.	
			inch	mm	inch	mm	inch	mm	inch	mm
NC26 VAM CDS	3.384	85.95	3.382	85.90	3.386	86.01	3.385	85.97	3.389	86.09
NC31 VAM CDS	3.891	98.83	3.889	98.77	3.893	98.89	3.892	98.85	3.896	98.97
NC38 VAM CDS	4.403	111.84	4.401	111.78	4.405	111.90	4.404	111.85	4.408	111.97
NC40 VAM CDS	4.915	124.84	4.913	124.78	4.917	124.90	4.917	124.88	4.921	125.00
NC46 VAM CDS	4.915	124.84	4.913	124.78	4.917	124.90	4.917	124.88	4.921	125.00
NC50 VAM CDS	4.915	124.84	4.913	124.78	4.917	124.90	4.917	124.88	4.921	125.00
5 1/2 FH VAM CDS	5.427	137.85	5.425	137.79	5.429	137.90	5.429	137.89	5.433	138.01
6 5/8 FH VAM CDS	5.425	137.80	5.423	137.74	5.427	137.85	5.427	137.84	5.431	137.96

*Shoulder to shoulder field tolerances for 95 to <120 ksi VAM CDS connections*

### 5.5.1.3 VAM® Express Field Tolerances

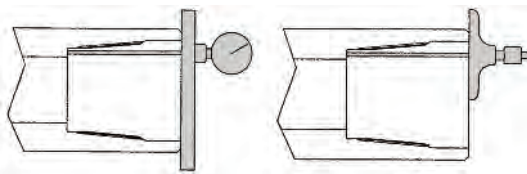
The following tables list the common make-up loss (MUL) and field tolerances for VAM Express connections:

Connection	Make-up Loss		Field Tolerance							
			Pin Length				Box Length			
			Min.		Max.		Min.		Max.	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	
VX-24	5.000	127.00	5.003	127.08	4.997	126.92	5.005	127.13	4.999	126.97
VX-26	5.250	133.35	5.253	133.43	5.247	133.27	5.254	133.45	5.248	133.30
VX-28	5.250	133.35	5.253	133.43	5.247	133.27	5.254	133.45	5.248	133.30
VX-31	5.500	139.70	5.504	139.80	5.497	139.62	5.505	139.83	5.498	139.65
VX-34	6.000	152.40	6.003	152.48	5.997	152.32	6.003	152.48	5.997	152.32
VX-38	6.000	152.40	6.004	152.50	5.996	152.30	6.007	152.58	5.999	152.37
VX-39	5.750	146.05	5.755	146.18	5.747	145.97	5.755	146.18	5.747	145.97
VX-40	6.250	158.75	6.254	158.85	6.247	158.67	6.254	158.85	6.247	158.67
VX-46	6.750	171.45	6.755	171.58	6.747	171.37	6.754	171.55	6.746	171.35
VX-50	7.000	177.80	7.005	177.93	6.996	177.70	7.005	177.93	6.996	177.70
VX-54	6.375	161.93	6.381	162.08	6.370	161.80	6.384	162.15	6.373	161.87
VX-57	7.000	177.80	7.006	177.95	6.997	177.72	7.006	177.95	6.997	177.72
VX-65	7.375	187.33	7.379	187.43	7.371	187.22	7.379	187.43	7.371	187.22
VX-69	7.125	180.98	7.130	181.10	7.122	180.90	7.127	181.03	7.119	180.82

*Shoulder to shoulder field tolerances*

### 5.5.2 Box connection length

The distance between the two make-up shoulders shall be verified at 2 locations 90° apart. This distance shall be compared to the requirements for the connection being inspected to determine acceptance or rejection. The diagram below shows two methods of measuring this dimension.



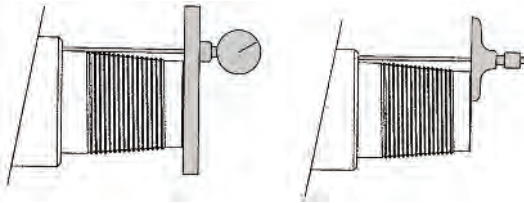
*Box connection length inspection*

If the connection length of the box exceeds the specified dimension, then repair must be made by re-facing the external shoulder of the box connection and vice versa. Re-facing limits are the same as for repair of damaged shoulders.

### 5.5.3 Pin connection length

The distance between the 2 make-up shoulders shall be verified at 2 locations 90° apart. This distance shall be compared to the requirements for

the connection being inspected to determine acceptance or rejection. The diagram below shows two methods of measuring this dimension.



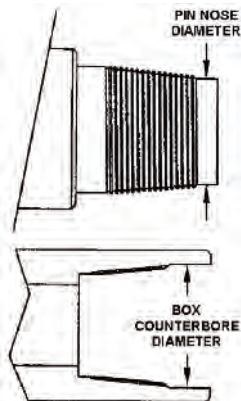
*Pin connection length inspection*

If the connection length of the pin exceeds the specified dimension, then repair may be made by re-facing the internal shoulder of the pin connection and vice versa. Re-facing limits are the same as for repair of damaged shoulders.

#### 5.5.4 Box and pin diameters for VAM® Express

The maximum box counter-bore and pin nose diameters (see 4.5.3 - *Pin connection length inspection*) shall be found with calipers and compared to the table in section 4.5.1.3. If the diameter is out of tolerance, the connection must be recut. Be sure to measure the box counterbore diameter and not the box benchmark diameter. Contact VAM Services for more details on tolerances.

Connection	Max Box		Max Pin Nose	
	inch	mm	inch	mm
VX-24	2.649	67.28	2.028	51.51
VX-26	2.887	73.33	2.242	56.95
VX-28	3.122	79.30	2.477	62.92
VX-31	3.402	86.41	2.733	69.42
VX-34	3.678	93.42	2.961	75.21
VX-38	4.005	101.73	3.288	83.52
VX-39	4.212	106.98	3.519	89.38
VX-40	4.476	113.69	3.735	94.87
VX-46	5.157	130.99	4.368	110.95
VX-50	5.555	141.10	4.742	120.45
VX-54	5.749	146.02	4.996	126.90
VX-57	5.990	152.15	5.177	131.50
VX-65	7.016	178.21	6.167	156.64
VX-69	7.363	187.02	6.538	166.07



*Maximum box and pin diameters*

*Diameter inspection locations*

## 5.6 Example of Performance Data Sheet

## Example of Performance Data Sheet


**Performance Datasheet**  
*Drill Pipe*

 Size: Pipe OD / Upset Type / Nominal Weight  
 Connection: API or VAM Drilling Proprietary  
 Pipe grade: Pipe Grade (TJ grade is given below)  
 Range: 2 or 3 (31ft or 45 ft)
**DRILL PIPE DIMENSIONS & MATERIALS**

		PIPE		
		NEW	PREMIUM	CLASS 2
OD	in	5	4.855	4.783
Wall thickness	in	0.362	0.290	0.253
% Remaining body wall	%	100%	80%	70%
ID	in	4.276	4.276	4.276
Grade			VM-105 DP SS	
Cross sectional area	in <sup>2</sup>	5.275	4.154	3.606

		TOOL JOINT		
		NEW	PREMIUM	CLASS 2
Connection			VAM Express VXS0	
OD	in	6-1/2	6-1/32	6-1/32
ID	in	4	4	4
Box tong length (Lb)	in	14	14	14
Pin tong length (Lp)	in	11	11	11
Make-up loss (MUL)	in	7.000	7.000	7.000
Grade	KSI	110	110	110

**DRILL PIPE ASSEMBLY DATA**

	HANDLING			HYDRAULICS	
Sh to Sh length	44.5	ft	Open end displacement	0.32	US gal/ft
Approx weight	927	lbs	Closed end displacement	1.06	US gal/ft
Adjusted weight	20.83	lbs/ft	Capacity	0.74	US gal/ft

**DRILL PIPE MECHANICAL PERFORMANCES**

		PIPE		
		NEW	PREMIUM	CLASS 2
Tensile strength	lbs	554,000	436,000	379,000
Torsional strength	ft-lbs	57,600	45,200	39,200
80% Tors. strength	ft-lbs	46,100	36,200	31,300
Collapse pressure	PSI	13,000	8,760	6,550
Internal pressure	PSI	13,300	12,200	10,600

		TOOL JOINT		
		NEW	PREMIUM	CLASS 2
Tensile strength	lbs	957,000	957,000	957,000
Torsional strength	ft-lbs	57,800	39,400	39,400
Maximum make-up torque	ft-lbs	37,900	25,800	25,800
Recommended make-up torque	ft-lbs	36,100	24,600	24,600
Minimum make-up torque	ft-lbs	34,300	23,300	23,300

Balance OD	in	6.436	6.436	6.436
Torsional ratio TJ/pipe		1.00	0.87	1.00

All data nominal and calculated per standard methods. VAM Drilling does not assume responsibility for results obtained through the use of this information. No warranty expressed or implied.



## 5.7 Protection of the connection

After inspection the connections shall have storage compound applied to avoid corrosion unless the drill pipe is run immediately.

Only protectors specially designed for VAM EIS, VAM CDS and VAM Express connections may be used. These cover the whole thread section and box counter-bore. Sufficient grease should be applied to prevent the ingress of water into the connection.

## 5.8 Repair Procedures

After inspection program described above, some connections could be repaired if damages are within defined limits.

If VAM CDS is assembled with an equivalent API threaded double shoulder connection, this connection must present pin and box lengths within VAM CDS field tolerance ranges.

Any connections that require major repair should NOT be used.

If rethreading is necessary, it should be carried out by a VAM® Licensee. For the location of your local VAM® Licensee please refer to the VAM Services website at [www.vamservices.com](http://www.vamservices.com).

### 5.8.1 Corrosion / Minor damages

Minor damage to internal shoulder can be hand dressed by file or hand grinder in order to remove any protrusion interfering with mating surfaces. Do not file on external shoulders.

Any build up of corrosion should be removed using a scoring pad (like "Scotch-brite®" or 400 grit emery paper).

### 5.8.2 Shoulder re-facing

This operation should be performed in a machine shop.

## 5.9 VAM Drilling Contacts

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## 5.10 Some applicable norms for VAM Drilling Products

**API 5D**, Specification for Drill Pipe.

**ISO 11961**, Petroleum and Natural Gas Industries  
Steel drill pipe.

**ISO 10407-1**, Petroleum and natural gas industries  
Rotary drilling equipment  
Part 1: Drill stem design and operating limits.

**ISO 10407-2**, Petroleum and natural gas industries  
Rotary drilling equipment  
Part 2: Inspection and classification of used drill stem elements

**API Spec 7**, Specification for Rotary Drill Stem Elements.

**API Spec 7-1 / ISO 10424-1**, Specification for Rotary Drill Stem Elements  
Petroleum and Natural Gas Industries - Rotary Drilling Equipment  
Part 1: Rotary Drill Stem Elements.

**API Spec 7-2 / ISO 10424-2**, Specification for Threading and Gauging of  
Rotary Shouldered Thread Connections Petroleum and Natural Gas  
Industries - Rotary drilling equipment  
Part 2: Threading and gauging of rotary shouldered threaded connections

**API RP 7A1**, Recommended Practice for Testing of Thread Compound for  
Rotary Shouldered Connections.

**API RP 7G**, Recommended Practice for Drill Stem Design and Operating  
Limits.

**NORSOK Standard M-702**, Drill String Components.

**NS-1™ Standard**, Quality and Inspection Requirements.

**NS-2™ Standard**, Drill String Inspection Standard.

**DS-1™ Standard**, Volume 1: Drilling Tubular Product Specification.  
Volume 2: Drill Stem Design and Operation.  
Volume 3: Drill Stem Inspection.

**IRP Volume 1, Section 1.8**, Drill String Design and Metallurgy.



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