Running Procedure

VAxplorer ®

Rev.:1

voestalpine Tubulars GmbH & Co KG
www.voestalpine.com/tubulars

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RS-RP-VAX-1 Rev.1: Change of layout (new corporate design)

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Table of Content

This document contains the recommended practices for the installation of voestalpine tubulars proprietary connections. This is not comprehensive and is meant only as general guidance, based on best industry practices.

The user assumes all responsibility for the safe and effective implementation of these practices. Further, it is the user's responsibility to provide competent and knowledgeable personnel, as well as appropriate and well maintained equipment.

Proprietary Connections

Fields of application		VAGT		VAsuperior		VAxplorer	VAroughneck
		Casing	Tubing	Casing	Tubing	Casing	Casing
	CAL	*	II	IV	IV	IV	I
Efficiency (% of pipe body) {Uniaxial Loads}	Tension	100**		100	100	100	100
	Compression	100**		100	100	100	100
	Internal pressure	100		100	100	100	100
	External pressure	100		100	100	100	100
Sealability (% of efficiency) {Combined Loads}	Tension	100		100	100	100	100
	Compression	50 (for fluids: 100)		100	100	100	100
	Internal pressure	100		100	100	100	100
	External pressure	30 (for fluids: 100)		100	100	100	100
Conditions of combined load tests	Medium	GAS		GAS	GAS	GAS	FLUID
	Von mises (%)	95		95	95	95	95
	Bending	20		20	20	20	20
Applications	High torque	NO		NO***	N.A.	YES	YES

* tested acc. to customer specifications
** exception for heavy walls
*** on request enhanced torque available

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Proprietary Grades

SPECIFIED MINIMUM YIELD STRENGTH	GRADE API SPEC 5CT	voestalpine Tubulars Proprietary Grades										
					SOUR SERVICE			DEEP WELL		MILD SWEET GAS		
		HIGH COLLAPSE	ENHANCED PROPERTIES	EXTREME PROPERTIES		with high collapse	with enhanced properties		with high collapse	Low Temperature	Ferrite Pearlite	Quenched & Tempered
psi												
55 000	J55	VA-HC-J55								VA-LT-J55	VA-FP-55-1CR	
	K55	VA-HC-K55								VA-LT-K55		
75 000											VA-FP-75-1CR	
80 000	N80-Q	VA-HC-N80-Q	VA-EP-N80-Q	VA-XP-N80-Q						VA-LT-N80-Q	VA-FP-80-1CR	
	L80-1	VA-HC-L80-1	VA-EP-L80-1	VA-XP-L80-1						VA-LT-L80-1		VA-L80-1-1CR / VA-L80-1-3CR
					VA-SS-80	VA-SS-80-HC	VA-SS-80-EP					
90 000	C90-1	VA-HC-C90-1	VA-EP-C90-1	VA-XP-C90-1	VA-SS-90	VA-SS-90-HC	VA-SS-90-EP			VA-LT-C90-1		
95 000	R95	VA-HC-R95	VA-EP-R95	VA-XP-R95						VA-LT-R95		
	T95-1	VA-HC-T95-1	VA-EP-T95-1	VA-XP-T95-1						VA-LT-T95-1		
					VA-SS-95	VA-SS-95-HC	VA-SS-95-EP					
110 000	C 110	VA-HC-C 110	VA-EP-C 110		VA-SS-110 VA-S-110	VA-SS-110-HC VA-S-110-HC	VA-SS-110-EP VA-S-110-EP			VA-LT-C 110		
	P 110	VA-HC-P 110	VA-EP-P 110	VA-XP-P 110						VA-LT-P 110		VA-P 110-1CR / VA-P 110-3CR
125 000	Q125-1	VA-HC-Q125-1	VA-EP-Q125-1	VA-XP-Q125-1						VA-LT-Q125-1		
					VA-S-125	VA-S-125-HC	VA-S-125-EP	VA-D-125	VA-D-125-HC			
140 000								VA-D-140	VA-D-140-HC			
150 000								VA-D-150	VA-D-150-HC			
On request in combination with		LOW TEMPERATURE								HIGH COLLAPSE		
								Enhanced/Extreme Properties				

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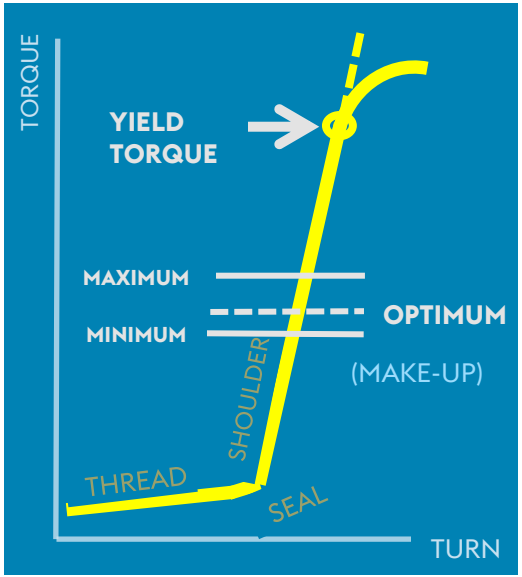

- Suitable for
  - Extreme torques
  - Extended reached wells
  - Rotation operations
- High yield torque
- 100% compression and tension efficiency
- Successfully Cal IV tested

Definition yield torque: transition point from elastic to plastic zone

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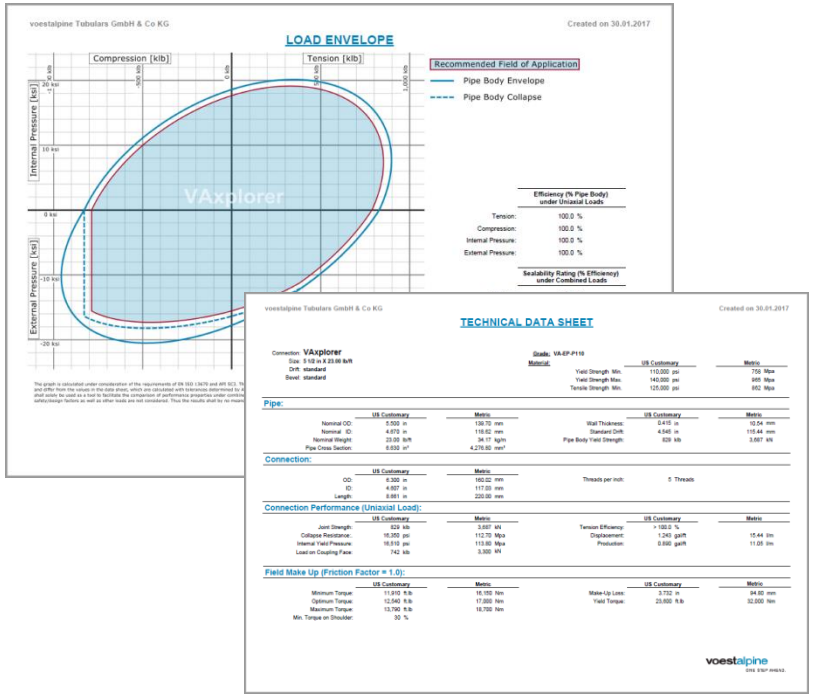

Dimensions and torque values will be provided through our datasheet generator: http://www.voestalpine.com/tubulars/en -> Customer service -> Datasheet generator

- Torques are valid for dope with friction factor 1 at room temperature
- Max. torque: optimum +10%
- Min. torque: optimum -5%
- Torques for special clearance couplings on request
- Special clearance & 20° beveled couplings: slip type elevator strongly recommended due to lower load on coupling face

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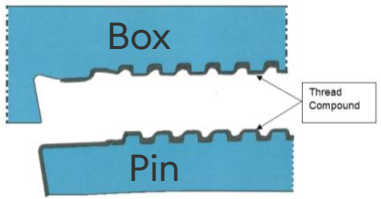
Running and handling

- Equipment
  - Elevator
    - If collar type – smooth bearing face
    - If slip type – clean and sharp dies
  - Derrick
    - Blocks are centered over rotary table
  - Power tong
    - Correct size and calibrated
    - Torque-turn monitoring system
- Pipe handling
  - Thread protectors in place
  - No hooks to lift pipes
  - No rough handling
  - Use proper racks
- Preparation
  - Cleaning
    - Remove and clean protectors
    - Clean pin and box
    - Diesel and oil-based products are not recommended as cleaning solvent
    - Prevent corrosion
  - Drifting
    - Drift on pipe rack – start from box end
  - Visual inspection
    - Check each pipe (see page 12)
    - Apply clean and dry protectors
  - Pipe tally
- Running
  - Lifting and stabbing
    - Remove pin protectors just before stabbing
    - Clean connection with compressed air
    - Check seal area for damages
    - Apply thread compound – pin & box



API-modified running compound with known friction factor between 0,8 ans 1,2 is recommended. Dope shall be applied uniform on pin and box (on pin including seal and shoulder)

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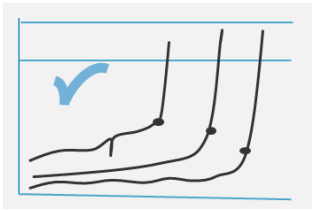
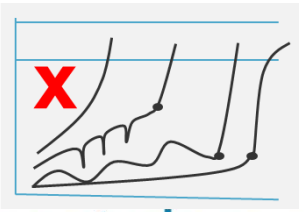
Running and handling

- Use a stabbing guide
- Lower carefully
- Maintain good alignment

- Make-up
  - Start slowly in high gear with open back-up
  - If connection jams (torque increases immediately)
    - Stop and release tong
    - Disengage connection / place back-up on coupling
    - Clean connection / visual inspection
    - If questionable - set aside
    - If o.k. – stab again
  - If connection stabs correct
    - Increase speed to spin-in (max. 20 rpm)
    - Assemble until torque increase
    - Stop rotation / close back-up
  - Finish in low gear and with speed less than 5 rpm
    - Approximately 1 to 2 turns before shouldering

- Acceptance
  - Final torque between maximum and minimum
    - Use correct friction factor of dope
    - Friction factor might be affected by extreme temperatures.
  - Delta torque shall be at least 30 % of actual applied torque
    - See diagram on page 9
  - No plastic deformation
  - Increase of torque shall be reasonable uniform and smooth





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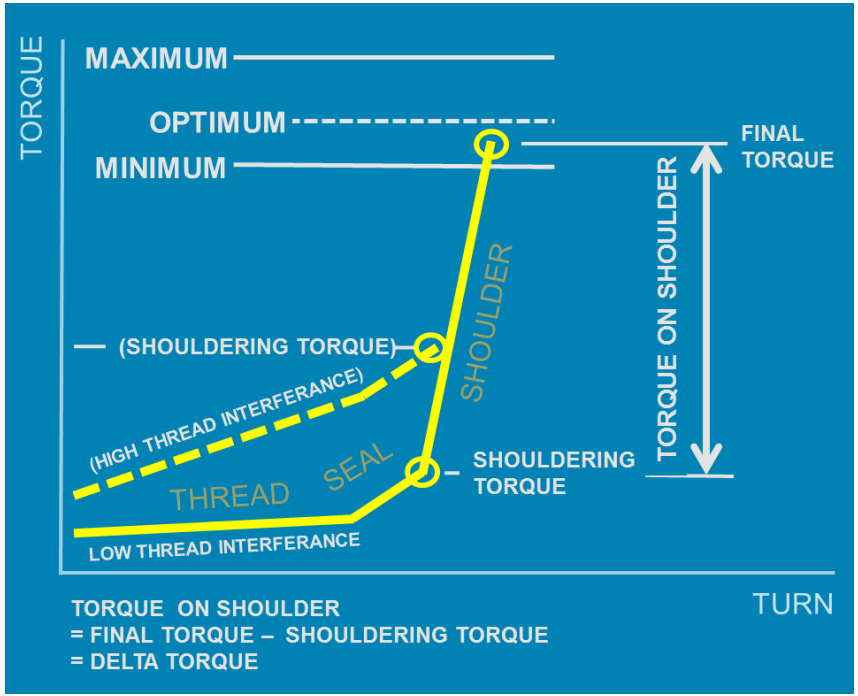
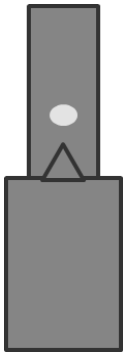
Running and handling



Casing

Minimum 30 % torque on shoulder (Delta torque).



Triangle stamp shall be used as rough indicator for the make-up progress only.

After final make-up the coupling should be close to base line.

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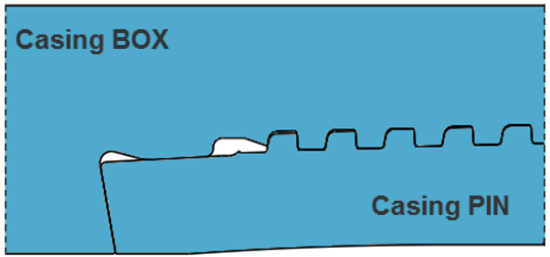
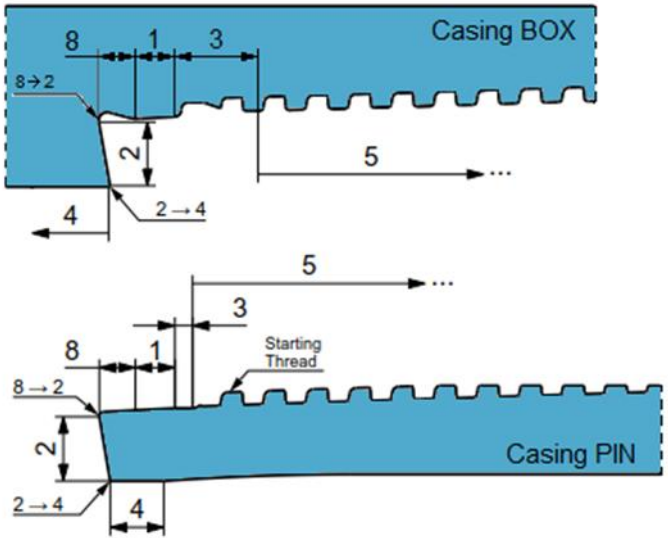
Running and handling

- Break-out
  - Place back up tong on coupling mill side
  - Set up power tongs to low gear
  - Speed shall be less than 10 rpm
  - Slowly lift the pin out of the box
  - Handle with care / use protectors
  - Clean all pipes
  - Visual inspection / page 13
  - Apply appropriate dope
  - Any problems during make-up or break-out should be reported immediately
    - Used equipment, thread compound, torques used, assembly speed, ...
  - Any questionable joint, set aside for evaluation, shall be brought to a disposition
    - Accepted or rejected
    - If rejected it must be properly marked
- High chrome material
  - Handling
    - Avoid metal to metal contact
  - Equipment
    - Use non ferrous low marking dies
    - Use weight compensator
    - Use non metallic drift
    - No misalignment
  - Make-up
    - Start make-up by hand
    - Maximum assembly speed 10 rpm
    - Final make-up speed max. 5 rpm
- Thread lock compound
  - Pin
    - Thread lock compound shall be applied on the first two-thirds of the threads. No other compound on pin.
  - Box
    - No thread lock compound on threads. On seal and shoulder running compound shall be applied.

Visual inspection and field repair

1 Seal
2 Shoulder
3 Cylindrical section
4 Internal bore
5 Perfect thread length
6 Non perfect thread length *
7 Coupling face *
8 Clearance





* not shown in sketch

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Visual inspection and field repair

Pin

Element	Area	Rust	Rust + Pitting	Burrs	Scratches	Dent
Seal (a*)	1	Remove with abrasive fleece	Re-cut the pin	N/A	Minor remove with abrasive fleece	Re-cut the pin
Shoulder	2	Remove with abrasive fleece	Grind to smooth surface with emery paper	N/A	Grind to smooth surface with emery paper	Grind to smooth surface with file and emery paper
Radius between seal and shoulder	1->2	Remove with abrasive fleece	Grind to smooth surface with emery paper	N/A	Grind to smooth surface with emery paper	Grind to smooth surface with file and emery paper
Edge between shoulder and bore	2->4	N/A	N/A	Remove with emery paper	N/A	Grind to smooth surface with file and emery paper
Cylindrical section	3	Remove with abrasive fleece	Remove rust with abrasive fleece. Pitting is accepted.	N/A	Accepted	Grind to smooth surface with file and emery paper
Internal bore	4	Accepted	Accepted	N/A	Accepted	Accepted
Perfect thread length (b*)	5	Remove with abrasive fleece	Grind to smooth surface with emery paper	Remove with emery paper	Accepted	Grind to smooth surface with file and emery paper
Non-perfect thread length	6	Remove with abrasive fleece	Grind to smooth surface with emery paper	Accepted	Accepted	Grind to smooth surface with file and emery paper
Clearance area	8	Remove with abrasive fleece	Remove rust with abrasive fleece. Pitting is accepted.	N/A	Accepted	Grind to smooth surface with file and emery paper

"Perfect Thread Length " (measured from Pin End)		
PIPE OD	**mm**	**inch**
5 1/2 "	37,44	1,474
6 "	35,84	1,411

a* Minor pitting, dents or scratches may be accepted after approval by voestalpine Tubulars specialist
b* Up to 2 thread-turns may be imperfect if not more than ¼ of a turn is affected. If more than 2 thread-turns / or more than a half turn in total / are affected, hand-repair may be accepted after approval by voestalpine Tubulars specialist.

Abrassive fleece : 400 / 500 (superfine)
Emery paper : 300 -400 (superfine)

Visual inspection and field repair

Element	Area	Rust	Rust + Pitting	Burrs	Scratches	Dent
Seal (a*)	1	Remove with abrasive fleece	Change coupling	N/A	Change coupling	Change coupling
Shoulder (a*)	2	Remove with abrasive fleece	Change coupling	N/A	Minor accepted	Change coupling
Radius between seal and shoulder	1->2	Remove with abrasive fleece	Change coupling	N/A	Minor accepted	Change coupling
Edge between shoulder and bore	2->4	N/A	N/A	Remove with emery paper	N/A	Change coupling
Cylindrical section	3	Remove with abrasive fleece	Remove rust with abrasive fleece. Pitting is accepted.	N/A	Accepted	Change coupling
Internal bore	4	Accepted	Accepted	N/A	Accepted	Accepted
Perfect thread length (b*)	5	Remove with abrasive fleece	Change coupling	Remove with emery paper	Accepted	Change coupling
Non-perfect thread length	6	Remove with abrasive fleece	Minor pitting, after removal of rust with abrassive fleece, is accaptable	Accepted	Accepted	Accepted
Coupling face	7	Accepted	Accepted	Accepted	Accepted	Accepted
Clearance	8	Accepted	Accepted	Accepted	Accepted	Accepted

Box

General : The phosphated surface shall not be removed by hand – repair
(except area 3,4 and 7. If removed, it can be accepted after approval by voestalpine Tubulars specialist and application of phosphate spray. It is also recommended that after repair Moly-disulfide spray should be applied (pin and box).

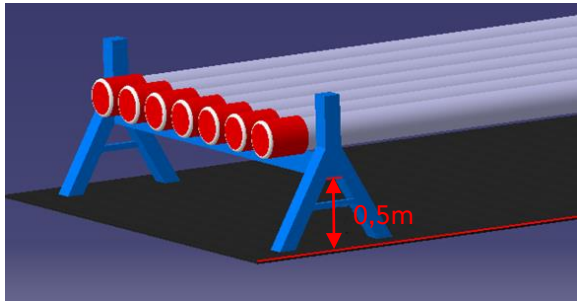
a* Minor pitting, dents or scratches may be accepted after approval by voestalpine Tubulars specialist
b* Up to 4 thread-turns may be imperfect if not more than ½ of a turn is affected. If more than 4 thread-turns / or more than 2 in total are affected, hand-repair may be accepted after approval by voestalpine Tubulars specialist

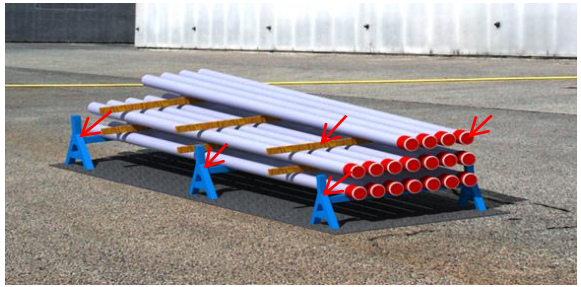
Transportation, Handling and Storage

- Transportation
  - Load pipe on bolsters and tie down with suitable chains or straps at the bolsters
  - Load pipe with all couplings on the same end of the truck
  - Do not overload the truck
- Handling
  - Before loading or unloading thread protectors should be in place
  - Do not unload pipe by dropping
  - Avoid rough handling which might damage the threads or the body of the pipe
  - When rolling pipe, on the rack, keep pipe parallel and do not allow pipe to strike the ends
  - Do not use hooks to lift pipes

Transportation, Handling and Storage

- Storage
  - At least every six months some of the pin and box thread protectors should be removed at random and the threads should be checked for corrosion
  - First tier of pipes should be no less than 1,5 feet's (approximately 0,5m) from the ground
  - Pipes should properly rest on supports to prevent bending and damages
  - Between the successive layers of pipes you should provide wooden strips as separators
  - Do not stack pipes higher than three meters
  - Only use thread protectors that correspond to the threaded pin/box ends
  - Do not mix different pipes in the stack
  - All protectors must be secured and should have no damage.





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Thank you

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