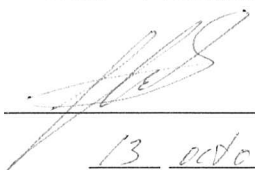




AGREED BY

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13 october 2015


**Guidelines
For Use Tubing
With Thread Connection TMK UP PF**

RE PS 02-005-2012

(Revision 5)


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Introduction

The present instructions are governed by the following documents:

- API RP 5C1 Recommended Practice for Care and Use of Casing and Tubing;
- API RP 5 1 Gaging and Inspection of Casing, Tubing and Pipe Line Threads;
- ISO 10405 Petroleum and Natural Gas Industries – Care and Use of Casing and Tubing.

Guidelines for use tubing with thread connection**UP F****Effective date 12–12–2014****1 Scope**

The present instructions contain recommendations for maintenance and use of tubing with TMK UP F threaded connections under field conditions including pipe preparation and make-up, string running and pulling operations, as well as guidelines for pipe handling, storage and inspection during operation.

2 References

The present instructions refer to the following documents:

API RP 5A3/ISO 13678 Recommended Practice on Thread Compounds for Casing, Tubing, and Line Pipe

NOTE: For dated references only the edition cited shall apply. For undated references the latest edition of the referenced document shall apply.

3 Terms and definitions

For the purposes of these instructions, standard terms shall apply as well as the following terms and definitions:

3.1 **seal assembly:** Assemblage of seal and shoulder elements of thread connection.

3.2 **thread connection torqueing during assembly operations:** Preselected travel of the threaded connection in a circumferential direction after it shoulder elements interlock.

3.3 **pin:** Thread connection element, made on the outer surface of the pipe end, containing external thread, external radial seal and a shoulder.

3.4 **coupling:** Thread connection element, made on the inner surface of the pipe end, containing internal thread, internal radial seal and a shoulder.

3.5 **thread connection seal elements:** Pin external radial seal and coupling internal radial seal

3.6 **thread connection shoulder elements:** Pin shoulder and coupling shoulder

3.7 **pin shoulder:** Pin surface located at an angle to the pin axis, acting as an arrester during make-up procedure.

3.8 **coupling shoulder:** Coupling surface located at an angle to coupling axis, acting as an arrester during make-up procedure.

4 Transportation

4.1 When pipes are transported by sea, railroad (railcars) or trucks, Cargo Shipping Rules and Technical Provisions for Cargo Handling and Fastening applicable at the particular transport type shall be practiced.

4.2 Pipe transportation, handling and storage shall be carried out with thread protectors for pipes and couplings in order to protect them from exposure.

4.3 Pipes of different batches and standard sizes can be loaded onto same means of transportation, but have to be separated.

4.4 Pipe packages shall be securely fastened for transportation to avoid any movement. Wooden blocks can be used for fastening purposes.

When several pipes packages are stacked or not packaged pipes are put into ranks. Pipe packages shall be separated by at least three wooden blocks, each 1,4 – 1,6 inch thick that weight of upper pipes do not distribute onto couplings of lower rows.

4.5 When transported by water, pipe packages shall not be placed in the water inside the vessel's hold or in any other corrosive environment. Dragging of bundles along the piles or hitting bundles against hatches or rails is strictly forbidden.

4.6 While loading pipe packages into railway cars or trucks, wooden girders (blocks) shall be provided for car floors or vehicle beds to ensure required distance between the products and uneven bottom of the vehicle. No blocks shall be placed under couplings.

4.7 Tubes made of steel with content of 9% chrome and more (further – chromium steel) shall be bundled with wooden or plastic blocks.

4.8 In order to prevent tubes from hitting against transport vehicle metal units and prominent parts of the neighboring bundles it is recommended to use a cargo platform with protecting covers.

4.9 When chromium steel tubes fastened to cargo platform or boat deck, nylon harnesses shall be used.

5 Handling operations

5.1 All handling operations shall be carried out with thread protectors on pipe ends and couplings.

5.2 Handling operations with pipe bundles shall be carried out using only hoisting transportation clamps.

In case of manual pipe unloading, rope slings shall be used and pipes shall be rolled along guides in parallel to the pile avoiding quick movement and collision of pipe ends that might result in thread damage even with protectors in place.

When using the crane, spreader beams with slings shall be used according to approved slinging diagrams.

5.3 Pipes shall not be allowed to fall down from heights or be picked up by the upper pipe end with a hook or be dragged or subjected to any other actions that might damage pipe and coupling threads, surfaces or shapes.

5.4 Handling operations with chromium steel pipes shall be performed with using nylon or steel harnesses with plastic braid. When using the crane gripping forks, frames and clamps with nonmetallic coating shall be employed.

5.5 Handling operation for chromium steel pipes shall be performed without collision with hard bodies or sharp edges that can perform to local increasing of pipes surfaces hardness and influence on the sulfide cracking resistance with voltage.

6 Stockholding and storage

6.1 Pipes shall be stored as per Materials, Equipment and Spare Parts Storage Guidelines for production and technical maintenance facilities ensuring their preservation and avoiding damage of pipe and coupling threads, surfaces or shapes.

6.2 Pipe bundles shall be laid on supports spaced in a manner avoiding sagging or thread damage. Rack supports shall be located in one plane and shall not sag under pile weight. Rack bearing surface shall be 12 inches above the ground or floor.

Pipe bundles shall not be laid on the ground, rails, steel or concrete floor!

It shall be no stones, sand, dirt on racks!

6.3 When pipe packages are laid into a pile or in several layers not connected into the package at least three wooden blocks, each 1,4...1,6 inch thick, shall be provided between them so that the weight of upper pipes is not applied to couplings in lower layers.

The height of the pipe pile shall not exceed 10 ft.

6.4 For unbundled pipes, it is recommended to install vertical stanchions in the racks.

6.5 If pipes are rolled on the racks, any movements at an angle to the rack axis shall be avoided as that might result in the collision of pipe ends and thread or protector damage.

6.6 While in storage, the presence and integrity of thread protectors shall be inspected, as well as compound underneath and its expiration date. Pipe corrosion shall be prevented.

6.7 While storage of pipes more than 6 months before usage, compound under safety components shall be replaced.

Following actions are required:

- remove thread protectors according to 7.1.3;
- remove the compound according to 7.1.4;
- apply rust-preventing compound (Kendex OCTG, Total Jet Marine, EONFILM 300 Thread Protection Compound or similar), with effective date expired not less than in 6 months – until the next compound replacement or pipes usage;
- install thread removed before protectors which were cleaned from compound or new thread protectors;

6.8 Pipes damaged during transportation, rejected during inspection, prepared for repairs or awaiting a final decision shall be stored in separate racks with corresponding tags.

6.9 While storage chromium steel pipes wood or steel gasket shall be laid onto all pipe bearing.

6.10 Drilling site shall have special area for pipes storage according to above-listed requirements.

6.11 To supply the full pipes buckle at drilling site it shall be installed required number of racks shall be installed.

While racking it is important to consider the order of string running (if it is defined by work instruction) to be sure that first pipe is not laid under the pipes that need to be run after. Pipes on to the rigs shall be placed in such way that couplings are turned to the drilling site.

7 Preparation

7.1 Pipes inspection

7.1.1 Prior to lifting the pipes onto the rig site, proceed as follows:

- inspect pipes and couplings visually;
- remove thread protectors from pipes and couplings;
- remove preservation compound from threaded connections;
- inspect threaded connections;
- drift pipes along the entire length;
- measure the length of each pipe;
- re-install clean thread protectors on pipes and couplings

7.1.2 Visual inspection of pipes, couplings and thread protectors is intended for detection of bent pipes, buckles and damage.

Visual inspection of pipes and couplings shall be carried out without the removal of protectors.

Pipes, couplings, thread protectors with significant damage discovered during the visual inspection shall be put aside awaiting decision on their suitability for use.

Amount of damaged pipes and couplings shall be specified in the Product Quality Discrepancy Protocol and all damaged areas shall be documented on photographs.

7.1.3 Thread protectors shall be removed after threaded connections are to be visually inspected.

Thread protectors shall be removed manually or using the key by one person. In case of difficulties removing protectors they can be heated by steam or taken off with the help of a wooden hammer in case of distortion.

7.1.4 Upon removal of thread protectors, threaded connections shall be cleaned from compound applying pressurized hot soapy water or using steam cleaner. Water should be under pressure. In case of freezing temperature, compound can be removed using solvent (White Spirit or similar). Upon compound removing thread connection shall be blast by compressed air or cleaned with dry rags.

**Compound shall not be removed using
diesel, kerosene, salty water, barite or metal brushes!**

Barite or metal brushes can cause scratches on seal surfaces resulting in loss of tightness.

Upon compound removal threaded connections shall be wiped with a dry and clean cloth or dried using compressed air.

7.1.5 While using under thread protectors thread sealing compound, the compound removal is not required. You need to be sure in following:

- lack of extraneous substance in compound;
- smoothness of compound application onto thread (smooth the surface and/or add the compound of the same type);
- service life of compound is not expired.

7.1.6 Threaded connection shall be inspected by specialists:

- crews for tubing assembly;
- companies specialized in tubing inspection.

When running casing for the first time, representatives of the casing supplier shall be present.

Inspecting threaded connections of pipes and couplings (including thread surface, seal and shoulder elements) special attention shall be paid to:

- damage resulting from pipe collisions or other impacts;
- damage caused during the installation of thread protectors;
- rust, corrosion or other chemical damage due to environmental exposure or aggressive compound compounds

If underlighting (twilight, night) it shall be used portable light source for individual usage during inspection.

Possible types of damage to thread, seal and shoulder surfaces of pipes and couplings, as well as repair methods are specified in Table 1.

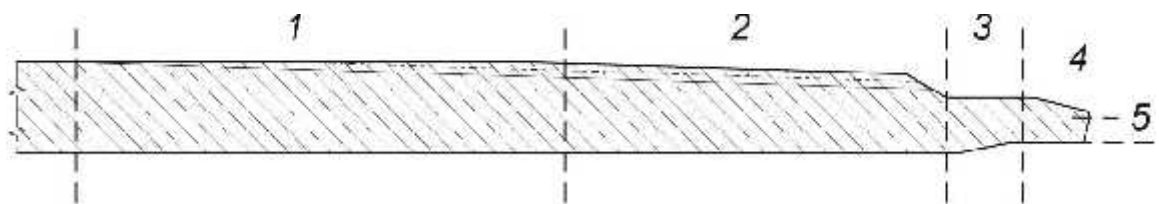
7.1.7 Depth of corrosion, burrs, tears, burrs height and scratches shall be determined using:

- Mould of the defect using special tape (X-Coarse by Testex for defects up to 0,004 inch deep, for deeper faults: X-Coarse Plus or equivalent) and measuring it with thickness gage. Precision of measurement shall be at least 0,0004 inch (PEACOCK G2-127 or equivalent);
- Depth gage with a needle tip (tip diameter not more than 0,004 inch). Precision of measurement shall be at least 0,0004 inch (PEACOCK -4 or equivalent).

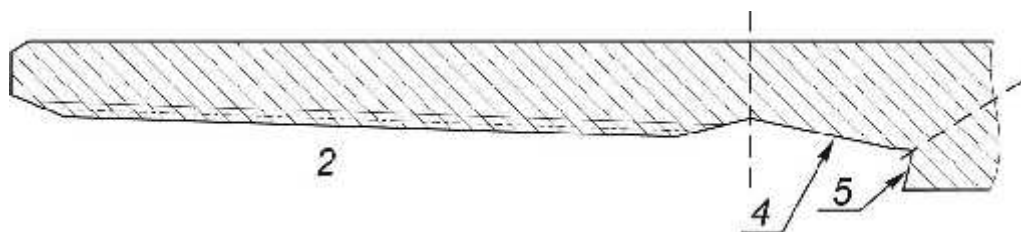
If any unacceptable damage is detected, such pipes shall be rejected and reported accordingly specifying serial numbers, describing defects found with photos attached.

1

Surface Area (Figure 1)	Damage	Damage Repair
1, 2, 5	Pit corrosion less than 0,0039 inch deep or insignificant surface rust	Manual repair (removal) using non-metal brush with soft bristle or polishing paper with grain 0
	Pit corrosion more than 0,0039 inch deep	Not reparable
	Burrs less than 0,0118 inch wide. Tears and scratches less than 0,0039 inch deep	Manual repair using needle file or polishing paper with grain 0
	Dents, nicks and other mechanical damages	Not reparable
3	Pit corrosion less than 0,0118 inch deep or insignificant surface rust	Manual repair using needle file or polishing paper
	Pit corrosion more than 0,0118 inch deep	Not reparable
	Burrs less than 0,0118 inch wide. Tears and scratches less than 0,0118 inch deep	Manual repair using needle file or polishing paper with grain 0
4	Pit corrosion of any depth	Not reparable
	Insignificant surface rust	Buffing
	Burrs, tears and scratches	Not reparable
	Dents	Not reparable
	Small grooves	Buffing



) – Pipe thread, seal and shoulder surfaces



) – Coupling thread, seal and shoulder surfaces

1 – imperfect profile thread ; 2 – perfect profile thread; 3 – cylinder bore ; 4 – seal taper bore;

5 – shoulder

Figure 1

7.2 Drifting

7.2.1 Pipe should be checked by drift along the entire length of the pipe. For pipes made of chromium and corrosion-resistant steels polymer or aluminium drifts shall be used.

Before drifting, the pipe shall be positioned in such a manner as to avoid sagging. Should any ropes or bars be used for the drifting process make sure they are clean. In case of freezing temperatures pipes shall be heated with steam prior to drifting, to remove snow and ice crust.

The temperature of pipe shall be equal to the drift temperature during drifting procedure.

Effective dimensions of the drift shall comply with Table 2. Effective diameter of the drift shall be checked in three planes along the whole length after each 50 pipes. If the diameter decreases by more than 0,02 inch in any of the three planes, such a drift shall be rejected.

The drift shall pass through the whole pipe, when pulled manually without significant effort.

If the drift cannot pass through the pipe, then such pipe shall be replaced by another pipe.

Pipes rejected during drifting shall be put aside until further decision.

Table 2

In inches

Pipe outside diameter, D	Effective length of the drift, Lo	Effective diameter of the drift, do
up to 2 7/8 incl.	42	$do = d^* - 0,094$
greater than 2 7/8	42	$do = d^* - 0,125$
NOTE: * – nominal pipe inside diameter		

7.3 Measurement of pipes length

Length of each pipe shall be measured from free (without a thread protector) coupling end to free (without thread protector) pipe end.

Measured pipe length should be compared to stencilled length. In case of discrepancies the measured length shall be stated on pipe body with a marker or chalk

When calculating the total length of the string, one should use the formula specified below:

$$L = L - n L$$

where: L – the total length of the string;

L – overall length of pipes in a string, measured from pin end face to free coupling end face;

n – number of pipes in a string;

L – decrease of pipe length during make-up (table 3).

Table 3

In inches

Pipe outer diameter, D	Decrease of pipe length during make-up, L
2 3/8	2,835
2 7/8	2,933
3 1/2	3,232
4	3,547
4 1/2	4,079

7.4 Completion of preparation

7.4.1 After inspection and measurements thread protectors or caps shall be re-installed on pipe ends and couplings.

7.4.2 Removed thread protectors can be re-used on the condition that prior to installation they have been thoroughly cleaned from conservation compound and do not have considerable damages of thread and form.

Cleaning of protectors from compound shall comply with the requirements for cleaning thread connections of pipes and couplings of 7.1.4.

8 Thread compound

8.1 Usage of thread compound

8.1.1 To ensure optimal conditions for make-up and to avoid burrs of mating surfaces, all thread, seal and shoulder surfaces of pipes and couplings shall be provided with thread compound. Thread compound shall comply with API RP 5A3/ISO 13678.

The following thread compounds are recommended:

- Bestolife 2000;
- Bestolife API Modified Thread Compound;
- Jet-Lube High Pressure Modified Thread Compound;
- Jet-Lube Z60 Tool Joint Compound.

Application of the thread compounds is allowed upon coordination with the connection designer; the thread compound shall comply with RP 5A3/ISO 13678 requirements and shall provide for thread connection sealability as well as for protection from galling and corrosion.

8.1.2 Apply thread compound implementing the following guidelines:

- use the same compound (the same type) when assembling one casing string;
- use a new compound package for each running, while usage the compound from opened package be sure there are no outside material;
- stir the compound thoroughly before use;
- warm up compound before application in case of low temperatures.

8.1.3 Compound shall be stored in closed overturned packages under temperatures specified by the manufacturer. When storing partially unused compound always specify the date of the first use.

8.2 Requirements for thread compound

8.2.1 Thread compound for make-up shall be taken only from original packages delivered by the supplier specifying name, batch number and date of manufacture.

Compound from packages without proper identification shall never be used.

Compound shall never be placed in other packages or thinned!

8.2.2 Compound applied shall be even, of ointment consistency, free from any solid inclusions (stones, sand, dry compound, fine chips, etc.).

8.2.3 Prior to use, check compound's expiration date on the package. Never apply compound with expired shelf life.

8.3 Calculation of thread compound quantity

8.3.1 Required amount of thread compound shall be distributed between coupling and pipe end as follows: two thirds shall be at the coupling end and one third shall be at the pin.

Minimum and maximal compound mass, m_{min} and m_{max} , in grams required for make-up one connection shall be calculated as follows:

$$m_{min} = 0,11 \quad D,$$

$$m_{max} = 0,14 \quad D;$$

where: m_{min} – minimum compound mass, g, rounded to the nearest whole number;

m_{max} – maximum compound mass, g, rounded to the nearest whole number;

D – nominal outside diameter, mm, rounded to the nearest whole number.

Example Minimum thread compound required for make-up one threaded connection of pipes with nominal diameter of 4,5 inches.

$$M_{min} = 0,11 \quad 4,5 = 0,4950 \approx 0,05 \text{ lb.}$$

Here with, at least 0,03 lb. shall be applied on coupling end and at least 0,02 lb. – on pin.

8.3.2 To determine the quantity of compound required for determine the number of pipes it shall be used compound can with known volume.

8.3.3 Prior to running down the hole, make sure that required thread compound have been applied.

8.4 Thread compound application

8.4.1 Thread compound shall be applied to all thread, seal and shoulder surfaces of pipes and couplings as plan layer onto all surface of thread, sealing and bearing elements of pipe and coupling connection. Correct application of thread compound as per figures 2 and 3.

8.4.2 Compound shall be applied only to thoroughly cleaned and dried (as per 7.1.4) surfaces.

8.4.3 Compound is recommended to be applied on to pin by nylon brush, on to couplings – by relief brush.

Never use metal brushes for compound application!

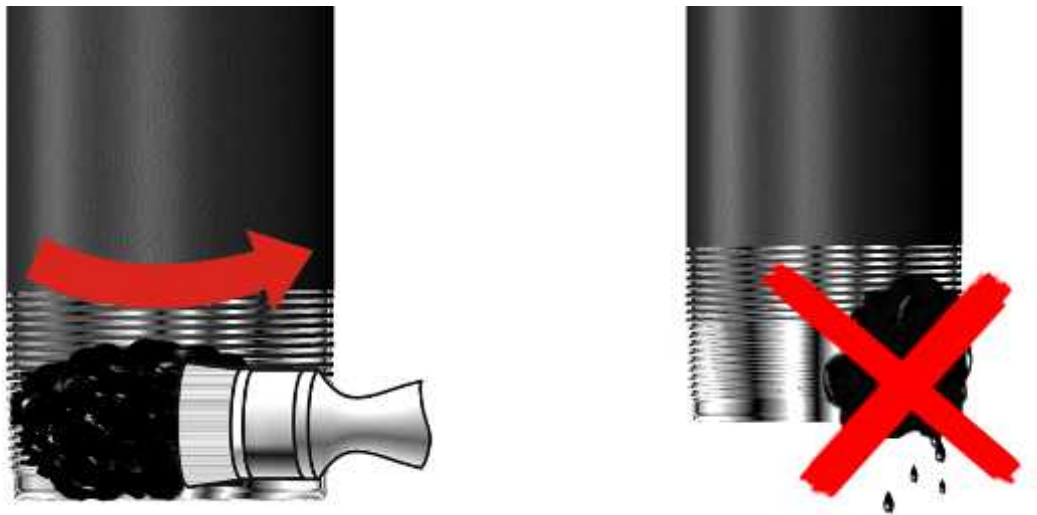


Figure 2

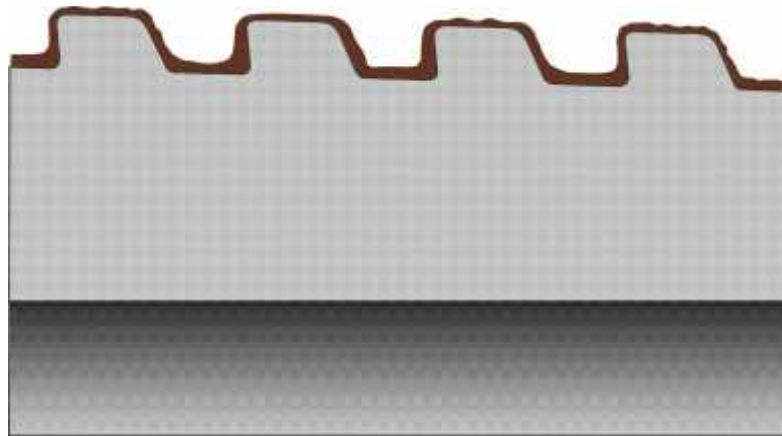


Figure 3

8.5 Thread compound effect over interlocking torque

When using other compounds the actual make-up torque can differ from the design torque, the final torque value shall be coordinated with the thread connection designers.

9 Trip

9.1 Requirements for trip

9.1.1 Tubing shall be assembled by a qualified operator. To ensure declared parameters of thread connection, the make-up shall be performed with usage Make-up torque registration system;

If the Make-up torque registration system is not available then the following shall be used in priority-oriented order:

- tong manometer (translation of pressure into torque in compliance with the wrench manufacturer recommendations);
- make-up triangle (cross stripe) and make-up marks.

9.1.2 A special bell guide is recommended for trip operations (figure 4). The devices help to align pin and coupling and prevent the connection from damage.



Figure 4

9.1.3 In order to decrease probability of new damages during chute-lift operations a pipe weight balancer is recommended.

9.1.4 While running of string of chrome steel pipes better to use elevator or special wedge claws not to damage the thread.

9.2 Requirements for tongs

9.2.1 Rotary tongs shall be equipped with a speed governor and ensure speed of 1 rpm at the final stage of make-up.

Tongs shall be equipped with clamps for specific pipe sizes to ensure a larger contact area with the pipe body. Clamp diameter shall be 1 % greater than pipe nominal diameter. Clamps shall be adjusted in such a way that they hold the pipe tightly and never slip.

9.2.2 “Back-up” tongue is recommended for use (figure 5), the lower clamp of which shall be fixed on the lower tube body under coupling. In case the clamp can’t reach the tube, it shall be fixed in the middle of a coupling.



Figure 5

9.2.3 While perform make-up and break-out of chromium steel pipes, the rotary tongs shall have nonmetal or undamaged dowel.

9.2.4 Prior to make-up, tongs shall be positioned as per figure 6.

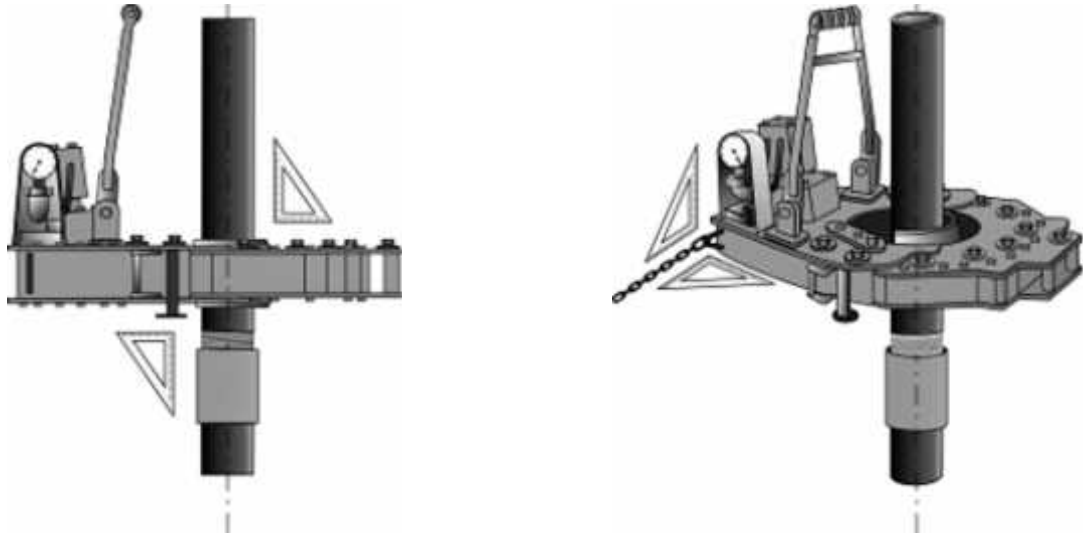


Figure 6

9.2.4 Make-up equipment shall ensure torque at least 30 % greater than recommended maximum make-up torque. Breaking-off requires more torque than make-up.

9.3 Assembly of string

9.3.1 Make sure thread protectors are secured in place prior to lifting pipes on to the rig floor.

Lifting pipes to the rig floor without thread protectors or end caps is not allowed!

9.3.2 Prior to assembly of the string remove thread protectors and check by touch seal and shoulder surfaces of the free pipe end for any mechanical damage as well as alignment of the assembled pipes (figures 7 and 8).

9.3.3 Application of compound shall be performed in compliance with 8.4. It is recommended to perform air blasting of pipe and coupling prior to application of compound.

9.3.4 When lowering pipe into coupling, pipe end shall not hit or slide down into the coupling end when pipe end contacts coupling end.

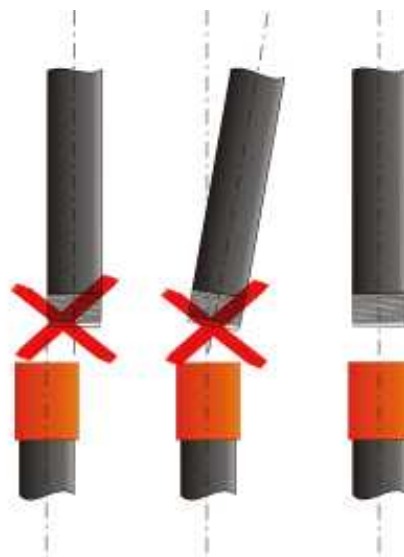


Figure 7

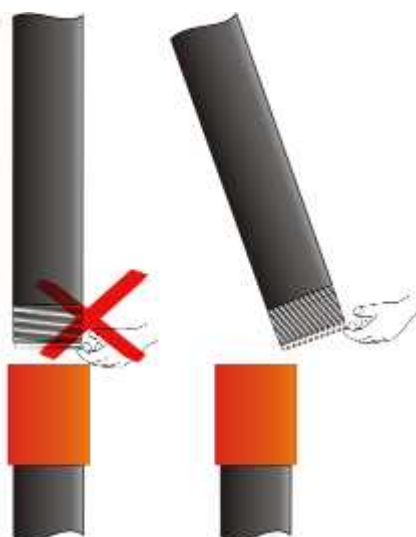


Figure 8

9.3.5 Make-up

9.3.5.1 Prior to make-up make sure that thread, seal and shoulder surfaces with applied compound are free from mud or mud laden fluid with small contaminations hindering integrity of connection. In case of mud or mud laden fluid on connection surfaces clean them and apply thread compound again.

9.3.5.2 Make-up shall be performed with the torque specified in table 4.

9.3.5.3 Make-up of pipes and couplings can be performed with equipment registering the process, by the make-up graphs (inspection according to 9.3.6), or without such equipment, by make-up marks (inspection according to 9.3.7).

Make-up with equipment registering the process is the priority one as it allows assessment of make-up quality by the graphs. The equipment used shall comply with the requirements specified in the Attachment A.

Table 4

D, in	S, in	Torque, ft. lb. for steel grades																	
		J55, K55			N80, L80			90			R95, 95, T95			110			Q135		
		min	opt	max	min	opt	max	min	opt	max	min	opt	max	min	opt	max	min	opt	max
2 3/8	0,1902	1000	1000	1100	1200	1300	1500	1300	1500	1600	1400	1500	1700	1600	1800	1900	1700	1900	2100
	0,2539	1100	1300	1400	1500	1600	1800	1600	1800	1900	1700	1900	2100	1900	2100	2400	2100	2400	2600
	0,2949	1300	1400	1500	1600	1800	1900	1800	2000	2200	1800	2100	2300	2100	2300	2500	2400	2600	2900
	0,3358	1300	1500	1600	1700	1900	2100	1900	2100	2400	2000	2200	2400	2300	2500	2700	2500	2800	3100
2 7/8	0,2169	1500	1600	1800	1800	2100	2300	2100	2300	2500	2200	2400	2700	2400	2700	3000	2700	3000	3300
	0,2760	1700	1900	2100	2200	2400	2700	2400	2700	3000	2600	2900	3200	2900	3200	3500	3200	3600	4000
	0,3079	1800	2000	2200	2400	2600	2900	2600	2900	3200	2700	3000	3300	3000	3400	3800	3400	3800	4100
	0,3402	2000	2200	2400	2500	2800	3100	2800	3100	3400	2900	3200	3500	3300	3700	4100	3700	4100	4600
	0,3921	2200	2400	2700	2800	3100	3400	3100	3500	3800	3200	3600	4000	3700	4100	4500	4100	4600	5000
	0,4402	2400	2700	2900	3000	3400	3800	3400	3800	4100	3600	4000	4400	4000	4400	4900	4500	5000	5500
3 1/2	0,2161	2400	2700	2900	3000	3400	3800	3400	3800	4100	3600	4000	4400	4000	4400	4900	4500	5000	5500
	0,2539	2600	2900	3200	3300	3700	4100	3700	4100	4600	3800	4300	4700	4400	4900	5400	4900	5500	6000
	0,2890	2800	3100	3400	3600	4000	4400	4000	4400	4900	4200	4600	5100	4700	5200	5800	5200	5800	6400
	0,3748	3200	3600	4000	4200	4600	5100	4600	5200	5700	4900	5500	6000	5500	6100	6700	6200	6900	7500
	0,4299	3500	3900	4300	4500	5000	5500	5000	5600	6200	5200	5800	6400	5900	6600	7200	6600	7400	8100
	0,4760	3800	4200	4600	4900	5400	5900	5400	6000	6600	5700	6300	6900	6300	7100	7800	7100	7900	8700
	0,5299	4100	4500	4900	5200	5800	6400	5800	6500	7200	6100	6800	7400	6900	7600	8300	7700	8600	9400
4	0,2260	2700	2900	3200	3400	3800	4100	3800	4200	4600	4000	4400	4900	4400	4900	5500	5000	5500	6100
	0,2618	2900	3200	3500	3800	4200	4600	4200	4600	5100	4400	4900	5500	5000	5500	6100	5600	6200	6800
	0,3299	3500	3900	4300	4500	5000	5500	5000	5600	6200	5200	5800	6400	5900	6600	7200	6600	7400	8100
	0,4150	4300	4700	5200	5500	6000	6600	6000	6700	7400	6300	7100	7800	7100	7900	8700	8000	8900	9800
4 1/2	0,2709	3000	3300	3700	3800	4200	4600	4200	4600	5100	4400	4800	5300	4700	5200	5800	5600	6200	6800
	0,3370	3400	3800	4100	4400	4900	5500	4900	5500	6000	5000	5600	6200	5500	6100	6700	6500	7200	8000
	0,3799	3800	4200	4600	5000	5600	6200	5500	6100	6700	5700	6300	7000	6300	6900	7600	7300	8100	8900
	0,4299	4400	4800	5300	5700	6300	7000	6300	6900	7600	6400	7200	7900	7000	7800	8600	8300	9100	10000
	0,5000	5000	5600	6200	6600	7400	8100	7200	8000	8800	7500	8300	9100	8200	9100	10000	9600	10600	11700
NOTE: Make-up with special-clearance couplings shall be performed using torque 20% less than the specified.																			

Make-up without registering equipment shall be performed based on applied by the manufacturer (in light paint) make-up marks on pipe and coupling and the make-up triangle on the pipe (figure 9). A cross stripe (in light paint) can be made on the pipe instead of the make-up triangle, in such a case a triangular sign (in light paint), denoting position of the make-up triangle shall not be painted.

9.3.5.4 When making-up pipe and coupling, the first two turns shall be carried out manually. Application of chain tong is also allowed.

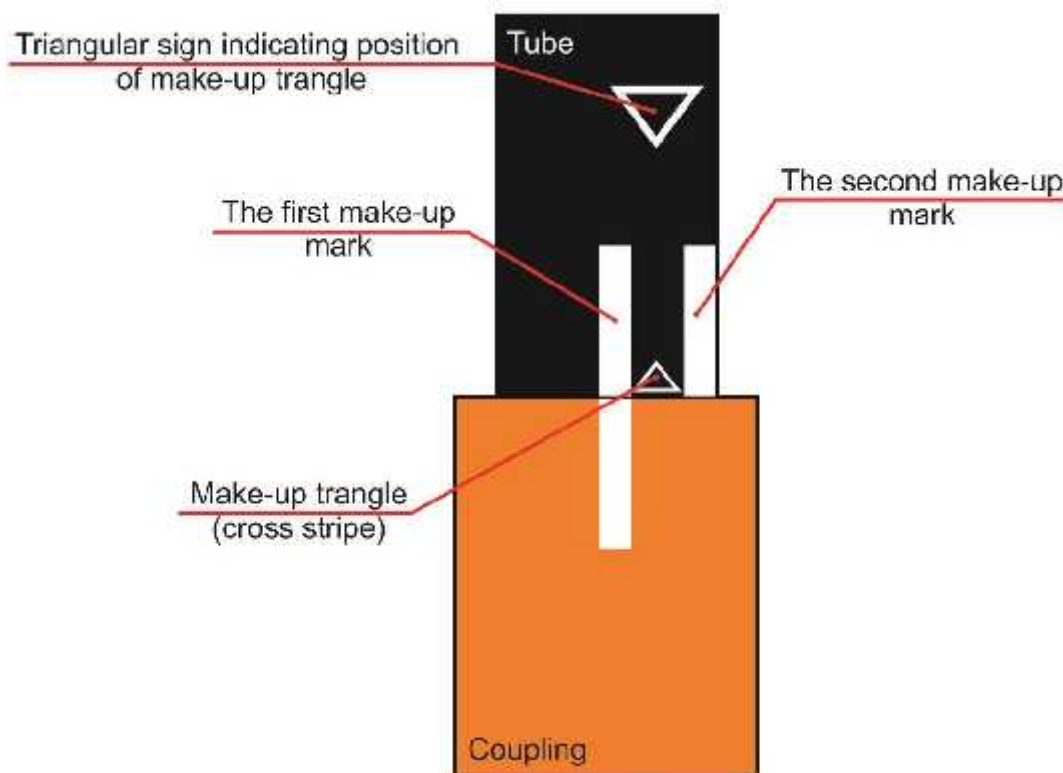


Figure 9

9.3.5.5 When making-up pipes made of chrome steels, the first two turns shall be carried out manually or a strap tong can be used (figure 10). Chain tong is allowed for use only under condition that the pipe body is secured from damage (e.g. safe gasket between the pipe body and the tong).



Figure 10

9.3.5.6 Rotation speed during connection make-up with the rotary tong shall correspond to the values specified in Table 5.

Table 5

Start of make-up		End of make-up (torqueing)
First two revolutions	Further revolutions	
Speed maximum 2 rev/min, Better manually	High speed, But maximum 10 rev/min	Speed maximum 2 rev/min

9.3.5.7 Even longitudinal movement of the pipe due to gradual increase of number of engaged turns, shall be watched, significant warming of the connection (not more than 500 °C over the ambient temperature) shall not be allowed.

9.3.5.8 Make-up shall not cause significant mechanical damages like galling or jamming etc. on the pipe and coupling body.

The outer coupling surface shall be free of damages with depth more than 1% from the coupling nominal outside diameter.

Jamming marks from the tongs clamps are allowed on the pipe outer surface under condition the marks are not larger than 12,5% from the pipe wall thickness.

After make-up of chrome steel pipes the mark on the pipe body shall not be more than 0,008 inch.

9.3.5.9 The final connection make-up torque shall be within T_{min} to T_{max} range.

9.3.5.10 Turning of coupling from the mill end is allowed when the maximum value of the final make-up torque (T_{max}) is achieved, but maximum L_{max} distance (table B.2). The final make-up torque values shall be within T_{min} to T_{opt} limits in order to reduce the possibility of the coupling turning.

If the turning of coupling exceeds L_{max} , thread connection shall be disassembled, visually inspected; make sure there are no deformations of seal and shoulder elements and continue make-up. Otherwise thread connection shall be rejected.

9.3.6 Thread connection make-up inspection by the make-up graph.

9.3.6.1 If the make-up is performed correctly and all the thread connection geometrical parameters comply with the requirements of the normative documentation, the make-up graph will show defined areas which correspond to torque increase due to thread surfaces mating (area I), and the further mating of sealing and shoulder elements of the connection (area II and area III), as shown in the figure 11 below.

The rotary torque increase on the first two revolutions corresponding to the initial mating of thread surfaces shall be smooth and even. Further on with mating of the thread surfaces and of sealing elements of the connection, acceleration of rotary torque increase till shouldering of the connection shall take place. The shouldering shall be accompanied with the sharp increase in torque, which confirms that make-up is performed correctly.

Depending on the power tong used and its adjustment, the make-up graph (especially area I) can show areas with insignificant deviation from straight line: waves, leaps, etc. Such deviations shall be deemed acceptable if general view of the make-up graph corresponds to the established requirements.

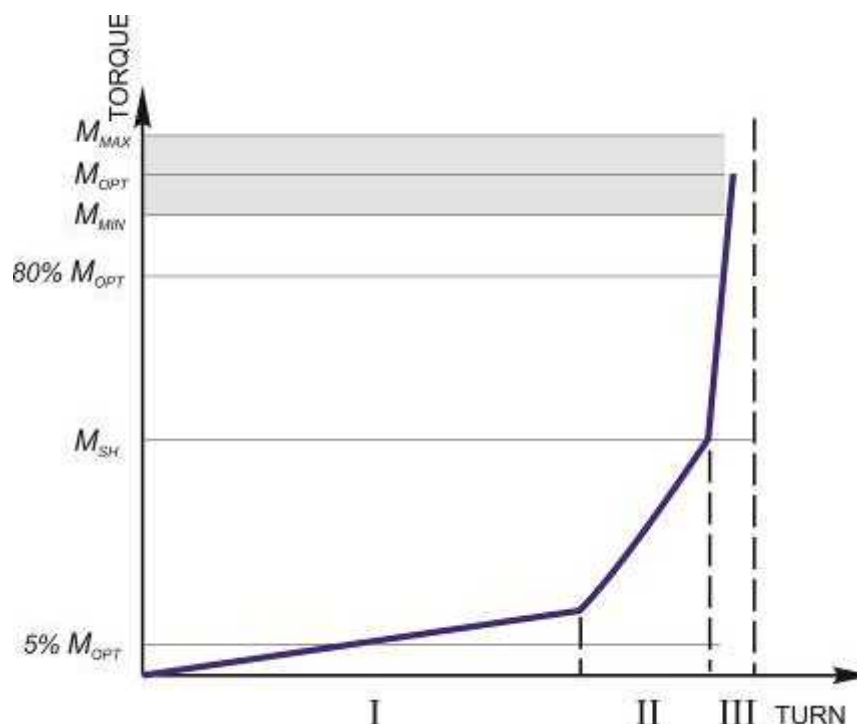


Figure 11

9.3.6.2 The make-up graphs for the pipes from the same lot shall be close in shape.

9.3.6.3 Interlocking torque M_{sh} of shoulder elements (coupling shoulder and pin shoulder) shall be within range of 5 % and 80 % of optimal make-up torque M_{opt} .

9.3.6.4 Final make-up torque shall be within minimum to maximum make-up torque.

9.3.6.5 Typical discrepancies of make-up diagram are specified in figures 12 – 18.

9.3.6.6 If we see that torque increase stops and there appears a horizontal area (area IV figure 12) at the final step of make-up procedure, but no slippage of clamp chucks is observed and the area IV length is maximum 0,12 of revolution, then such a make-up will be considered acceptable. If not, the connection shall be broken-out, inspected for absence of damages and deformations. Re-assembly of the connection can be performed if during inspection of thread, seal and shoulder elements no surface damage or shape distortion such as decrease of pin or coupling shoulder Inside Diameter, sagging on the coupling inside surface is observed.

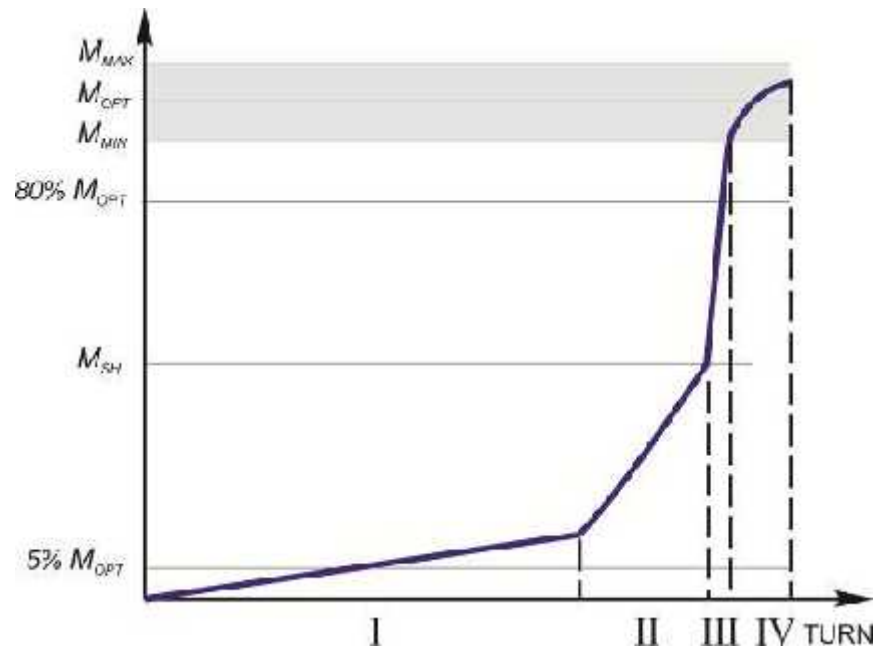


Figure 12

9.3.6.7 If the graph shows slight torque increase due to the connection seal elements mating (area II, figure 13), this might result from insufficient contact of sealing surfaces, combination of thread high interference and seal low interference.

With correct diagram form one shall take into account that a component of the radial seal of the make-up graph is far less than a thread component. Therefore, it might not be always clear on the diagram and the make-up can be deemed acceptable. Should any doubts arise in correctness of its assembly, the connection shall be broken-out. If during visual inspection the contact marks are found on the sealing elements' surface, then a proper type and quality of compound shall be re-applied onto connection and make-up shall be repeated.

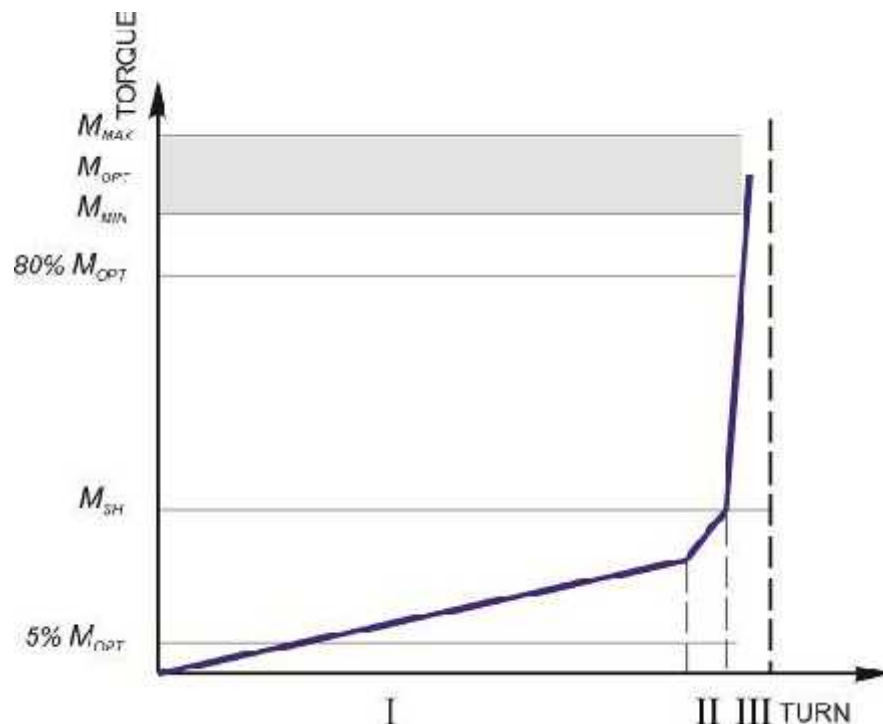


Figure 13

9.3.6.7 Rather low value of shoulder interlocking torques T_{sh} at make-up diagram (figure 14) may result from:

- unfavorable combination of technological features of the connection;
- application of wrong type compound;
- compound contamination or poor storage conditions.

Connection shall be undone, cleaned from compound and inspected. If visual inspection reveals satisfactory results, proper amount of compound shall be applied and make-up shall be carried out again.

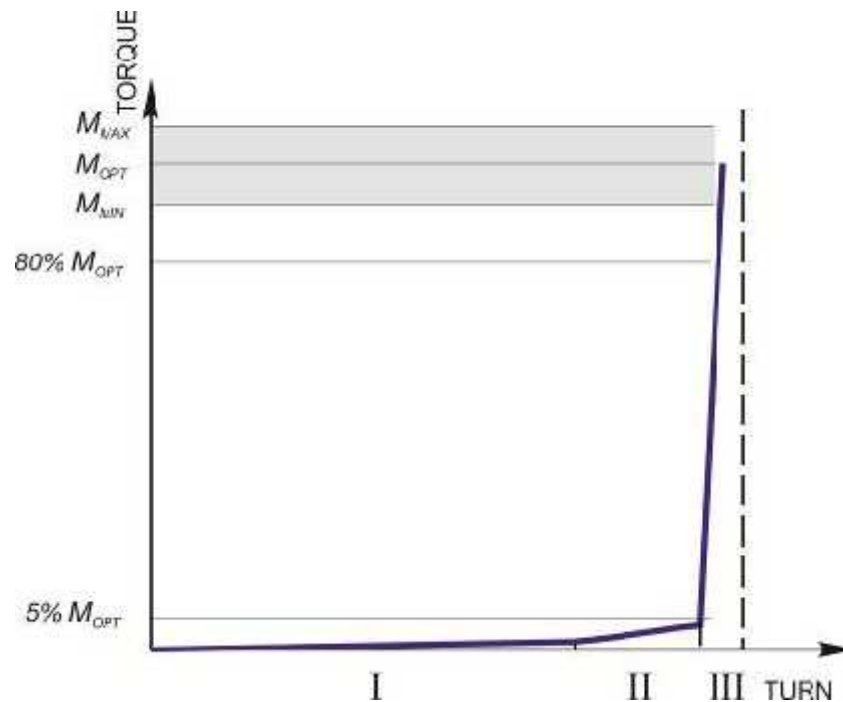


Figure 14

9.3.6.8 Rather high value of shoulder interlocking torques T_{sh} at make-up diagram (figure 15) may result from:

- damage of thread and/or seal elements;
- improper thread cleaning;
- application of wrong type compound,
- thread contamination;
- high density of thread (e.g. at low temperatures);
- unfavorable combination of technological features of the connection.

Connection shall be undone, cleaned from compound and inspected. If visual inspection reveals satisfactory results, proper amount of compound shall be applied and make-up shall be carried out again.

If the shape of the make-up graph after another make-up is not changed, the pipe shall be laid aside and make-up with another pipe shall be performed. The pipe that was laid aside is allowed to be used for further make-ups provided the surface is free of damages and the shape of thread, seal and shoulder elements of the connection is not distorted.

If the shape of the make-up graph when being made-up with another pipe is not changed the connection shall be undone and the previous pipe shall be used.

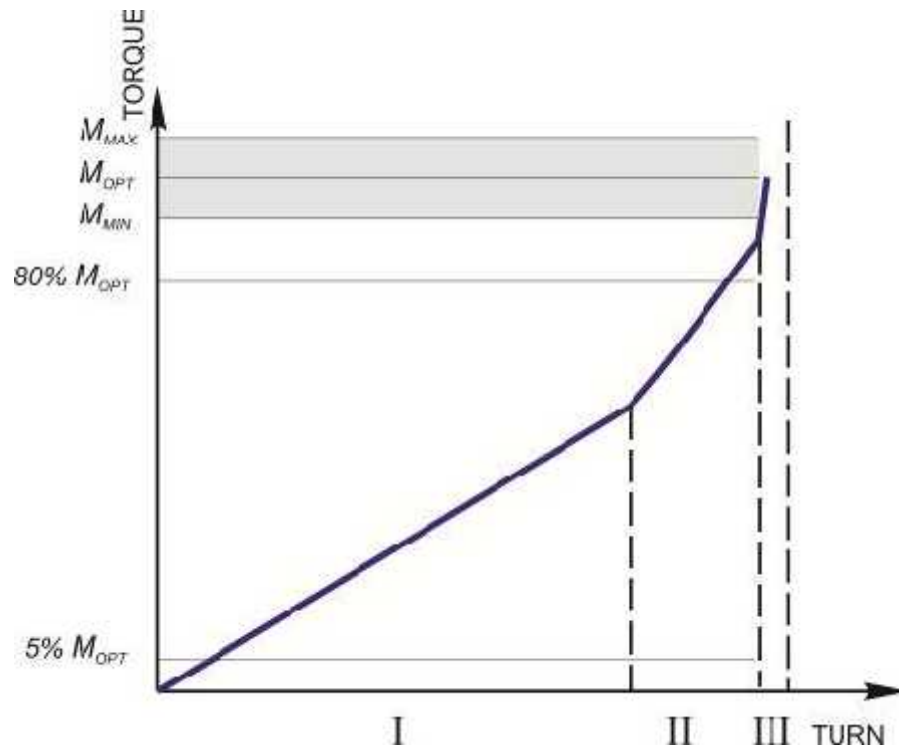


Figure 15

9.3.6.9 Leaps in the make-up diagram (figure 16) may result from:

- uneven application of compound and improper cleaning from preservative compound;
- tongs jam;
- uneven torque of torquing.

Connection shall be undone, cleaned from compound and inspected. If visual inspection reveals satisfactory results, proper amount of compound shall be applied and make-up shall be carried out again.

If the shape of the make-up graph after another make-up is not changed, the pipe shall be laid aside and make-up with another pipe shall be performed. The pipe that was laid aside is allowed to be used for further make-ups provided the surface is free of damages and the shape of thread, seal and shoulder elements of the connection is not distorted.

If the shape of the make-up graph when being made-up with another pipe is not changed the connection shall be undone and the previous pipe shall be used.

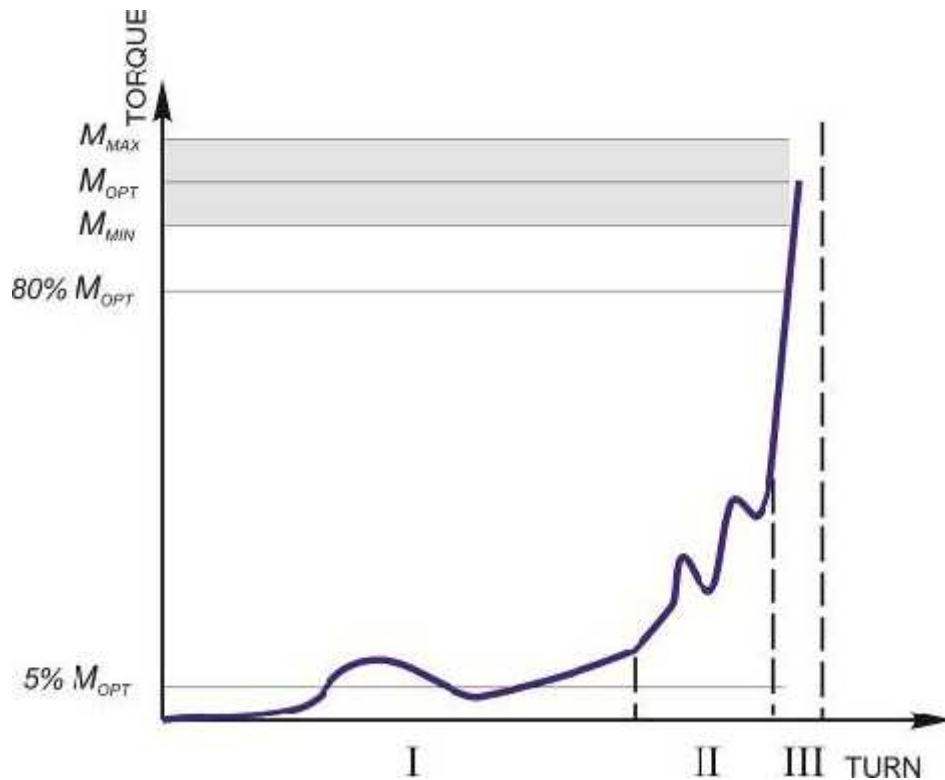


Figure 16

9.3.6.10 Make-up curve without clear shouldering torque $_{sh}$ (figure 17) may result from:

- thread damage;
- improper thread cleaning;
- unfavorable combination of interlocking features.

Connection shall be undone, cleaned from compound and inspected. If visual inspection reveals satisfactory results, proper amount of compound shall be applied and make-up shall be carried out again.

If the shape of the make-up graph after another make-up is not changed, the pipe shall be laid aside and make-up with another pipe shall be performed. The pipe that was laid aside is allowed to be used for further make-ups provided the surface is free of damages and the shape of thread, seal and shoulder elements of the connection is not distorted.

If the shape of the make-up graph when being made-up with another pipe is not changed the connection shall be undone and the previous pipe shall be used.

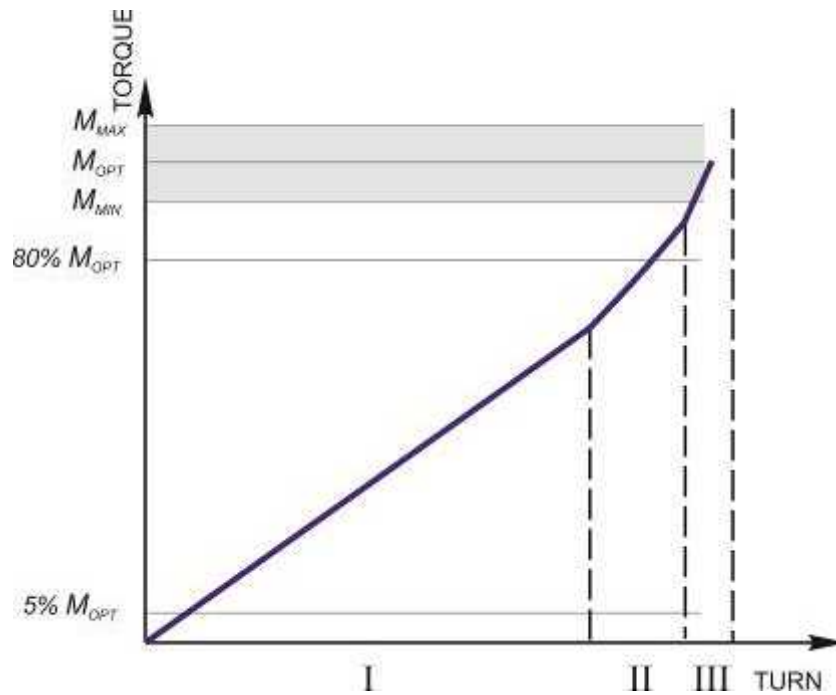


Figure 17

9.3.6.11 Make-up curve with a wave-like effect not exceeding shouldering torque (figure 18) may result from: sh

- improper thread cleaning;
- contamination of the compound contents or its high density (e.g. at low temperatures);
- raised amount of compound.

Undo the connection and make sure wave effect is not caused by the compound quality or by its application and make-up again. Otherwise, clean the connection, apply proper amount of compound of the proper type and make-up the connection again.

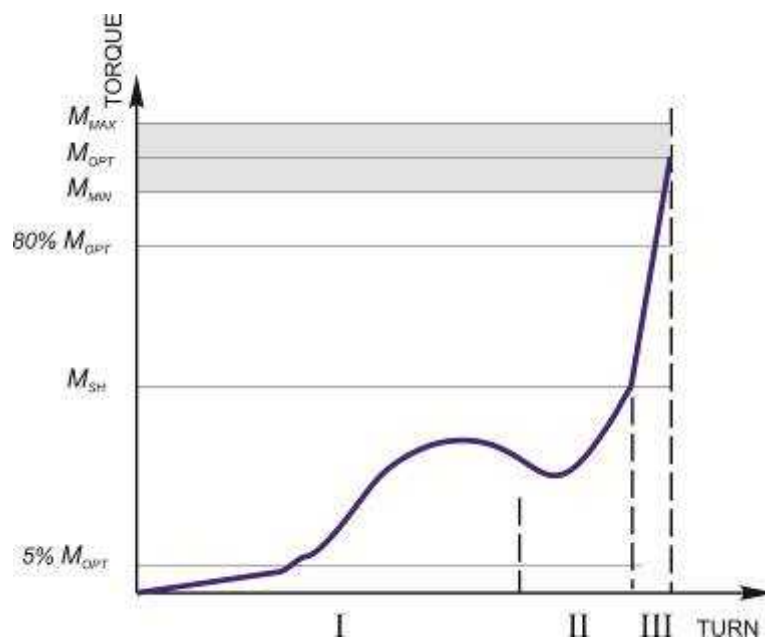


Figure 18

9.3.6.12 Any time the make-up curve differs from the sample, connection shall be undone. Pipe and coupling connections shall be cleaned from compound and inspected. Should visual inspection reveal no damage, apply proper amount of compound of the proper type and check the equipment and carry out the make-up again. Should the second make-up give the same results, such pipe and coupling shall be rejected.

9.3.7 Make-up inspection by make-up marks.

9.3.7.1 When making-up a threaded connection, conjunction of mark on the first coupling with mark on the first pipe along make-up direction corresponds to interlocking of pipe shoulder end with coupling shoulder end.

9.3.7.2 When make-up torque is reached a make-up mark on the coupling shall coincide with the second mark on the pipe along the make-up direction (shall be located at L_{\max} distance from the first mark*) on the pipe or be positioned between the first and second marks (shall be located at L_{\min} distance from the first mark*) that corresponds to torqueing of threaded connection intended to reach given diametrical standoffs in thread and radial seal as well as to engage shoulder elements in seal process.

Torqueing is accompanied by significant torque increase, herewith it shall be at least 90 % and not more than 110 % of optimal make-up torque.

9.3.7.3 When make-up torque is reached, coupling end shall correspond to base of make-up triangle (cross stripe) on the pipe with allowable deviation $\pm 0,02$ inch.

9.3.7.4 Various locations of make-up marks after make-up with optimal torque with corresponding mating of shoulder surfaces is possible (figure 19).

) the connection is undertorqued (figure 19,). The coupling mark doesn't reach the first mark on the pipe in direction of make-up. This means that the gap between the mating surfaces of pipe and coupling exceeds 0,0012 inch. Make-up completion till the coupling mark matches the first or the second pipe mark in the direction of make-up is allowed (figure 19 b, c, d), the make-up torque shall not be over its maximal value.

If the make-up torque exceeds its maximal value, but the coupling mark doesn't reach the first pipe mark in the direction of make-up, the connection shall be undone, cleaned from compound, surfaces of pipe and coupling thread connection shall be visually inspected.

Should any non-reparable damages be detected (table1), the connection shall be rejected.

If no visible damages are observed on the thread connection or the damages can be repaired (Table1), then after its repair the connection can be made-up again, but not more than three times. New make-up marks shall be applied by special tool supplied by the pipe manufacturer (Attachment B).

The following make-up shall be performed till the new coupling mark reaches the first or the second new pipe mark (turn L_{\max} distance from the first mark*) in direction of make-up (figure 19 b, c, d). The make-up torque shall not be over its maximal value.

b) The connection is correctly made-up with the minimal torqueing (figure 19 b), with medium torqueing (figure 19, c), with maximum torqueing (figure 19, d). After the make-up is complete, inspection of make-up correctness by make-up (see 9.3.7.3).

Inspection of make-up correctness by make-up triangle position shall be performed.

c) The connection is overtorqued (figure 19, e). The coupling mark is located behind the second pipe mark (the distance between the coupling mark and the first pipe mark in direction of make-up is larger than L_{\max}^*), which means possible deformation of mating sealing surfaces of pipe groove and coupling bore. In such a case the following shall be done:

- Inspect coupling location relative to make-up triangle. If the coupling end face aligns with the triangular base, the coupling mark corresponds to the second pipe mark (figure 19, d), and L_{\max} distance is exceeded by maximum 12 mm, the connection can be accepted. If the coupling mark is behind the second pipe mark (figure 19 e), and L_{\max} distance is exceeded by more than 12 mm, the connection shall be rejected;
- The connection shall be undone, cleaned from compound and inspected. If deformation of sealing surfaces of pipe groove and coupling bore is not observed, new make-up marks shall be applied by special tool supplied by the pipe manufacturer. Repeat the connection make-up till the new coupling mark aligns the first or the second new pipe mark in direction of make-up (figure 19 b, c, d). The make-up torque shall not be over its maximal value.

If deformation of sealing surfaces of pipe groove and coupling bore is observed, the connection shall be rejected. The actual applied make-up torque value shall be checked, and the optimal torque value can be reduced, if necessary.

* For the case, when there is only one mark on the pipe after restoration.

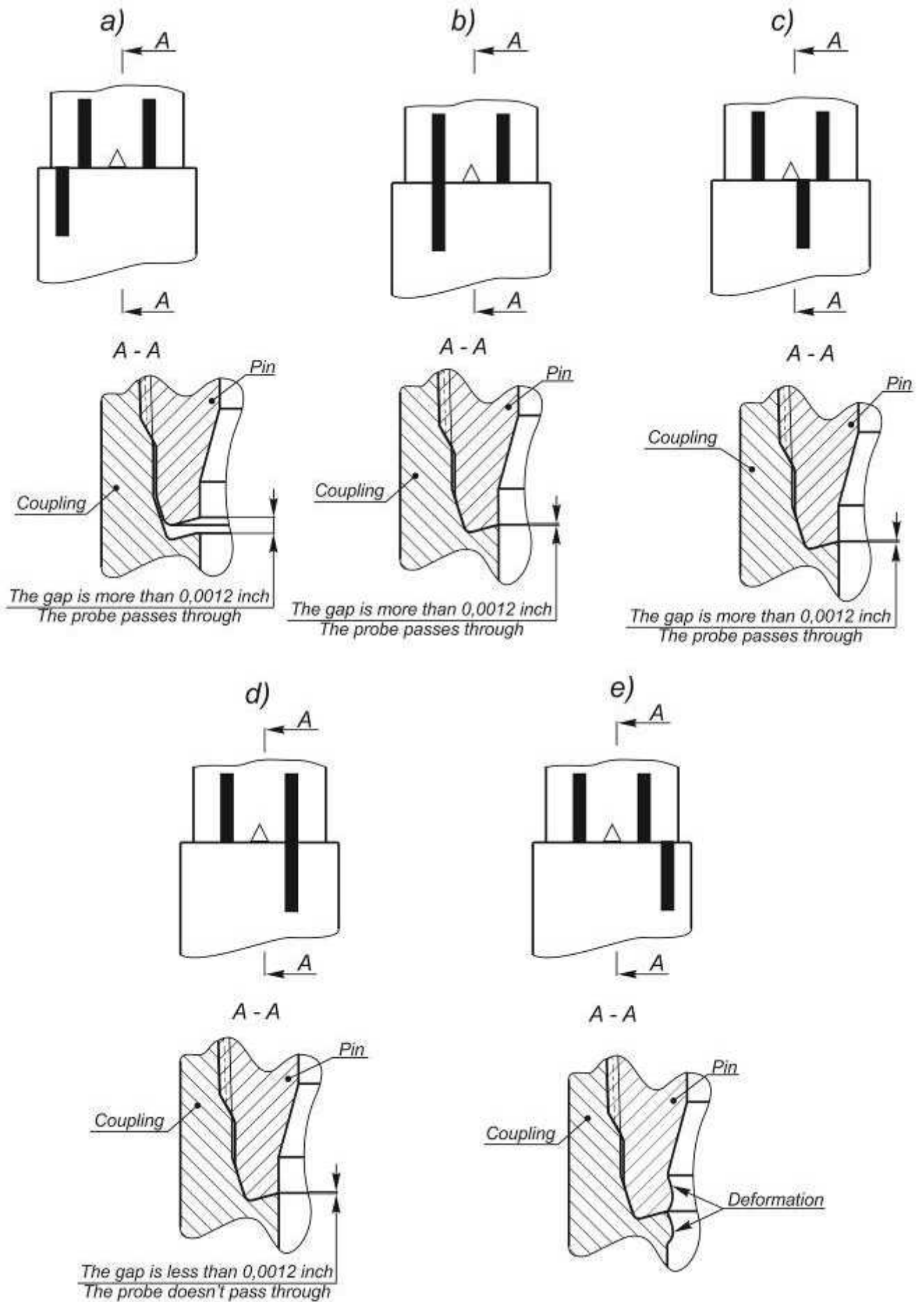


Figure 19

9.4 Disassembly of string

9.4.1 When the string is being pulled out of the well, pipe ends are not allowed to hit against coupling ends.

9.4.2 Break-out

9.4.2.1 Longitudinal even movement of the pipe due to gradual increase of number of engaged turns, shall be watched when the connection is disassembled.

9.4.2.2 The tongs shall be adjusted as shown in the figure 6 prior to break-out.

9.4.2.3 Break-out torque shall provide for the connection break-out.

9.4.2.4 Speed of connection break-out by rotary tong shall correspond to the ones, specified in table 6.

able 6

Break-out start		Break-out finish
First two turns	Further turns	
Speed maximum 2 rev/min,	High speed but maximum 10 rev/min	Speed maximum 2 rev/min

9.4.2.5 Break-out shall not cause significant mechanical damages like galling or jamming etc. on the pipe and coupling body.

The outer coupling surface shall be free of damages with depth more than 1 % from the coupling nominal Outer Diameter.

Jamming marks from the tongs clamps are allowed on the pipe outer surface under condition the marks are not larger than 12,5% from the pipe wall thickness.

After make-up of chrome steel pipes and corrosion-proof steel pipes the mark on the pipe body shall not be more than 0,008 inch.

9.4.3 When the string is disassembled immediately after break-out thread protective elements shall be installed onto pipe and coupling ends.

9.4.4 To store used pipes after string disassembly, if necessary, following preparations shall be carried out:

- visual inspection of thread protectors damage;
- visual inspection of thread protectors, pipes and couplings for significant mechanic damage (like galls, jamming etc.) (see 7.1.2);
- cleaning thread connections from compound and contaminations (see 7.1.4);
- visual inspection of thread, seal and shoulder surfaces of pipes and couplings (see 7.1.6). In case of any discrepancies repair as per Table 1 or reject the pipes;
- cleaning thread protectors from previous compound and contaminations (see 7.1.4);
- application of preservation compound (like Kendex OCTG, Total Jet Marine, EONFILM 300 Thread Protection Compound or equivalent) or preservative thread compound onto pipe and coupling thread connections and installation of thread protectors.

10 Manufacturer's warranty

Subject to strict compliance herewith UP F threaded connection shall withstand at least 9 make-and-break cycles with same performance.

Attachment

(mandatory)

Equipment for make-up registration

UP F threaded connection shall be made-up using equipment for record-keeping and saving make-up diagram (make-up curve) in graphic or electronic type.

The curve is plotted based on torque values along vertical axis and number of turns along horizontal axis in linear scale. Only two last turns shall be displayed as torque increases at torqueing.

Using a computer make-up diagram shall be as follows:

- Sufficient resolution (at least 800 × 600 pixels) for precise curve display. Display shall be at least 9,8425 inch in diagonal, herewith make-up curve shall take at least 80 % of display.
- Display of minimum and maximum torque by horizontal lines (if required, optimal torque shall be displayed).
- Display of minimum and maximum interlocking torque of shoulder elements by horizontal lines.
- Automatic and manual determination of interlocking torque of connection shoulder elements.
- Display of rig floor number at each make-up.
- Display of date and time of each make-up.
- Availability of comments.
- Display of Client name, well number, pipe diameter, weight, steel grade, type of threaded connection, thread compound data and pipe manufacturer.
- When applicable, mapping of latest make-up curve over diagrams of previous successful make-ups.
- When applicable, display of make-up speed in rpm, either on the make-up curve or on a separate graph.

Displayed make-up results shall not be sufficient for acceptance or rejection of make-up operations. Correctness of make-up shall be confirmed by a competent specialist.

Prior to running the casing downhole, the calibration certificate shall be checked with latest and planned equipment calibration dates!

Attachment B

(mandatory)

Restoration of make-up marks and cross stripe, substitutive make-up triangle

B.1 When the tubes used repeatedly, make-up marks painted on the connection as well as cross stripe, applied to substitute the make-up triangle, may come off. In such case they shall be restored.

B.2 Cross stripe shall be made in permanent light paint. It shall be 0,4 inch wide, 3 inch long and it shall be applied at A_1 distance from tube end face (figure B.1 and table B.1).

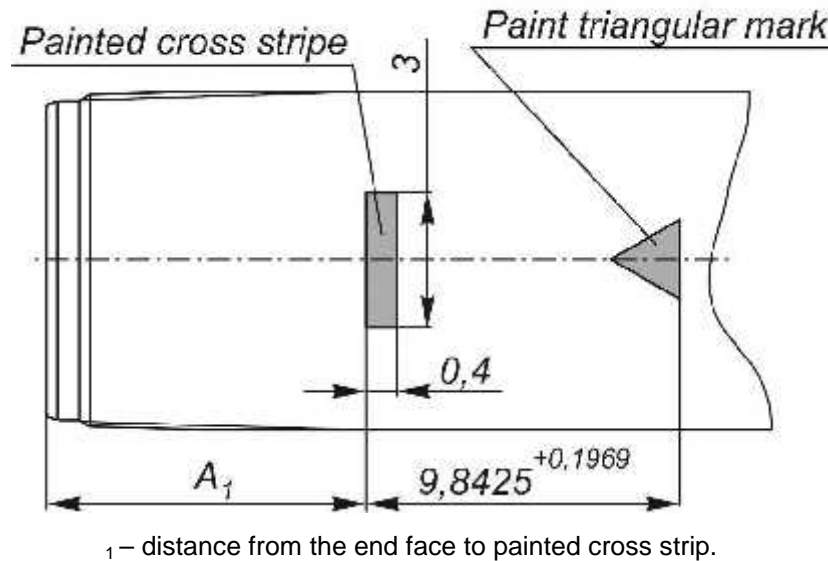


Figure B.1 – Painted cross stripe position

ble B.1

In inches

Pipe outer diameter, D	Distance, A_1	Limit deviation, A_1
2 3/8	2,835	$\pm 0,008$
2 7/8	2,933	
3 1/2	3,232	
4	3,547	
4 1/2	4,079	

B.3 Make-up marks shall be made in permanent light paint on tube and coupling ends (figure B.2).

B.4 Make-up marks shall be restored by special devices – pin and coupling combs supplied by the tubes manufacturer.

B.5 Combs shall be installed correspondingly onto pin and coupling threads and move them in direction of make-up till closure of shoulder surfaces of the devices with shoulder surfaces of correspondingly pin and coupling. Herewith, no gap shall be allowed between the shoulder surfaces of pin, coupling and device. Probe 0,0012 inch thick shall not pass along the entire joint perimeter of these surfaces.

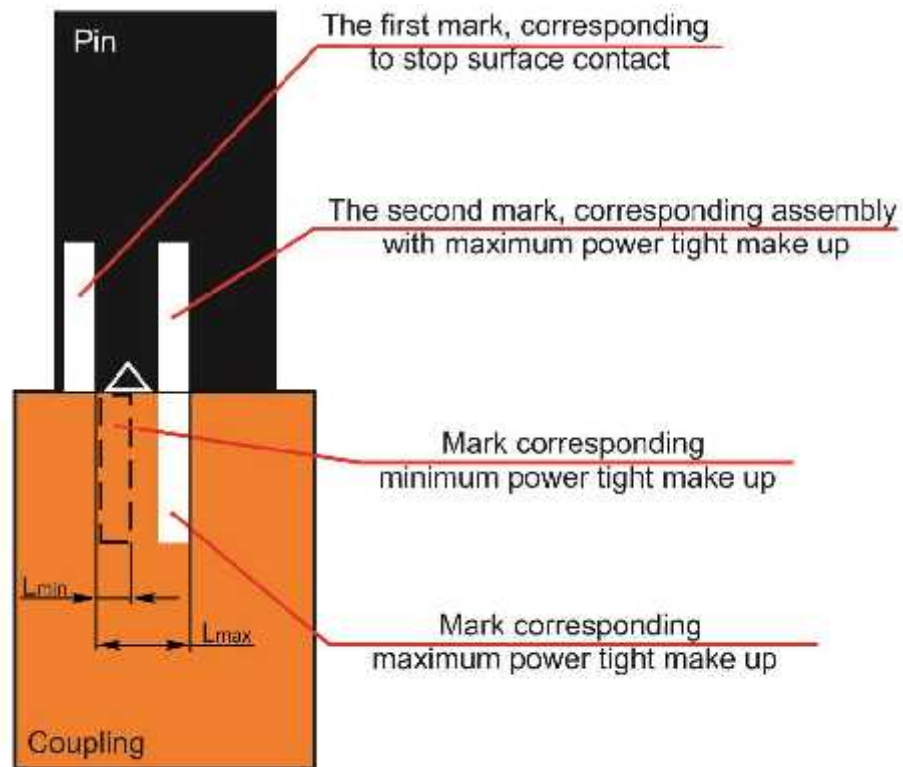


Figure B.2 – Position of make-up marks

Table B.2

In inches

Pipe outer diameter, D	Distance between marks	
	L_{min}	L_{max}
2 3/8	0,158	0,433
2 7/8	0,197	0,551
3 1/2	0,197	0,630
4	0,236	0,748
4 1/2	0,276	0,827

B.6 Make-up marks on pin and coupling shall be applied along the control groove of the corresponding device, see figures B.3 and B.4.

B.7 During the process of restoration the wear-off of devices shall be checked by assembly of pin and coupling combs together till full alignment of control grooves (figure B.5). In case the grooves do not align other set of combs shall be used.

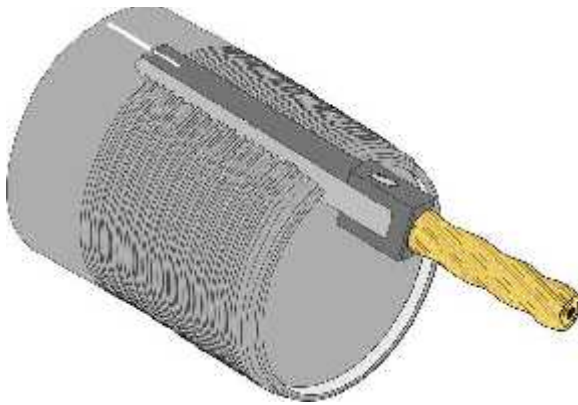


Figure B.3

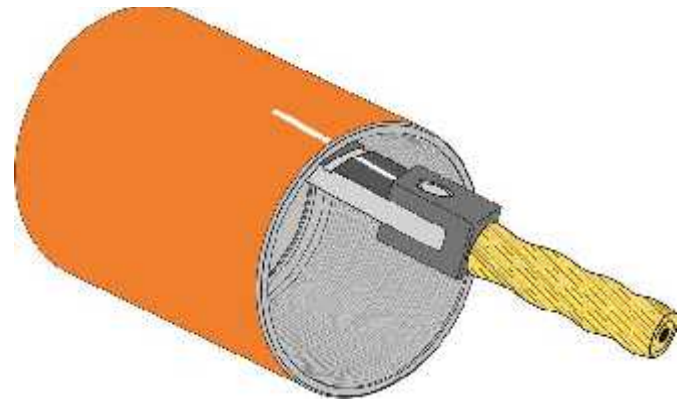


Figure B.4

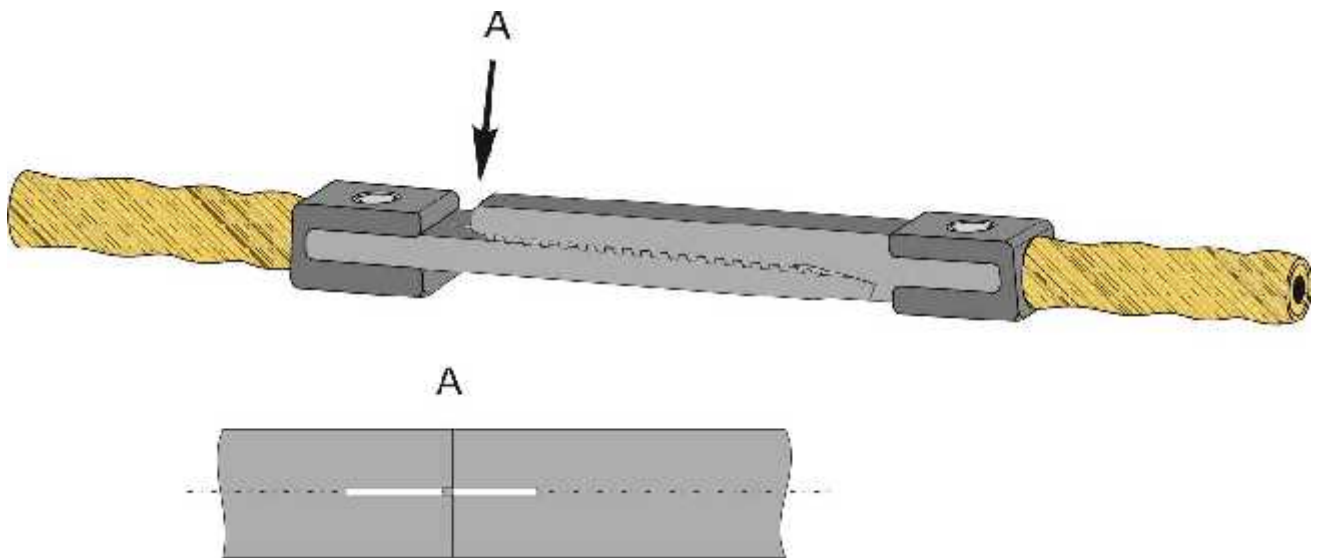


Figure B.5