T M K - P R E M I U M S E R V I C E S
(T M K - P S)

GUIDELINES FOR USE

RE PS 02-060-2021

USE OF

TMK UP CWB II THREAD CONNECTION FOR CASINGS

Revision 2

2022

Introduction

The present guidelines are worked out taking into account the requirements of the following documents:

- API RP 5C1 Recommended Practice for Care and Use of Casing and Tubing;
- API RP 5B1 Gaging and Inspection of Casing, Tubing and Pipe Line Threads;
- ISO 10405 Petroleum and Natural Gas Industries – Care and Use of Casing and Tubing.
- TR CU 010/2011 – Technical Regulations of EAEC “On the Safety of Machinery and Equipment”.

Information about the guidelines for use

1 APPROVED by Head of Premium Connections Development Department

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July 18, 2022

2 DEVELOPED BY Serial Design Bureau

3 Revision 2 Effective date is September 18, 2022 with an option of early use.

4 For replacement of Revision 1 introduced into effect in December 15, 2021.

5 The present revision contains changes and additions in relation to the previous revision and amendments, which are highlighted in the text.

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G U I D E L I N E S S F O R U S E

USE OF
TMK UP CWB IITHREAD CONNECTION FOR CASINGS

Effective date 18 -09-2022

1 Scope

The present guidelines contain recommendations for maintenance and use of casing with TMK UP CWB II thread connection 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 Normative references

The present guidelines contain normative references to the following documents:

GOST R ISO 13678-2015 Casing, Tubing, Pipe Line and Elements of Drill Strings for Oil and Gas Industry; Evaluation and testing of thread compounds

GOST15150-69 Machines, Instruments and Other Industrial Products. Modifications for Different Climatic Regions. Categories, Operating, Storage and Transportation Conditions as to Environment Climatic Aspects Influence

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

RD 39-7-904-83 Instruction on Material, Equipment and Spare Parts Storage in Warehouses on Facilities of Production and Technical Servicing and Completing, Enterprises and Entities of Ministry of Oil Industry

TU 0254-001-46977243-2002 RUSMA-1, RUSMA-1(3) Thread Compounds;

TU 0254-031-46977243-2004 RUSMA R-4, RUSMA R-4(3)Thread Compounds;

TU 0254-068-46977243-2009 RUSMA R–14, RUSMA R–14 (3)Special Thread Compounds

TU 19.20.29-223-46977243-2018 RUSMA API Modified 1000 Thread Compound

TU 0254-167-46977243-2015 “RUSMA API Modified Thread Compound”

TU 0254-158-46977243-2013 RUSMA Storage Compound.

TU 19.20.29-250-46977243-2018 RUSMA-M3 Compound.

N o t e - The specified document edition shall be applied for dated references taking into account all issued amendments. The valid revision shall be applied for undated references.

3 Terms and definitions

For the purposes of the present guidelines the standard terms as well as the following terms and definitions shall be applied:

3.1 **rotation on shoulder:** Preset movement of thread connection in circumferential direction after thread connection surfaces shouldering.

3.2 **box (box connection):** The product with a thread connection on an inside surface.

3.3 **pin (pin connection):** The end of pipe with a thread connection on an outside surface.

3.4 **thread connection (make-up result)**: Make-up of pin and coupling by means of thread.

3.5 **thread connection (structural element)**: Thread, thread shoulder and other auxiliary elements of structure on pin or coupling;

3.5 **thread shoulders:** Pin shoulder and box shoulder acting as an arrester upon pin and coupling make-up.

4 Transportation, handling operations and storage

4.1 Transportation

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

4.1.2 Pipe transportation, handling and storage shall be carried out with thread protectors screwed on pin and coupling end faces in order to protect surface of thread and thread shoulders from exposure.

4.1.3 Pipe bundles of different lots and standard sizes can be loaded into same means of transportation, but have to be separated.

4.1.4 Pipe bundles shall be securely fastened during transportation to avoid any movement. Wooden blocks can be used for fastening purposes.

When several pipes bundles are stacked or not bundled pipes are stacked into several ranks, pipe bundles and pipe ranks shall be separated by at least three wooden blocks, with the thickness from 1.3780 to 1.5748 inch each, so that weight of upper pipe ranks is not distributed onto couplings of lower ranks.

4.1.5 When transported by sea, pipe bundles shall not be placed in 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.

4.1.6 When loading pipe bundles 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.

4.1.7 Pipes from chromium, chrome-nickel (with grades containing Cr letters) and stainless steel shall be packaged using wooden or plastic beds.

4.1.8 In order to avoid hitting of pipes against vehicle metal elements or protruding parts of neighbouring pipe bundles, it is recommended to use load platforms with protecting covers.

4.1.9 When attaching pipe bundles to loading platform or deck from chromium, chrome-nickel (with grades containing Cr letters) and stainless steel it is required to use nylon cables.

4.2 Handling operations

4.2.1 All handling operations with pipes and couplings shall be carried out with thread protectors screwed on pin and coupling ends.

4.2.2 Handling operations with pipe bundles shall be carried out only with the help of hoisting transportation clamps.

In case of manual 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.

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

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

4.2.4 Handling operations with chromium, chrome-nickel (with grades containing Cr letters) and stainless steel pipes shall be performed using nylon or steel harnesses with plastic braid. When using a forklift, gripping forks, frames and clamps with nonmetallic coating shall be used.

4.2.5 Handling operations for chromium, chrome-nickel (with grades containing Cr letters) and stainless steel pipes shall exclude collision of pipes.

4.3 Stockholding and storage

4.3.1 Pipe storage conditions shall comply with GOST 15150 for Group 4 (long-term storage) or Group 8 (short-term storage up to three months and service interruptions).

4.3.2 Pipes, equipment and spare parts storage in warehouses on facilities of production and technical servicing and completing, enterprises and entities shall be according to RD 39-7-904-83.

4.3.3 Requirements for storage and stockholding of casings:

- pipes are not allowed to be stacked on the ground, rails, steel or concrete foundations without wooden blocks;

- to exclude ingress of dust, moisture from the ground and foreign objects the first layer of pipes shall be located above the ground at the distance of not less than 13.7795 inch;

- the distance between the supports shall be such as to avoid sagging or thread damage. Wooden blocks shall be located horizontally and in the same plane, and supports (racks) shall withstand the weight of all the pipe pile with wooden blocks without sagging. There shall be at least four supports either wooden or similar in properties to wooden blocks, with the height that provides that couplings do not touch each other.

- the height of bundled pipe piles including the use of wooden blocks shall not exceed 118.1102 inch;

- when stockholding unbundled pipes it is required to use piece by piece scheme of stacking. The ranks of pipes shall be divided by wooden blocks to exclude any load on couplings. It is required to use at least four wooden blocks. It is required to place wooden blocks at right angle to pipes and directly above the wooden blocks and supports of the previous ranks to avoid sagging. It is not allowed to locate wooden blocks under thread protectors;

- pipes made from chrome, chrome-nickel (with grades containing Cr letters) steels need to be stored separately, no contact between the pipes and steel racks are allowed.

- the pipes shall be equipped with the thread protectors during the whole period of storage as well as during handing operations;

4.3.4 If pipes are rolled on the racks, any movements at an angle to the rack axis shall be excluded as this may result in collision of pins and damage of thread connection or thread protectors.

4.3.5 During pipe storage, availability and integrity of thread protectors, as well as compound underneath and its expiration date shall be inspected. Pipe corrosion shall not be allowed.

4.3.6 During pipe storage for more than 6 months before use the compound under safety parts shall be renewed, except for the pipes with compound of longer period of storage or GreenWell compound, applied on thread connection.

For this purpose, the following actions shall be performed:

– unpack the package and roll the pipes;

– remove thread protectors according to para. 5.3;

– remove initial compound according to para. 5.4;

– apply storage compound (Kendex OCTG, BESTOLIFE Storage Compound (BSC), Total Jet Marine, RUSMA Storage Compound, RUSMA-M3 or thread compound with storage properties), with the expiration date of minimum 6 months – till the next compound renewal or pipe usage;

– install the thread protectors that were previously removed, make sure they are cleaned from old compound, or install new thread protectors according to para. 5.8.

– after completion of operation, package the pipes in compliance with packing list or store separately.

4.3.7 Pipes damaged during transportation, rejected during inspection, prepared for repair or awaiting a final decision shall be stored on separate racks with the corresponding information tags.

4.3.8 Drilling site shall have a special area for pipe stockholding in compliance with above-listed requirements.

4.3.9 Required quantity of racks shall be installed at drilling site in order to provide for stockholding of full set of pipes.

While stacking onto racks it is important to consider the order of string running (if it is specified in the work instruction), to exclude the risk of additional reassorting.

5 Preparation of pipes for make-up

5.1 General

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

- perform visual inspection of pipes and couplings;
- remove thread protectors from pipes and couplings;
- remove preservation compound from external and internal thread connections (in case of use of thread compound, removal is not required, see. 5.4.4);
- inspect surfaces of external and internal thread connections;
- drift pipes along the entire length;
- measure the length of each pipe;
- Re-install clean thread protectors on pins and couplings.

5.2 Visual inspection

5.2.1 Visual inspection of pipes, couplings and thread protectors shall be performed in order to detect bent pipes, dents and damages.

5.2.2 Visual inspection of pipes and couplings shall be carried out with protectors screwed on.

5.2.3 Pipes, couplings, thread protectors connections with damages, discovered during visual inspection shall be put aside awaiting decision on their suitability for use.

Amount of damaged pipes shall be specified in the Product Quality Non-Conformity Protocol and all damaged areas shall be documented on photographs.

5.3 Thread protectors removal

5.3.1 Thread protectors shall be removed after thread connections are visually inspected.

5.3.2 Thread protectors shall be removed manually or using a special tong with one person's effort. In case of difficulties when removing thread protectors, heating of thread protectors with steam is allowed as well as striking slightly with a wooden hammer at a protector end to eliminate a possible distortion.

5.4 Compound removal

5.4.1 After removal of thread protectors, external and internal thread connections shall be cleaned from preservation compound by hot soapy water or with a steam cleaner. It is recommended to supply water under pressure. In case of freezing temperature, compound may be removed by using a solvent (Nefras, white spirit or similar). After compound is removed, thread connection shall be purged with compressed air or cleaned with dry rags.

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

5.4.2 Barite or metal brushes can cause scratches on surfaces of thread shoulders resulting in loss of tightness.

5.4.3 After compound is removed, thread connections shall be purged with compressed air or cleaned with dry rags.

5.4.4 When pipes are supplied with thread compound RUSMA-1 (з), RUSMA R-4 (з), RUSMA R-14 (з) under thread protectors, it is allowed to perform the first running and pulling operation with mill compound if mill thread protectors are screwed on and are not damaged. When thread protectors are screwed off, it is necessary to make sure that:

– the compound is free of foreign particles (if there are foreign particles, compound shall be removed according to 5.4.1, and reapplied according to 6.1);

– the compound is applied onto thread in an even layer (make the surface even and/or add the compound of the same type if necessary);

– the pipe was manufactured not more than 1 year ago according to the Certificate.

5.5 Thread connection inspection

5.5.1 Thread connection shall be inspected by the following specialists:

– crews for casing strings assembly;

– companies specialized in casing inspection.

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

5.5.2 When inspecting pipe and coupling thread connections surfaces, make sure you pay due attention to the presence of:

– damages resulting from pipes collisions or other impacts;

– damages resulting from installation of thread protectors;

– rust, corrosion or other chemical damages caused as a result of environmental exposure or due to aggressive agents.

5.5.3 Under low light condition (twilight, night) individual portable light sources shall be used during inspection.

5.5.4 Possible damages that might occur on thread connections surface before pipe and coupling putting into operation and the ways of the damages elimination are listed in Table 1 for defined areas of thread connections, indicated in Figure 1.

5.5.5 Determination of corrosion depth and damages is recommended to perform using:

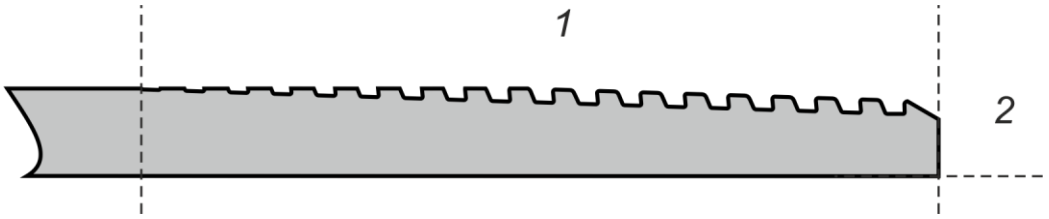
– a mold taken from a detected defect using a special tape (X Coarse material of Testex company for defects up to 0.0039 inch deep, for deeper defects: X-Coarse Plus or equivalent one). Mold height shall be measured with a thickness gage; measurement accuracy shall be at least 0.0004 inch (PEACOCK G2-127 gage or equivalent one);

– depth gage with a needle-type contact point (contact point diameter shall be maximum 0.0039 inch), measurement accuracy shall be at least 0.0004 inch (PEACOCK T-4 gage or equivalent one).

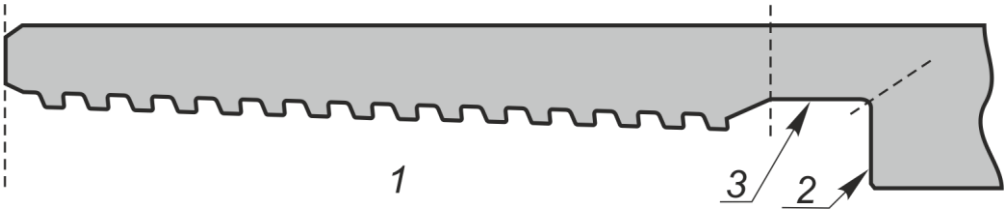
5.5.6 If any irreparable damages are detected, pipes shall be rejected then and reported accordingly specifying pipes serial numbers, describing damages found with photos attached.

Table 1 - Types of possible damages of thread connections surface before putting into operation and methods of their repair.

Surface area (Figure 1)	Type of damage	Damage repair method
1	Surface corrosion (rust), pit corrosion not more than 0.0039 inch depth	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 to be repaired
	Dents, nicks, grooves and other defects with the depth of not more than 0.0039 inch	Manual repair using needle file or polishing paper with grain 0
	Dents, nicks, grooves and other defects with the depth of more than 0.0039 inch	not to be repaired
3	Surface corrosion (rust), pit corrosion not more than 0.0118 inch depth	Manual repair using needle file or polishing paper with grain 0
	Pit corrosion more than 0.0118 inch deep	not to be repaired
	Dents, nicks, grooves and other defects with the depth of not more than 0.0039 inch	Manual repair using needle file or polishing paper with grain 0
	Dents, nicks, grooves and other defects with the depth of more than 0.0039 inch	not to be repaired
2	Dents, nicks, grooves, pit and surface corrosion and other defects.	Manual repair (removal) using a needle file No.2, No.3, and polishing paper with grain 100÷-150 micron for further treatment. Repair within 10 minutes, not more



a) – Surface of external thread connection



b) – Surface of internal thread connection

1 - thread (machined surface only); 2 - thread shoulder;

3 - cylinder bore;

Figure 1

5.6 Drifting

5.6.1 Drifting shall be performed using a mandrel along the entire length of pipes.

For drifting of pipes made of chromium, chrome-nickel (with grades containing Cr letters) and stainless steel, polymer or aluminium mandrels shall be used.

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

5.6.3 Pipe and drift shall be of the same temperature during drifting process.

5.6.4 Dimensions of the drift effective part shall comply with those specified in Table 2.

5.6.5 The mandrel shall pass through the entire pipe, when pulled manually without significant effort.

5.6.6 Pipes rejected during drifting process, shall be put aside until further decision on their validity and recorded in product quality non-compliance report.

Table 2 – Dimensions of the effective part of the mandrel

In inches

Pipe outside diameter	Length of the effective part of the mandrel	Diameter of the effective part of the mandrel
From 4 1/2 to 8 5/8 incl.	5.9843	*d* – 12.5197
from 9 5/8 to 13 3/8 incl.	12.0079	d – 0.1563
[1)] Drifts with the effective part 49.2126 inch are allowed to be used. N o t e s: *d* is a pipe inside diameter.		

5.7 Measurement of length of pipes

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

It is recommended to compare measured pipe length with the marked length. In case of discrepancies the measured length shall be marked on the pipe body with a marker or a chalk.

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

$$L = \sum L_{ф} - n\,\Delta L \qquad (1)$$

where L – the total length of the string;

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

n – number of pipes in a string;

ΔL – decrease of pipes length during make-up according to Table 3.

Table 3 – Decrease of pipe length during make-up process

In inches

Pipe outside diameter	Decrease of pipe length during make-up Δ*L*
4 1/2	3.8780
5	3.9409
5 1/2	4.0039
5 3/4	0.1600
6 5/8	4.1890
7	4.3740
7 5/8	4.5630
10 3/4	4.6890
12 3/4	4.6890
13 3/8	4.6890

5.8 Thread protectors installation

5.8.1 After inspection and control, thread protectors or caps shall be re-installed on pin and coupling ends.

5.8.2 Before installation thread protectors shall be thoroughly cleaned and shall have no significant damages affecting protection of thread and thread shoulder against direct contact with exposure.

6 Make-up of pipes

6.1 Application of thread compound

6.1.1 To ensure optimum conditions for make-up and to avoid burrs of mating surfaces, all surfaces of thread and thread shoulders of pins and couplings shall be provided with thread compound.

The following types of thread compound are recommended: RUSMA-1 and its modifications, RUSMA- P-4 and its modifications, RUSMA API Modified 1000, RUSMA API Modified, Bestolife API Modified, Bestolife 72733, Bestolife 2000, Bestolife API Modified HP / HT, Bestolife 2000 NM, JET-LUBE API Modified.

During make-up of pipes from chromium, chrome-nickel (with grades containing Cr letters) and stainless steel with the chrome content over 3 %, it is recommended to use RUSMA R-4 and RUSMA R-14 thread compounds and their modifications.

By agreement with the developer of the connection, other thread compounds that meet requirements of API RP 5A3/ISO 13678 or GOST R ISO 13678 are allowed.

6.1.2 Thread compound for make-up shall only be taken from original packages, delivered by the supplier, the container shall show name, batch number and manufacturing date.

Compound from packages without proper identification shall never be used. Compound shall never be placed in other packages or dissolved!

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

Prior to use, check compound's expiration date on the package.

Never apply compound with expired shelf life.

6.1.3 Make sure you follow the recommendations specified below when using thread compound:

– use the same compound (the same type) when assembling one casing string;

– use a new compound package for each running, if the compound from opened package is used, make sure it is free from foreign inclusions;

– stir the compound thoroughly before use;

– warm up the compound before application in case of freezing temperatures.

Compound shall be stored in closed overturned packages at the temperature specified by the manufacturer. When storing partially unused compound, always specify the date of the first use on the package.

6.1.4 Thread compound shall be applied in an even and continuous layer on the whole surface of thread and thread shoulders of pins and couplings connections.

Figures 2 and 3 demonstrate proper and unacceptable application of thread compound.

Before application of thread compound, thread connection surface shall be thoroughly cleaned and dried.

Never use metal brushes for compound application!

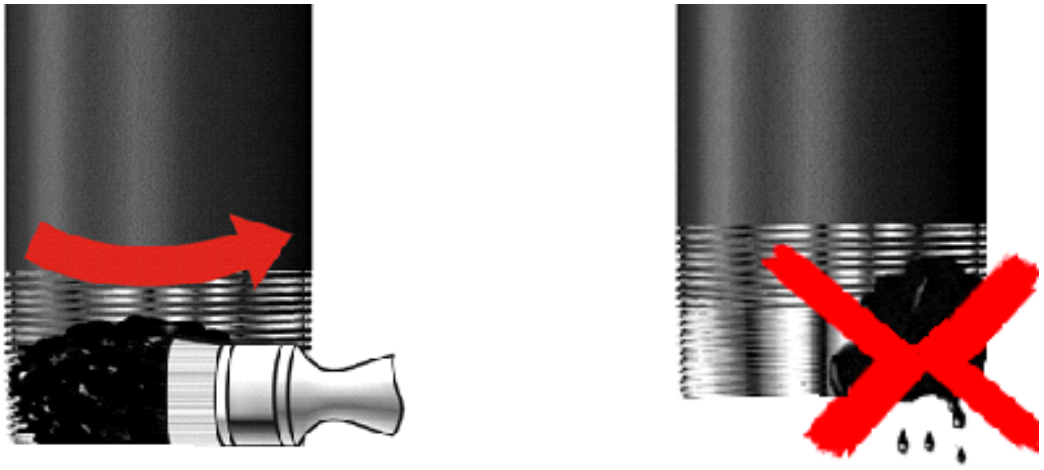


Figure 2

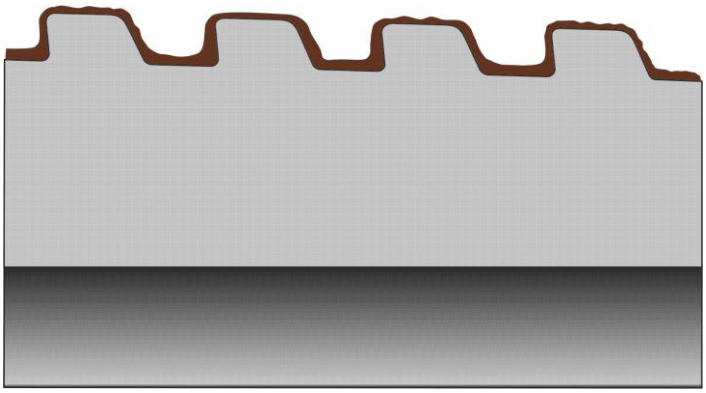


Figure 3

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

The minimum and the maximum compound mass m_{min} and m_{max} in gr for make-up of one thread connection shall be calculated as follows:

$$m_{min} = 0{,}25\ D \quad (2)$$

$$m_{max} = 0{,}30\ D \quad (3)$$

where m_{min} is the minimum compound mass in gr rounded to an integral value;

m_{max} is the maximum compound mass in gr rounded to an integral value;

D is the outside diameter of pipes, in mm, rounded to an integral value.

Example. The minimum quantity of thread compound required for make-up of one thread connection of a coupling and pipe with an outside diameter of 244.48 mm (9 5/8 inch):

mmin = 0.25 x 244.5 ≈ 61 gr (2.15oz) with

at least 43 gr (1.52oz) per coupling and at least 18 gr (0.63oz) per pin.

N o t e - Calculated compound mass is theoretical.

6. 1. 6 To determine the quantity of compound required for determined number of pipes, a package of compound with specified volume shall be used.

Prior to pipes running down the hole, make sure that required thread compound of one type is available.

6.1.7 Thread sealant can be used for make-up of pipes with crossovers or other string elements provided the below conditions are followed:

- if shoulder torque of thread shoulders is from 25% of optimum make-up torque and final make-up torque exceed shoulder torque by 20%;

– Shoulder torque of thread shoulders is higher than 80 % of optimum make-up torque and it does not result from thread jamming or damage, and 20 % of optimum make-up torque is applied after the shoulders interlock.

6.2 Running and pulling

6.2.1 Casing shall be assembled by a qualified personnel. Make-up of connection, with the use of torque registration system is the method ensuring proper make-up and claimed by the manufacturer technical properties of the connection.

If make-up torque registration system is not available, then the following shall be used:

– manometer of breakout tong (conversion of pressure into torque shall be in compliance with the recommendations of the manufacturer of tong);

– make-up triangle (cross stripe) and make-up marks.

6.2.2 A special stab guide or bell guide is recommended for running and pulling operations (Figure 4). This device helps to align pin and coupling and prevent the connection from damage

6.2.3 In order to decrease the risk of new damages during running and pulling operations, it is recommended to use pipe weight balancer.

In case of non-operating state of pipe weight balancer or its absence, a driller shall control constant weight on hook (within limits ±100 kg (±220.46 lb)) taking into consideration pipe weight.

6.2.4 While running a string of chromium, chrome-nickel (with grades containing Cr letters) and stainless steel pipes it is recommended to use an elevator and special wedge claws to avoid pipe body damages.

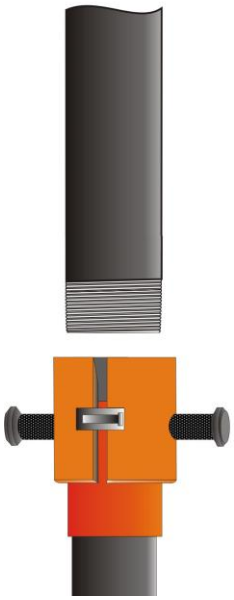


Figure 4

6.2.5 Rotary tong or casing make-up system shall be equipped with a speed governor and shall ensure:

-- at the initial stage - speed of make-up of not more than 2 rpm for safe entering of external thread into internal thread (reverse is allowed).

- at the stage of the main make-up - smooth rotation of a pipe at the speed of not more than 10 rpm;

- at the stage of rotation on shoulder - make-up speed of not more than 2 rpm and smooth rotation of a pipe without jerks and stops.

If break-out of thread connection according to. 6.5 and casing make-up system use are required, rotary tongs shall be provided.

Rotary tongs shall be equipped with clamps, for pipe sizes used to ensure a sufficient surface area contacting with the pipe body. Clamps diameter shall be 1 % greater than pipe nominal outside diameter. Clamps shall be adjusted in such a way that they hold the pipe tightly and never slip.

For make-up and break-out of chromium, chrome-nickel (with grades containing Cr letters) and stainless steel pipes, the rotary tongs shall be equipped with non-metallic or non-injurious tong dies.

Prior to make-up, tongs shall be positioned as per Figure 5.

6.2.6 Make-up equipment shall ensure torque at least 30 % greater than recommended maximum make-up torque.

6.3 Assembly of string

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

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

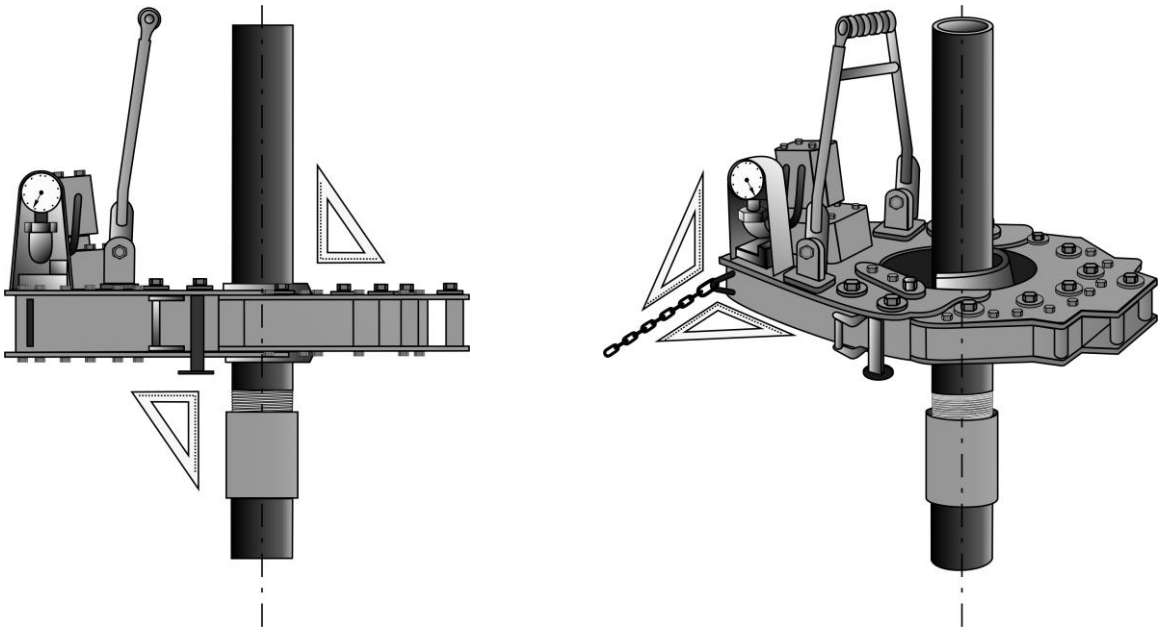


Figure 5

6.3.2 Prior to assembly of the string, remove thread protectors or end caps (clepo) and check surfaces of thread, thread shoulders of the free pipe end for any mechanical damage according to Figure 6.

6.3.3 During make-up process, if a derrick man is absent, it is required to control alignment of upper pipe coupling end (decline) with lower pipe rotation axis and correct the situation timely by directing a driller accordingly (topdrive turn, elevator movements up and down, etc.). (Figure 7).

Maximum misalignment of connected pipes shall not exceed 0.7874 inch.

6.3.4 Compound shall be applied according to para. 6.1. It is recommended to perform air blasting of external and internal threads prior to compound application.

6.3.5 Make sure prior to make-up, that surfaces of thread and thread shoulders with applied compound are free from mud or mud laden fluid with small contaminations, hindering tightness of connection. In case of mud or mud laden fluid on connection surfaces, clean them and apply thread compound again.

6.3.6 When stabbing a pin into a coupling, pin end face shall not hit coupling end face, pin sliding down into the coupling is not allowed.

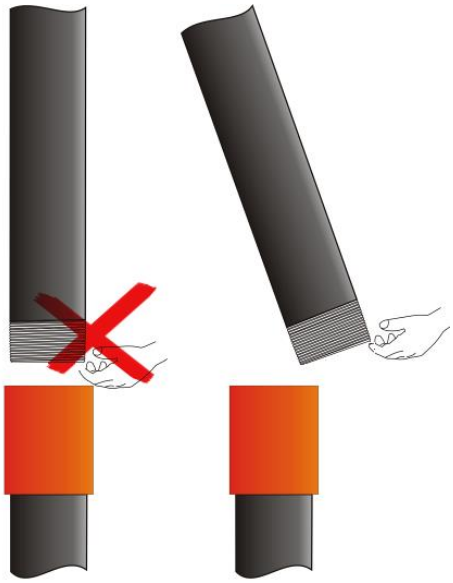


Figure 6

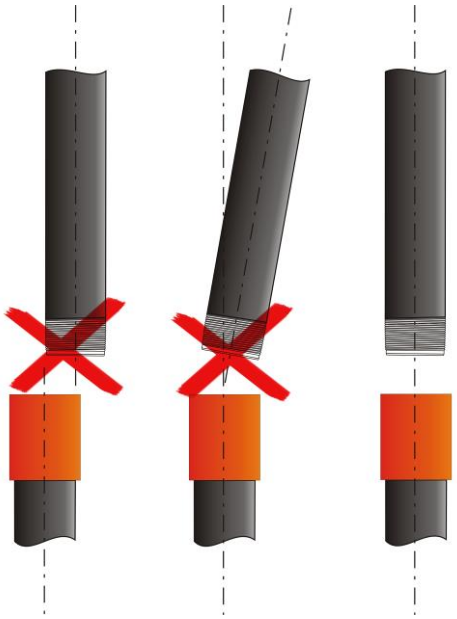


Figure 7

6.3.7 The make-up torque for a thread connection shall be within the range from the minimum up to the maximum torques, indicated in Table 4 for the corresponding sizes and grades.

If thread connection make-up with torque within the limits shown in Table 4 is not in compliance with specified requirements, M_{opt} can be corrected but not more than by ±15 %. At that the values of M_{min} and M_{max} shall also be corrected but not more than by ±10 % of corrected M_{opt}..

Change of make-up torque within a wider range is allowed only subject to approval by TMK-Premium Services.

6.3.8 During make up of pins and couplings made of steels of different grades, the make-up torque value shall be chosen according to the lowest steel grade of both pin and coupling.

6.3.9 Make-up of pins and couplings shall be performed with the use of make-up registering equipment, by make-up diagrams, at that it shall meet the requirements specified in Annex A.

Make-up of pipes and couplings without make-up registering equipment shall be performed based on make-up torques and make-up marks on free ends of pipe and coupling, applied by the manufacturer (in light paint) and make-up triangle applied on pipe, figure 8.

Transverse stripe can be applied (in light paint) on pipe instead of make-up triangle.

When make-up is checked by triangle marking (transverse stripe), correct make-up is proved by alignment of coupling end face with the base of make-up triangle (transverse stripe near edge) on the pin with allowable deviation ±0.0394 inch.

Above inspection methods are secondary, and they do not provide for assessment of make-up quality.

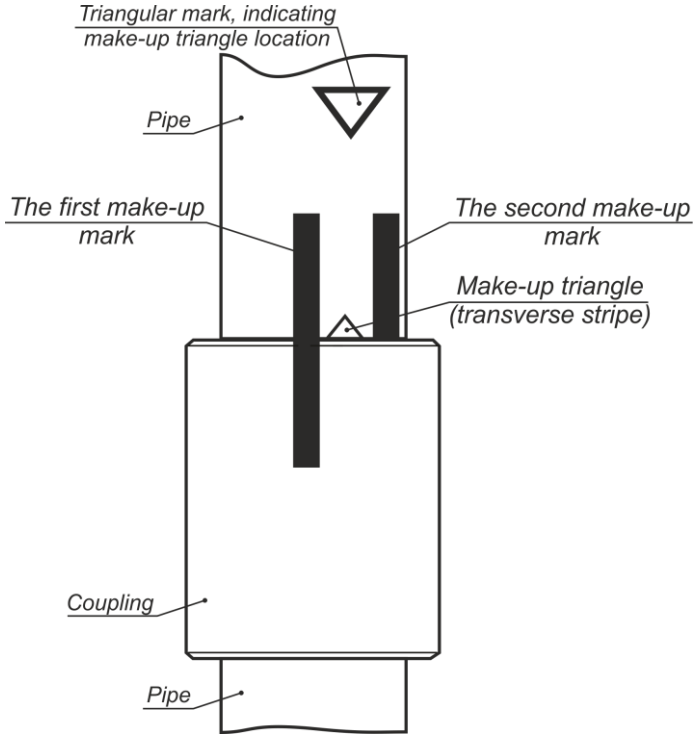


Figure 8

6.3.10 At the initial stage of assembling it is recommended to perform the first two revolutions of pipe using strap tongs (chain tongs are allowed for use only with the safe gasket which is set between the pipe body and the tong thus avoiding pipe body damage) to assure connection of external and internal threads, i.e. entering of external thread profile in mating profile of internal thread.

Table 4 – Make-up torques

D, Inch	*S*, Inch	Torque, ft lb for steel grades																									
		J55, K55			N80, L80			C90			R95, T95			C110, P110			Q125			Q135			TMK140			TMK150		
		M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}
4 1/2	0.2500	5300	5900	6500	5500	6100	6700	5700	6300	7000	6000	6600	7200	6400	7100	7800	6500	7200	8000	6900	7700	8500	7400	8200	9000	7700	8500	9400
	0.2709	5500	6200	6800	5800	6400	7000	6200	6900	7500	6500	7200	8000	6700	7400	8200	6800	7600	8300	7300	8100	8900	7700	8600	9400	8000	8900	9800
	0.2902	5800	6500	7100	6000	6600	7300	6400	7200	7900	6800	7500	8300	7000	7700	8600	7200	8000	8800	7700	8600	9400	8100	9100	10000	8500	9400	10300
	0.3370	6700	7400	8200	6900	7700	8500	7600	8400	9200	7900	8700	9600	8100	9000	9900	8300	9200	10100	8800	9900	10800	9400	10500	11500	9800	10800	11900
5	0.2531	6400	7200	7900	6600	7400	8100	6700	7400	8200	6800	7500	8300	6900	7700	8400	7000	7800	8600	7200	8000	8800	7400	8300	9100	7700	8600	9400
	0.2961	7200	8000	8800	8800	9700	10700	8800	9800	10800	8900	9900	10800	9100	10100	11100	9300	10300	11400	9600	10600	11700	9800	10900	12000	10100	11200	12300
	0.3618	8900	9900	10800	10800	12000	13200	11000	12200	13400	11000	12200	13500	11300	12500	13800	11500	12800	14000	11800	13100	14500	12200	13600	14900	12500	13900	15300
	0.4370	10500	11700	12900	12200	13600	14900	12300	13700	15100	12500	13900	15300	12800	14200	15600	13100	14500	16000	13300	14800	16300	13800	15300	16900	14200	15800	17300
	0.4780	11700	13000	14300	13600	15000	16500	13600	15200	16700	13800	15300	16900	14100	15600	17200	14400	16000	17600	14700	16400	18000	15200	16900	18600	15600	17400	19200
	0.5000	12000	13300	14700	13900	15400	17000	14100	15600	17200	14200	15800	17300	14500	16200	17800	14800	16400	18100	15300	17000	18700	15700	17500	19200	16200	18000	19800
5 1/2	0.2748	8500	9400	10400	9300	10300	11400	9400	10500	11500	9500	10500	11600	9700	10700	11800	9800	10900	12000	10100	11200	12300	10400	11600	12800	10700	11900	13100
	0.3039	8200	9100	10000	9500	10500	11600	9600	10600	11700	9700	10700	11800	9900	11000	12100	10100	11200	12300	10300	11500	12700	10700	11900	13100	11000	12200	13500
	0.3610	9900	11000	12100	10300	11500	12700	10500	11700	12800	10500	11700	12900	10800	12000	13200	11100	12300	13600	11400	12600	13900	11700	13000	14300	12000	13300	14700
	0.4150	10800	11900	13100	11300	12500	13800	11400	12700	13900	11500	12800	14000	11800	13100	14500	12000	13300	14700	12400	13800	15200	12800	14200	15600	13100	14600	16100
5 3/4	0.2756	8700	9700	10600	9400	10400	11400	9500	10500	11600	9600	10600	11700	9700	10800	11900	10000	11100	12200	10300	11400	12500	10500	11700	12900	10900	12100	13300
	0.3031	9100	10200	11200	9900	11000	12100	10000	11100	12200	10100	11200	12300	10300	11500	12700	10500	11700	12900	10900	12100	13300	11200	12500	13700	11600	12800	14100
	0.3346	9800	10900	12000	10400	11600	12800	10500	11700	12900	10700	11900	13100	10900	12100	13300	11100	12400	13600	11400	12700	13900	11700	13100	14400	12100	13400	14700
	0.3740	10500	11700	12900	11300	12500	13800	11400	12700	13900	11600	12800	14100	11700	13100	14400	12000	13300	14700	12300	13700	15100	12700	14100	15500	13100	14500	16000
	0.4213	11300	12500	13800	12200	13600	14900	12300	13700	15100	12400	13800	15200	12700	14100	15500	13000	14400	15900	13300	14700	16200	13600	15200	16700	14200	15700	17300
6 5/8	0.2882	9100	10200	11200	9500	10500	11600	9700	10700	11800	9700	10800	11900	9900	11000	12100	10100	11200	12300	10300	11500	12700	10700	11900	13100	11000	12200	13500
	0.3520	10500	11700	12900	11000	12200	13500	11200	12500	13700	11400	12600	13900	11600	12800	14100	11800	13100	14500	12200	13500	14800	12500	13900	15300	12900	14300	15700
	0.4169	13900	15400	17000	14500	16200	17800	14800	16400	18100	15000	16700	18400	15400	17100	18800	15800	17600	19300	16200	17900	19700	16700	18500	20400	17100	19000	20900
	0.4748	20300	22600	24900	21500	23800	26200	21800	24200	26600	22100	24500	26900	22700	25200	27700	23400	26000	28500	23800	26500	29100	24600	27300	30000	25300	28100	30900
7	0.3169	11000	12200	13400	11500	12800	14000	11700	13000	14300	11900	13100	14400	14400	15900	17600	14700	16200	17800	15100	16700	18400	15600	17300	18900	16000	17800	19500
	0.3618	12100	13400	14700	12600	14000	15400	12800	14200	15600	13000	14400	15800	15900	17700	19500	16200	18000	19800	16700	18600	20400	17300	19100	21000	17800	19700	21600
	0.4079	13600	15200	16700	14300	15900	17400	14500	16100	17700	14600	16200	17800	16200	18000	19800	16500	18300	20100	17000	18900	20700	17600	19500	21300	18100	20000	22000
	0.4531	14600	16200	17800	15300	17000	18700	15600	17300	19000	15700	17400	19100	16500	18300	20100	16800	18600	20400	17300	19200	21000	17800	19800	21600	18400	20400	22300
	0.4980	16400	18200	20100	17300	19200	21100	17500	19400	21300	17600	19500	21500	16800	18600	20400	17100	18900	20600	17600	19500	21300	18200	20100	22000	18700	20600	22600

End of Table 4

D, Inch	*S*, Inch	Torque, ft lb for steel grades																										
		J55, K55			N80, L80			C90			R95, T95			C110, P110			Q125			Q135			TMK140			TMK150		
		M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}	M_{min}	M_{opt}	M_{max}
7 5/8	0.3280	14300	15900	17500	14900	16500	18100	15000	16700	18400	15200	16900	18600	15600	17300	19000	15900	17600	19400	16300	18100	20000	16800	18700	20500	17300	19200	21100
	0.3748	15700	17500	19200	16500	18400	20200	16700	18600	20400	16900	18700	20600	17300	19200	21200	17700	19700	21700	18200	20200	22200	18700	20800	22900	19200	21400	23500
	0.4299	17300	19200	21200	18300	20300	22300	18500	20600	22600	18700	20800	22900	19200	21400	23500	19700	21900	24100	20200	22400	24600	20800	23100	25400	21500	23800	26200
	0.5000	19100	21200	23400	20200	22400	24600	20500	22800	25100	20900	23200	25400	21500	23900	26300	22100	24600	27000	22600	25100	27600	23200	25800	28400	23900	26500	29200
	0.5618	21800	24200	26600	22900	25400	28000	23300	25900	28500	23600	26300	28900	24300	27100	29800	25000	27800	30600	25600	28400	31300	26300	29300	32200	27100	30100	33100
10 3/4	0.3500	17300	19200	21100	17900	19900	21900	18100	20100	22100	18300	20400	22400	18700	20700	22800	19000	21200	23300	19600	21800	24000	20200	22400	24600	20800	23100	25400
	0.4000	19000	21100	23200	19800	22100	24300	20100	22300	24500	20300	22500	24800	20800	23100	25400	21300	23700	26000	21800	24200	26600	22400	24900	27400	23100	25700	28200
	0.4500	20600	22900	25200	21700	24100	26500	22000	24400	26800	22300	24700	27200	22900	25400	28000	23500	26100	28700	24000	26700	29400	24800	27500	30200	25500	28300	31100
12 3/4	0.3346	19600	21800	24000	20400	22600	24900	20600	22900	25100	20800	23100	25400	21200	23600	26000	21700	24100	26500	22300	24800	27300	22900	25500	28100	23600	26300	28900
	0.3740	21600	24000	26500	22600	25100	27600	22900	25400	27900	23100	25700	28200	23700	26300	29000	24300	27000	29700	24900	27700	30500	25600	28500	31300	26300	29300	32200
	0.4331	23500	26000	28600	24600	27400	30100	24900	27700	30500	25300	28100	30900	26000	28900	31800	26700	29600	32600	27300	30300	33300	28200	31300	34400	28900	32200	35400
	0.4882	24600	27400	30000	25900	28800	31600	26300	29100	32100	26500	29500	32400	27400	30400	33400	28000	31100	34200	28700	31900	35000	29600	32800	36100	30400	33800	37200
13 3/8	0.3799	22000	24400	26800	22400	24900	27400	22400	24900	27400	22300	24900	27400	22300	24700	27200	22900	25400	28000	23300	25900	28500	24000	26700	29400	24800	27500	30200
	0.4299	22600	25100	27700	23200	25800	28400	23300	25900	28500	23300	25900	28500	23200	25800	28400	24000	26700	29400	24300	27100	29800	25100	27900	30700	25800	28700	31600
	0.4799	23200	25800	28400	24100	26800	29400	24200	26800	29500	24200	26800	29500	24300	26900	29600	25100	27900	30700	25400	28200	31000	26300	29100	32100	26900	29900	33000

N o t e s:

1. The grades specified without types, include all the types.
2. When making-up pipes with the grades not specified in present Table, refer to the torques provided in regulatory documentation for these pipes.

At this stage pipe reversal half-revolution is allowed for steady continuation of make-up without threads overlapping and high-quality assembly.

6.3.11 When making-up chromium, chrome-nickel (with grades containing Cr letters) and stainless steel pipes, the first two turns shall be carried out manually, or strap tongs can be used (Figure 9). Chain tong is allowed for use only under condition that the pipe body is secured from damage (e.g. by the safe gasket which is set between the pipe body and the tong).

Figure 9

6.3.12 Make-up rotation speed during connection make-up with the rotary tong shall correspond to the values specified in Table 5.

Table 5 – Rotation speed during make-up

Start of make-up		End of make-up marks (rotation)
First two turns	**Further turns**	
Speed 2-5 rpm, Better manually	Speed maximum 10 rpm	Speed 2-5 rpm

6.3.13 Even longitudinal movement of the pipe resulting from gradual increase of number of engaged revolutions shall be watched, significant warming of the connection (not more than 122 °F of the ambient temperature) shall not be allowed.

6.3.14 Make-up shall not cause significant mechanical damages like galling, jamming or other imperfections on pipe and coupling body.

The outer surface of coupling shall be free of damages with the depth larger than 0,5% of the coupling nominal outside diameter.

Damages from tong clamps are allowed on the pipe outer surface provided that the actual pipe wall thickness, taking into account depth of the damage, shall be not less than 87.5% of nominal pipe wall thickness.

After make-up of chromium, chrome-nickel (with grades containing Cr letters) and stainless steel pipes, the trace depth on the pipe body shall be not more than 0.0079 inch.

6.3.15 When using hydrotongs with back up, the following conditions shall be observed:

During the first rotations (better manually, using a chain tong), back up shall be opened, and make-up shall be performed without make-up torque increase. At that it is possible to make horizontal movements of hydrotong (right/left) to prevent thread bite during make-up.

Upon increase of make-up torque (on the last 3 turns), it is required to stop, fix the back up on lower pipe body (back-up installation on coupling is not allowed) and continue make-up.

If for make-up of thread connection hydrotong is used not equipped with back up which serves as an arrester it is required to use a mechanical universal tong with a fixing function on lower pipe body.

6..3.16 When the value of the final make-up torque equal to M_{max} value is achieved, turning of coupling from the side of mill connection is allowed, if the make-up diagram has not been changed (Figure 11). The final make-up torque values shall be within M_{min} to M_{opt} limits in order to reduce the probability of turning.

6.3.17 When mud fluid is added into the string, to avoid mud fluid on thread and coupling thread shoulder, thread protectors need to be used, Figure 10a, it is allowed to use thread protectors machined (with thread removed), Figure 10b.

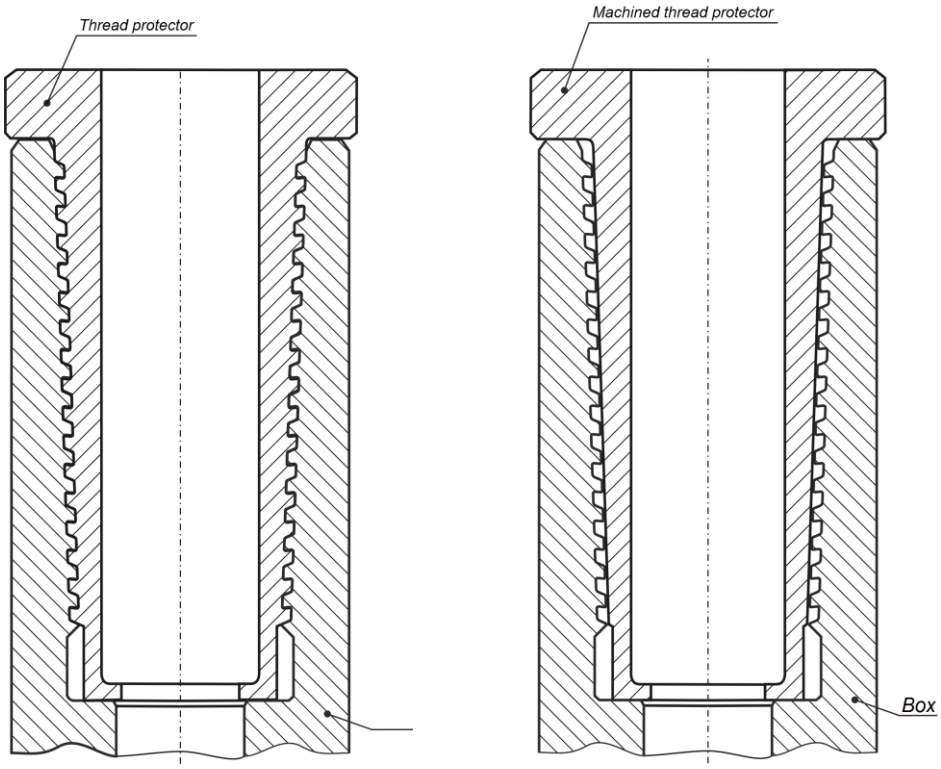


Figure 10

6.4 Inspection of thread connection make-up by make-up diagram

6.4.1 General requirements

6.4.1.1 The shoulder torque M_{sh} of thread connection shall be within the range between 5% and 80% of the optimum make-up torque $M_{opt.}$

6.4.1.2 The final make-up torque shall be within the range from the minimum M_{MIN} to the maximum M_{MAKC} make-up torques.

6.4.1.3 Typical cases of make-up diagram shape non-compliance are shown in Figures 12 – 16.

6.4.1.4 If the make-up curve is of improper shape, giving rise to doubt in make-up correctness, break out the connection.

After break-out remove compound from the surfaces of external and internal thread connections and inspect them.

- If no surface damages and (or) shape distortion (decrease of inside diameter in the plane of thread shoulder) are observed, thread compound shall be applied on thread connections of pin and coupling in accordance with the requirements of para 6.1, the settings of equipment, alignment of made-up pipes shall be checked, make sure there is no slippage of clamp jaws and make-up the connection again.

- If surface damages are observed and can be repaired in accordance with para 6.5.10 after repair thread compound shall be applied on pin and coupling connections in accordance with the

requirements of 6.1, the settings of equipment, alignment of made-up pipes shall be checked, make sure there is no slippage of clamp jaws and make-up the connection again.

If the damages observed cannot be repaired it is necessary to reject the connection.

If the shape of the make-up diagram after re-make-up is similar to the shape of the first make-up diagram, the pipe shall be laid aside and make-up with another pipe shall be performed. The laid aside pipe is allowed to be used for further make-up if no damages are observed or the damages are repaired. Reapply thread compound of the appropriate type and quality, check the settings of equipment.

Pipes on which pin or coupling were made up three times with replacement of counter pipe and with make-up diagrams of a wrong form shall be rejected.

6.2 Make-up diagram when make-up is correct

6.4.2.1 If make-up is performed correctly and all the thread connection geometric parameters comply with the established requirements, the make-up diagram (Figure 11) clearly shows defined areas, which correspond to torque increase when mating of thread (area 1) thread and shoulder (area II).

6.4.2.2 The torque increase on the first two revolutions corresponding to the initial mating of thread surfaces shall be smooth and even. Torque shall increase upon further mating of thread and mating of thread shoulders. The moment of shoulder elements mating is followed by sharp increase of torque thus confirming correct process of make-up. Value of torque increase due to connection shouldering shall be at least 737.56 lb/ft (1000 Nm) per 0.015 of rotation.

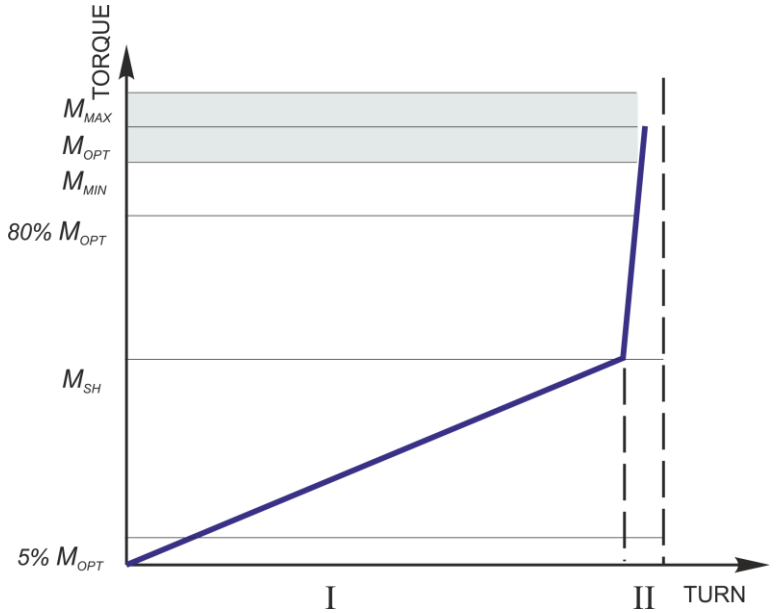


Figure 11

6.4.2.3 Depending on the rotary tong used, its adjustment and other factors, the make-up diagram (especially in area I) can show areas with insignificant deviations from the straight line: oscillations, leaps, etc. Such deviations shall be deemed acceptable, provided that peak values do not exceed the shoulder torque M_{sh} value, and it is possible to track areas of mating of thread and shoulders on the diagram.

6.4.3 Make-up diagram when torque increase stops

If the torque make-up increase and, horizontal section appears during the final make-up stage (area III, Figure 12) and there is no slippage of the clamp jaws the actions shall be taken according to Para 6.4.1.4.

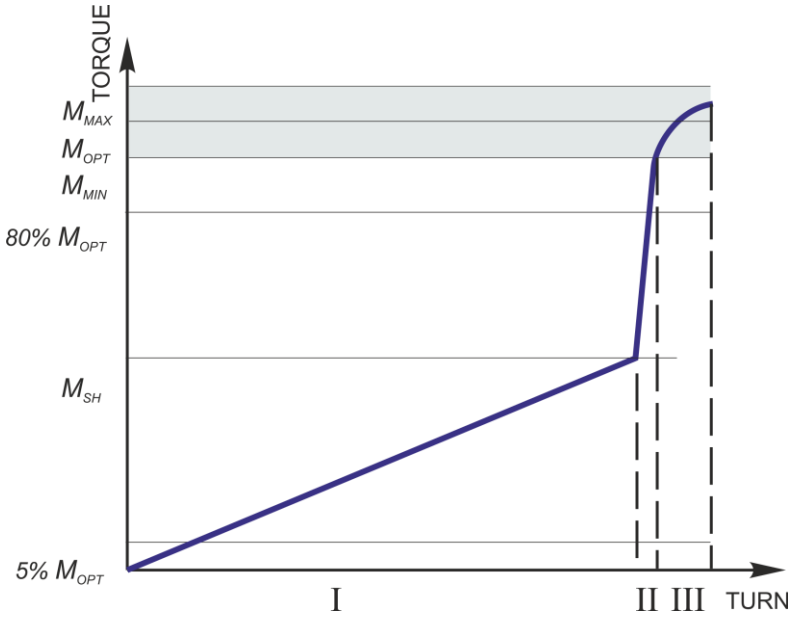


Figure 12

6.4.4 Make-up diagram when torque is low

Too low value of shoulder torque M_{sh} (below 5% of $M_{ОПТ}$) on the make-up diagram (Figure 13) may result from:

- application of wrong type compound;
- compound contamination or its poor storage conditions;
- defects of load sensor.

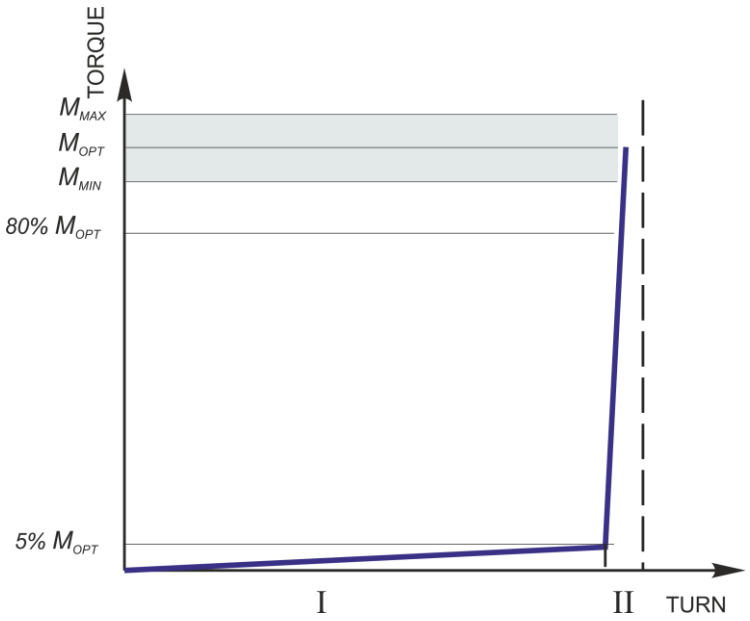


Figure 13

If the make-up curve is of improper shape, the following actions shall be taken according to para 6.4.1.4.

6.4.5 Make-up diagram when torque is high

Too high value of shoulder torque M_{sh} (over 80% of M_{opt}) on the make-up diagram (Figure 14) may result from:

- Damage of thread and/or thread shoulders;
- Improper thread cleaning;
- application of wrong type compound;
- thread compound contamination or high density of thread compound (for example, at low temperatures);
- defects of load sensor.

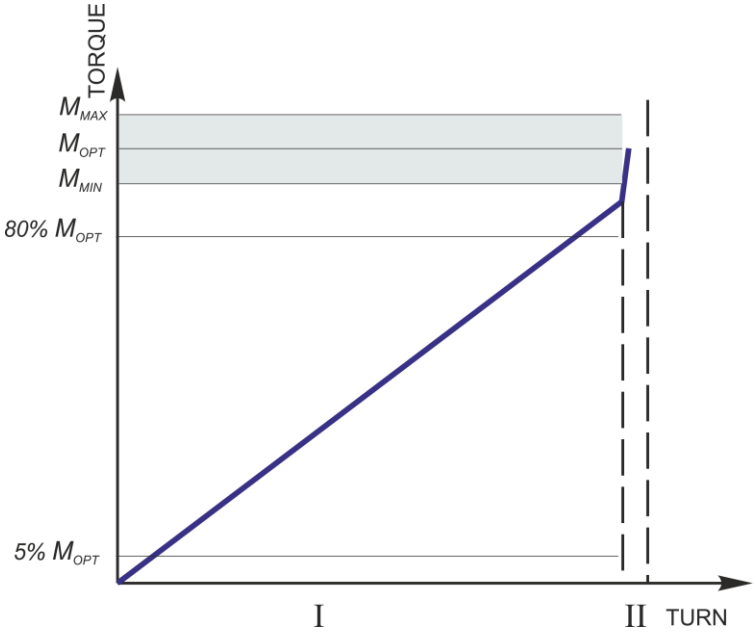


Figure 14

If the make-up curve is of improper shape, the following actions shall be taken according to para 6.4.1.4.

6.6 Make-up diagram with torque leaps

6.4.1.9 Torque leaps on the make-up diagram (Figure 15) may result from:

- uneven application of thread compound;
- misalignment of the equipment for make-up;
- misalignment of made-up pipes;
- Insufficient force of rotation on shoulder;
- slippage of clamp jaws.

Such a diagram is considered good and may be accepted according to requirements specified in. 6.4.2.3

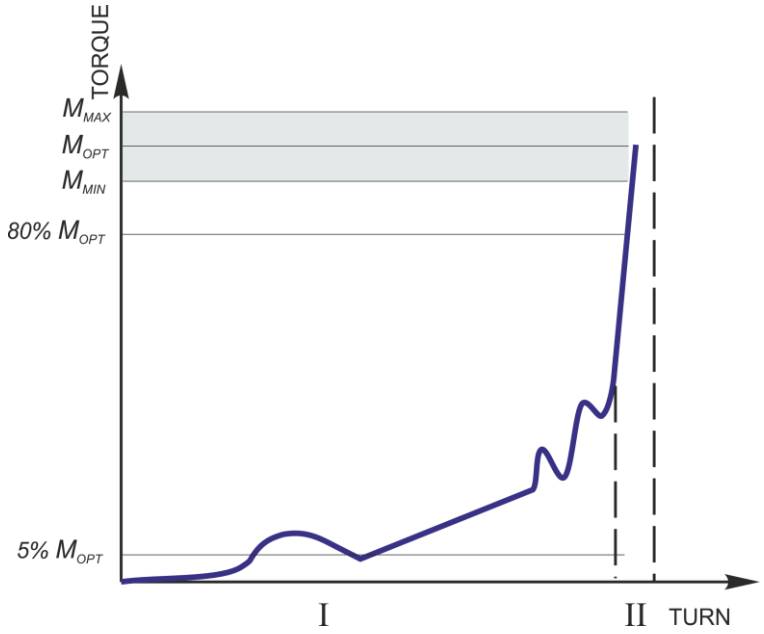


Figure 15

In case of any doubts concerning the make-up quality, the following actions shall be taken according to para 6.4.1.4.

6.4.7 Make-up diagram with a wave-like effect

Make-up curve with a wave-like effect (Figure 16), may result from:

- Improper thread cleaning;
- thread compound contamination or high density of thread compound (e.g. at low temperatures);
- excess of compound.

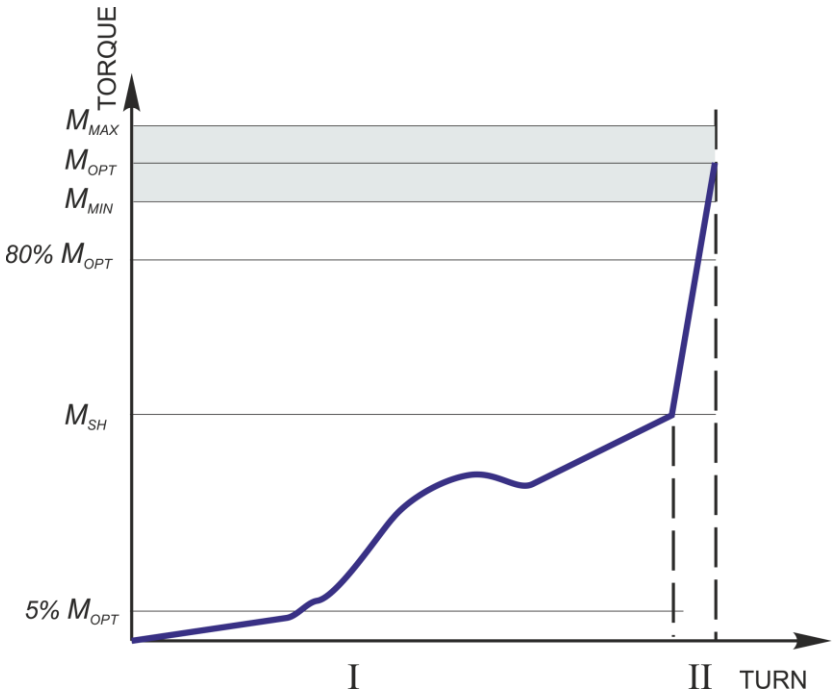


Figure 16

Such a diagram is considered good and may be accepted according to requirements specified in para. 6.4.2.3

In case of any doubts concerning the make-up quality, the following actions shall be taken according to para 6.4.1.4.

6.5 Break-out of string

6.5.1 Prior to break-out, the rotary tongs shall be positioned as per Figure 5.

Prior to start break-out of connection hydro tong back-up shall be fixed on lower pipe body of a broken-out connection. If for break-out of connection hydro tong is used not equipped with back up or casing make-up system which serves as an arrester it is required to use a mechanical universal tong with a fixing function on coupling of lower pipe of a broken-out thread connection (fixing of back up on lower pipe body is not allowed, to exclude break-out of the mill connection).

6.5.3 When the string is being pulled out of the well, pin end faces are not allowed to hit against coupling end faces.

6.5.4 Even longitudinal movement of the pipe resulted from gradual increase of number of engaged turns, shall be watched when the connection is broken-out.

A driller fixes the weight on a hook load free, provides tension within 220.5÷330.7 lbs, and tries to maintain these values in the process of breaking-out. On the last turn pipe moving up shall be stopped in order to fix thread run-out (a click) and after that the pin shall be moved out of the coupling.

6.5.5 Break-out torque shall provide for the connection disassembly.

Reduce of thread connection break-out torque by 20% relative to the recommended optimum make-up torque M_{opt} is allowed.

6.5.6 Speed of connection break-out by rotary tong shall correspond to the speed, specified in Table 6.

Table 6 – Speed of thread connection break-out

Start of break-out		End of break-out
First two turns	**Further turns**	
Speed 2-5 rpm,	Speed maximum 10 rpm	Speed 2-5 rpm

6.5.7 Break-out shall not cause significant mechanical damages like galling, jamming or other imperfections on pipe and coupling body.

The outer surface of couplings shall be free of damages with the depth larger than 0,5% of the couplings nominal outside diameter.

Damages from tong clamps are allowed on the pipe outer surface provided that the actual pipe wall thickness, taking into account depth of the damage, shall be not less than 87.5% of the nominal pipe wall thickness, the damage depth on the outer surface of pipes from chromium, chrome-nickel (with grades containing Cr letters) and stainless steel shall be not more than 0.0079 inch.

6.5.8 When the string is disassembled, immediately after break-out thread protectors shall be installed on pin and coupling ends.

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

– visual inspection of pipes and couplings body for significant mechanical damages (ref. para. 6.5.7;

– cleaning of external and internal thread connections from compound and contaminations (ref. para. 5.4);

– visual inspection of thread and thread shoulders surfaces of pins and coupling thread connections (ref. para.6.5.10). In case of any damages detection, perform repair of thread connections or reject the pipes and couplings;

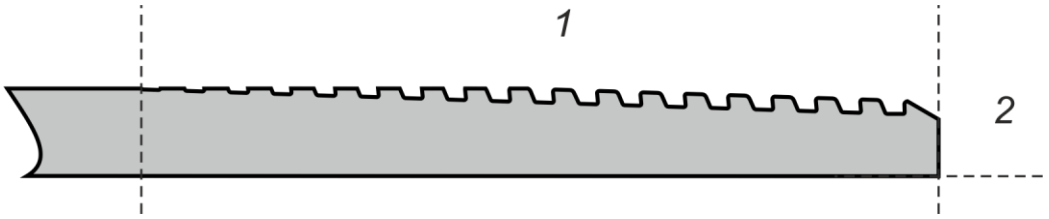
– cleaning of thread protectors from previously applied compound and contaminations (ref. para. 5.8);

– Application of storage compound Kendex OCTG, BESTOLIFE Storage Compound (BSC), Total Jet Marine, RUSMA storage compound, RUSMA - M3; or thread compound with storage properties on thread connections of pins and couplings and installation of thread protectors according to para. 5.8.

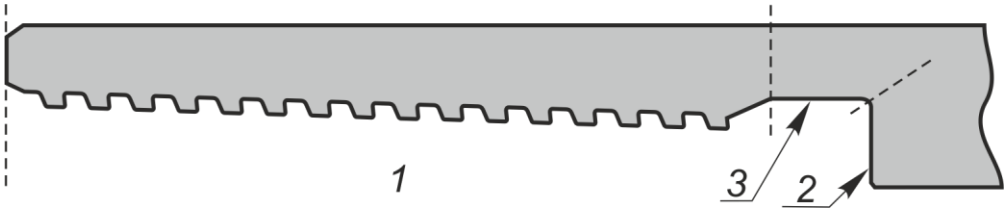
6.5.10 Possible types of damages of thread and thread shoulders surfaces of pins and couplings after make-up/brake-out, as well as repair methods are specified in Table 7 and figure 18.

Table 7 - Types of possible damages of thread connections surface after make-up - break out and methods of their repair.

Surface area (Figure 17)	Type of Damages	Extent of damage As per time allowed for repair, but not more than	Method of repair
1	Irregularities Of profile (peaks and roots, figure 18)	Light damages which can be removed within not more than 10 minutes	Manual repair (removal of profile peaks up to the level of joining thread turn surface) using polishing paper with grain 100÷150 micron
		Moderate damages - which can be removed within not more than 10 minutes	Manual repair (removal of profile peaks up to the level of joining thread turn surface) using a needle file No.2, No.3, and polishing paper with grain 100÷150 micron for further treatment
		Severe damages - which can not be removed within 10 minutes	not to be repaired
1, 3	Dents, nicks Tears, grooves and other defects	Light damages which can be removed within not more than 10 minutes	Manual repair (removal) using polishing paper with grain 100÷-150 micron
		Moderate damages - which can be removed within not more than 10 minutes	Manual repair (removal) using a needle file No.2, No.3, and polishing paper with grain 100÷-150 micron for further treatment
		Severe damages - which can not be removed within 10 minutes	not to be repaired
2	Grooves, dents, nicks flaws and other defects	Light damages - which can be removed within not more than 10 minutes	Manual repair (removal) using a needle file No.2, No.3, and polishing paper with grain 100÷-150 micron for further treatment
		Moderate and severe Severe damages - which can not be removed within 10 minutes	not to be repaired



a) – Surface of external thread connection

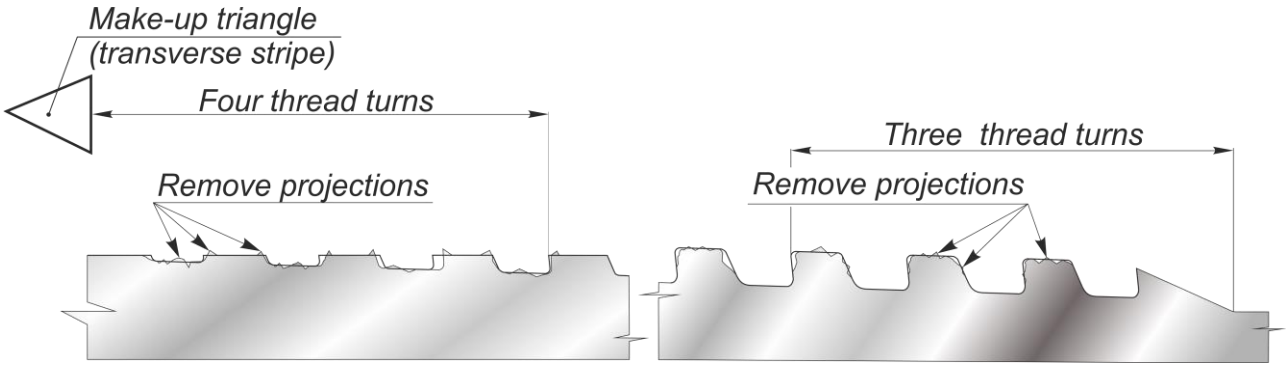


b) – Surface of internal thread connection

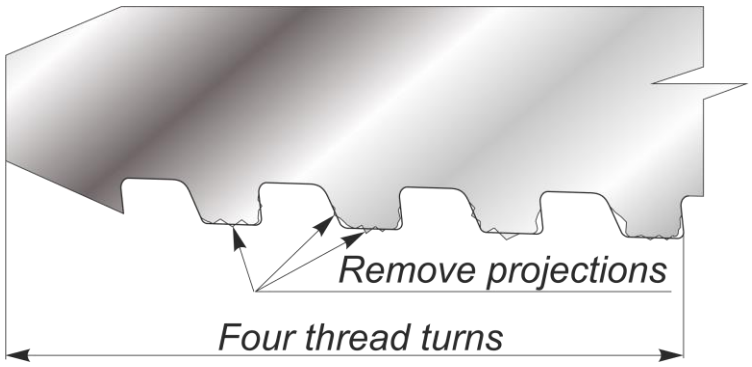
1 - thread (machined surface only); 2 - thread shoulder;

3 - cylinder bore;

Figure 17



a) – Surface of external thread connection



b) – Surface of internal thread connection

Figure 18

6.6 Make-up inspection by make-up marks and make-up triangle.

6.6.1 When making-up thread connection by make-up marks, superimposition of the mark on the coupling with the first mark on the pin in the direction of make-up, corresponds to shoulder of pin and box shoulders (Figure 19 a).

6.6.2 When make-up torque value is reached, a make-up mark on the coupling shall coincide with the second mark on pin in the direction of make-up or be positioned between the first and the second marks that corresponds to rotation on shoulder of thread connection intended to reach given diametrical interferences in thread and radial seal as well as to engage thread shoulders in seal process (Figure 19 b), c).

Rotation on shoulder is accompanied by significant torque increase; herewith it shall be minimum 90 % and maximum 110 % of optimum make-up torque value.

6.6.3 When make-up torque value is reached, coupling end face shall align with the base of make-up triangle (transverse stripe) on the pin with allowable deviation ±0.0394 inch.

6.6.4 Various locations of make-up marks after thread connection make-up with optimum torque and corresponding to such make-up mating of thread shoulder surfaces are possible (Figure19).

[Figure 19, a)]– the connection is under-torqued. The mark on coupling does not run up to the first mark on pin in the direction of make-up. It means that there is a gap between the mating surfaces of pin and coupling.

Make-up is allowed to be continued till the mark on coupling aligns with the first or the second mark on pin in the direction of make-up [Figure 19 b), c), d)]. The make-up torque should not exceed its maximum value.

If the make-up torque exceeds its maximum value, and the mark on coupling doesn't reach the first mark on the pin in direction of make-up, the connection shall be broken-out, cleaned from compound, surfaces of pin and coupling connections shall be visually inspected.

If damages, which cannot be repaired by one of the ways listed in table 10, are detected, the connection shall be rejected.

If no visible damages are observed on the thread connection or the damages can be repaired, upon elimination of damages the connection can be made-up again, herewith the total number of make-ups shall be not more than three times.

When performing remake-up, the mark on coupling shall stay between the first and the second marks on pin or it may align with the second mark on pin [Figure 19 c), d)]. The torque shall be within the range from the optimum to the maximum value.

When make-up is complete, inspection of make-up correctness shall be performed according to the position of make-up triangle.

Figure 19, b), c), d) – the connection is correctly made-up with the minimum rotation on shoulder [Figure 19 b)], with the optimum rotation on shoulder [Figure 19, c)], with the maximum rotation on shoulder [Figure 19, d)].

Inspection of make-up correctness shall be performed according to the position of make-up triangle.

Figure 19, e) – the connection is over-torqued. The mark on coupling is located behind the second mark on pin that means possible deformation of mating pin and coupling shoulders surfaces.

In this case the coupling location shall be inspected relative to make-up triangle.

If the coupling end face aligns with the make-up triangle base and the mark on coupling is located behind the second mark on pin at the distance of not more than 0.4724 inch [Figure 19, e)], the connection can be accepted.

If the coupling end face aligns with the make-up triangle base, but the mark on coupling is located behind the second mark on pin at the distance of more than 0.4724 inch [Figure 19, e)], the connection shall be broken-out and inspected. The thread connection shall be rejected if deformation of pin and coupling shoulders surfaces is observed and shall be remade-up with optimum torque if no deformation is observed.

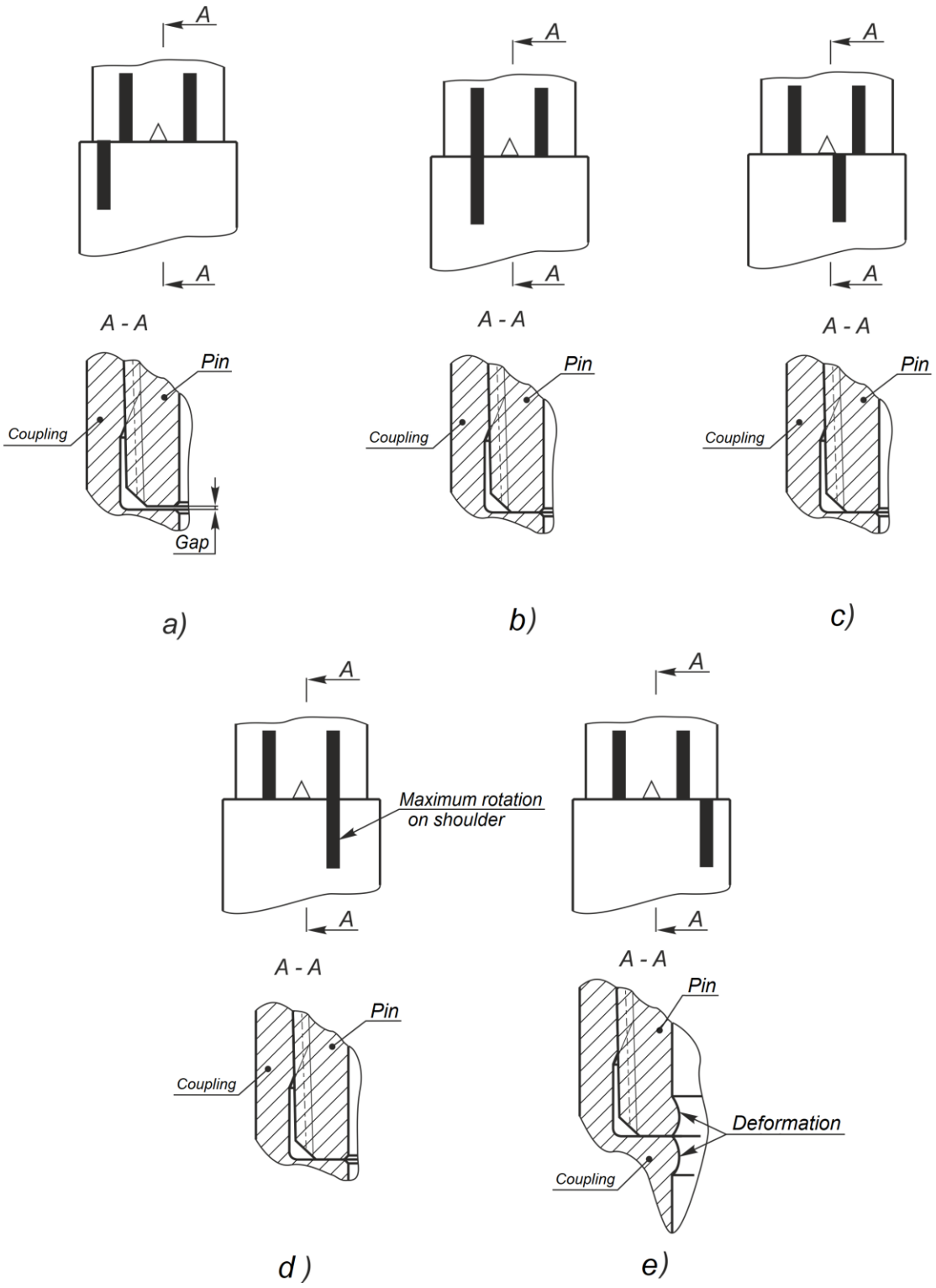


Figure 19

7 Developer's warranty

Provided that the present recommendations are met TMK UP CWB II thread connection shall withstand at least 3 make-up and break-out cycles preserving the same technical characteristics.

Annex A

(reference)

Equipment for make-up registration

TMK UP CENTUM II thread connection shall be made-up using equipment for make-up registration and saving of make-up diagram (make-up curve) in a graphical or electronic format.

The make-up curve is plotted by torque values linear scale (vertical axis) and the number of revolutions (horizontal axis), which shall be linear scaled. Only last two revolutions are recommended to be recorded on the diagram, since torque increases at make-up completion.

When using a computer, a make-up, diagram shall have the following characteristics:

- sufficient resolution (at least 800×600 pixels) for accurate display of the curve profile. The display screen shall be with the diagonal size of at least 9.8425 inch, and the make-up curve shall occupy at least 80 % of the screen area;

– display of minimum and maximum torque with horizontal lines (if required, optimum torque shall be displayed);

– display of minimum and maximum shoulder torques as horizontal lines;

– automatic and manual determination of shoulder torque of thread shoulders;

– display of rig floor number of each make-up;

– date and time display for each make-up;

– availability of comments;

- display of customer's name, well number, pipe outside diameter and wall thickness, weight; grade, thread connection type, thread seal compound data, and pipe manufacturer's name;

– when applicable, superimposing of the latest make-up curve over the curves of previous satisfactory make-up diagrams;

– 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 with the latest and next planned equipment
calibration dates shall be checked!

Annex B

(mandatory)

Requirements to safety upon casings operation

B.1 Safety Ensuring

Measures to ensure safety during casings operation, including their putting into operation, technical maintenance, all types of repair, periodical diagnostics, tests, preservation are determined by the company that uses the equipment, consisting of casings.

B.2 Specified service life rate

The specified service life of casings shall be at least 365 days and nights since the moment of their putting into operation subject to compliance with the requirements of the present guidelines for use.

When the service life of casings is expired, the decision on their inspection and determination of new service life is made by the company that uses the equipment consisting of casings.

B.3 List of critical failures

Critical failures during casings operation are loss of tightness and thread connection or pipe integrity as a whole.

Critical failures may result from actions of the personnel connected with maintenance of the equipment, consisting of casings, and related to the non-compliance with the requirements of the present guidelines for use,

B.4 Actions of personnel in case of failure or accident

In case of critical failure or accident the personnel connected with maintenance of the equipment, consisting of casings, shall perform the following actions:

- inform the executives about failure or accident immediately;
- take measures to eliminate failure or accident and inform the executives about it.
- after elimination of failure or accident it is required to report briefly and exactly on the incident in the operator shift log, specifying the place, reason of failure or accident, measures taken to eliminate them.

Works on elimination of failure or accident shall be performed according to the plan worked out by the company than uses the equipment, consisting of casings.

B.5 Criteria of limit states

B. 5.1 Wall thickness loss and internal surface state

The key factors which determine the limit state of casings are considered to be wall thickness loss and internal surface state.

Decrease in pipe wall thickness is stipulated by metal loss usually on pipe internal surface as a result of mechanical wear or galling, caused by mechanical effect of the equipment and pipes, located inside the casing string. Decrease of pipe wall thickness loss may result in uniform pipe wall wear or local mechanical damages.

Deterioration of pipe internal surface state is stipulated by corrosion environmental exposure, under conditions of which recovery is performed.

Maximum allowable pipe wall thickness loss (prior to decommissioning) - is 50% of the nominal wall thickness.

B.5.2 Evaluation of validity

Evaluation of casings validity for further operation requires inspection of the wall thickness loss and pipes internal surface state to determine resistance to crumple, burst, tensile and corrosion effect, and shall be performed in compliance with the regulatory documentation on pipes.

B.6 Decommissioning and utilization

Decommissioning of pipes shall be performed by the company that uses the equipment, consisting of casings, if the casings limit state criteria, specified in para 5.5, B,2 and B.5 of the present guidelines for use, are achieved. Decision on utilization of the casings shall be made up depending on the terms and conditions of well abandon.

B.7 Employee qualification

Employee involved in maintenance of the equipment, which includes the casings, shall have professional training of not lower than advanced education.

Prior to putting pipes into operation the employee shall be acquainted with the casings specifications and with the present guidelines for use.