



GUIDELINES
for USE

RE PS
02-003-2011

USE OF
TMK UP PF THREAD CONNECTION FOR CASINGS

Revision 13

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

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2 DEVELOPED BY Serial Design Bureau

3 Revision 13. Effective date is April 22, 2024 with an option of early use.

4 For replacement of Revision 12 introduced into effect in June 26, 2023.

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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USE OF TMK UP PF THREAD CONNECTION FOR CASINGS

Effective date 22-04-2024

1 Scope

The present guidelines contain recommendations for maintenance and use of casings, connecting parts (accessories and equipment) with TMK UP PF thread connection including with Green Well Crystal compound (further – GWC) under field conditions, including pipe preparation and make-up, string running and pulling operations, as well as recommendations for pipe, connecting parts (accessories and equipment) 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

GOST R ISO 13679-2016 Casing and tubing steel pipes for oil and gas industry. Procedures of thread connection testing

API RP 5C5 Procedures for Testing Casing and Tubing Connections

ISO 13679: 2019 Steel Pipes used as Casing or Tubing for Wells in Oil and Gas Industry. - Procedures of thread connection testing.

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 19.20.29-330-46977243-2022 RUSMA OCTG 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.

Draft of STO TMK 5660 1056-0046 Green Well Crystal compound for thread connections of casings and tubings General Technical Requirements

Note - 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 **design of thread connection, design:** Design of thread connection, which takes into account different requirements to passability of internal passage of casing string.

Note - Pipe and coupling with special design of thread connection have unequal inside diameters and inspection of passability is supposed to be carried out with the use of special mandrel correspondingly.

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

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

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

3.6 **thread connection (structural element):** Thread, seals, and shoulders machined on pin and coupling, and other auxiliary elements of structure of thread connections;

3.7 **thread seals:** Pin sealing groove and coupling sealing bore ensuring tightness of thread connection upon pin and coupling make-up.

3.8 **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 thread surface, thread shoulders and thread seals 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 pipe 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 steels with the chrome content 3% and over (with grades containing Cr letters) and of chrome-nickel alloys (with grades containing Cr and Ni letters) 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 to loading platform or deck bundles of pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters), it is required to use nylon harnesses.

4.2 Handling operations

4.2.1 All handling operations with pipes 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 the pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters) shall be performed using nylon or steel harnesses with plastic braid. When using a forklift, gripping forks, frames and clamps with non-metallic coating shall be used.

4.2.5 Handling operations for pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters) 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 from steels with the chrome content 3% and over (with grades containing Cr letters) and of chrome-nickel alloys (with grades containing Cr and Ni letters) 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;

- to ensure condensed water discharge form the pipe body and to exclude condensed water entering into coupling, stockholding of casings with a slope from 0.1969 to 0.2756 inch per 1 meter run towards pipe pin end is recommended.

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 thread compounds of longer period of storage.

If pipes and couplings are covered with Green Well Crystal (GWC) compound, the compound under thread protectors shall be renewed if pipes are stored for more than 12 months.

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 or GWC according to para. 5.4;
- apply storage compound (Kendex OCTG, BESTOLIFE Storage Compound (BSC), Total Jet Marine, RUSMA Storage Compound, RUSMA-M3, RUSMA OCTG **Cortec VpCI-369** 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 When stockholding of pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and of chrome-nickel alloys (with grades containing Cr and Ni letters) working (bearing surfaces) of racks shall be covered with non-metallic material (for example, rubber, polyurethane and etc.) or non-metallic blocks (wooden or plastic).

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

4.3.10 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 reasorting.

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 thread protectors screwed on.

5.2.3 Pipes and 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.

5.2.4 During visual inspection of pipes make sure you pay due attention to additional colour marking of pipes and couplings in the form of circular stripes, indicating (see Table 1):

- that drift performance with the use of special mandrel is required;

Table 1 - Additional colour marking

In what cases circular stripes are applied	Quantity and colour of stripes	
	for pipes	for couplings
- when drift performance with the use of special mandrel is required;	one blue stripe	one blue stripe

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.

Diesel, kerosene, salty water, barite or metal brushes are not allowed to be used for removal of thread compound and GWC compound!

5.4.2 Barite or metal brushes can cause scratches on surfaces of sealing elements 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 (3), RUSMA R-4 (3), RUSMA R-14 (3) 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.

5.4.5 After thread protectors are screwed off from pipes with the thread compound applied, it is necessary to be 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 of quality of the manufacturer.

5.4.6 When pipes are supplied with GWC compound under thread protectors, the first running and pulling operation is carried with GWC compound if mill thread protectors are screwed on and are not damaged.

GWC compound is transparent, this allows to perform inspection of thread connections after thread protectors are screwed off with the compound.

5.4.7 After thread protectors are screwed off from pipes with GWC thread compound applied, it is necessary to be sure that:

- no potential damages of thread connections are detected under GWC thread compound according to the requirements of paras 5.5.3 and 5.5.4.
- GWC compound is free of foreign particles (if there are foreign particles, the compound shall be removed according to 5.4.1, and reapplied according to 6.1);
- the pipe was manufactured not more than 1 year ago according to the Certificate of quality of the manufacturer.

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

5.5.3 When inspecting pipe and coupling thread connections, 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.

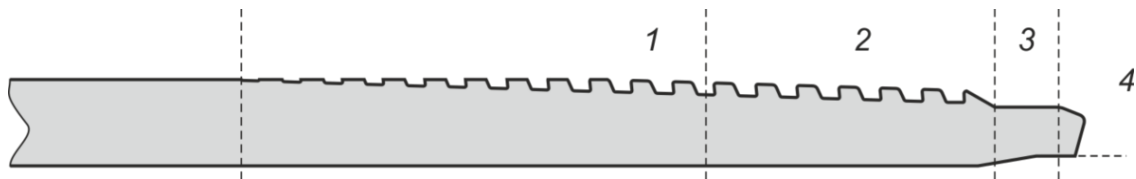
5.5.4 Possible damages that might occur on thread connections surface before pipe and coupling putting into operation and the ways of the damages elimination are listed in Table 2 for defined areas of thread connections, indicated in Figure 1.

Table 2 - Types of possible damages of thread connections surface before putting into operation and methods of their repair.

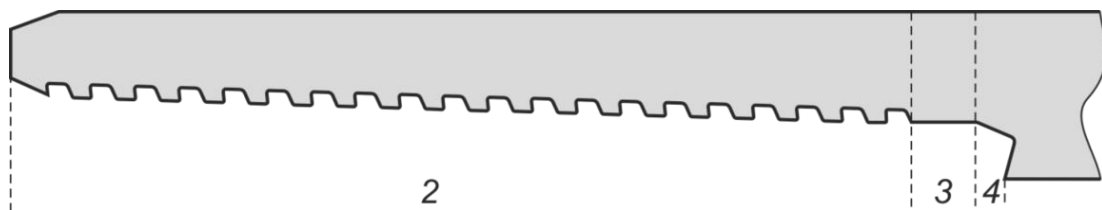
Surface area (Figure 1)	Type of damage	Damage repair method
1.2	Surface corrosion (rust), pit corrosion not more than 0.0039 inch depth	Manual repair (removal) using non-metal brush with soft bristle or polishing paper with grain 0
	Pit corrosion more than 0.0039 inch deep	not to be repaired
	Dents, 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
4	Pit corrosion of any depth	not to be repaired
	Surface corrosion (rust), removed by buffing	Repair by buffing
	Grooves removed by buffing	Repair by buffing
	Dents, nicks and other defects of any depth	not to be repaired

Thread area with imperfect profile thread on pipes (Area 1 on Figure 1a) has an unfinished surface of thread crests (black-crested threads), corresponding to the surface of pipe body, and interruption of the last thread turns.

Note - Surface quality of unfinished thread crests complies with the quality of pipe body surface
 The length of an area of pipe thread with perfect profile and of an area, on which no interruption of thread turns shall be, is determined in accordance with Table 3.



a) – Surface of external thread connection



b) – Surface of internal thread connection

1 - imperfect profile of thread; 2 - perfect profile of thread;
 3 – cylinder groove or bore; 4 - seal and thread shoulders.

Figure 1

Table 3 - Length of thread area with perfect profile and an area without interruption of thread turns

In inches		
Pipe outside diameter, D	Length of thread area with perfect profile, Not less than ¹⁾	Length of thread area without interruption of thread turns, not less than ¹⁾
4	1.4567	2.7953
4 1/2	1.4567	3.2677
5	1.4567	3.2677
5 1/2	1.4961	3.3465
5 3/4	1.4961	3.3465
6 5/8	1.6929	3.5039
7	1.8898	3.7008
7 5/8	2.0866	3.8583
	3.5039 ²⁾	4.6063 ²⁾
7 3/4	3.5039	4.6063
8 5/8	2.2047	4.0157
9 5/8	2.2047	4.0157
9 7/8	2.2047	4.0157
10 3/4	2.2047	3.9764
	3.5039 ³⁾	4.6063 ³⁾
11 3/4	2.2047	3.9764
11 7/8	2.2047	3.9764
12 3/4	2.2047	3.9764
13 3/8	2.2047	3.9764
13 5/8	2.2047	3.9764

¹⁾ Measurement of the length of areas is carried out from the end face of pipe.
²⁾ for wall thickness 0.6870 and 0.7500 inch;
³⁾ for wall thickness 0.5949 and 0.6720 inch.

5.5.5 Determination of corrosion depth and defects is recommended to perform using:
 – 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 reported accordingly specifying pipes serial numbers, describing damages found with photos attached.

5.6 Drifting

5.6.1 Drifting shall be performed using a standard or special mandrel along the entire length of pipes (see Table 1):

- standard mandrel - if pins and couplings do not have additional colour marking.
- special mandrel - if one circular stripe of blue colour is applied on pins and couplings.

For drifting of pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters) polymer and aluminium mandrels should 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 standard drift mandrel effective part shall comply with the ones specified in Table 4, dimensions of special mandrel effective part shall comply with the ones specified in Table 5.

5.6.5 The drift 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 4 – Dimensions of the effective part of the mandrel

In inches		
Pipe outside diameter	Length of the effective part of the drift mandrel	Diameter of the effective part of the drift mandrel
From 2 7/8 to 4 incl.	42.0079 ¹⁾	d – 0.1252
From 4 1/2 to 8 5/8 incl.	5.9843	d – 0.1252
from 9 5/8 to 13 3/8 incl.	12.0079	d – 0.1563
Above 13 3/8	12.0079	d – 0.1874
1) Drifts with the effective part 49.2126 inch are allowed to be used. Note: d is a pipe inside diameter.		

Table 5 – Dimensions of the effective part of special mandrel

In inches

Outside Pipe diameter, D	Wall thickness of pipes S	Dimensions of the effective part of a drift mandrel, not less than special	
		Length of	Outside diameter
		7	0.4079

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.

$$L = \sum L_{\phi} - n \Delta L \quad (1)$$

where L – the total length of the string;

$\sum L_{\phi}$ – 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 6.

Table 6 – Decrease of pipe length during make-up process

In inches

Pipe outside diameter	Decrease of pipe length during make-up ΔL
4	3.5472
4 1/2	4.0787
5	4.2008
5 1/2	4.2638
5 3/4	4.2638
6 5/8	4.4843
7	4.6732
7 5/8	4.9173
	5.3150 ¹⁾
7 3/4	5.3150
8 5/8	5.0394
9 5/8	5.0394
9 7/8	5.0394
10 3/4	5.0787
	5.3150 ²⁾
11 3/4	5.0787
11 7/8	5.0787
12 3/4	5.0787
13 3/8	5.0787
13 5/8	5.0787

¹⁾ for wall thickness 0.6870 and 0.7500 inch
²⁾ for wall thickness 0.5949 and 0.6720 inch

5.8 Thread protectors installation

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

It is not allowed to store pipes and couplings thread connections without applied storage or thread compound and without thread protectors for more than 4 hours!

5.8.2 Before installation thread protectors shall be thoroughly cleaned and shall have no significant damages affecting protection of thread and seal 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, thread seals and thread shoulders of pins and couplings shall be provided with thread compound or GWC compound.

It is recommended to use:

- the following thread compounds: RUSMA-1 and its modifications, RUSMA- P-4 and its modifications, RUSMA API Modified, RUSMA API Modified, Bestolife 72733, Bestolife 2000, Bestolife API Modified HP / HT, Bestolife 2000 NM, JET-LUBE API Modified.

- GWC compound

When making-up pipes made of steels with the chrome content 3% and over (with grades containing Cr letters) and of chrome-nickel alloys (with grades containing Cr and Ni it is recommended to use thread compounds Bestolife API Modified, Bestolife 72733, JET-LUBE API Modified, PYCMA API Modified and PYCMA P-14 and its modifications and GWC compound.

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 It is not allowed to mix thread compound and GWC compound during make-up of thread connection.

To ensure proper make-up it is required to:

- remove GWC compound from thread connection of pin or coupling according to para 5.4 and apply thread compound on thread connection of pin or coupling according to para 6.1.

- remove GWC compound from thread connection of pin or coupling according to para 5.4 and apply GWC compound on thread connection of pin or coupling according to para 6.1.

6.1.3 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.

6.1.4 Make sure you follow the recommendations specified below when using thread compound or GWC compound:

- use the same compound (the same type) when assembling one casing string;
- when assembling one casing string, if GWC compound is removed it is allowed to use thread compound according to para 6.1.1;
- 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.

6.1.5 Thread compound shall be applied in an even layer on the whole thread surface, thread seals 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!

6.1.6 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:

$$m_{min} = 0.25 \times D \tag{2}$$

$$m_{max} = 0.30 \times D \tag{3}$$

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 the outside diameter of 244.48 mm (9 5/8 inch):

$m_{min} = 0.25 \times 244.5 \approx 61 \text{ gr (2.15oz)}$ with at least 43 gr (1.52oz) per coupling and at least 18 gr (0.63oz) per pin.

Note - Calculated compound mass is theoretical.

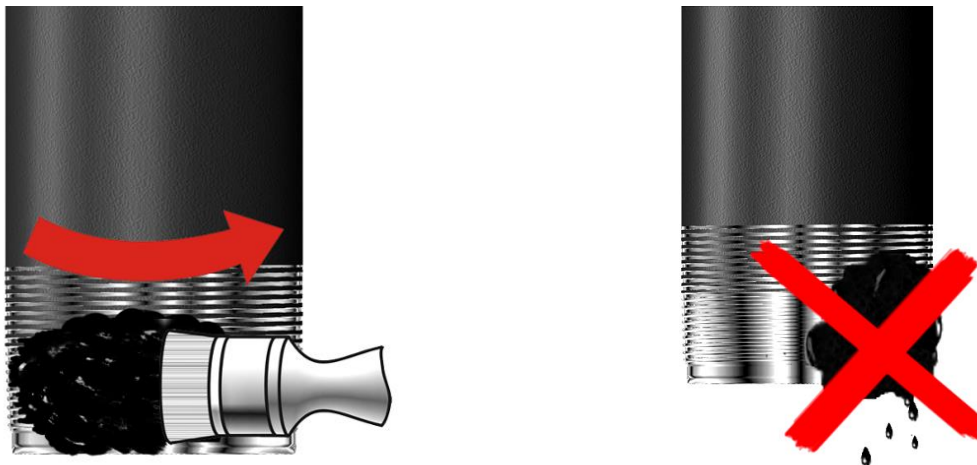


Figure 2

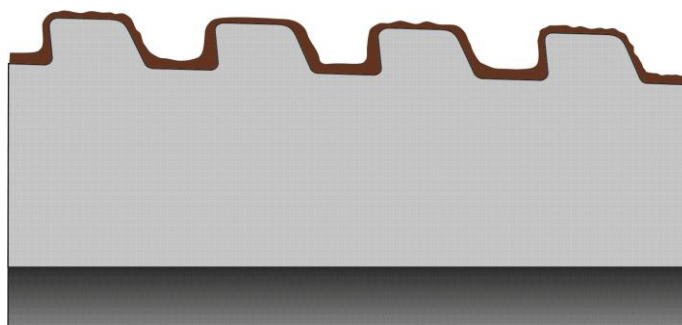


Figure 3

6. 1. 7 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.

6.1.8 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.

Rotation on shoulder (without break-out) is allowed, at the same time it is necessary to ensure 20% difference between shoulder torque and make-up torque.

When using thread sealant, **it is required** to apply small quantity of thread compound on the thread connection shoulder elements and on the first two threads of pipe and coupling.

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 and make-up diagram plotting is the method ensuring proper make-up and claimed by the manufacturer technical properties of the connection.

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 pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters) it is recommended to use an elevator and special wedge clamps to avoid pipe body damages.

6.2.5 **Hydro tong** or casing make-up system (**further - Casing make-up system (overdrive)**) shall be equipped with a speed governor and shall ensure:

- at the initial stage - speed of make-up of not more than 2 -5 rpm for safe entering of external thread into internal thread.

- 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 - 5 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 (Over-drive) are required, hydro tong shall be provided.



Figure 4

Hydro 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 pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters), the hydro tongs shall be equipped with non-metallic or non-injurious tong dies.

Prior to make-up, hydro 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.

6.2.7 When running pipes and couplings with the special outside chamfer and special couplings (with reduced outside diameter) it is necessary to use slip-type elevators (spider-elevators).

Wedge clamps and slips of the elevator shall be clean, without visible mechanical damages and deformation of the edges, shall comply with the outside diameter of the pipe run in the hole and shall evenly enclose the pipe at the gripping point.

It is necessary to ensure that the wedge clamp and slips of the elevator are lowered simultaneously. Their uneven lowering may result in formation of dents or severe cuts on pipes. Elevator latch shall be checked for proper operation.

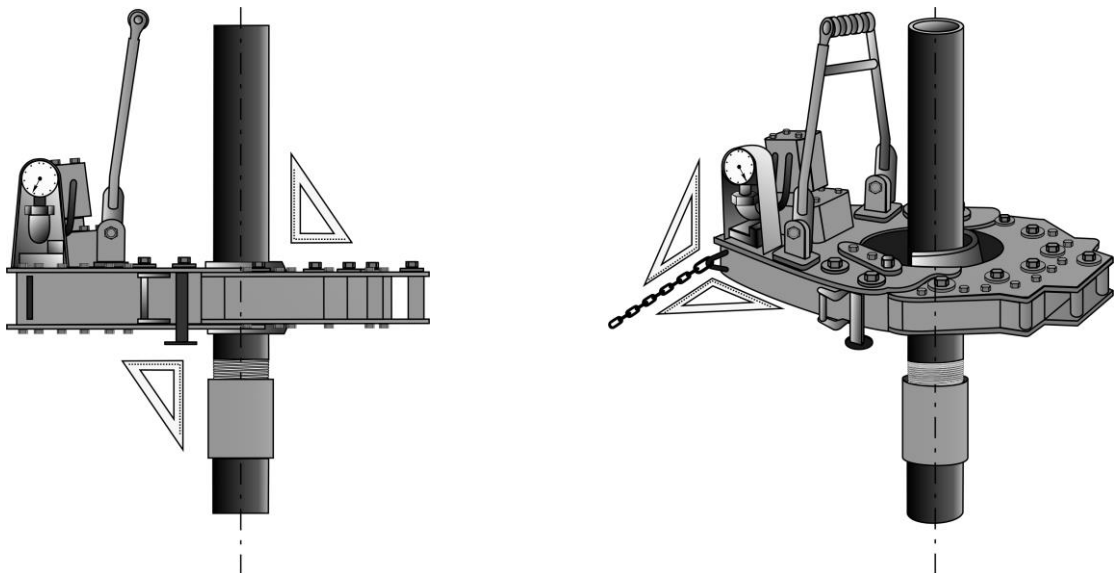


Figure 5

Note – Traces of slips of the elevator and of pipe tong dies have a negative influence on pipes. It is required to take all possible measures to minimize such damages.

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!

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

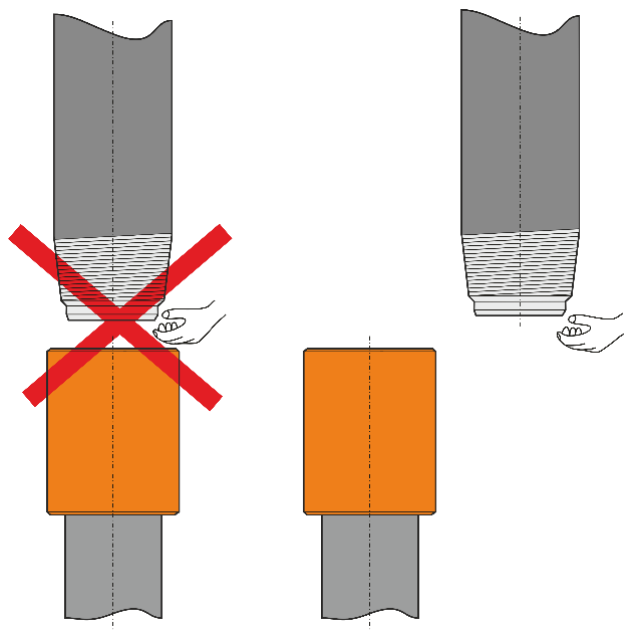


Figure 6

6.3.3 Prior to assembly of the string it is required to control alignment of pipes and decline, proper position of pipes (Figure 7 a).

Inspection of alignment of pipes shall be carried out according to the requirements of Annex A.

6.3.4 Misalignment (Figure 7 b) and decline (Figure 7 c) can be eliminated as follows:

- turning of pipe using topdrive (further - topdrive), casing make-up system (Overdrive);
- changing position of an elevator;
- directing a derrick man accordingly, and etc.

At the moment of alignment check the position of topdrive, casing make-up system (Overdrive) shall be in a neutral (zero) position.

Maximum misalignment of pipes connected shall not exceed 0.7874 inch.

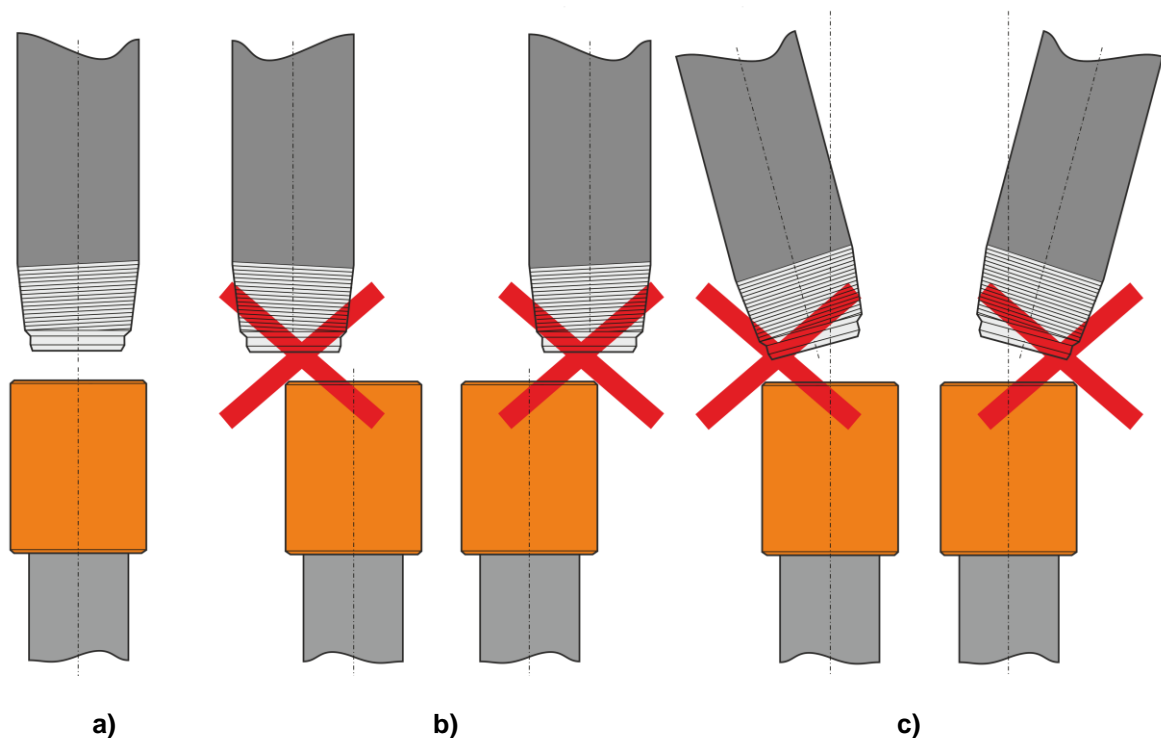


Figure 7

6.3.5 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.

6.3.6 Make sure prior to make-up, that surfaces of seals 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.

6.3.7 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.

6.3.8 The make-up torque for a thread connection shall be within the range from the minimum up to the maximum torques for the corresponding sizes and grades specified in Table 7, taking into account additional colour marking (see Table 1).

If thread connection make-up with torque within the limits shown in Table 7 is not in compliance with specified requirements, M_{opt} can be corrected but not more than by $\pm 15\%$ (for pipes with the outside diameter of 4 inch, but not more than by $\pm 10\%$). Herewith the values of M_{min} and M_{max} shall also be corrected, but maximum $\pm 10\%$ from the corrected M_{opt} .

Change of make-up torque within a wider range is allowed only subject to agreement with the developer of thread connection.

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

At the same time the working characteristics of string are limited by the smallest characteristics of pipes made-up with couplings.

Example 1 - during make-up of pipes with the outside diameter and wall thickness of 7×0.3618 inch (7" 26.00 ppf), grade J55, with couplings with the outside diameter of 7×0.4079 inch (7" 29.00 ppf), grade P110, torque corresponding to the smallest characteristics of pipes and couplings (7×0.3618 inch (7" 26.00 ppf), grade J55) should be chosen for make-up. And the working characteristics of string should comply with the chosen characteristics of pipes and couplings (7×0.3618 inch (7" 26.00 ppf), grade J55).

Example 2 - during make-up of pipes with the outside diameter and wall thickness of 7×0.3618 inch (7" 26.00 ppf), grade P110, with couplings with the outside diameter of 7×0.4079 inch (7" 29.00 ppf), grade N80, torque corresponding to the smallest characteristics of pipes and couplings (7×0.4079 inch (7" 29.00 ppf), grade N80) should be chosen for make-up. And the working characteristics of string should comply with the chosen characteristics of pipes and couplings (7×0.4079 inch (7" 29.00 ppf) grade N80).

6.3.10 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 B.

Table 7 – Make-up torques

D, Inch	S, Inch	Torque, ft lb for steel grades																											
		J55, K55			N80, L80			C90			R95, T95			C110, P110			Q125			TMK135, Q135			TMK 140			TMK 150			
		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	0.2559	2900	3200	3500	3000	3400	3800	3200	3500	3900	3500	3800	4200	3800	4200	4600	4200	4600	5100	4400	4800	5300	4400	4800	5300	4500	5000	5500	
4 1/2	0,2500	2700	3000	3300	3500	3900	4300	3800	4300	4700	4000	4400	4900	4400	4800	5300	4800	5300	5800	5200	5800	6300	5500	6000	6600	5600	6200	6800	
	0,2902	3200	3500	3900	4100	4500	4900	4500	5000	5500	4600	5200	5700	5000	5600	6200	5600	6200	6800	6000	6600	7300	6300	7000	7700	6500	7200	8000	
	0,3370	3400	3800	4100	4400	4900	5500	4900	5500	6000	5000	5600	6200	5500	6100	6700	6100	6800	7400	6500	7200	8000	6900	7700	8400	7200	8000	8800	
5	0,2961	3500	3900	4300	4400	4900	5400	4700	5200	5800	4700	5200	5800	5300	5900	6500	5800	6500	7200	6400	7200	7900	6700	7500	8300	7000	7800	8700	
	0,3618	4400	4800	5300	5400	6000	6600	5800	6400	7100	5800	6400	7100	6500	7200	8000	7200	8000	8800	7900	8800	9700	8300	9300	10200	8700	9600	10500	
	0,4370	4900	5500	6000	6200	6900	7500	7000	7800	8600	7000	7800	8600	7700	8600	9500	8700	9700	10600	9100	10100	11100	9600	10600	11700	10000	11100	12100	
	0,4780	5400	6000	6600	6800	7500	8300	7700	8600	9400	7700	8600	9400	8500	9400	10400	9500	10500	11600	10000	11100	12200	10500	11700	12800	10900	12100	13300	
	0,5000	5700	6300	6900	7100	7900	8700	8000	8900	9800	8000	8900	9800	8900	9900	10800	10000	11100	12200	10400	11600	12800	11000	12200	13500	11400	12700	14000	
	5 1/2	0,2748	3700	4100	4600	4600	5100	5600	5100	5700	6300	5100	5700	6300	5700	6300	7000	6300	7000	7700	6700	7400	8200	7100	7900	8700	7400	8200	9000
0,3039		4100	4600	5000	5000	5600	6200	5700	6300	6900	5700	6300	6900	6300	7000	7700	7000	7700	8600	7400	8300	9100	7700	8700	9600	8000	9000	10000	
0,3610		4700	5200	5800	5500	6100	6700	6300	6900	7600	6300	6900	7600	7300	8100	8900	8100	9000	9900	8100	9000	9900	8600	9500	10400	8900	9900	10800	
0,4150		5500	6000	6600	6300	7000	7700	7200	8000	8800	7200	8000	8800	8300	9300	10300	9300	10300	11400	9300	10300	11400	9800	10800	12000	10200	11300	12500	
0,4760		6300	6900	7600	7200	8000	8800	8300	9100	10000	8300	9100	10000	9700	10700	11800	10700	11900	13100	10700	11900	13100	11200	12500	13700	11700	13000	14300	
5 3/4	0,2756	5000	5600	6200	5200	5800	6300	5200	5800	6400	5200	5800	6400	5300	5900	6500	5500	6000	6600	5500	6100	6700	5500	6100	6700	5600	6200	6800	
	0,3031	5100	5700	6300	5200	5800	6400	5300	5900	6500	5300	5900	6500	5400	6000	6600	5500	6100	6700	5600	6200	6800	5600	6200	6800	5700	6300	6900	
	0,3346	5800	6400	7100	6000	6600	7300	6000	6700	7400	6000	6700	7400	6100	6800	7400	6300	7000	7700	6300	7000	7700	6300	7100	7800	6400	7200	7900	
	0,3740	6900	7700	8400	7300	8100	8900	7400	8300	9100	7500	8300	9100	7700	8500	9400	8000	8800	9700	8000	8900	9800	8200	9100	10000	8300	9200	10200	
	0,4213	7600	8400	9200	8000	8800	9700	8100	9000	9900	8200	9100	10000	8300	9200	10200	8600	9600	10500	8700	9700	10600	8800	9800	10800	9000	10000	11000	
6 5/8	0,2882	6100	6800	7400	7400	8200	9000	8300	9300	10300	8300	9300	10300	9400	10500	11500	10300	11500	12700	10800	12000	13200	11400	12700	13900	11900	13200	14500	
	0,3150	7200	8000	8800	8100	9700	10800	10000	11100	12200	10000	11100	12200	11300	12900	13800	12400	13800	15200	12900	14300	15700	13700	15200	16800	14200	15800	17500	
	0,3520	7400	8300	9100	9000	10000	11000	10300	11400	12500	10300	11400	12500	11500	12800	14000	12600	14000	15400	13100	14600	16100	13900	15400	17000	14500	16000	17700	
	0,4169	8800	9800	10800	10600	11800	13000	12100	13400	14700	12100	13400	14700	13600	15100	16700	15000	16600	18300	15600	17300	19100	16400	18300	20100	17100	19000	20900	
	0,4748	10000	11100	12200	12100	13400	14700	13700	15300	16800	13700	15300	16800	15500	17200	18900	17000	18900	20800	17800	19800	21800	18700	20800	22900	19500	21600	23700	
7	0,3169	6300	7100	7800	8300	9100	10000	9100	10200	11200	9100	10200	11200	10100	11200	12300	11300	12500	13800	12100	13400	14700	12800	14200	15600	13300	14700	16200	
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		8300 ¹⁾	9100 ¹⁾	10000 ¹⁾	10500 ¹⁾	11700 ¹⁾	12900 ¹⁾	11700 ¹⁾	13100 ¹⁾	14400 ¹⁾	11700 ¹⁾	13100 ¹⁾	14400 ¹⁾	13000 ¹⁾	14400 ¹⁾	15900 ¹⁾	14500 ¹⁾	16100 ¹⁾	17700 ¹⁾	15600 ¹⁾	17300 ¹⁾	19000 ¹⁾	16400 ¹⁾	18100 ¹⁾	20000 ¹⁾	17000 ¹⁾	18900 ¹⁾	20800 ¹⁾	
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	0,6870	15600	17300	19100	19200	21400	23500	21400	23700	26100	21300	23700	26000	24300	26900	29600	26900	29900	33000	28200	31400	34600	29600	32900	36200	30800	34200	37600	

Table 7, continuation

D, Inch	S, Inch	Torque, ft lb for steel grades																												
		J55, K55			N80, L80			C90			R95, T95			C110, P110			Q125			TMK135, Q135			TMK 140			TMK 150				
		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}	M _{min}	M _{opt}
7 5/8	0,3280	9000	10000	11100	10700	11900	13100	12100	13400	14700	12100	13400	14700	13000	14500	15900	14200	15700	17300	15700	17500	19200	16600	18400	20200	17200	19100	21000		
	0,3748	10800	12000	13200	13200	14700	16200	15100	16800	18500	15100	16800	18500	17000	18800	20700	18300	20300	22300	19500	21600	23700	20400	22700	25000	21200	23600	26000		
	0,4299	12400	13800	15200	15100	16800	18500	17300	19200	21200	17300	19200	21200	19500	21600	23700	20900	23300	25700	22300	24700	27200	23500	26000	28700	24300	27100	29800		
	0,5000	14400	16000	17600	17600	19500	21500	20200	22400	24600	20200	22400	24600	22600	25100	27600	24300	27100	29800	25900	28800	31600	27300	30300	33400	28400	31500	34700		
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	0,7500	18500	20600	22600	24500	27200	29900	27500	30500	33600	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
7 3/4	0,5949	17900	19900	21900	22900	25400	28000	26100	29000	31900	26100	29000	31900	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
8 5/8	0,3520	11600	12800	14100	13600	15100	16700	16800	18700	20500	16800	18700	20500	18300	20300	22300	19300	21500	23600	20000	22200	24400	21200	23500	25800	22000	24300	26800		
	0,4000	13100	14500	16000	15500	17200	18900	18000	20000	22000	18000	20000	22000	20100	22300	24600	22100	24500	26900	22800	25300	27800	24000	26600	29300	24900	27700	30400		
	0,4500	14700	16400	18000	17400	19300	21200	20300	22500	24800	20300	22500	24800	22600	25100	27700	24800	27500	30200	25600	28400	31300	27000	29900	32900	28000	31100	34200		
	0,5000	16400	18200	20100	19400	21500	23700	22600	25100	27600	22600	25100	27600	25200	28000	30800	27600	30700	33800	28500	31600	34800	29900	33200	36500	29900	33200	36500		
	0,5571	18300	20300	22300	21600	24000	26400	23700	26400	29100	23700	26400	29100	27300	30300	33300	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
9 5/8	0,3520	12100	13400	14700	14300	15900	17500	15800	17600	19300	15800	17600	19300	17000	18900	20800	18600	20600	22700	20900	23300	25700	22200	24600	27100	23000	25500	28200		
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9 7/8	0,6252	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
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	0,7201	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
10 3/4	0,3500	13600	15000	16500	17300	19200	21100	19500	21600	23700	19500	21600	23700	21300	23700	26000	24600	27300	30000	25400	28200	31000	26800	29700	32700	27800	30900	33900		
	0,4000	17300	19200	21100	21300	23700	26000	24600	27300	30000	24600	27300	30000	27400	30500	33500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
	0,4500	19500	21600	23700	24000	26600	29300	27600	30700	33800	27600	30700	33800	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
	0,4949	21400	23700	26100	26300	29300	32200	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
	0,5449	23500	26100	28700	29100	32300	35500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
	0,5949	25700	28500	31400	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500		
0,6720	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500			

End of Table 7

D, Inch	S, Inch	Torque, ft lb for steel grades																										
		J55, K55			N80, L80			C90			R95, T95			C110, P110			Q125			TMK135, Q135			TMK 140			TMK 150		
		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}
11 3/4	0,3331	18300	20400	22400	22300	24900	27400	23200	25800	28400	24300	27100	29800	26300	29300	32200	28000	31100	34200	28900	32100	35300	29200	32400	35700	29900	33200	36500
	0,3748	19500	21600	23700	25100	27900	30700	26200	29100	31900	27000	30000	33000	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,4350	22500	25000	27500	29000	32200	35500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,4890	25200	28000	30800	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,5339	27500	30500	33600	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,5819	28200	31300	34500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
11 7/8	0,5500	26900	29900	32900	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,5819	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
12 3/4	0,3740	17000	19000	20900	22000	24400	26800	25900	28800	31600	25900	28800	31600	28500	31600	34800	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,4331	19800	22000	24200	25400	28200	31000	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,4882	22300	24700	27200	28700	31900	35000	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,5512	25100	27900	30800	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
13 3/8	0,3799	21000	23400	25700	27100	30100	33100	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,4299	24900	27700	30500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,4799	27800	30900	34000	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,5142	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,5512	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,6063	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
13 5/8	0,5551	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,6252	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500
	0,7598	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500	29900	33200	36500

1) If one circular stripe of blue colour is applied on pins and couplings (when inspection of passability is carried out with the use of special mandrel).

Notes:

1. The grades specified without types, include all the types.
2. Make-up with special couplings shall be performed using torques 20% less than the specified ones, **excluding the special couplings with an alternative outside diameter.**
3. When making-up pipes with the grades not specified in present Table, refer to the torques provided in regulatory documentation for these pipes.

6.3.11 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.

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

6.3.12 When making-up pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters), the first two turns shall be carried out manually, or strap tongs can be used (Figure 8). 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 8

6.3.13 Thread connection make-up speed [redacted] shall meet the values indicated in Table 8.

Table 8 – Rotation speed during make-up

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

6.3.14 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 50 °C (122 F) of the ambient temperature) shall not be allowed.

6.3.15 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 pipes made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters), the trace depth on pipe shall be not more than 0,0079 inch.

6.3.16 When using **hydro tongs** with back up, the following conditions shall be observed:

Upon make-up of the first two rotations of pipes manually using a chain tong (6.3.10 and 6.3.11), during make-up using a hydro 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 by a **hydro tong** (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 **hydro tong** 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.

6.3.17 When the value of the final make-up torque equal to M_{max} value is achieved, **rotation on shoulder** of coupling from the side of mill connection is allowed, if the make-up diagram has not been changed (Figure 10). The final make-up torque values shall be within M_{min} to M_{opt} limits in order to reduce the probability of **rotation on shoulder**.

6.3.18 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 9a, it is allowed to use thread protectors machined (with thread removed), Figure 9b

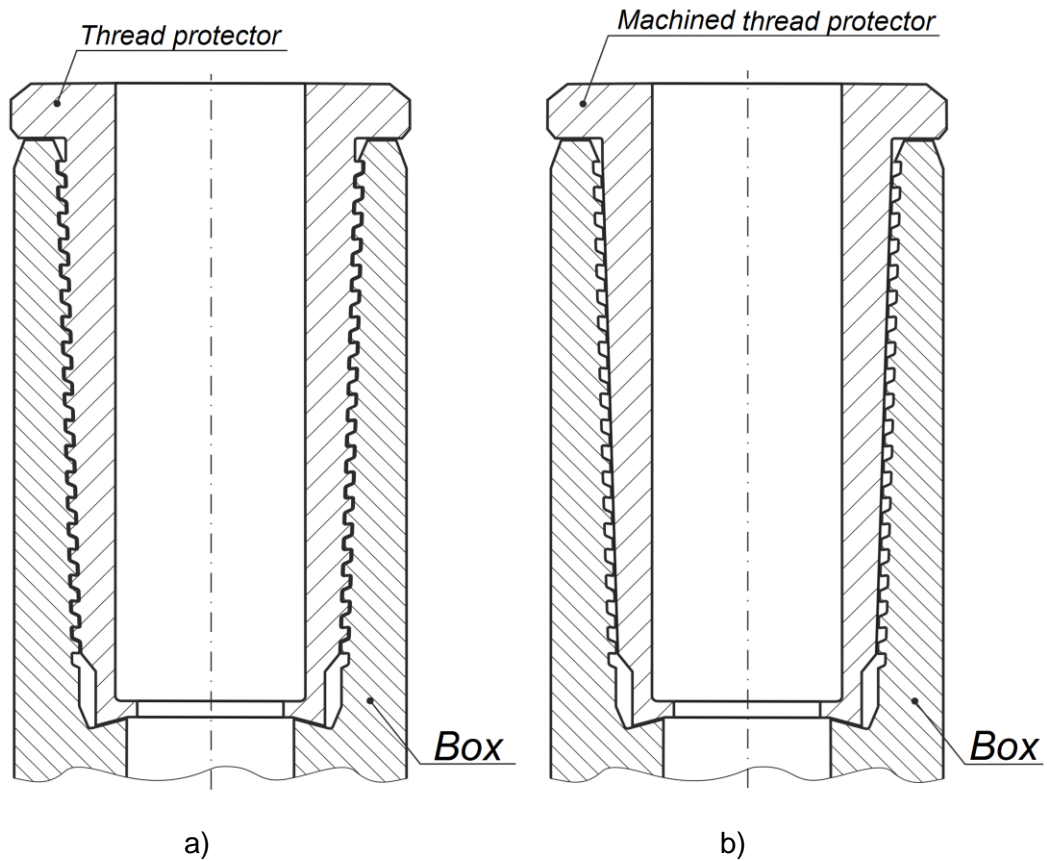


Figure 9

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 shoulders (box shoulder and pin shoulder) shall be within the range between 5% and 80% of the optimum make-up torque M_{opt} (Figure 10).

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

6.4.1.3 Typical cases of make-up diagram shape non-compliance are shown in Figures 11 – 15.

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 pin and box shoulder, sagging on coupling inside surface) are observed, thread compound shall be applied on thread connections of pins and couplings again 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 10) clearly shows defined areas, which correspond to torque increase due to thread surfaces mating (area I), thread and thread seals (area II), thread, thread seals and thread shoulders (area III).

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 guiding surface, mating of sealing elements. 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 1000 Nm per 0,015 of rotation.

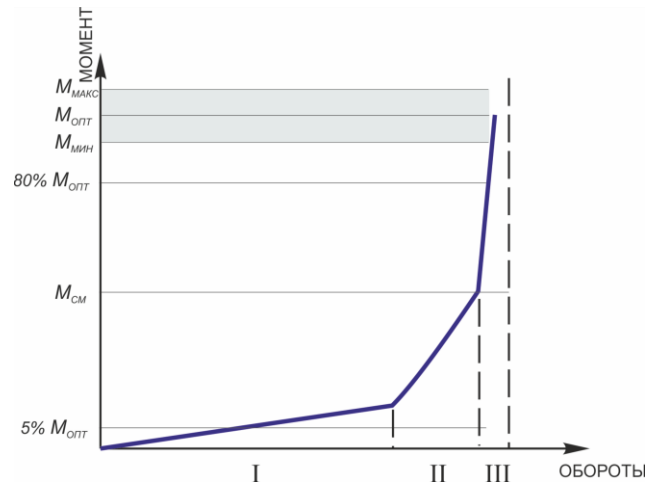


Figure 10

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 surfaces, seals 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 IV, Figure 11) and there is no slippage of the clamp jaws, the actions shall be taken according to Para 6.4.1.4.

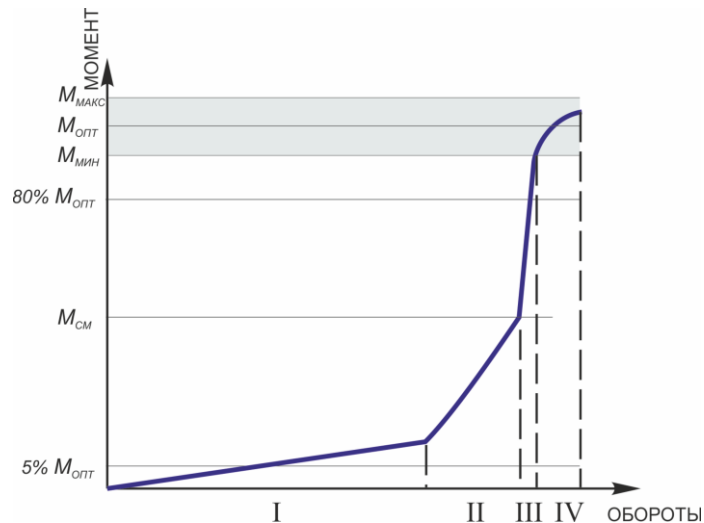


Figure 11

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 12) may result from:

- application of wrong type compound;
- compound contamination or its poor storage conditions;

- defects of load sensor.

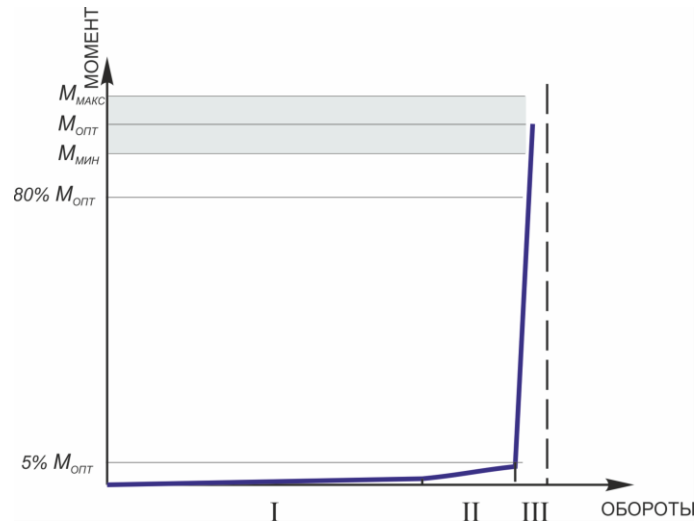


Figure 12

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 13) may result from:

- damage of thread and/or thread seals;
- 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.

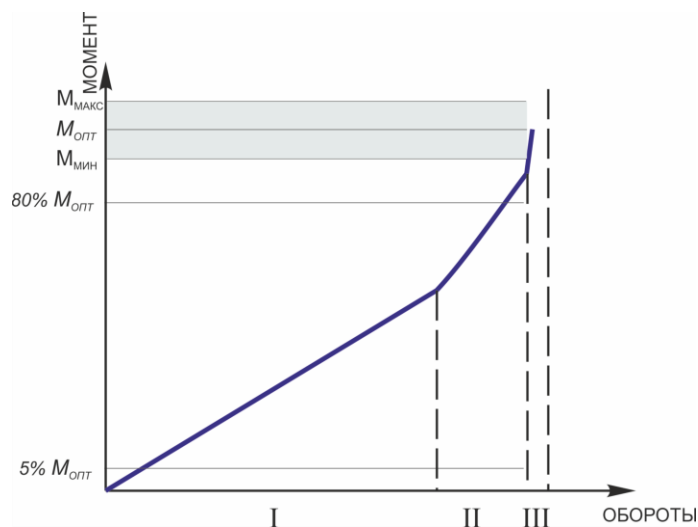


Figure 13

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

Torque leaps on the make-up diagram (Figure 14) 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

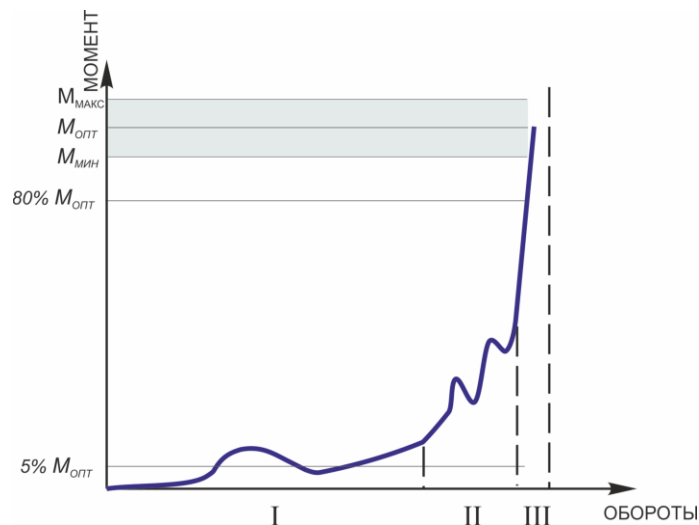


Figure 14

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 15), may result from:

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

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

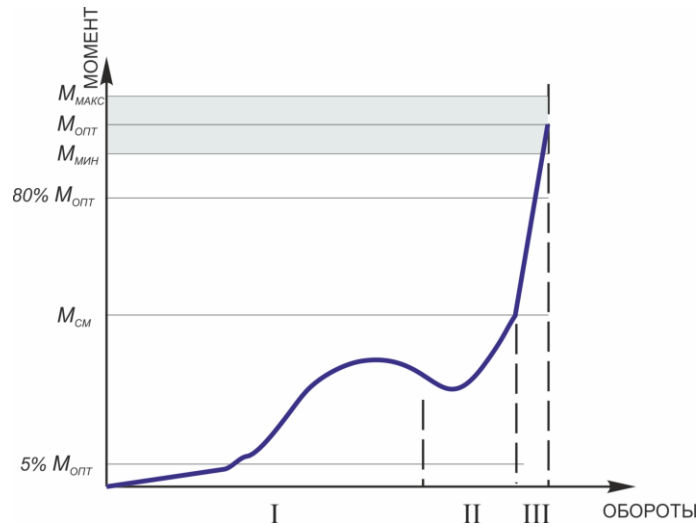


Figure 15

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

6.5 Break-out of string

6.5.1 Prior to break-out, the hydro tong 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 (Overdrive), 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 100÷150 kg (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 Thread connection break-out speed shall meet the values indicated in Table 9.

Table 9 – Speed of thread connection break-out

Start of break-out		End of break-out
First two turns	Further turns	
Speed maximum 2-5 rpm,	Speed maximum 10 rpm	Speed maximum 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 made from steels with the chrome content 3% and over (with grades containing Cr letters) and from chrome-nickel alloys (with grades containing Cr and Ni letters) shall be not more than 0.0079 inch.

6.5.8 When the string is disassembled, immediately after break-out or repair thread protectors shall be in-stalled immediately on pin and box thread connections.

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

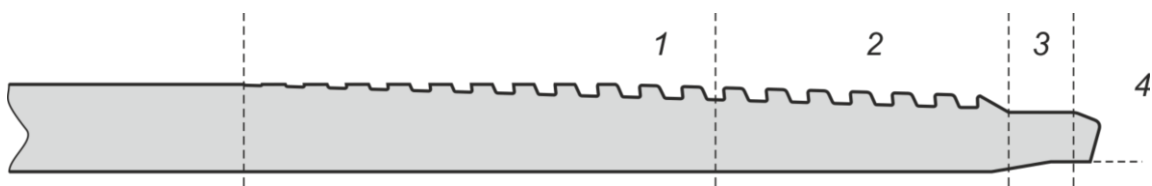
- visual inspection of pipes and couplings body for significant mechanical damages (ref. para. 6.5.7);
- cleaning of external and internal thread connections from compound and contaminations (ref. para. 5.4);
- visual inspection of thread, thread seals and thread shoulders surfaces of pins and coupling thread connections. In case of any damages detection, perform repair (see p. 6.5.10) 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, RUSMA OCTG, Cortec VpCl-369 or thread compound with storage properties on thread connections of pins and couplings and installation of thread protectors according to para. 5.8.

It is not allowed to store pipes and couplings thread connections without applied storage or thread compound and without thread protectors for more than 4 hours!

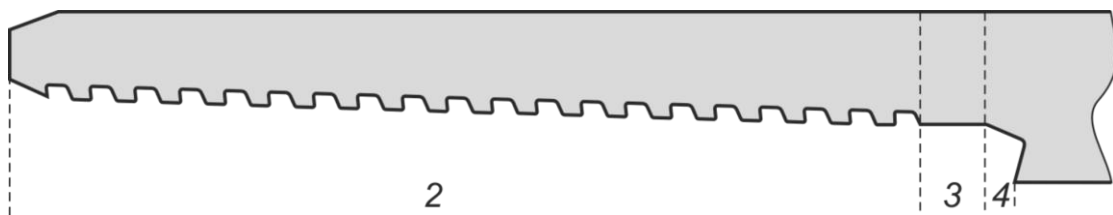
6.5.10 Possible types of damages of thread, thread seals and thread shoulders surfaces of pins and couplings after make-up/brake-out, as well as repair methods are specified in Table 10 and figure 18.

Table 10 - Types of possible damages of thread connections surface after make-up - break out and methods of their repair.

Surface area (Figure 16)	Type of Damages	Extent of damage As per time allowed for repair, but not more than	Method of repair
1, 2	Irregularities of profile (peaks and roots, figure 17)	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, 2, 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
4	Grooves	Light damages - which can be removed within not more than 10 minutes	Repair (removal) by buffing
		Moderate and severe Severe damages - which can not be removed within 10 minutes	not to be repaired
	Dents, nicks Dents, nicks and other defects of any depth	Damages of any extent	not to be repaired



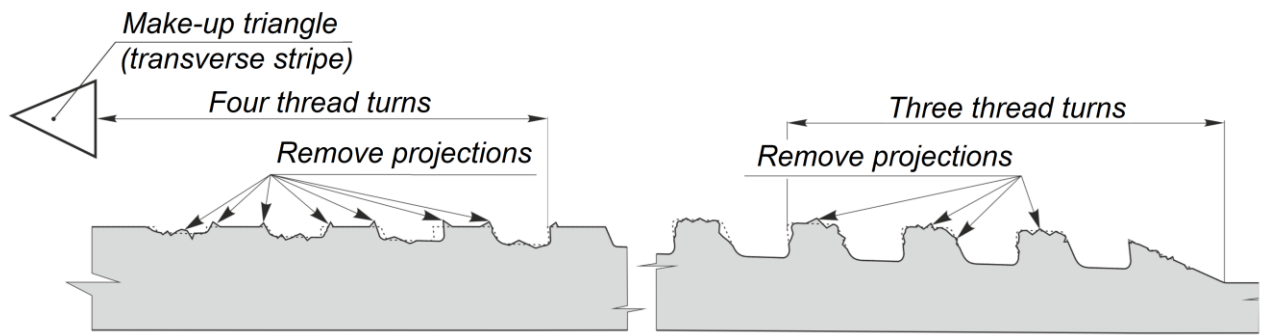
a) – Surface of external thread connection



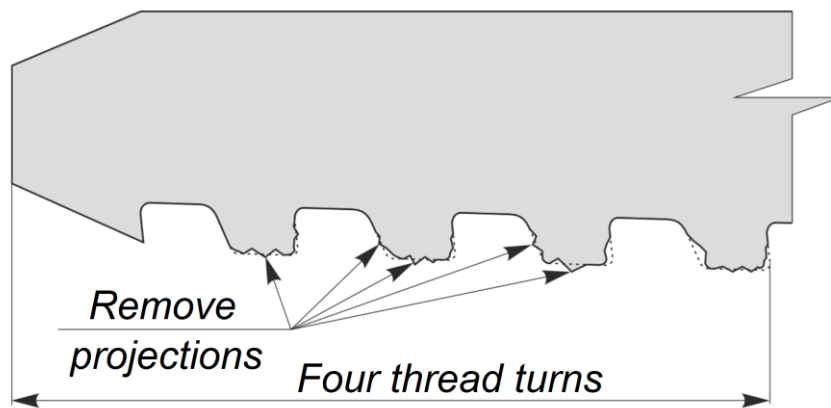
b) – Surface of internal thread connection

1 - imperfect profile of thread; 2 - perfect profile of thread;
 3 – cylinder groove or bore; 4 - seal and thread shoulders.

Figure 16



a) – Surface of external thread connection



b) – Surface of internal thread connection

Figure 17

7 Developer's warranty

TMK UP PF thread connection shall withstand at least 3 make-up and break-out cycles preserving the technical characteristics according to the requirements of GOST R ISO 13679/ISO13679/API RP 5C5 and if the present recommendations are met.

Annex A (mandatory)

Inspection of alignment of pipes

A.1 General part

A.1.1 The present Annex contains requirements for alignment of pipes, meeting of the requirements is a basic criterion for successful make-up.

Proper centering (lack of misalignment and decline) is given in Figure A.1. (not taking into account horizontal make-up).

Note: please, do not confuse centering of drilling rig and alignment of made-up pipes.

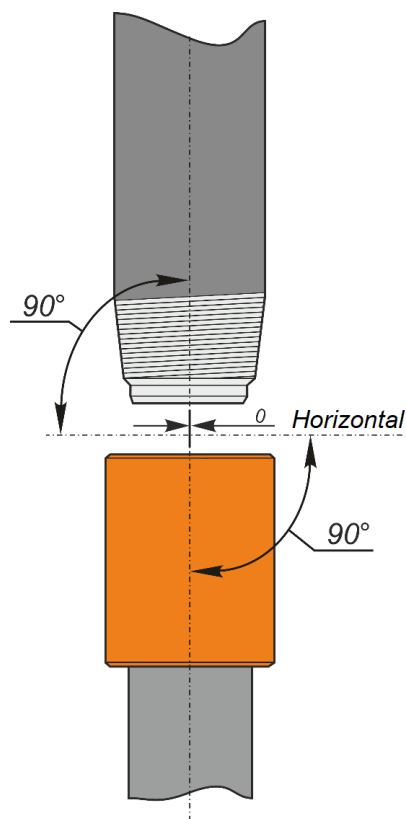


Figure A.1

A.1.2 Before make-up it is necessary to carry out the procedure of centering of drilling rig relative to the wellhead (centering relative to rotor is allowed) using the pipes subject to running.

A.2 Inspection of vertical deviation

A.2.1 Inspection of lower pipe vertical deviation

Lower pipe vertical deviation can be caused by deviation of the string during gaining in weight or inclination of drilling rig.

A.2.1.1 Before and during make-up it is necessary to carry out inspection of lower pipe vertical deviation according to figure A.2, through every $90^\circ (\pm 5^\circ)$ in two planes.

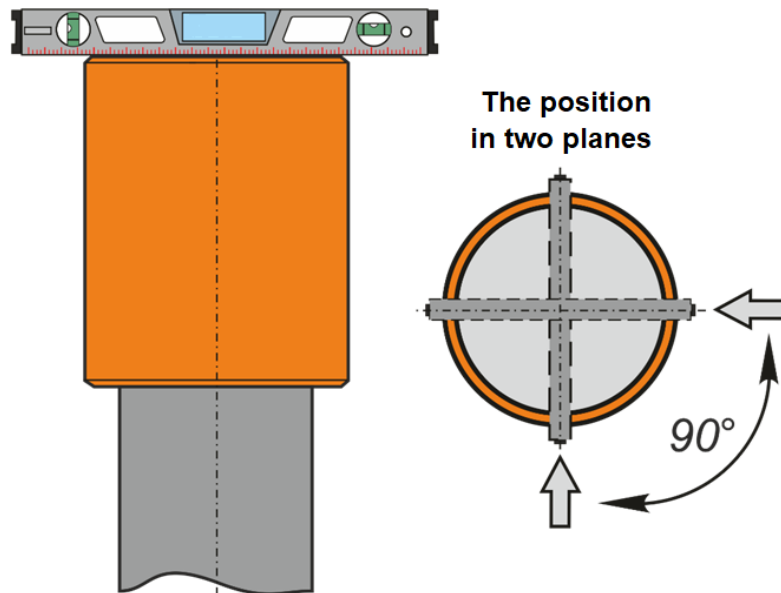


Figure A.2

A.2.1.2 During inspection in the first of the planes the lower pipe can be in vertical position (figure A.3 a).

A.2.1.3 During inspection in the second of the planes the lower pipe can be in the position with vertical deviation (figure A.3 b).

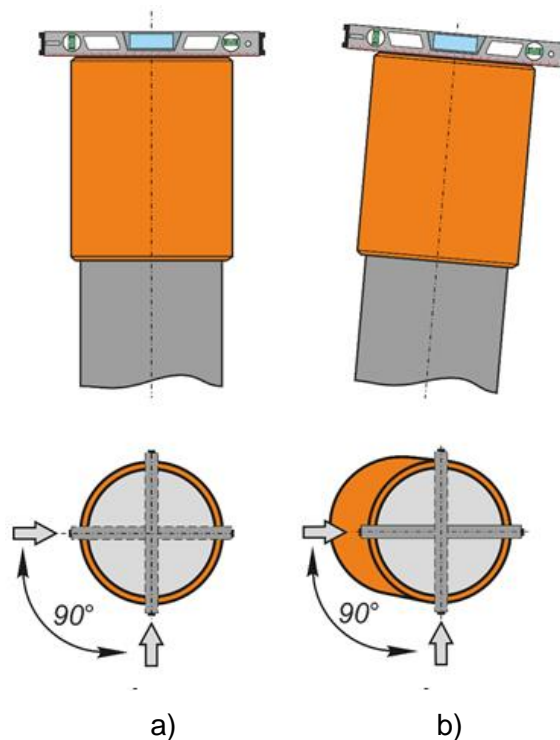


Figure A.3

A.2.1.4 If the lower pipe is in the position with vertical deviation, it is necessary to adjust the position of the lower pipe till the deviation is corrected.

Correction of the lower pipe is carried out by centering of drilling rig or by any other available method.

A.2.2 Inspection of position of the upper pipe relative to the lower pipe

Proper position of the upper pipe relative to the lower pipe is given in figure A.4.

A.2.2.1 Position of the upper pipe relative to the position of the lower pipe shall be inspected through every 90° ($\pm 5^\circ$) in two planes according to figure

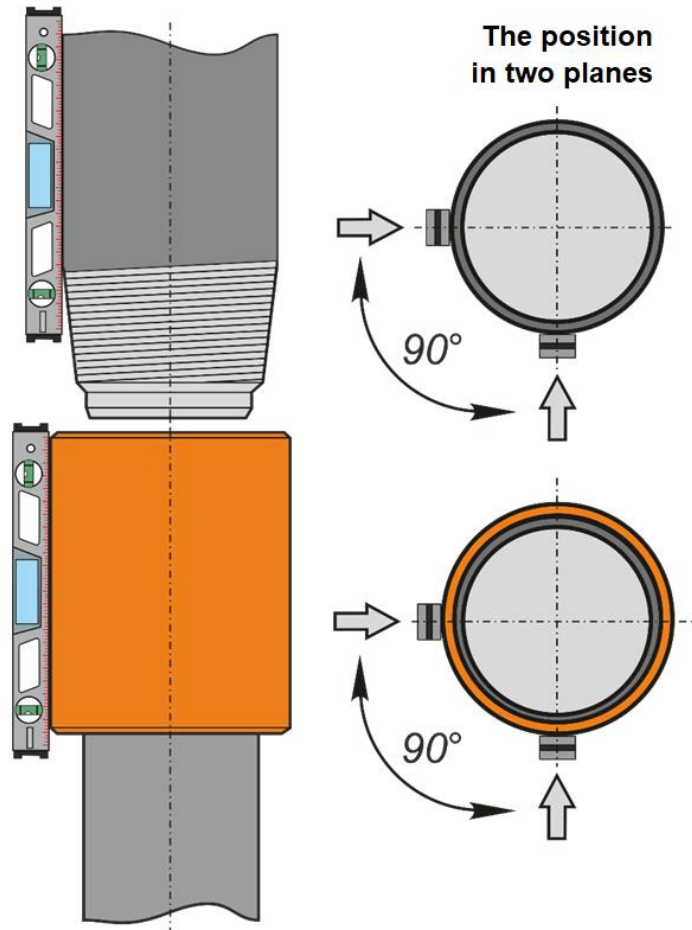


Figure A.4

A.2.2.2 During inspection in the first of the planes the upper pipe can be in vertical position.

A.2.2.3 During inspection in the second of the planes the upper pipe can be in the position with vertical deviation.

A.2.2.4 If the upper pipe is in the position with vertical deviation, it is necessary to adjust the position of the upper pipe till the deviation is corrected.

A.3 Inspection of misalignment

A.3.1 Inspection of misalignment of made-up pipes is carried out before make-up using measurement instruments:

- in horizontal plane (parallel displacement) using a ruler in the area with the largest deviation of the pipe from the coupling (Figure A.5); the value obtained shall not exceed 0.7874 inch;

If misalignment exceeds 1.9685 inch, centering of drilling rig shall be carried out relative to the wellhead (centering relative to rotor is allowed).

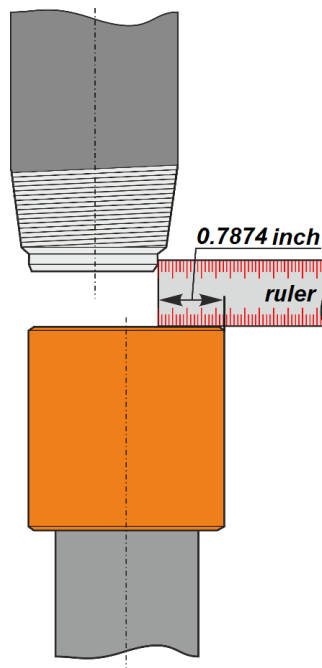


Figure A.5

- in vertical plane (angular displacement) from pin end face to coupling end face using a calliper in one plane (two measurements) (Figure A.6).

Maximum difference between the values of two measurements in one plane (L_1 and L_2) shall not exceed:

- the value of 0.0591 inch for pipes with the outside diameter from 4 to 4 1/2 inch including,
- the value of 0.0787 inch for pipes with the outside diameter from 5 to 13 5/8 inch including.

Misalignment of pipes is eliminated according to para 6.3.4.

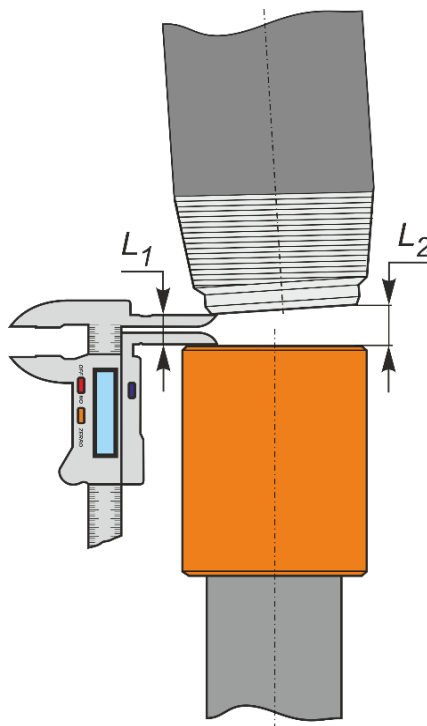


Figure A.6

A.3 Inspection of pipe decline

A3.5 If it is impossible to carry out inspection of alignment of pipes using measuring instruments before make-up, It is allowed to carry out visual inspection for lack of decline during make-up (Figure A.7).

If thread turn in the root or in the crest touches coupling end face from the left side in one point and from the right side thread turn in the root or in the crest touches coupling end face in the second point, the position of pipe is deemed to have proper alignment in one of the planes.

Alignment shall be inspected through every 90° in two planes according to figure A.7a).

If thread profile root or crest touches coupling end face from the left side, and another thread turn root or crest touches coupling end face from the right side, the pipe is declined to the right, figure A.7b).

If thread turn in the root or in the crest is parallel to coupling end face, the pipe is declined to the right, figure A.7c).

Decline of pipes is eliminated according to para 6.3.4.

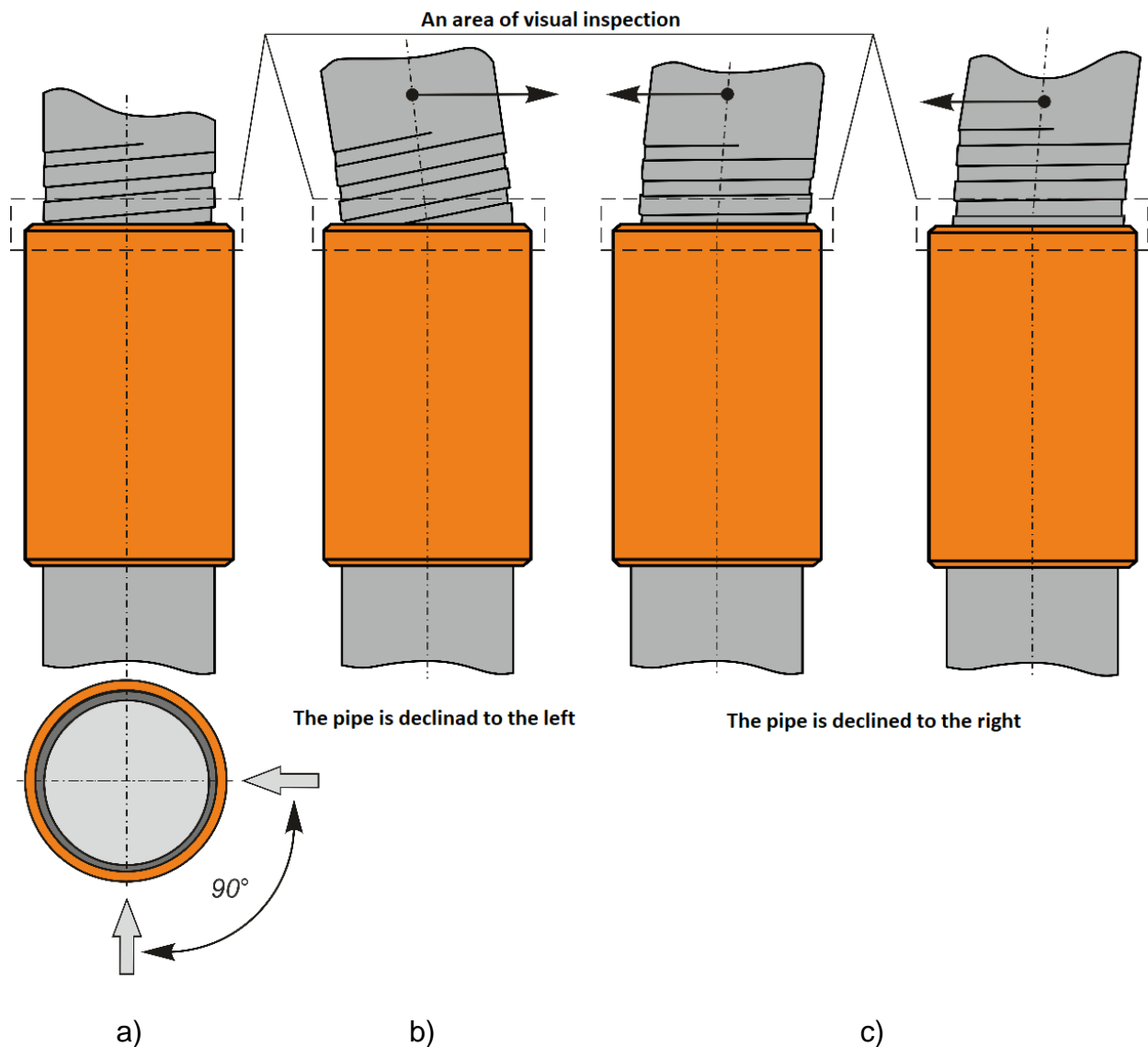


Figure A.7

Annex B

(mandatory)

Equipment for make-up registration

TMK UP PF 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;

- superimposing of the latest make-up curve over the curves of previous satisfactory make-up diagrams;

- display of make-up speed in rpm, either on the make-up curve or on a separate graph.

Acceptance or rejection of make-up operations shall not be based on displayed make-up results. 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 C

(mandatory)

Requirements to safety upon casings operation

C.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.

C.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.

C.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,

C.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.

C.5 Criteria of limit states

C.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.

C.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.

C.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.

C.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.