SLOVENSKI STANDARD
SIST EN ISO 10405:2007

01-maj-2007

Industrija za predelavo nafte in zemeljskega plina - Vzdrģevanje in uporaba zaģļ itnih in proizvodnih (dviģnih) cevi (ISO 10405:2000)

Petroleum and natural gas industries - Care and use of casing and tubing (ISO 10405:2000)

Erdöl- und Erdgasindustrie - Pflege und Gebrauch von Futterrohren und Steigrohren (ISO 10405:2000)

Industries du pétrole et du gaz naturel - Entretien et utilisation des tubes de cuvelage et de production (ISO 10405:2000)

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75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment

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EUROPEAN STANDARD

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English Version

Petroleum and natural gas industries - Care and use of casing and tubing (ISO 10405:2000)

Industries du pétrole et du gaz naturel - Entretien et utilisation des tubes de cuvelage et de production (ISO 10405:2000)

Erdöl- und Erdgasindustrie - Pflege und Gebrauch von Futterrohren und Steigrohren (ISO 10405:2000)

This European Standard was approved by CEN on 9 November 2006.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

The text of ISO 10405:2000 has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10405:2006 by Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by May 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 10405:2000 has been approved by CEN as EN ISO 10405:2006 without any modifications.

INTERNATIONAL STANDARD

ISO 10405

Second edition
2000-03-01

Petroleum and natural gas industries — Care and use of casing and tubing

Industries du pétrole et du gaz naturel — Entretien et utilisation des tubes de cuvelage et de production

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10405 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, Subcommittee SC 5, *Casing, tubing and drill pipe*.

This second edition cancels and replaces the first edition (ISO 10405:1993), which has been technically revised.

Annex A of this International Standard is for information only.

Petroleum and natural gas industries — Care and use of casing and tubing

1 Scope

This International Standard establishes practices for care and use of casing and tubing. It specifies practices for running and pulling casing and tubing, including drifting, stabbing, making up and lowering, field makeup, drifting and landing procedures. Also included are causes of trouble, as well as transportation, handling and storage, inspection and field welding of attachments.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 10400:1993, *Petroleum and natural gas industries — Formulae and calculation for casing, tubing, drill pipe and line pipe properties* [API Bul 5C3, *Bulletin on Formulas and Calculations for Casing, Tubing, Drill Pipe, and Line Pipe Properties*].

ISO 10422:1993, *Petroleum and natural gas industries — Threading, gauging, and thread inspection of casing, tubing and line pipe threads — Specification* [API Spec 5B, *Specification for Threading, Gauging, and Thread Inspection of Casing, Tubing, and Line Pipe Threads*].

ISO 11960:—[1)], *Petroleum and natural gas industries — Steel pipes for use as casing or tubing for wells* [API Spec 5CT, *Specification for Casing and Tubing*].

API[2)] Bul 5A3, *Bulletin on Thread Compounds for Casing, Tubing, and Line Pipe*.

API Bul 5C2, *Bulletin on Performance Properties of Casing, Tubing, and Drill Pipe*.

AWS[3)] Spec A5.1, *Covered Carbon Steel Arc Welding Electrodes*.

1) To be published. (Revision of ISO 11960:1996)

2) American Petroleum Institute, 1220 L Street NW, Washington DC, USA.

3) American Welding Society, 550 N.W. LeJeune Rd, PO Box 351040, Miami, FL 33135, USA.

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply:

3.1
shall
is used to indicate that a provision is mandatory

3.2
should
is used to indicate that a provision is not mandatory, but recommended as good practice

3.3
may
is used to indicate that a provision is optional

4 Running and pulling casing

4.1 Preparation and inspection before running

4.1.1 New casing is delivered free of injurious defects as defined in ISO 11960 or API Specification 5CT and within the practical limits of the inspection procedures prescribed therein. Some users have found that, for a limited number of critical well applications, these procedures do not result in casing sufficiently free of defects to meet their needs for such critical applications. Various nondestructive inspection services have been employed by users to ensure that the desired quality of casing is being run. In view of this practice, it is suggested that the individual user:

a) Familiarize himself with inspection practices specified in the standards and employed by the respective mills, and with the definition of “injurious defect” contained in the standards.

b) Thoroughly evaluate any nondestructive inspection to be used by him on tubular goods to assure himself that the inspection does in fact correctly locate and differentiate injurious defects from other variables that can be and frequently are sources of misleading “defect” signals with such inspection methods.

4.1.2 All casing, whether new, used or reconditioned, should always be handled with thread protectors in place. Casing should be handled at all times on racks or on wooden or metal surfaces free of rocks, sand or dirt other than normal drilling mud. When lengths of casing are inadvertently dragged in the dirt, the threads should be recleaned and serviced again as outlined in 4.1.7.

4.1.3 Slip elevators are recommended for long strings. Both spider and elevator slips should be clean and sharp and should fit properly. Slips should be extra long for heavy casing strings. The spider shall be level.

NOTE Slip and tong marks are injurious. Every possible effort should be made to keep such damage at a minimum by using proper up-to-date equipment.

4.1.4 If collar-pull elevators are used, the bearing surface should be carefully inspected for (a) uneven wear that may produce a side lift on the coupling with danger of it jumping off, and (b) uniform distribution of the load when applied over the bearing face of the coupling.

4.1.5 Spider and elevator slips should be examined and watched to see that all lower together. If they lower unevenly, there is danger of denting the pipe or badly slip-cutting it.

4.1.6 Care shall be exercised, particularly when running long casing strings, to ensure that the slip bushing or bowl is in good condition. Tongs may be sized to produce 1,5 % of the calculated pullout strength (see ISO 10400 or API Bulletin 5C3, with the units changed to N·m if necessary) (150 % of the guideline torque given in Table 1). Tongs should be examined for wear on hinge pins and hinge surfaces. The backup line attachment to the backup post should be corrected, if necessary, to be level with the tong in the backup position so as to avoid uneven load distribution on the gripping surfaces of the casing. The length of the backup line should be such as to cause minimum bending stresses on the casing and to allow full stroke movement of the makeup tong.

4.1.7 The following precautions should be taken in the preparation of casing threads for makeup in the casing strings:

a) Immediately before running, remove thread protectors from both field and coupling ends and clean the threads thoroughly, repeating as additional rows become uncovered.

b) Carefully inspect the threads. Those found damaged, even slightly, should be laid aside unless satisfactory means are available for correcting thread damage.

c) The length of each piece of casing shall be measured prior to running. A steel tape calibrated in millimetres (feet) to the nearest 3,0 mm (0,01 ft) should be used. The measurement should be made from the outermost face of the coupling or box to the position on the externally threaded end where the coupling or the box stops when the joint is made up power-tight. On round-thread joints, this position is to the plane of the vanish point on the pipe; on buttress-thread casing, this position is to the base of the triangle stamp on the pipe; and on extreme-line casing, this position is to the shoulder on the externally threaded end. The total of the individual lengths so measured will represent the unloaded length of the casing string. The actual length under tension in the hole can be obtained by consulting graphs that are prepared for this purpose and are available in most pipe handbooks.

d) Check each coupling for makeup. If the standoff is abnormally great, check the coupling for tightness. Tighten any loose couplings after thoroughly cleaning the threads and applying fresh compound over entire thread surfaces, and before pulling the pipe into the derrick.

e) Before stabbing, liberally apply thread compound to the entire internally and externally threaded areas. It is recommended that a thread compound that meets the performance objectives of API Bulletin 5A3 be used; however, in special cases where severe conditions are encountered, it is recommended that high-pressure silicone thread compounds as specified in API Bulletin 5A3 be used.

f) Place a clean thread protector on the field end of the pipe so that the thread will not be damaged while rolling pipe on the rack and pulling into the derrick. Several thread protectors may be cleaned and used repeatedly for this operation.

g) If a mixed string is to be run, check to determine that appropriate casing will be accessible on the pipe rack when required according to the programme.

h) Connectors used as tensile and lifting members should have their thread capacity carefully checked to ensure that the connector can safely support the load.

i) Care should be taken when making up pup joints and connectors to ensure that the mating threads are of the same size and type.

4.2 Drifting of casing

4.2.1 It is recommended that each length of casing be drifted for its entire length just before running, with mandrels conforming to ISO 11960 or API Specification 5CT. Casing that will not pass the drift test should be laid aside.

4.2.2 Lower or roll each piece of casing carefully to the walk without dropping. Use rope snubber if necessary. Avoid hitting casing against any part of derrick or other equipment. Provide a hold-back rope at the window. For mixed or unmarked strings, a drift or “jack” rabbit should be run through each length of casing when it is picked up from the catwalk and pulled onto the derrick floor to avoid running a heavier length or one with a lesser inside diameter than called for in the casing string.

4.3 Stabbing, making up and lowering

4.3.1 Do not remove thread protector from field end of casing until ready to stab.

4.3.2 If necessary, apply thread compound over the entire surface of threads just before stabbing. The brush or utensil used in applying thread compound should be kept free of foreign matter, and the compound should never be thinned.

4.3.3 In stabbing, lower casing carefully to avoid injuring threads. Stab vertically, preferably with the assistance of a man on the stabbing board. If the casing stand tilts to one side after stabbing, lift up, clean and correct any damaged thread with a three-cornered file, then carefully remove any filings and reapply compound over the thread surface. After stabbing, the casing should be rotated very slowly at first to ensure that threads are engaging properly and not cross-threading. If spinning line is used, it should pull close to the coupling.

NOTE Recommendations in 4.3.4 and 4.4.1 for casing makeup apply to the use of power tongs. For recommendations on makeup of casing with spinning lines and conventional tongs, see 4.4.2.

4.3.4 The use of power tongs for making up casing made desirable the establishment of recommended torque values for each size, mass and grade of casing. Early studies and tests indicated that torque values are affected by a large number of variables, such as variations in taper, lead, thread height and thread form, surface finish, type of thread compound, length of thread, mass and grade of pipe, etc. In view of the number of variables and the extent that these variables, alone or in combination, could affect the relationship of torque values versus made-up position, it was evident that both applied torque and made-up position have to be considered. Since the joint pullout strength formula in API Bulletin 5C2 contains several of the variables believed to affect torque, using a modified formula to establish torque values was investigated. Torque values obtained by taking 1 % of the calculated pullout value were found to be generally comparable to values obtained by field makeup tests using API modified thread compound in accordance with API Bulletin 5A3. Compounds other than API modified thread compound may have other torque values. This procedure was therefore used to establish the makeup torque values listed in Table 1. All values are rounded to the nearest 10 N·m (10 ft·lbf). These values shall be considered as a guide only, due to the very wide variations in torque requirements that can exist for a specific connection. Because of this, it is essential that torque be related to made-up position as outlined in 4.4.1. The torque values listed in Table 1 apply to casing with zinc-plated or phosphate-coated couplings. When making up connections with tin-plated couplings, 80 % of the listed value can be used as a guide. The listed torque values are not applicable for making up couplings with PTFE (polytetrafluoroethylene) rings. When making up round thread connections with PTFE rings, 70 % of the listed values are recommended. Buttress connections with PTFE seal rings may make up at torque values different from those normally observed on standard buttress threads.

NOTE Thread galling of gall-prone materials (martensitic chromium steels, 9 Cr and 13 Cr, duplex stainless steels and Ni base alloys) occurs during movement — stabbing or pulling and makeup or breakout. Galling resistance of threads is primarily controlled in two areas — in surface preparation and finishing during manufacture and in careful handling practices during running and pulling.

Threads and lubricant shall be clean. Assembly in the horizontal position should be avoided. Connections should be turned by hand to the hand-tight position before slowly power-tightening. The procedure should be reversed for disassembly.

4.4 Field makeup

4.4.1 The following practice is recommended for field makeup of casing:

a) For round thread, 114,3 mm (4 1/2-in) to 339,7 mm (13 3/8-in) outside diameter (OD):

1) It is advisable when starting to run casing from each particular mill shipment to make up sufficient joints to determine the torque necessary to provide proper makeup. See 4.4.2 for the proper number of turns beyond hand-tight position. These values may indicate that a departure from the values listed in Table 1 is advisable. If other values are chosen, the minimum torque should be not less than 75 % of the value selected. The maximum torque should be not more than 125 % of the selected torque.

2) The power tong should be provided with a reliable torque gauge of known accuracy. In the initial stages of makeup, any irregularities of makeup or in speed of makeup should be observed, since these may be indicative of crossed threads, dirty or damaged threads, or other unfavourable conditions. To prevent galling when making up connections in the field, the connections should be made up at a speed not to exceed 25 r/min.

3) Continue the makeup, observing both the torque gauge and the approximately position of the coupling face with respect to the thread vanish point position.

4) The torque values shown in Tables 1 and 2 have been selected to give recommended makeup under normal conditions and should be considered as satisfactory providing the face of the coupling is flush with the thread vanish point or within two thread turns, plus or minus, of the thread vanish point.

5) If the makeup is such that the thread vanish point is buried two thread turns and 75 % of the torque shown in Table 1 is not reached, the joint should be treated as a questionable joint as provided in 4.4.3.

6) If several threads remain exposed when the listed torque is reached, apply additional torque up to 125 % of the value shown in Table 1. If the standoff (distance from the face of the coupling to the thread vanish point) is greater than three thread turns when this additional torque is reached, the joint should be treated as a questionable joint as provided in 4.4.3.

b) For buttress thread casing connections in sizes 114,3 mm (4 1/2-in) to 508,0 mm (20-in) OD, makeup torque values should be determined by carefully noting the torque required to make up each of several connections to the base of the triangle. Then using the torque value thus established, make up the balance of the pipe of that particular weight and grade in the string.

c) For round thread, 406,4 mm (16-in), 473 mm (18 5/8-in) and 508 mm (20-in) OD:

1) Makeup of 406,4 mm (16-in), 473 mm (18 5/8-in) and 508 mm (20-in) OD shall be to a position on each connection represented by the thread vanish point or the base of the triangle using the minimum torque shown in Table 1 as a guide.

On 8-round-thread casing, a 9,5 mm (3/8-in) equilateral triangle is die-stamped at a distance of L_4 + 1,6 mm (1/16 in) from each end (for L_4, see Figure 21 in ISO 10422:1993 or API Spec 5B). The base of the triangle will aid in locating the thread vanish point for basic power-tight makeup; however, the position of the coupling with respect to the base of the triangle shall not be a basis for acceptance or rejection of the product. Care shall be taken to avoid cross-threading in starting these larger connections. The tongs selected should be capable of attaining high torques [67 800 N·m (50 000 ft·lbf)] for the entire run. Anticipate that maximum torque values could be five times the minimum experienced in makeup to the recommended position.

2) Joints that are questionable as to their proper makeup in item a) 5) or a) 6) should be unscrewed and laid down to determine the cause of improper makeup. Both the pipe thread and mating coupling thread should be inspected. Damaged threads or threads that do not comply with the specification should be repaired. If damaged or out-of-tolerance threads are not found to be the cause of improper makeup, then the makeup torque should be adjusted to obtain proper makeup [see item a) 1)]. It should be noted that a thread compound with a coefficient of friction substantially different from common values may be the cause of improper makeup.

4.4.2 When conventional tongs are used for casing makeup, tighten with the tongs to the proper degree of tightness. The joint should be made up beyond the hand-tight position at least three turns for sizes 114,3 mm (4 1/2 in) to 117,8 mm (7 in), and at least three-and-one-half turns for sizes 193,7 mm (7 5/8 in) and larger, except 244,5 mm (9 5/8 in) and 273,1 mm (10 3/4-in) grade P-110, and 508 mm (20-in) grade J-55 and K-55, which should be made up four turns beyond the hand-tight position. When using a spinning line, it is necessary to compare hand tightness with spin-up tightness. In order to do this, make up the first few joints to the hand-tight position, then back off and spin up joints to the spin-up tight position. Compare the relative positions of these two makeups and use this information to determine when the joint is made up the recommended number of turns beyond hand tight.

4.4.3 Joints that are questionable as to their proper tightness should be unscrewed and the casing laid down for inspection and repair. When this is done, the mating coupling should be carefully inspected for damaged threads. Parted joints should never be re-used without shopping or regauging, even though the joints may have little appearance of damage.

4.4.4 If casing has a tendency to wobble unduly at its upper end when making up, indicating that the thread may not be in line with the axis of the casing, the speed of rotation should be decreased to prevent galling of threads. If