INTERNATIONAL STANDARD ISO 2645

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Materials and equipment for petroleum and natural gas industries — Casing and tubing for oil or natural gas wells

Matériel d'équipement pour les industries du pétrole et du gaz naturel — Tubes de cuvelage et tubes de production pour puits de pétrole ou de gaz naturel

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2645 was drawn up by Technical Committee ISO/TC 67, *Materials and equipment for petroleum and natural gas industries*, and circulated to the Member Bodies in December 1972.

It has been approved by the Member Bodies of the following countries :

Australia	Germany	Portugal
Austria	Hungary	Romania
Bulgaria	India	Thailand
Canada	Israel	Turkey
Czechoslovakia	Italy	United Kingdom
Egypt, Arab Rep. of	Mexico	U.S.S.R.
France	Netherlands	

The Member Body of the following country expressed disapproval of the document on technical grounds :

U.S.A.

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Annexes

Materials and equipment for petroleum and natural gas industries — Casing and tubing for oil or natural gas wells

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard specifies the characteristics of casing and tubing used in the operation of oil or natural gas wells.

1.2 It also specifies the characteristics of threaded casing and tubing couplings, and thread protectors.

1.3 It specifies the sizes, diameters, wall thicknesses and grades of steel.

1.4 Casing and tubing are divided into three classes :

— Class I : Steel pipes with standard mechanical properties;

— Class II : Steel pipes with high strength mechanical properties;

— Class III : Steel pipes with reduced proof stress range.

1.5 The requirements concerning pipe and coupling threads and inspection methods and instruments are given in ISO . . .

1.6 This International Standard applies to both seamless and welded pipes.

2 REFERENCES

ISO/R 202, *Flattening test on steel tubes.*

ISO 375, *Steel — Tensile testing of tube.*

ISO/R 404, *General technical delivery requirements for steel.*

ISO . . ., *Materials and equipment for petroleum and natural gas industries — Casing, tubing and line pipe threads — Threading, gauging and thread inspection.*[1)]

3 DEFINITIONS

3.1 casing : A pipe run from the surface and intended to line the walls of a drilled well.

3.2 tubing : A pipe placed within a productive well to serve as an exhaust or delivery duct.

4 MANUFACTURING PROCESSES

4.1 Seamless process

Applicable to Classes I, II, III. A seamless pipe is a steel tubular product manufactured by hot working from a solid steel blank and, if necessary, by cold finishing to produce the desired shapes, dimensions and properties.

4.2 Welded process by resistance or flash

Applicable by resistance or flash to Class I pipes, and by flash to casing in C 66 steel.

4.3 Electrically welded process

Applicable to Class 1 pipes and to casing in C 66 steel.

An electrically welded pipe is a pipe having one longitudinal seam formed by electric-flash welding or electric-resistance welding, without the addition of extraneous metal.

5 DATA TO BE GIVEN BY THE PURCHASER

5.1 In placing orders the purchaser shall specify the following :

a) the reference number of this International Standard;

b) quantity (length or number of lengths);

c) type of pipe :

casing

— threaded or plain-end,

1) In preparation.

– thread type,

– with or without couplings;

tubing

– upset or non-upset,

– threaded or plain-end,

– thread type,

– with or without couplings;

d) size (outside diameter) in millimetres (see tables 20, 22, 24, 26 and 28);

e) mass per unit length in kilograms per metre, or wall thickness in millimetres (see tables 20, 22, 24, 26 and 28);

f) class (I, II, III) and grade (see tables 1 and 2);

g) length range (see 9.4);

h) manufacturing process (seamless or welded);

i) delivery date, shipping instructions and marking;

j) mill inspection (if required).

5.2 The purchaser shall also state on the order his requirements concerning the following optional stipulations :

– normalizing of J 38 casing, and tubing, and of K 38 and N 56 casing;

– chemical, ladle and supplementary analyses;

– flattening test on grade H 28, seamless pipes;

– casing jointers;

– casing or tubing with couplings detached;

– coupling make-up (other than power-tight);

– pipe coating;

– non-destructive testing for class I and III pipes.

5.3 Attention is also called to the following stipulations which are subject to agreement at the time of ordering :

– test pressures for handling-tight make-up or higher alternatives;

– hydrostatic test at a value higher than the standard value;

– special threads or special finishes (see 8.2.1.2);

– thread compound;

– thread protectors;

– marking.

6 DESIGNATION

A pipe manufactured according to this International Standard shall be designated by :

a) its type;

b) the type of its ends and the threads of the latter;

c) its size (outside diameter) in millimetres;

d) its mass per unit length in kilograms per metre, or its wall thickness in millimetres;

e) its grade;

f) its length range;

g) its manufacturing process;

h) a reference to this International Standard.

Example :

Casing, Buttress, 114,3 X 5,7, K 38, range 2, seamless according to ISO 2645.

7 STEELS

7.1 Steelmaking

The only processes permitted by this International Standard are the following :

open-hearth, electric furnace or basic oxygen steelmaking processes.

7.2 Chemical composition

The limits of the permissible chemical composition are given in table 1 for each grade concerned.

7.3 Mechanical properties

The limits of the test piece mechanical properties (see 11.3.1) are given in table 2 for each steel concerned.

7.4 Heat treatment

The compulsory or optional heat treatments are given in table 3 for each grade concerned.

After final heat treatment C 52 steel pipes shall not be cold worked except for normal straightening operations. After final heat treatment C 66 steel casing shall not be submitted to tensile straining or cold expansion, nor shall they be cold reduced by more than 3 %.

Forged class II and III pipes and pipes of grade N 56 shall be heat treated over their full length after forging.

TABLE 1 — **Chemical characteristics**

Class	Grade of steel		C %	Si %	Mn %	P %	S %	Cr + Ni + Cu %	Cr %	Mo %
I	H 28 H 31 J 38 K 38 N 56					⩽ 0,040	⩽ 0,060			
II	P 72 P 76					⩽ 0,040	⩽ 0,060			
III	C 52	Type 1	⩽ 0,50	⩽ 0,35	⩽ 1,90	⩽ 0,040	⩽ 0,060	⩽ 0,50		0,15 to 0,30
	—	Type 2	⩽ 0,40	⩽0,35	⩽ 1,50	⩽ 0,040	⩽ 0,060			
	—	Type 3	0,38 to 0,48		0,75 to 1,00	⩽ 0,040	⩽ 0,040		0,80 to 1,10	0,15 to 0,25
	C 66[1]		⩽ 0,45	⩽ 0,35	⩽ 1,90	⩽ 0,040	⩽ 0,060			

1) In the case of quenching and tempering : C ⩽ 0,40 with Mn ⩽ 1,70
or C ⩽ 0,45 with Mn ⩽ 1,60

TABLE 2 — **Mechanical characteristics**

Class	Grade of steel	Proof stress, R_p	Minimum tensile strength R_m	Minimum elongation on $5{,}65\sqrt{S_o}$*
		N/mm²	N/mm²	%
I	H 28	$R_{p\,0,5} \geqslant 276$	414	22,5
I	H 31	$R_{p\,0,5} \geqslant 310$	483	19,3
I	J 38	$379 \leqslant R_{p\,0,5} \leqslant 552$	517	18
I	K 38	$379 \leqslant R_{p\,0,5} \leqslant 552$	655	14,3
III	C 52	$517 \leqslant R_{p\,0,5} \leqslant 621$	655	14,3
I	N 56	$552 \leqslant R_{p\,0,5} \leqslant 758$	689,5	13
III	C 66	$655 \leqslant R_{p\,0,5} \leqslant 758$	724	12,8
II	P 72	$723 \leqslant R_{p\,0,6} \leqslant 931$	827	11,3
II	P 76	$758 \leqslant R_{p\,0,6} \leqslant 965$	862	10,8

* If other gauge lengths are used, the corresponding elongation values shall be obtained according to ISO 2566. In cases of dispute, the gauge length of $5{,}65\sqrt{S_o}$ shall be used.

TABLE 3 – **Heat treatments**

Unless specified in the order, heat treatments shall be left to the discretion of the manufacturer.

Class	Casing	Heat treatment
I	K 38 J 38	Normalizing, if specified in the order
	N 56	Normalizing, or quenching and tempering
II	P 76	Quenching and tempering, or normalizing and tempering
III	C 52 types 1,3	Normalizing and tempering
	C 52 type 2	Quenching and tempering
III	C 66	Quenching and tempering (538 °C min.)
Class	**Tubing**	**Heat treatment**
I	J 38	Normalizing, if specified in the order
I	N 56	Normalizing, or quenching and tempering
II	P 72	Quenching and tempering, or normalizing and tempering
III	C 52 types 1,3	Normalizing and tempering
	C 52 type 2	Quenching and tempering
III	C 66	Normalizing and tempering, or quenching and tempering (538 °C min.)

8 PIPE CONDITION

8.1 Diameters, wall thicknesses and masses

The pipes supplied shall have the diameters, wall thicknesses and masses shown in tables 20, 22, 24, 25, 26 and 28.

8.2 Pipe ends

8.2.1 *Casing*

Ends may be finished to accommodate the various types of threads.

8.2.1.1 Casing shall in principle be furnished with both ends machined with a round thread (8 threads per inch) (see ISO . . .), one of the ends being fitted with a coupling.

NOTE – For grades H 28, H 31, J 38, K 38 where two thread types (long and short) are given in table 20, pipes with short thread will be delivered. In case the thread type is not stipulated on the purchase order, the manufacturer should be responsible for obtaining clarification from the purchaser. See clause 5.

Delivery may be made without couplings or with a (normal or special) coupling with special make-up as defined in 8.4.

8.2.1.2 If stated in the order, end finishes may be as follows :

– Buttress threads[1] with or without couplings;

– Extreme-Line threads[1] in the so-called "integral" form without couplings (table 25);

– special end finish, according to previous written agreement between supplier and purchaser.

8.2.1.3 In certain cases pipes may be furnished with square-cut plain ends.

8.2.2 *Tubing*

Ends may be finished to accommodate the various types of threads.

8.2.2.1 Pipes may have upset ends. In principle these shall be furnished with a round thread (8 threads per inch) (see ISO . . .).

One end shall normally be fitted with a (normal or special) coupling made up as defined in 8.4.

Delivery may also be made without couplings or with a special handling-tight make-up.

8.2.2.2 In certain cases pipes may be furnished either with non-upset, square-cut plain ends or with upset, non-finished ends but with all burrs removed.

If so stated in the order, ends may have a special finish.

8.3 Threading of pipes and couplings

Threads and thread inspection methods shall conform to ISO . . ., except for special cases.

Ends shall not be rounded out by hammering to secure compliance with threading requirements.

1) See ISO . . .

The inside and outside edges of all pipe types shall be free of burrs.

8.4 Coupling make-up and thread protection

8.4.1 Regular clearance couplings shall be screwed onto the pipe power-tight. However, if so specified on the order they may be screwed on handling-tight or shipped separately.

8.4.2 Special clearance tubing couplings shall be screwed on handling-tight. If so required on the order they may, however, be shipped separately.

8.4.3 A high-grade thread compound shall be applied to cover the full surface of the engaged thread of either the pipe or the coupling.

Compound type and grade shall conform to the relevant requirements in national standards and may be specified on the order.[1)]

8.4.4 The pipe ends without couplings and the non-engaged end of couplings shall be provided with thread protectors conforming to clause 15.

All exposed thread parts shall be coated with a high-grade thread compound.

NOTE – Handling-tight is defined as sufficiently tight that the coupling cannot be removed except by the use of a wrench. The purpose of making-up couplings handling-tight is to facilitate removal of the couplings for cleaning and inspecting threads and applying fresh thread compound before using the pipe.

This procedure has been found to result in less chance of thread leakage, because mill-applied couplings made-up power-tight, although leak proof at the time of make-up, may not always remain so after transportation, handling and use.

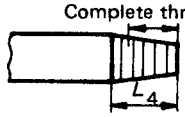
9 PERMISSIBLE DIMENSIONAL DEVIATIONS

9.1 Outside diameter

9.1.1 *Pipe body*

The tolerances on the outside diameter of the pipe are given in table 4.

TABLE 4 – **Tolerances on diameter**

Pipe body		Pipe ends
Outside diameter	Tolerances	Complete threads  **Permissible deviations** These shall be such that length L_4 and the number of complete threads within this length conform to the tolerances given in ISO ...
$D < 114,3$ mm	± 0,79 mm	
$D \geqslant 114,3$ mm	± 0,75 %	

9.1.2 *Upset ends*

Close to the upset end at the part of the pipe affected by heating and upsetting, the outside diameter may be within the tolerances given in table 5.

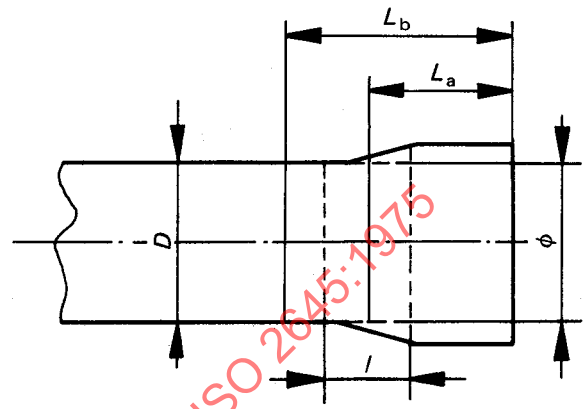


FIGURE 1 – **Upset end**

TABLE 5 – **Tolerances on upset ends**

Casing		
Outside diameter D mm	**Tolerances**	**On length** l
$D \leqslant 127,0$	+ 2,8 mm – 0,75 % D	127 mm
$139,7 \leqslant D \leqslant 219,1$	+ 3,2 mm – 0,75 % D	# D
$D \geqslant 244,5$	+ 4,0 mm – 0,75 % D	

Tubing			
Outside diameter mm	**Length** L_a* mm	**Tolerance on diameter at distance** L_a mm	**Length** L_b* mm
60,3	152,4	D + 2,4 – 0,8	254
73	159	D + 2,4 – 0,8	260
88,9	165	D + 2,4 – 0,8	267
101,6	165	D + 2,8 – 0,8	267
114,3	171,5	D + 2,8 – 0,75 % D	273

* Lengths L_a and L_b are measured from the pipe end. L_b is the distance from which the tolerances given in 9.1 for the pipe body apply.

The alterations in the diameter between the points of measurement at distances L_a and L_b shall be smooth and progressive, not abrupt.

9.2 Wall thickness

9.2.1 Each length of pipe shall conform to the following specifications :

At any place the minimum thickness shall not be less than 87,5 % of the tabulated thickness, the maximum thickness being limited by the mass tolerance (see 9.3.3).

1) An International Standard on compounds is in preparation; meanwhile reference may be made to API Bulletin 5 A2, latest edition.

Thickness measurements shall be made with a gauge fitted with contact pins having a diameter of 6,35 mm. The end of the pin contacting the inside surface of the pipe shall be rounded to a radius of 38 mm; the end of the pin contacting the outside surface shall be flat or rounded to a radius of 38 mm.

Thickness measurements can also be made using appropriately calibrated non-destructive equipment of adequate accuracy. In case of dispute the mechanical gauge measurement will, however, be relied upon.

9.3 Mass

9.3.1 Each casing and tubing shall be weighed separately. However, tubing of diameters less than or equal to 33,4 mm may be weighed in convenient lots. Threaded and coupled pipes may be weighed with their couplings attached.

Threaded pipes with or without couplings shall be weighed without thread protectors except for wagon load weighings where proper allowances must be made for the mass of the thread protectors in the total mass.

9.3.2 The masses determined shall conform to the specified (or adjusted calculated) masses for the end finishes provided for in the order within the tolerances stipulated in 9.3.3. Calculated masses shall be determined in accordance with the following formula :

$$W_L = (W_{pe} L) + e_w$$

where

W_L is the calculated mass of a pipe of length L, in kilograms;

W_{pe} is the plain end theoretical mass per unit length in kilograms per metre;

L is the length of pipe, as defined in 9.4, in metres;

e_w is the mass gain or loss due to end finishing, in kilograms.

9.3.3 On one pipe or on one lot of pipes for lot-weighed pipes ($D \leqslant 33{,}4$ mm) the tolerance shall be $^{+6,5}_{-3,5}$ %.

On a complete wagon load (i.e. 18 t minimum) the tolerance shall be $^{0}_{-1,75}$ %.

NOTE – Tolerances per pipe lot or pipe wagon load are applicable simultaneously, except for loads less than 18 t where the tolerance $^{+6,5}_{-3,5}$ % only is obligatory.

9.4 Length

9.4.1 Pipes shall be furnished in the length range specified in the order. The length ranges shall comply with table 6. When the pipe is furnished with threads and couplings, the length is measured from the outer face of the coupling to the opposite plain spigot end. For Extreme-Line casing, the length shall be measured from the box end to the opposite threaded spigot end.

9.4.2 If so specified in the order, for round thread casing only, jointers (i.e. two pieces coupled to make a standard length) may be furnished to a maximum of 5 % of the order. No length used in making a jointer shall be less than 1,52 m and the jointer total length shall conform to the standard length of the one-piece pipe.

TABLE 6 – **Length ranges**

	Range 1		Range 2		Range 3	
	m	ft	m	ft	m	ft
Casing (jointers included)	4,9 to 7,6	16 to 25	7,6 to 10,4	25 to 34	10,4 and over[1)]	34 and over
On 95 % min. of a shipment (see table 8)						
– maximum variation	1,8	6	1,5	5	1,8	6
– *minimum length*	5,5	18	8,5	28	11,0	36
Tubing	6,10 to 7,3	20 to 24	8,5 to 9,7	28 to 32		
On 100 % min. of a shipment (see table 8)						
– maximum variation	0,6	2	0,6	2		
– minimum length	6,1	20	8,5	28		

1) By agreement at the time of ordering the upper limit may be stated by the purchaser.

9.5 Inside diameter

Each pipe shall be checked over its whole length with a cylindrical mandrel in conformity with table 7.

The front end of the mandrel shall be rounded to allow an easy fit in the pipe. The mandrel shall enter the pipe freely over its whole length with a reasonable effort. The pipe shall not be rejected as long as it is not tested free of foreign materials and supported to avoid collapse.

TABLE 7 — **Dimensions of check mandrel**

Values in millimetres

Nominal outside diameter D	Mandrel length	Minimum mandrel diameter[2]
Casing[1]		
$D \leqslant 219,1$	152	$d - 3,2$
$244,5 \leqslant D \leqslant 339,7$	305	$d - 4$
$D \geqslant 406,4$	305	$d - 4,8$
Tubing		
$D \leqslant 73$	1 067	$d - 2,4$
$D \geqslant 88,9$	1 067	$d - 3,2$

1) For Extreme-Line casing the mandrel minimum diameter is specified in column 5 of table 24.

2) d = theoretical internal diameter.

9.6 Curvature

All pipes shall be delivered with a reasonable straightness.

9.7 Loads

Wagon loads shall comply with table 8.

TABLE 8 — **Wagon loads (see ranges — table 6)**

Order smaller than one wagon load	Order larger than one wagon load	
	Railway shipment direct from mill to final consignee	Railway shipment interrupted from mill to final consignee
Total tolerances of ranges	Total variation on 5 % maximum of shipment, required per wagon load in the corresponding range	Total variation on 5 % maximum of shipment, required for total load in the corresponding range

10 CHEMICAL ANALYSES

10.1 Ladle analysis

When requested by the purchaser, the manufacturer shall furnish a ladle analysis of each steel heat used. In addition, the purchaser, upon request, shall be furnished with the results of such other chemical analyses as may be obtained. The analyses, so determined, shall conform to the requirements specified in 7.2.

10.2 Check analysis

10.2.1 Two finished pipe lengths shall be analysed by the manufacturer from each lot of 400 ($\phi \leqslant 139,7$ mm) or 200 ($\phi \geqslant 168,3$ mm) pipes of the same diameter. For multiple-length seamless pipes, a length is considered as all of the sections cut from a particular multiple length.

10.2.2 The samples shall be composed of cuttings or drillings representing the full wall thickness of the pipe. If drillings are used the minimum drill size shall be 12,7 mm.

10.2.3 If the check analysis on one length representing the lot fails to conform to the requirements of 7.2, the manufacturer will be allowed to re-test two supplementary lengths. If the re-check is satisfactory, the lot shall be accepted except for the defective length. If both lengths representing the lot, or one (or both) length(s) of the re-check analysis fail, at the manufacturer's option the entire lot shall be rejected or individual re-check analyses carried out. These re-check analyses shall be made on defective elements only. Samples shall be taken as specified in 10.2.2.

10.3 Mill-control check analyses

A ladle analysis of each steel heat used shall be made by the manufacturer. A record of such analyses shall be available to the purchaser.

11 MECHANICAL AND NON-DESTRUCTIVE TESTS

11.1 Nature of tests

Class I, II and III pipes shall be tested for tensile strength and flattening strength. They shall also be submitted to hydrostatic tests. Class II pipes shall be submitted to non-destructive inspection. This inspection is optional for class I and III pipes.

11.2 Number of tests

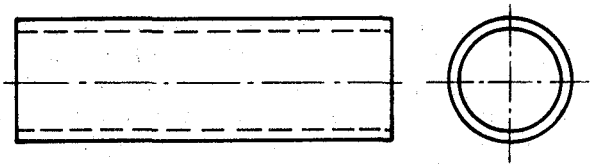
The number of tests shall conform to the requirements of table 9.

11.3 Tensile tests

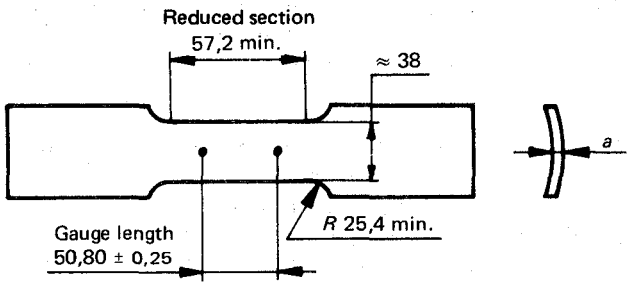
11.3.1 Tensile tests shall be carried out in accordance with ISO 375. Proof stress values shall be calculated for an elongation under load of 0,5 % or 0,6 % (see table 2).

Test pieces, at the manufacturer's option, shall be either full sections or strips with the same heat treatment as the pipe (see figure 2). A test piece shall represent the full thickness of the pipe from which it is taken; it must not be flattened before testing. In the case of welded pipes the test piece shall be taken approximately 90° from the weld.

Dimensions in millimetres



Full section test piece



Strip test piece

FIGURE 2 – **Tensile test pieces**

In the case of heat treated pipes, the test piece shall be submitted to the same treatment as the finished pipe.

The mechanical properties of upset ends shall meet the requirements for the pipe body. In case of dispute the minimum tensile strength and the proof stress shall be determined on a test piece taken from an upset end.

11.3.2 The width of the test piece gauge length shall be about 38 mm if suitable face testing grips are used or if the ends of the test piece are machined to reduce the curvature in the grip area; otherwise it shall be approximately 19 mm for pipes 88,9 mm and smaller, 25,4 mm for pipes from 101,6 to 193,7 mm, and approximately 38 mm for pipes 219,1 mm and larger. In no case shall the width of the test piece gauge length be greater than four times the thickness of the test piece.

11.3.3 If any tensile test piece shows defective machining or develops flaws, it may be discarded and another test piece substituted. When the elongation of any tensile test piece is less than that specified, a re-test is allowed if any part of the fracture is outside the middle third of the gauge length as indicated by scribe scratches marked on the test piece before testing.

TABLE 9 – ***Number of tests***

Test	Number of tests		
	Class I	Class II	Class III
Tensile test on test piece	$D \leqslant 139,7$ mm : 1 per 400 lengths $D \geqslant 168,3$ mm : 1 per 200 lengths } 1) 2)	Casing : 1 per 100 lengths Tubing : 1 per 200 lengths } 1) 2)	
Mill-control tensile test	1 per heat		
Flattening test on test piece	On non-upset or untreated pipes : on each end of each pipe 3) 4) On upset and treated pipes : test pieces shall be taken at each end of each pipe before upsetting and treatment or on pipes at the rate of 1 per 20 lengths (casing) and 1 per 100 lengths (tubing). In this case test pieces shall be treated in a similar way to that specified for the grade concerned.		
Hydrostatic test	On each pipe		
Non-destructive inspection	Optional	On the whole length of each pipe	Optional

1) In the case of treated pipes, all pipes in a lot shall have been submitted to the same treatment.

2) In the case of seamless pipes in multiple lengths, a length is classed as the sum of the sections obtained from this multiple length.

3) The test shall not be carried out for seamless pipes of grade H 28 and H 31.

4) In the case of seamless pipes in multiple lengths cut in sections, tests shall be made at each end of the multiple length.

TABLE 10 – **Distance z between plates**

Grade of steel	Distance z with		
	$D/a < 3{,}93$	$3{,}93 \leqslant D/a < 16$	$D/a \geqslant 16$
H 28	$(0{,}83 - 0{,}020\,6\ D/a)\ D$	$(0{,}83 - 0{,}020\,6\ D/a)\ D$	$0{,}5\ D$
H 31	$(0{,}88 - 0{,}020\,6\ D/a)\ D$	$(0{,}88 - 0{,}020\,6\ D/a)\ D$	$0{,}55\ D$
J 38, K 38	$(1{,}104 - 0{,}051\,8\ D/a)\ D$	$(0{,}98 - 0{,}020\,6\ D/a)\ D$	$0{,}65\ D$
	$9 \leqslant D/a \leqslant 25$		
C 52, N 56	$(1{,}074 - 0{,}019\,4\ D/a)\ D$		
C 66	$(1{,}080 - 0{,}017\,8\ D/a)\ D$		
P 72, P 76	$(1{,}086 - 0{,}016\,3\ D/a)\ D$		

D = outside diameter in millimetres
a = wall thickness in millimetres

11.4 Flattening test

This test is applicable for all grades except H 28 and H 31 in the case of seamless pipes.

11.4.1 The flattening test shall be carried out in accordance with ISO/R 202.

No cracks or breaks shall occur anywhere in the test piece until the distance between plates z is less than that specified in table 10.

If a test piece representing class II or III pipes or grade N 56 pipes is shown defective at a point of maximum bending (12 h and 6 h), the test shall be pursued until the remaining part of the test piece breaks at 90° from the point of maximum bending (3 h or 9 h).

Premature fracture at the point of maximum bending shall not be taken into account for the possible rejection of the pipes.

11.4.2 In the case of welded pipes, the weld shall be placed at the point of maximum bending. At the discretion of the inspector, separate tests shall be made with the weld 90° from the point of maximum bending.

Evidence must not appear of poor texture, incomplete fusion in the weld, laminations, burnt metal or extruded metal.

11.5 Hydrostatic test

11.5.1 *Test pressure*

Each length shall be hydrostatically tested at the manufacturer's works, unless otherwise specified in the order.

The test shall be carried out at the pressures given in table 11.

TABLE 11 – **Test pressures**

Grade of steel	Diameter of pipe D	Pressure p
H 28, H 31, J 38, K 38	$D \leqslant 244{,}5$ mm	$p = 0{,}914 \times p_E$ with 207 bar max.
–	$D \geqslant 273$ mm	$p = 0{,}685 \times p_E$ with 207 bar max.
Other grades		$p = 0{,}914 \times p_E$ with 689,5 bar max.

p = test pressure

p_E = internal yield pressure specified in table 20, 22, 24, 26 or 28 for the adopted end type.

If so specified in the order, class I and II pipes may, however, be tested at the pressure given by the formula, no account being taken of the maximum limit.

The test pressure shall be held for at least 5 s. No leakage shall then occur.

11.5.2 *Welded pipes*

While under pressure, welded pipes shall be struck at both ends near the weld with a 1 kg hammer or its equivalent.

Pressure shall then be reduced to not less than one-half and maintained for a sufficient period to permit thorough inspection of the weld for leakage or sweats.

11.5.3 *Threaded pipes with couplings*

a) Couplings made-up power-tight

For diameters less than 406 mm, the test shall be carried out with the coupling.

For diameters 406 mm and greater, hydrostatic testing before threading is permitted.

b) Couplings made-up handling-tight

The test shall be carried out as agreed in the order on plain end or threaded and coupled pipes. Minor leakage at the joint shall be disregarded in this case.

11.5.4 *Special test*

A higher pressure may be used if agreed between supplier and purchaser. In any case, the pressure shall never exceed the values given in annex B.

11.6 Non-destructive testing

11.6.1 *Applications and options*

In a case where such testing is specified (see table 12) in addition to visual inspection, casing and tubing shall be tested over their full length to detect longitudinal defects, by magnetic particle inspection, or by an ultrasonic method, or by an electromagnetic method. Furthermore the ends of upset pipes shall be inspected for transverse defects by the magnetic particle method. The location of the equipment in the mill will be at the discretion of the manufacturer. However, the non-destructive testing shall take place after all heat-treating operations, but may take place before cropping or threading.

11.6.2 *Magnetic particle inspection*

When magnetic particle inspection is employed for longitudinal defect detection, the entire outside surface of the pipe and the inside surface for a distance of 305 mm from the end of casing or of 152 mm from the end of tubing should be inspected. The inside and outside surfaces of the ends of upset pipes shall be inspected for transverse defects by the magnetic particle method. Magnetic particle inspection of casing and tubing may be employed on inside surfaces after heat treatment and before end cropping.

If defects are found, further cropping is permissible provided that the inside surface is again inspected by the magnetic particle method as stipulated above. The depth of all defects revealed by this inspection shall be determined.

11.6.3 *Electromagnetic or ultrasonic inspection*

a) Equipment

For pipe inspection, any equipment utilizing the electromagnetic or ultrasonic principles may be used provided that it is capable of continuous and uninterrupted inspection of the outer surface of the pipe.

The equipment shall have sufficient sensitivity to indicate injurious defects and it shall be checked as prescribed in 11.6.3.b).

b) Reference standard

A reference standard taken from the pipes as supplied and having the same nominal diameter and wall thickness as the product being tested shall be used at least once every working turn to demonstrate the effectiveness of the inspection equipment.

The reference standard shall have any convenient length as determined by the manufacturer; it shall be scanned by the inspection unit in a manner simulating the inspection of the product.

c) Notch (see table 12)

Standard notches (types 12,5 % and 5 %) shall be made in the reference standards.

When using internal and external notches it is not necessary that they be farther apart than the distance required for signal differentiation.

TABLE 12 — **Non-destructive testing**

Class	Conditions	Standards						
		Ultrasonic inspection			Electromagnetic methods			
		Depth	Notch		Depth	Notch		Hole (diameter)
			width	length		width	length	
I and III	100 % by agreement	0,05 *a*	1 mm	50 mm	0,05 *a*	1 mm	38 mm	1,6 mm (0.062 5 in)
		0,125 *a*	1 mm	2 widths of probe	0,125 *a*	1 mm	38 mm	3,2 mm (0.125 in)
II	100 %	0,05 *a*	1 mm	50 mm	0,05 *a*	1 mm	38 mm	1,6 mm (0.062 5 in)

NOTE — The widths given for the notch are meant at full depth.
a : wall thickness in millimetres.

The notch sides shall be theoretically parallel and the bottom shall be theoretically perpendicular to the sides. The notch shall be cut on the external surface of the reference standard and shall be parallel to the pipe longitudinal axis except for seamless pipes, and at the option of the manufacturer it will possibly be oriented at an angle to allow maximum defect detection.

Lengths

— ultrasonic or diverted flux testing

α) 5 % *a* notch : 50 mm (2 in) min.

β) 12,5 % *a* notch : twice the probe length (total length).

— eddy current testing

total maximum length : 38 mm (1.5 in).

Width

1 mm (0.04 in) maximum.

Depth

Two types are used :

α_1) 5 % *a* notch : 5 % of the specified wall thickness with a minimum of 0,3 mm (≈ 0.012 in).

β_1) 12,5 % *a* notch : 12,5 % of the specified wall thickness with a minimum of 0,6 mm (≈ 0.024 in), with a depth tolerance ± 15 % and a minimum of ± 0,05 mm (0.002 in).

11.6.4 *Permissible depth of defects*

For class II pipes and for class I and III pipes checked with 5 % *a* reference notch, all detected defects the depth of which is greater than 5 % but smaller than 12,5 % of the nominal wall thickness shall be removed by grinding or machining.

The maximum depth of grinding or machining is limited by the observance of the thickness tolerance, i.e. the remaining thickness at the bottom of the ground or machined part shall not be less than 87,5 % of the nominal thickness.

Where grinding or machining is done, use generous radii to prevent abrupt changes in wall thickness. After reducing these imperfections such areas shall be reinspected by one of the non-destructive testing methods specified above to verify complete removal of the defect.

11.6.5 *Surface inspection of "Extreme-Line" casing*

The upset portions of Extreme-Line casing shall be examined visually for defects.

The maximum permissible depth of defects from the inside or outside surface is 12,5 % of the theoretical pipe body wall thickness, except in the following two cases :

a) pin end : on the inside surface, from the end of the pipe to the plane of the external shoulder (bored) : 0,38 mm.

b) box end : on the outside surface :

— for 121 mm from the end ($\phi < 193,7$ mm) : 0,25 mm.

— for 165 mm from the end ($\phi < 219,1$ mm) : 0,25 mm.

All machined surfaces of the box end shall be free from seams and cracks; the threads shall be free from any imperfections which break the continuity.

11.7 Re-tests

In a case where a test on a pipe sample representative of the lot is not satisfactory the manufacturer may decide to re-test the product using test pieces taken on two additional pipes in the same lot.

These test pieces shall be cut as indicated in 11.3 and 11.4. If these test pieces meet the requirements, then all pipes in the lot shall be accepted except the one initially selected and from which the first defective test piece was cut.

If one of the test pieces fails to meet the requirements of the re-test, the manufacturer may choose to test individually all remaining pipes in the lot. In this case the test shall be carried out only for those properties which were not satisfactory at the re-test.

In case of unsatisfactory flattening re-tests per lot, the manufacturer may decide to re-treat and then re-test the lot. In case of individual testing the manufacturer may re-test test pieces cut on the same pipe end until satisfactory results are obtained. However, the pipe length shall not then be less than 80 % of that before the first cropping.

12 INSPECTION RIGHTS

When pipes are accepted by an inspector representing the purchaser, acceptance shall be in accordance with the requirements of clause 5 of ISO/R 404.

Pipes which show injurious defects on mill inspection or subsequently when applied in service may be rejected, and the manufacturer notified so that he will have the possibility to check the justice of the claim.

If destructive inspection is made other than at the place of manufacture, the purchaser shall only pay for those products which meet the requirements of this International Standard and not for those which result from rejection of non-conforming parts.

13 TEST REPORTS

Test reports may be required by the purchaser. They shall conform to the requirements of clause 4 of ISO/R 404.

14 COUPLINGS

14.1 Couplings for pipes conforming to this International Standard shall be seamless and, unless otherwise specified in the order, of the same grade as the pipe. However, all grade H 28 and H 31 pipes and those grade J 38 pipes the nominal diameter of which is less than or equal to 339,7 mm can be supplied with grade K 38 and J 28 couplings respectively.

In the case of welded C 66 steel pipes, couplings may be supplied flash-welded.

In the case of class III pipes, the couplings shall be submitted to the same heat treatment as the pipes.

14.2 Mechanical properties

Couplings shall conform to the mechanical requirements specified in table 2 for the particular grade ordered. A tensile test shall be made on each steel heat from which couplings are produced. For Class II and III couplings a test shall also be made on one pipe in a lot of 100 pipes used for casing coupling manufacture and on one pipe in a lot of 200 pipes used for tubing coupling manufacture.

The manufacturer shall maintain a record of such tests; this record shall be open to inspection by the purchaser.

For tensile tests on finished class I couplings and on class II and III pipes intended for coupling manufacture, at the manufacturer's option, either round proportional test pieces or strips shall be used as prescribed in ISO/R 375.

14.3 Dimensions and tolerances

Couplings shall conform to the dimensions and tolerances given in tables 21, 23, 27 and 29.

Unless otherwise specified, threaded and coupled casing and tubing shall be supplied with normal clearance couplings.

14.3.1 *Regular couplings*

These couplings shall have diameters as shown in column 2 of tables 21, 23, 27 and 29.

The inside and outside edges of the bearing face shall be rounded or broken but shall not materially reduce dimension *b* so that sufficient thickness is left to support safely the weight of the pipe on the elevator. The ends of the couplings shall be faced true at right angles to the axis.

14.3.2 *Special clearance couplings*

These couplings (reduced outside diameter) may be furnished at the purchaser's request for Buttress casing and external upset tubing. They shall conform to the dimensions and tolerances given in tables 23 and 29.

Unless otherwise specified, special clearance couplings for tubing shall be bevelled on both ends.

14.3.3 *Special bevel couplings*

Special bevel couplings shall be furnished for tubing when specified in the order. They shall conform to the requirements of tables 27 and 29.

Unless otherwise specified, these couplings shall be bevelled 20° on both ends.

14.4 Threading

Coupling threads, gauging methods and instruments shall conform to the requirements of ISO . . .

Couplings shall not be expanded to provide the required taper for threads.

14.5 Surface texture

14.5.1 Finished couplings shall be free from all visible seams and cracks.

14.5.2 Class II and III couplings shall be inspected by the magnetic particle method (or any appropriate non-destructive process).

14.5.3 Finished couplings with pits, round-bottom gouges and similar imperfections shall not be rejected unless the depth of the imperfections exceeds the values given in table 13.

14.5.4 Finished couplings with grip marks, sharp-bottom gouges or imperfections shall not be rejected unless the depth of the imperfections exceeds the values given in table 13.

14.5.5 Couplings shall be free of imperfections on the inside which break the continuity of the thread.

14.6 Measurement of imperfections

The depth of imperfections shall be measured from the normal surface or contour of the coupling extended over the imperfection. The outside diameter of the coupling shall be measured from its normal surface or contour and not from the base of an acceptable imperfection.

14.7 Repair and removal of imperfections

Repair by welding is not permitted.

TABLE 13 – **Permissible depth of defects**

Values in millimetres

Pipe type	Diameter	Tolerances	
		according to 14.5.3	according to 14.5.4
Casing	$D \leqslant 139,7$	0,9	0,8
	$168,3 \leqslant D \leqslant 193,7$	1,1	1,0
	$D \leqslant 219,1$	1,6	
Tubing	$D \geqslant 73$	0,8	0,6
	$D \leqslant 88,9$	1,1	0,8

All defects shall be removed or reduced to admissible limits by grinding or machining on the outer surface, provided that the outside diameter after grinding or machining is within the tolerances given in table 13.

Machining or grinding shall be approximately faired into the outer contour of the coupling.

15 MINIMUM MECHANICAL CHARACTERISTICS

15.1 Pipe body

The body of the pipe shall show values of proof stress at least equal to those given in tables 20, 22, 24, 26 and 28. These tables also give collapse strength values for guidance. The method of calculation of these minimum values is given in annex A.

15.2 Joint

The pipe-coupling assembly shall show values of internal yield pressure, collapse strength and joint proof stress at least equal to those given in tables 20, 22, 24, 26 and 28. The method of calculation of these minimum values is indicated in annex B.

The pipe-coupling assembly shall show an efficiency at least equal to those given in tables 22, 24, 26 and 28. This efficiency is defined by the ratio of the proof stress of the coupling to that of the tube. The value in parentheses shows that the coupling is more resistant than the tube.

16 THREAD PROTECTORS

16.1 Application

The manufacturer shall apply external and internal thread protections of such design, material and mechanical strength as to protect the thread and end of the pipe from damage under normal handling and transportation.

Thread protectors shall cover the full length of the thread.

Thread protectors shall exclude water and dirt from the thread during transportation and normal storage (a period of approximately one year).

The thread design shall be such that the pipe threads are not damaged by the protectors.

16.2 Material

Protector material shall contain no compounds capable of causing corrosion or promoting adhesion of the protectors to the threads.

Protectors shall be suitable for service temperatures from $-50\ ^{\circ}C$ to $+65\ ^{\circ}C$.

17 SURFACE PROTECTION

Unless otherwise specified in the order, pipes shall be given a mill coating to protect them from rusting in transit.

If bare or specially coated pipes are required by the purchaser, this shall be specified in the order.

For special coatings the order shall state whether the coating is to be applied to the full length or whether a certain specified distance from the ends shall be left uncoated.

Unless otherwise specified, such bare ends shall be given a coating with oil for protection in transit.

18 MARKING

18.1 Pipes and couplings manufactured in accordance with this International Standard shall be marked by the manufacturer as specified below.

Markings shall be hot die-stamped (a cold alternative is allowed for classes I and II) or paint-stencilled according to 18.2; markings shall be paint-stencilled or in the case of 26,7 mm and 33,4 mm tubing marking shall be die-stamped on a metal tag attached to the bundle. Markings shall not overlap and shall be applied in such a manner as not to injure the pipes.

Paint-stencilled markings shall be placed on the outer surface of the pipe, starting 600 mm from the coupling, or box, or external threaded end (for pipes furnished without couplings), or from one end for plain-ended pipes.

Additional paint-stencilled or die-stamped markings are possible before final heat treatment, at the discretion of the manufacturer, or at the request of the purchaser.

18.2 The particulars shall be the following :

TABLE 14 — **Marking particulars**

Marking	Class		
	I	II	III
a) die stamping			
name or trade mark of manufacturer	X	X	
ISO mark	X	X	
wall thickness in millimetres	X	X	
grade of steel (possibly heat treatment : A = annealed; N = normalized; Q = quenched; T = tempered)	X	X	
b) paint-stencilling			
size (outside diameter in millimetres)	X	X	X
mass per unit length in kilograms per metre	X	X	X
grade of steel (possibly heat treatment : A = annealed; N = normalized; Q = quenched; T = tempered)	X	X	X
length in metres with two decimals	X	X	X
total mass in kilograms	X	X	X
thread type : round, Buttress, Extreme-Line	X	X	X
name or trade mark of manufacturer			X
ISO mark			X
thickness in millimetres			X

18.3 Coupling marking

The manufacturer's name (or mark), the class, grade and ISO mark shall be marked on each coupling (see 18.1).

For small diameter pipes, these data may be stencilled on a tag.

18.4 Colour identification

To make identification easier, each pipe shall be identified by one or several bands, 50 mm wide and of a colour as defined in table 15, encircling the pipe at a maximum distance of 600 mm from the coupling or the box. Couplings shall be painted all over their outer surface.

TABLE 15 — **Colour identification**

Grade	Pipe	Coupling
H 28	1 black band	black
H 31	1 grey band	grey
J 38	1 green band	green
K 38	2 green bands	green
C 52	1 blue band	blue
N 56	1 red band	red
C 66	1 brown band	brown
P 72	1 white band	white
P 76	1 white band	white

NOTE — In cases where special clearance couplings are used, these shall bear a black band in the middle in addition to the above marking.

ANNEX A

BASES FOR CALCULATING THE PIPE BODY CHARACTERISTICS

A.1 PIPE BODY PROOF STRESS

This value is calculated as the product of the theoretical pipe section by the minimum specified proof stress of the steel used :

$$P_y = \frac{\pi}{4}(D^2 - d^2)\, R_p$$

where

P_y is the pipe body proof stress, in newtons;

D is the specified outside diameter of the pipe, in millimetres;

d is the specified inside diameter of the pipe, in millimetres;

R_p is the minimum proof stress of the grade used, in newtons per square millimetre.

A.2 COLLAPSE STRENGTH

A.2.1 The accurate mathematical representation of the pipe collapse strength results in a homogenous but complicated formula for which it is preferable to substitute four empirical formulae which are simpler and established on the basis of over 2 000 tests.

This simplified representation has been obtained by overlooking very important unfavourable parameters such as lack of circularity, or ovality of the outside wall, and eccentricity. It is then advisable to rely on these values only when

- lack of circularity does not exceed 0,75 % of the outside diameter;
- lack of concentricity is within tolerances;
- average wall thickness is not below nominal thickness as a result of internal or external repair.

A.2.2 The formula for calculation varies with ratio D/a and the steel grade used. Different formulae correspond to the plastic or elastic range.

TABLE 16 – **Plastic range with minimum yield strength limitation**

Grade of steel	D/a
H 28	⩽ 16,44
H 31	⩽ 15,89
J 38, K 38	⩽ 14,80
C 52	⩽ 13,67
N 56	⩽ 13,38
C 66	⩽ 12,83
P 72	⩽ 12,56
P 76	⩽ 12,42

$$P_c = 2R_p \left[\frac{(D/a) - 1}{(D/a)^2} \right]$$

where

P_c is the collapse strength in newtons per square millimetre;

R_p is the minimum proof stress in newtons per square millimetre;

a is the minimum theoretical thickness in millimetres;

D is the minimum theoretical outside diameter in millimetres.

TABLE 17 – **Plastic range**

Grade of steel	D/a	A	B	C
H 28	16,44 to 26,62	2,950	0,046 3	52,02
H 31	15,89 to 26,08	2,963	0,048 9	62,35
J 38, K 38	14,80 to 24,99	2,990	0,054 1	83,02
C 52	13,67 to 23,09	3,060	0,064 2	124,36
N 56	13,38 to 22,46	3,070	0,066 7	134,70
C 66	12,83 to 21,21	3,125	0,074 5	165,70
P 72	12,56 to 20,66	3,162	0,079 5	186,03
P 76	12,42 to 20,29	3,180	0,082 0	196,71

$$P_c = R_p\left(\frac{A}{D/a} - B\right) - C$$

TABLE 18 — **Transitional range between plastic and elastic ranges**

Grade of steel	*D/a*	*A*	*B*
H 28	26,62 to 42,70	2,047	0,031 25
H 31	26,08 to 40,87	2,028	0,032 8
J 38, K 38	24,99 to 37,20	1,990	0,036 0
C 52	23,09 to 32,05	1,985	0,041 7
N 56	22,46 to 31,05	1,998	0,043 4
C 66	21,21 to 28,25	2,047	0,049 0
P 72	20,66 to 26,88	2,052	0,051 5
P 76	20,29 to 26,20	2,075	0,053 5

$$P_c = R_p\left(\frac{A}{D/a} - B\right)$$

TABLE 19 — **Elastic range**

Grade of steel	*D/a*
H 28	> 42,70
H 31	> 40,87
J 38, K 38	> 37,20
C 52	> 32,05
N 56	> 31,05
C 66	> 28,25
P 72	> 26,88
P 76	> 26,20

$$P_c = \frac{0{,}323\,7 \times 10^6}{(D/a)\,[(D/a) - 1]^2}$$

ANNEX B

BASIS FOR CALCULATING THE INTERNAL YIELD PRESSURE OF PIPES AND COUPLINGS

B.1 For plain end pipes and Extreme-Line threaded casing the internal yield pressure is given by the formula

$$P_c = 175\, R_p \frac{a}{D} 10^{-1}$$

where

P_c is the internal yield pressure, in bars;

R_p is the minimum proof stress of the pipe in newtons per square millimetre;

a is the minimum specified wall thickness in millimetres;

D is the minimum specified diameter in millimetres.

B.2 For threaded and coupled casing the yield pressure is determined by the above formula, but is limited due to the thread and coupling strengths.

Calculation formulae for maxima are as follows :

– round thread casing

$$P_c = R_p \frac{W - D_1}{W} 10^{-1}$$

$$D_1 = E_1 - (L_1 + A)\, T + H - 2S$$

where

W is the nominal outside diameter of the coupling in millimetres;

E_1 is the pitch diameter at hand-tight make-up level in millimetres;

L_1 is the pipe end length at hand-tight make-up level in millimetres;

A is the value of stand-off in millimetres;

T is the taper, 0,062 5;

H is the thread height, 2,749 mm;

S is the height of the truncated part of the threading 0,432 mm.

– Buttress thread casing

Regular couplings : $P_c = R_p \frac{W - D_2}{W}$

special clearance couplings : $P_c = R_p \frac{W_c - D_2}{W_c}$

$$D_2 = E_7 - (L_7 + J_h - J)\, T + H$$

where

W is the nominal outside diameter of the normal coupling in millimetres;

W_c is the nominal outside diameter of the special clearance coupling in millimetres;

E_7 is the pitch diameter in millimetres;

L_7 is the complete thread length in millimetres;

J_h is the distance of the pipe end to the hand-tight made-up coupling centre in millimetres;

J is the distance of the pipe end to the power-tight made-up coupling centre in millimetres;

T is the taper, $D \leqslant 339{,}7$ mm : 0,062 5,
$D > 339{,}7$ mm : 0,083 3;

H is the height of one thread : 1,575 mm.

TABLE 20 — **Round thread casing — Dimensions and characteristics**

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint strength			
										Plain end		Threads and coupling					Collapse[1]		Internal yield (87.5 % E)						Short thread		Long thread	
												Short		Long					Short thread		Long thread							
										W_{pe}		e_w		e_w															
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf	daN	lbf
114,3	4.500	14,1	9.50	5,2	0.205	103,9	4.090	100,7	3.965	14,0	9.40	1,9	4.20			H28	19,1	2 770	220	3 190			50 000	111 000	35 000	77 000		
																J38	22,8	3 310	302	4 380			69 000	152 000	46 000	101 000		
																K38	22,8	3 310	302	4 380			69 000	152 000	51 000	112 000		
		15,6	10.50	5,7	0.224	102,9	4.052	99,8	3.927	15,2	10.23	1,7	3.80			J38	27,6	4 010	330	4 790			75 000	165 000	60 000	132 000		
																K38	27,6	4 010	330	4 790			75 000	165 000	66 000	146 000		
		17,3	11.60	6,4	0.250	101,6	4.000	98,4	3.875	16,9	11.35	1,5	3.40	1,7	3.80	J38	34,2	4 960	369	5 350	369	5 350	84 000	184 000	70 000	154 000	74 000	162 000
																K38	34,2	4 960	369	5 350	369	5 350	84 000	184 000	77 000	170 000	52 000	180 000
																C52	42,3	6 130			503	7 290	114 000	250 000			96 000	212 000
																N56	43,8	6 350			536	7 780	121 000	267 000			101 000	223 000
																C66	48,3	7 010			637	9 240	144 000	317 000			106 000	234 000
																P76	52,1	7 560			737	10 690	167 000	367 000			127 000	279 000
		20,1	13.50	7,4	0.290	99,6	3.920	96,4	3.795	19,4	13.04			1,5	3.20	C52	56,3	8 170			583	8 460	131 000	288 000			117 000	257 000
																N56	58,9	8 540			622	9 020	139 000	307 000			123 000	270 000
																C66	66,5	9 650			738	10 710	165 000	364 000			129 000	284 000
																P76	73,6	10 670			856	12 410	192 000	422 000			153 000	338 000
		22,5	15.10	8,6	0.337	97,2	3.826	94,0	3.701	22,3	14.98			1,3	2.80	P76	98,7	14 320			994	14 420	220 000	485 000			184 000	406 000
127	5.000	17,1	11.50	5,6	0.220	115,8	4.560	112,7	4.435	16,7	11.23	2,5	5.40			J38	21,1	3 060	292	4 240			83 000	182 000	60 000	133 000		
																K38	21,1	3 060	292	4 240			83 000	182 000	67 000	147 000		
		19,4	13.00	6,4	0.253	114,1	4.494	111,0	4.369	19,1	12.83	2,2	4.80	2,6	5.80	J38	28,5	4 140	336	4 870	336	4 870	94 000	208 000	77 000	159 000	83 000	182 000
																K38	28,5	4 140	336	4 870	336	4 870	94 000	208 000	84 000	186 000	91 000	201 000
		22,3	15.00	7,5	0.296	112,0	4.408	108,8	4.283	22,2	14.87	1,9	4.20	2,4	5.20	J38	38,3	5 550	393	5 700	393	5 700	109 000	241 000	94 000	207 000	101 000	223 000
																K38	38,3	5 550	393	5 700	393	5 700	109 000	241 000	104 000	228 000	112 000	246 000
																C52	48,1	6 970			536	7 770	149 000	328 000			134 000	295 000
																N56	50,0	7 250			572	8 290	159 000	350 000			141 000	311 000
																C56	55,8	8 090			678	9 840	189 000	416 000			148 000	326 000
																P76	60,9	8 890			786	11 400	218 000	481 000			176 000	388 000
		26,8	18.00	9,2	0.362	108,6	4.276	105,4	4.151	26,7	17.93			1,9	4.20	C52	69,0	10 000			655	9 500	180 000	396 000			171 000	376 000
																N56	72,3	10 490			699	10 140	192 000	422 000			180 000	396 000
																C66	83,0	12 040			830	12 040	227 000	501 000			189 000	416 000
																P76	92,7	13 450			961	13 940	263 000	580 000			225 000	495 000
139,7	5.500	20,8	14.00	6,2	0.244	127,3	5.012	124,1	4.887	20,4	13.70	2,5	5.40			H28	18,2	2 630	214	3 110			73 000	161 000	59 000	130 000		
																J38	21,5	3 120	294	4 270			101 000	222 000	78 000	172 000		
																K38	21,5	3 120	294	4 270			101 000	222 000	86 000	189 000		
		23,1	15.50	7,0	0.275	125,7	4.950	122,6	4.825	22,9	15.35	2,2	4.80	2,6	5.80	J38	27,9	4 040	332	4 810	332	4 810	113 000	248 000	92 000	202 000	98 000	217 000
																K38	27,9	4 040	332	4 810	332	4 810	113 000	248 000	101 000	222 000	109 000	239 000
		25,3	17.00	7,7	0.304	124,3	4.892	121,1	4.767	25,1	16.87	2,00	4.40	2,5	5.40	J38	33,9	4 910	367	5 320	367	5 320	124 000	273 000	104 000	229 000	112 000	247 000
																K38	33,9	4 910	367	5 320	367	5 320	124 000	273 000	114 000	252 000	123 000	272 000
																C52	41,9	6 070			500	7 250	169 000	372 000			148 000	327 000
																N56	43,3	6 280			534	7 740	180 000	397 000			158 000	348 000
																C66	47,8	6 930			634	9 190	214 000	471 000			170 000	374 000
																P76	51,4	7 460			734	10 640	248 000	546 000			202 000	445 000
		29,8	20.00	9,2	0.361	121,4	4.778	118,2	4.658	29,5	19.81			2,0	4.40	C52	58,2	8 440			594	8 610	198 000	437 000			183 000	403 000
																N56	60,9	8 830			634	9 190	212 000	466 000			194 000	428 000
																C66	69,0	10 000			753	10 915	252 000	554 000			209 000	460 000
																P76	76,4	11 080			872	12 640	291 000	641 000			249 000	548 000
		34,2	23.00	10,5	0.415	118,6	4.670	115,4	4.545	33,6	22.54			1,5	3.20	C52	72,1	10 460			639	9 260	226 000	497 000			215 000	473 000
																N56	76,9	11 160			682	9 880	241 000	530 000			228 000	502 000
																C66	89,1	12 920			810	11 740	286 000	630 000			245 000	540 000
																P76	100,1	14 520			937	13 580	331 000	729 000			292 000	643 000

1) These values are given for guidance.

TABLE 20 — **Round thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint strength			
										Plain end		Threads and coupling					Collapse[1]		Internal yield (87.5 % E)						Short thread		Long thread	
												Short		Long					Short thread		Long thread							
										W_{pe}		e_w		e_w															
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf	daN	lbf
168,3	6.625	29,8	20.00	7,3	0.288	153,7	6.049	150,5	5.924	29,0	19.49	5,0	11.00	6,2	13.60	H28	17,4	2 520	210	3 040			104 000	229 000	84 000	184 000		
																J38	20,5	2 970	288	4 180	288	4 180	143 000	315 000	111 000	245 000	121 000	266 000
																K38	20,5	2 970	288	4 180	288	4 180	143 000	315 000	121 000	267 000	132 000	290 000
		35,7	24.00	8,9	0.352	150,4	5.921	147,2	5.796	35,1	23.58	4,4	9.60	5,5	12.00	J38	31,4	4 560	352	5 110	352	5 110	173 000	382 000	143 000	314 000	154 000	340 000
																K38	31,4	4 560	352	5 110	352	5 110	173 000	382 000	155 000	342 000	169 000	372 000
																C52	38,4	5 570			481	6 970	236 000	520 000			206 000	453 000
																N56	39,7	5 760			513	7 440	252 000	555 000			218 000	481 000
																C66	43,4	6 290			608	8 820	299 000	659 000			248 000	546 000
																P76	46,3	6 710			705	10 230	346 000	763 000			291 000	641 000
		41,7	28.00	10,6	0.417	147,1	5.791	143,9	5.666	41,2	27.65			4,6	10.20	C52	54,0	7 830			570	8 260	277 000	610 000			251 000	552 000
																N56	56,3	8 170			607	8 810	296 000	651 000			266 000	586 000
																C66	63,4	9 200			721	10 460	350 000	773 000			302 000	665 000
																P76	69,9	10 140			836	12 120	406 000	895 000			355 000	781 000
		47,6	32.00	12,1	0.475	144,2	5.675	141,0	5.550	46,5	31.20			4,0	8.80	C52	67,8	9 830			649	9 410	312 000	688 000			290 000	638 000
																N56	71,2	10 320			692	10 040	333 000	734 000			307 000	677 000
																C66	81,4	11 800			822	11 920	396 000	872 000			349 000	769 000
																P76	91,0	13 200			952	13 800	458 000	1 009 000			410 000	904 000
177,8	7.000	25,3	17.00	5,9	0.231	166,1	6.538	162,9	6.413	24,9	16.70	4,5	10.00			H28	10,0	1 450	159	2 310			89 000	196 000	55 000	122 000		
		29,8	20.00	6,9	0.272	164,0	6.456	160,8	6.331	29,1	19.54	4,3	9.40			H28	13,6	1 980	187	2 720			104 000	230 000	80 000	176 000		
																J38	15,7	2 270	258	3 740			143 000	316 000	106 000	234 000		
																K38	15,7	2 270	258	3 740			143 000	316 000	115 000	254 000		
		34,2	23.00	8,1	0.317	161,7	6.366	158,5	6.241	33,7	22.63	3,6	8.00	4,7	10.40	J38	22,5	3 270	301	4 360	301	4 360	166 000	366 000	129 000	284 000	142 000	313 000
																K38	22,5	3 270	301	4 360	301	4 360	166 000	366 000	140 000	309 000	155 000	341 000
																C52	26,0	3 770			410	5 940	227 000	499 000			189 000	416 000
																N56	26,4	3 830			437	6 340	242 000	532 000			201 000	442 000
																C66	28,6	4 150			519	7 530	287 000	632 000			229 000	505 000
		38,7	26.00	9,2	0.362	159,4	6.276	156,2	6.151	38,2	25.66	3,3	7.20	4,3	9.40	J38	29,8	4 320	343	4 980	343	4 980	188 000	415 000	152 000	334 000	167 000	367 000
																K38	29,8	4 320	343	4 980	343	4 980	188 000	415 000	165 000	364 000	182 000	401 000
																C52	36,2	5 250			468	6 790	257 000	566 000			222 000	489 000
																N56	37,3	5 410			499	7 240	274 000	604 000			236 000	519 000
																C66	40,5	5 870			593	8 600	325 000	717 000			269 000	592 000
																P76	42,8	6 210			687	9 960	377 000	830 000			315 000	693 000
		43,2	29.00	10,4	0.408	157,1	6.184	153,9	6.059	42,8	28.72			3,6	8.00	C52	46,6	6 760			527	7 650	288 000	634 000			255 000	562 000
																N56	48,4	7 020			563	8 160	307 000	676 000			271 000	597 000
																C66	53,9	7 820			668	9 690	364 000	802 000			310 000	682 000
																P76	58,7	8 510			774	11 220	422 000	929 000			361 000	797 000
		47,6	32.00	11,5	0.453	154,8	6.094	151,6	5.969	47,2	31.68			3,0	5.60	C52	56,7	8 230			585	8 490	317 000	699 000			287 000	633 000
																N56	59,3	8 600			625	9 060	338 000	745 000			305 000	672 000
																C66	67,1	9 730			742	10 760	402 000	885 000			349 000	768 000
																P76	74,2	10 760			859	12 460	465 000	1 025 000			407 000	897 000
		52,1	35.00	12,7	0.498	152,5	6.004	149,3	5.879	51,5	34.58			2,5	7.60	C52	67,0	9 710			597	8 660	346 000	763 000			319 000	703 000
																N56	70,2	10 180			637	9 240	370 000	814 000			339 000	746 000
																C66	80,3	11 640			757	10 980	438 000	966 000			387 000	853 000
																P76	89,7	13 010			875	12 700	508 000	1 119 000			452 000	996 000
		56,6	38.00	13,7	0.540	150,4	5.920	147,2	5.795	55,5	37.26			2,0	4.40	C52	73,6	10 680			597	8 660	373 000	822 000			346 000	767 000
																N56	78,5	11 390			637	9 240	398 000	877 000			370 000	814 000
																C66	92,5	13 420			757	10 980	473 000	1 041 000			423 000	931 000
																P76	104,2	15 110			875	12 700	547 000	1 205 000			493 000	1 087 000

1) These values are given for guidance.

TABLE 20 – **Round thread casing – Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint strength			
										Plain end		Threads and coupling					Collapse[1]		Internal yield (87.5 % E)						Short thread		Long thread	
												Short		Long					Short thread		Long thread							
										W_{pe}		e_w		e_w															
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf	daN	lbf
193,7	7.625	35,7	24.00	7,6	0.300	178,5	7.025	175,3	6.900	35,0	23.47	7,2	15.80			H28	14,1	2 040	190	2 750			125 000	276 000	96 000	212 000		
																J38	19,9	2 890	285	4 140	285	4 140	188 000	414 000	143 000	315 000	157 000	346 000
		39,3	26.40	8,3	0.328	177,0	6.969	173,8	6.844	38,1	25.56	6,9	15.20	8,6	19.00	K38	19,9	2 890	285	4 140	285	4 140	188 000	414 000	155 000	342 000	171 000	377 000
																C52	22,6	3 280			390	5 650	256 000	564 000			209 000	461 000
																N56	23,4	3 400			415	6 020	273 000	602 000			222 000	490 000
																C66	25,6	3 710			493	7 150	324 000	714 000			254 000	560 000
		44,2	29.70	9,5	0.375	174,7	6.875	171,5	6.750	43,3	29.04			7,9	17.40	C52	32,2	4 670			445	6 450	291 000	641 000			246 000	542 000
																N56	33,0	4 790			475	6 890	310 000	683 000			261 000	575 000
																C66	35,3	5 120			564	8 180	367 000	811 000			299 000	659 000
																P76	36,8	5 340			653	9 470	427 000	940 000			349 000	769 000
		50,2	33.70	10,9	0.430	171,9	6.765	168,7	6.640	49,2	33.04			7,2	15.80	C52	43,6	6 320			510	7 400	331 000	729 000			288 000	635 000
																N56	45,2	6 560			545	7 900	353 000	778 000			306 000	674 000
																C66	50,1	7 260			647	9 380	419 000	923 000			350 000	772 000
																P76	54,1	7 850			749	10 860	485 000	1 069 000			409 000	901 000
		58,0	39.00	12,7	0.500	168,3	6.625	165,1	6.500	56,7	38.05			6,2	13.60	C52	58,1	8 430			594	8 610	381 000	839 000			341 000	751 000
																N56	60,7	8 810			633	9 180	406 000	895 000			362 000	798 000
																C66	68,8	9 980			752	10 900	483 000	1 063 000			415 000	914 000
																P76	76,3	11 060			870	12 620	559 000	1 231 000			484 000	1 066 000
219,1	8.625	35,7	24.00	6,7	0.264	205,7	8.097	202,5	7.972	35,1	23.57	10,7	23.60			J38	9,4	1 370	203	2 950			173 000	381 000	111 000	244 000		
																K38	9,4	1 370	203	2 950			173 000	381 000	119 000	263 000		
		41,7	28.00	7,7	0.304	203,6	8.017	200,5	7.892	40,3	27.02	10,1	22.20			H28	11,3	1 640	170	2 470			144 000	318 000	106 000	233 000		
																H28	15,2	2 210	197	2 860			166 000	366 000	127 000	279 000		
		47,6	32.00	8,9	0.352	201,2	7.921	198,0	7.796	46,3	31.10	9,4	20.80	12,5	27.60	J38	17,4	2 530	271	3 930	271	3 930	228 000	503 000	169 000	372 000	189 000	417 000
																K38	17,4	2 530	271	3 930	271	3 930	228 000	503 000	183 000	402 000	205 000	452 000
		53,6	36.00	10,2	0.400	198,8	7.825	195,6	7.700	52,3	35.14	8,8	19.40	11,5	25.60	J38	23,8	3 450	308	4 460	308	4 460	258 000	568 000	197 000	434 000	221 000	486 000
																K38	23,8	3 450	308	4 460	308	4 460	258 000	568 000	212 000	468 000	239 000	526 000
																C52	27,7	4 020			420	6 090	352 000	775 000			294 000	648 000
																N56	28,3	4 100			447	6 490	375 000	827 000			312 000	688 000
																C66	30,1	4 360			532	7 710	446 000	982 000			358 000	789 000
		59,5	40.00	11,4	0.450	196,2	7.725	193,0	7.600	58,5	39.29			10,8	23.80	C52	36,9	5 350			472	6 850	394 000	867 000			337 000	742 000
																N56	38,1	5 520			503	7 300	420 000	925 000			358 000	788 000
																C66	41,4	6 010			598	8 670	498 000	1 098 000			410 000	904 000
																P76	44,0	6 380			692	10 040	577 000	1 271 000			479 000	1 055 000
		65,5	44.00	12,7	0.500	193,7	7.625	190,5	7.500	64,6	43.39			9,9	21.80	C52	46,1	6 680			525	7 610	434 000	957 000			379 000	834 000
																N56	47,9	6 950			560	8 120	464 000	1 021 000			403 000	887 000
																C66	53,3	7 730			665	9 640	551 000	1 213 000			462 000	1 017 000
																P76	57,9	8 400			769	11 160	637 000	1 404 000			538 000	1 186 000
		72,9	49.00	14,2	0.557	190,8	7.511	187,6	7.386	71,5	48.00			8,9	19.60	C52	56,5	8 200			585	8 480	481 000	1 059 000			426 000	939 000
																N56	59,1	8 570			623	9 040	513 000	1 129 000			453 000	997 000
																C66	66,8	9 690			741	10 740	609 000	1 341 000			519 000	1 144 000
																P76	73,9	10 720			857	12 430	705 000	1 553 000			606 000	1 335 000
244,5	9.625	48,1	32.30	7,9	0.312	228,6	9.001	224,6	8.845	46,2	31.03	11,1	24.40			H28	9,7	1 400	157	2 270			165 000	365 000	115 000	254 000		
																H28	12,0	1 710	176	2 560			186 000	410 000	133 000	294 000		
		53,6	36.00	8,9	0.352	226,6	8.921	222,6	8.765	51,9	34.86	10,4	23.00	14,5	32.00	J38	13,9	2 020	243	3 520	243	3 520	256 000	564 000	179 000	394 000	206 000	453 000
																K38	13,9	2 020	243	3 520	243	3 520	256 000	564 000	192 000	423 000	222 000	489 000
																J38	17,7	2 570	272	3 950	272	3 950	286 000	630 000	205 000	452 000	236 000	520 000
																K38	17,7	2 570	272	3 950	272	3 950	286 000	630 000	221 000	486 000	255 000	561 000
		59,5	40.00	10,0	0.395	224,4	8.835	220,6	8.679	58,0	38.94	9,7	21.40	13,6	30.00	C52	20,5	2 980			372	5 390	390 000	859 000			315 000	694 000
																N56	21,3	3 090			396	5 750	416 000	916 000			335 000	737 000
																C66	23,0	3 330			470	6 820	494 000	1 088 000			385 000	847 000

1) These values are given for guidance.

TABLE 20 — **Round thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint strength			
										Plain end		Threads and coupling					Collapse[1]		Internal yield (87.5 % E)						Short thread		Long thread	
												Short		Long					Short thread		Long thread							
										W_{pe}		e_w		e_w															
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf	daN	lbf
244,5	9.625	64,7	43.50	11,1	0.435	222,4	8.755	218,4	8.599	63,6	42.70			12,8	28.20	C52	25,9	3 750			409	5 930	428 000	942 000			352 000	776 000
																N56	26,3	3 810			436	6 330	456 000	1 005 000			375 000	825 000
																C66	28,5	4 130			518	7 510	542 000	1 193 000			430 000	948 000
																P76	30,5	4 430			600	8 700	627 000	1 381 000			502 000	1 106 000
		70,0	47.00	12,0	0.472	220,5	8.681	216,5	8.525	68,7	46.14			12,1	26.60	C52	31,9	4 630			444	6 440	462 000	1 018 000			387 000	852 000
																N56	32,8	4 750			474	6 870	493 000	1 086 000			411 000	905 000
																C66	36,0	5 080			561	8 150	586 000	1 290 000			472 000	1 040 000
																P76	36,6	5 310			651	9 440	678 000	1 493 000			551 000	1 213 000
		79,6	53.50	13,8	0.545	216,8	8.535	212,8	8.379	78,7	52.85			10,6	23.40	C52	44,0	6 380			512	7 430	529 000	1 166 000			454 000	999 000
																N56	45,6	6 620			547	7 930	565 000	1 244 000			482 000	1 062 000
																C66	50,5	7 330			649	9 410	671 000	1 477 000			554 000	1 220 000
																P76	54,7	7 930			752	10 900	775 000	1 710 000			646 000	1 422 000

1) These values are given for guidance.

TABLE 20 — **Round thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass				Grade of steel	Pressure				Load corresponding to pipe body proof stress		Joint strength (short)	
										Plain end		Threads and coupling (short)			Collapse[1]		Internal yield (87.5 % E) (short)					
										W_{pe}		e_w										
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf
273	10.750	48,7	32.75	7,1	0.279	258,9	10.192	254,9	10.036	46,5	31.20	13,2	29.00	H28	6,1	880	126	1 820	167 000	367 000	93 000	205 000
		60,3	40.50	8,9	0.350	255,3	10.050	251,3	9.894	57,9	38.88	12,0	26.40	H28	9,8	1 420	157	2 280	207 000	457 000	143 000	314 000
														J38	10,9	1 580	216	3 130	286 000	629 000	191 000	420 000
														K38	10,9	1 580	216	3 130	286 000	629 000	204 000	450 000
		67,7	45.50	10,2	0.400	252,7	9.950	248,7	9.794	65,9	44.22	11,1	24.40	J38	14,4	2 090	247	3 580	325 000	715 000	224 000	493 000
														K38	14,4	2 090	247	3 580	325 000	715 000	240 000	528 000
		75,9	51.00	11,4	0.450	250,2	9.850	246,2	9.694	73,7	49.50	10,3	22.60	J38	18,6	2 700	278	4 030	364 000	801 000	256 000	565 000
														K38	18,6	2 700	278	4 030	364 000	801 000	275 000	606 000
														C52	21,4	3 100	379	5 490	496 000	1 092 000	343 000	756 000
														N56	22,2	3 220	404	5 860	529 000	1 165 000	365 000	804 000
														C66	24,1	3 490	480	6 960	628 000	1 384 000	421 000	927 000
														P76	25,3	3 670	556	8 060	727 000	1 602 000	490 000	1 080 000
		82,6	55.50	12,6	0.495	247,9	9.760	243,9	9.604	80,8	54.21	9,4	20.80	C52	27,2	3 950	417	6 040	543 000	1 196 000	382 000	842 000
														N56	27,7	4 020	445	6 450	579 000	1 276 000	406 000	895 000
														C66	29,6	4 300	528	7 660	688 000	1 515 000	469 000	1 032 000
														P76	31,9	4 630	611	8 860	796 000	1 754 000	546 000	1 203 000
		90,3	60.70	13,0	0.545	245,4	9.660	241,4	9.504	88,5	59.40	8,5	18.30	P76	40,4	5 860	673	9 760	875 000	1 922 000	607 000	1 338 000
		97,8	65.70	15,1	0.595	242,8	9.560	238,8	9.404	96,1	64.53	7,6	16.80	P76	51,6	7 490	734	10 650	948 000	2 088 000	668 000	1 472 000
298,5	11.750	62,5	42.00	8,5	0.333	281,5	11.084	277,5	10.928	60,5	40.60	13,4	29.60	H28	7,4	1 070	137	1 980	217 000	478 000	139 000	307 000
		69,9	47.00	9,5	0.375	279,4	11.000	275,4	10.844	67,9	45.56	12,5	27.60	J38	10,4	1 510	212	3 070	335 000	737 000	217 000	477 000
														K38	10,4	1 510	212	3 070	335 000	737 000	231 000	509 000
		80,4	54.00	11,1	0.435	276,3	10.880	272,3	10.724	78,3	52.57	11,4	25.00	J38	14,3	2 070	245	3 560	386 000	850 000	258 000	568 000
														K38	14,3	2 070	245	3 560	386 000	850 000	275 000	606 000
		89,3	60.00	12,4	0.489	273,6	10.772	269,6	10.616	87,6	58.81	10,3	22.60	J38	18,4	2 660	276	4 010	432 000	952 000	295 000	649 000
														K38	18,3	2 660	276	4 010	432 000	952 000	315 000	693 000
														C52	21,2	3 070	376	5 460	589 000	1 298 000	395 000	869 000
														N56	21,9	3 180	402	5 830	628 000	1 384 000	419 000	924 000
														C66	23,7	3 440	477	6 920	746 000	1 643 000	484 000	1 066 000
339,7	13.375	71,4	48.00	8,4	0.330	323,0	12.715	319,0	12.559	68,5	45.98	15,1	33.20	H28	5,3	770	119	1 730	246 000	541 000	146 000	322 000
		81,1	54.50	9,7	0.380	320,4	12.615	316,4	12.459	78,6	52.74	14,0	30.80	J38	7,8	1 130	188	2 730	387 000	853 000	233 000	514 000
														K38	7,8	1 130	188	2 730	387 000	853 000	248 000	547 000
		90,8	61.00	10,9	0.430	317,9	12.515	313,9	12.359	88,6	59.45	12,9	28.40	J38	10,6	1 540	213	3 090	437 000	962 000	270 000	595 000
														K38	10,6	1 540	213	3 090	437 000	962 000	287 000	633 000
		101,2	68.00	12,2	0.480	315,3	12.415	311,3	12.259	98,5	66.11	11,7	25.80	J38	13,4	1 950	238	3 450	485 000	1 069 000	306 000	675 000
														K38	13,4	1 950	238	3 450	485 000	1 069 000	326 000	718 000
		107,1	72.00	13,1	0.514	313,6	12.347	309,6	12.191	105,2	70.60	11,0	24.20	C52	17,9	2 590	348	5 040	707 000	1 558 000	444 000	978 000
														N55	18,4	2 670	371	5 380	754 000	1 661 000	472 000	1 040 000
406,4	16.000	96,7	65.00	9,5	0.375	387,4	15.250	382,6	15.069	93,2	62.58	19,3	42.60	H28	4,6	670	113	1 640	334 000	736 000	199 000	439 000
		111,6	75.00	11,1	0.438	384,1	15.124	379,4	14.938	108,3	72.72	17,3	38.20	J38	7,0	1 020	181	2 630	535 000	1 178 000	322 000	710 000
														K38	7,0	1 020	181	2 630	535 000	1 178 000	341 000	752 000
		125,0	84.00	12,6	0.495	381,3	15.010	376,5	14.822	122,1	81.97	15,5	34.20	J38	9,7	1 410	205	2 980	602 000	1 326 000	371 000	817 000
														K38	9,7	1 410	205	2 980	602 000	1 326 000	393 000	865 000
473,1	18.625	130,2	87.50	11,1	0.435	451,0	17.75	446,2	17.567	125,9	84.51	33,4	73.60	H28	4,3	630	113	1 640	451 000	994 000	254 000	559 000
														J38	4,3	630	155	2 250	621 000	1 367 000	342 000	754 000
														K38	4,3	630	155	2 250	621 000	1 367 000	360 000	794 000

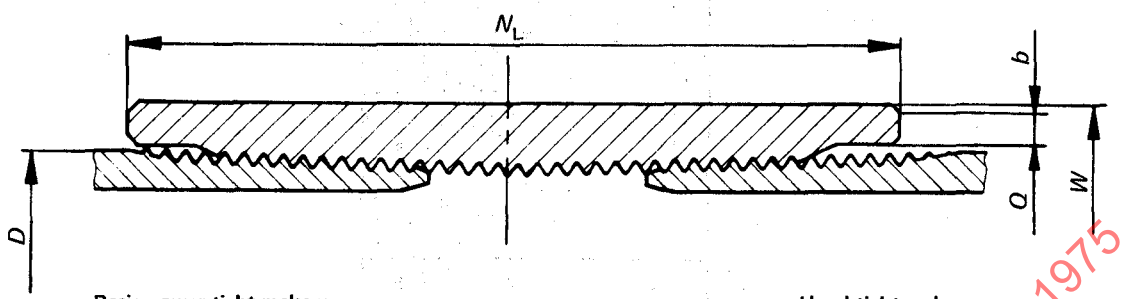
1) These values are given for guidance.

TABLE 20 — **Round thread casing — Dimensions and characteristics** (*concluded*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint strength			
										Plain end		Threads and coupling					Collapse[1]		Internal yield (87,5 % E)						Short thread		Long thread	
												Short		Long					Short thread		Long thread							
										W_{pe}		e_w		e_w															
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf	daN	lbf
508	20.000	139,9	94.00	11,1	0.438	485,7	19.124	481,0	18.936	136,2	91.41	22,3	49.00	28,7	63.20	H28	3,6	520	105	1 530			489 000	1 077 000	264 000	581 000		
																J38	3,6	520	145	2 110	145	2 110	672 000	1 480 000	356 000	784 000	411 000	907 000
																K38	3,6	520	145	2 110	145	2 110	672 000	1 480 000	374 000	824 000	434 000	955 000
		158,5	106.50	12,7	0.500	482,6	19.000	477,8	18.812	155,2	104.13	19,4	42.80	24,5	54.00	J38	5,3	770	166	2 410	166	2 410	765 000	1 685 000	414 000	913 000	479 000	1 057 000
																K38	5,3	770	166	2 410	166	2 410	765 000	1 685 000	436 000	960 000	505 000	1 113 000
		198,0	133.00	16,1	0.635	475,7	18.730	471,0	18.542	195,6	131.33	13,6	30.00	18,5	40.60	J38	10,3	1 500	211	3 060	211	3 060	965 000	2 125 000	541 000	1 192 000	626 000	1 380 000
																K38	10,3	1 500	211	3 060	211	3 060	965 000	2 125 000	569 000	1 253 000	660 000	1 453 000

1) These values are given for guidance.

TABLE 21 — **Round thread casing — Dimensions and masses of couplings**



Basic power-tight make-up

Hand-tight make-up

1		2		3		4		5		6		7		8	
Nominal size[1]		Outside diameter W[2]		Length N_L				Diameter of recess Q		Width of bearing face b		Mass			
				Short		Long						Short		Long	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb	kg	lb
114,3	4.500	127	5.000	158,8	6.25	177,8	7.00	116,7	4.59	4,0	0.15	3,65	8.05	4,12	9.07
127	5.000	141,3	5.563	165,1	6.50	196,8	7.75	129,4	5.09	4,8	0.18	4,62	10.18	5,70	12.56
139,7	5.500	153,7	6.050	171,4	6.75	203,2	8.00	142,2	5.59	3,2	0.12	5,19	11.44	6,37	14.03
168,3	6.625	187,7	7.390	184,2	7.25	222,2	8.75	170,7	6.71	6,4	0.25	9,07	19.97	11,27	24.82
177,8	7.000	194,5	7.650	184,2	7.25	228,6	9.00	180,2	7.09	4,8	0.18	8,33	18.34	10,75	23.67
193,7	7.625	215,9	8.500	190,5	7.50	235,0	9.25	196,1	7.71	6,4	0.25	12,23	26.93	15,54	34.23
219,1	8.625	244,5	9.625	196,8	7.75	254,0	10.00	221,5	8.71	7,1	0.28	16,15	35.58	21,56	47.48
244,5	9.625	269,9	10.625	196,8	7.75	266,7	10.50	246,9	9.71	7,1	0.28	17,94	39.51	25,32	55.77
273	10.750	298,5	11.750	203,2	8.00	.....	.....	275,4	10.84	7,1	0.28	20,67	45.53	.....	.....
298,5	11.750	323,9	12.750	203,2	8.00	.....	.....	300,8	11.84	7,1	0.28	22,52	49.61	.....	.....
339,7	13.375	365,1	14.375	203,2	8.00	.....	.....	342,1	13.46	7,9	0.31	25,53	56.23	.....	.....
406,4	16.000	431,8	17.000	228,6	9.00	.....	.....	408,8	16.09	7,9	0.31	35,86	78.98	.....	.....
473	18.625	508	20.000	228,6	9.00	.....	.....	475,5	18.71	7,9	0.31	54,00	118.94	.....	.....
508	20.000	533,4	21.000	228,6	9.00	292,1	11.50	510,4	20.09	7,9	0.31	44,61	98.25	57,54	126.74

1) The nominal size of the coupling is equal to the corresponding outside pipe diameter D.

2) Tolerance on outside diameter W, ± 1 %, but not greater than ± 3,18 mm (1/8 in).

TABLE 22 — Buttress thread casing — Dimensions and characteristics

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure								Load corresponding to pipe body proof stress		Joint efficiency				Joint strength							
										Plain end		Threads and coupling					Collapse		Internal yield (87,5 % E)										Normal coupling		Special clearance coupling		Normal coupling				Special clearance coupling			
												Normal		Special clearance					Normal coupling				Special clearance coupling															
										W_{pe}		e_w		e_w					Same grade		Higher grade		Same grade		Higher grade				Same grade	Higher grade	Same grade	Higher grade	Same grade		Higher grade		Same grade		Higher grade	
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	%	%	%	%	daN	lbf	daN	lbf	daN	lbf	daN	lbf
114,3	4.500	15,6	10.50	5,7	0.224	102,9	4.052	99,8	3.927	15,2	10.23	2,3	5.00	1,2	2.56	J38	27,6	4 010	330	4 790	330 N	4 790 N	330	4 790	330 N	4 790 N	75 000	165 000	100 (144)	100 (209)	100 (112)	100 (163)	92 000	203 000	92 000	203 000	92 000	203 000	92 000	203 000
																K38	27,6	4 010	330	4 790	330 N	4 790 N	330	4 790	330 N	4 790 N	75 000	165 000	100 (144)	100 (209)	100 (112)	100 (163)	113 000	249 000	113 000	249 000	113 000	249 000	113 000	249 000
		17,3	11.60	6,4	0.250	101,6	4.00	98,4	3.875	16,9	11.35	2,1	4.60	1,0	2.16	J38	34,2	4 960	369	5 350	369 N	5 350 N	369	5 350	369 N	5 350 N	84 000	184 000	100 (134)	100 (189)	100 (101)	100 (147)	102 000	225 000	102 000	225 000	102 000	225 000	102 000	225 000
																K38	34,2	4 960	369	5 350	369 N	5 350 N	369	5 350	369 N	5 350 N	84 000	184 000	100 (130)	100 (189)	100 (101)	100 (147)	126 000	277 000	126 000	277 000	126 000	277 000	126 000	277 000
																C52	42,3	6 130	503	7 290			503	7 290			114 000	250 000	100 (130)		100 (101)		131 000	288 000			131 000	288 000		
																N56	43,8	6 350	536	7 780	536 P	7 780 P	536	7 780	536 P	7 780 P	121 000	267 000	100 (130)	100 (179)	100 (101)	100 (139)	138 000	304 000	138 000	304 000	138 000	304 000	138 000	304 000
																C66	48,3	7 010	637	9 240			637	9 240			144 000	317 000	100 (130)		100 (101)		148 000	325 000			148 000	325 000		
																P76	52,1	7 560	737	10 690	737 V	10 690 V	737	10 690	737 V	10 690 V	167 000	367 000	100 (130)	100 (177)	100 (101)	100 (138)	175 000	385 000	175 000	385 000	175 000	385 000	175 000	385 000
		20,1	13.50	7,4	0.290	99,6	3.920	96,4	3.795	19,4	13.04	1,8	4.00	0,7	1.56	C52	56,3	8 170	583	8 460			516	7 490			131 000	288 000	100 (113)		88		150 000	331 000			145 000	320 000		
																N56	58,9	8 540	622	9 020	622 P	9 020 P	551	7 990	622 P	9 020 P	139 000	307 000	100 (113)	100 (155)	88	100 (121)	158 000	349 000	158 000	349 000	153 000	337 000	158 000	349 000
																C66	66,5	9 650	738	10 710			654	9 490			165 000	364 000	100 (113)		88		170 000	374 000			160 000	353 000		
																P76	73,6	10 670	856	12 410	856 V	12 410 V	758	10 990	856 V	12 410 V	192 000	422 000	100 (113)	100 (154)	88	100 (120)	201 000	443 000	201 000	443 000	191 000	421 000	201 000	443 000
		22,5	15.10	8,6	0.337	97,2	3.826	94,0	3.701	22,3	14.98	1,5	3.20	0,4	0.76	C66	87,9	12 750	802	11 630			654	9 490			190 000	419 000	98		76									
																P76	98,7	14 320	928	13 460	998 V	14 420 V	758	10 990	994 V	14 420 V	220 000	483 000	98	100 (134)	76	100 (104)	231 000	509 000	231 000	509 000	191 000	421 000	231 000	509 000
127	5.000	19,4	13.00	6,4	0.253	114,1	4.494	111,0	4.369	19,1	12.83	3,0	6.60	1,1	2.42	J38	28,5	4 140	336	4 870	336 N	4 870 N	336	4 870	336 N	4 870 N	94 000	208 000	100 (143)	100 (208)	100 (101)	100 (146)	114 000	252 000	114 000	252 000	114 000	252 000	114 000	252 000
																K38	28,5	4 140	336	4 870	336 N	4 870 N	336	4 870	336 N	4 870 N	94 000	208 000	100 (143)	100 (208)	100 (101)	100 (146)	140 000	309 000	140 000	309 000	140 000	309 000	140 000	309 000
		22,3	15.00	7,5	0.296	112,0	4.408	108,8	4.283	22,2	14.87	2,6	5.80	0,7	1.62	J38	33,3	5 550	393	5 700	393 N	5 700 N	353	5 130	393 N	5 700 N	109 000	241 000	100 (124)	100 (180)	87	100 (126)	133 000	293 000	133 000	293 000	130 000	287 000	133 000	293 000
																K38	33,3	5 550	393	5 700	393 N	5 700 N	353	5 130	393 N	5 700 N	109 000	241 000	100 (124)	100 (180)	87	100 (126)	163 000	359 000	163 000	359 000	163 000	359 000	163 000	359 000
																C52	48,1	6 970	536	7 770			482	6 990			149 000	328 000	100 (124)		87		170 000	375 000			165 000	364 000		
																N56	50,0	7 250	572	8 290	572 P	8 290 P	514	7 460	572 P	8 290 P	159 000	350 000	100 (124)	100 (170)	87	100 (119)	180 000	396 000	180 000	396 000	179 000	383 000	180 000	396 000
																C66	55,8	8 090	678	9 840			611	8 860			189 000	416 000	100 (124)		87		192 000	424 000			183 000	402 000		
																P76	60,9	8 830	786	11 400	786 V	11 400 V	707	10 250	786 V	11 400 V	218 000	481 000	100 (124)	100 (168)	87	100 (118)	228 000	503 000	228 000	503 000	217 000	479 000	228 000	503 000
		26,8	18.00	9,2	0.362	108,6	4.276	105,4	4.151	26,7	17.93	2,0	4.40	0,1	0.22	C52	69,0	10 000	640	9 290			482	6 990			180 000	396 000	100 (102)		72		205 000	452 000			165 000	364 000		
																N56	72,3	10 490	683	9 910	699 P	10 140 P	514	7 460	699 P	10 140 P	192 000	422 000	100 (102)	100 (141)	72	99	217 000	477 000	217 000	477 000	179 000	383 000	217 000	477 000
																C66	83,0	12 040	811	11 770			611	8 860			227 000	501 000	100 (102)		72		232 000	512 000			183 000	402 000		
																P76	92,7	13 450	939	13 620	961 V	13 940 V	707	10 250	961 V	13 940 V	263 000	580 000	100 (102)	100 (140)	72	98	275 000	606 000	275 000	606 000	217 000	479 000	275 000	606 000

TABLE 22 — **Buttress thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure								Load corresponding to pipe body proof stress		Joint efficiency				Joint strength							
										Plain and		Threads and coupling					Collapse		Internal yield (87.5 % E)								Normal coupling		Special clearance coupling		Normal coupling				Special clearance coupling			
												Normal		Special clearance					Normal coupling				Special clearance coupling															
																			Same grade		Higher grade		Same grade		Higher grade						Same grade		Higher grade		Same grade		Higher grade	
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	W_{pe} kg/m	lb/ft	e_w kg	lb	e_w kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	%	%	%	%	daN	lbf	daN	lbf	daN	lbf	daN	lbf
139,7	5.500	23,1	15.50	7,0	0.275	125,7	4.950	122,6	4.825	22,9	15.35	2,9	6.40	1,0	2.10	J38	27,9	4 040	332	4 810	332 N	4 810 N	326	4 730	332 N	4 810 N	113 000	248 000	100 (129)	100 (188)	93	100 (135)	136 000	300 000	136 000	300 000	136 000	300 000	136 000	300 000
																K38	27,9	4 040	332	4 810	332 N	4 810 N	326	4 730	332 N	4 810 N	113 000	248 000	100 (129)	100 (188)	93	100 (135)	166 000	366 000	166 000	366 000	166 000	366 000	166 000	366 000
		25,3	17.00	7,7	0.304	124,3	4.892	121,1	4.767	25,1	16.87	2,6	5.80	0,7	1.50	J38	33,9	4 910	367	5 320	367 N	5 320 N	326	4 730	367 N	5 320 N	124 000	273 000	100 (118)	100 (171)	85	100 (123)	149 000	329 000	149 000	329 000	144 000	318 000	149 000	329 000
																K38	33,9	4 910	367	5 320	367 N	5 320 N	326	4 730	367 N	5 320 N	124 000	273 000	100 (118)	100 (171)	85	100 (123)	183 000	402 000	183 000	402 000	183 000	402 000	183 000	402 000
																C52	41,9	6 070	500	7 250			445	6 450			169 000	372 000	100 (118)		85		192 000	423 000			183 000	403 000		
																N56	43,3	6 280	534	7 740	534 P	7 740 P	474	6 880	534 P	7 740 P	180 000	397 000	100 (118)	100 (162)	85	100 (116)	202 000	446 000	202 000	446 000	192 000	424 000	202 000	446 000
																C66	47,8	6 930	634	9 190			563	8 170			214 000	471 000	100 (118)		85		218 000	480 000			202 000	445 000		
																P76	51,1	7 460	734	10 640	734 V	10 640 V	652	9 460	734 V	10 640 V	248 000	546 000	100 (118)	100 (160)	85	100 (115)	258 000	568 000	258 000	568 000	241 000	530 000	258 000	568 000
		29,8	20.00	9,2	0.361	121,4	4.778	118,2	4.653	29,5	19.81	2,1	4.60	0,1	0.30	C52	58,2	8 440	581	8 430			445	6 450			198 000	437 000	100		72		226 000	497 000			183 000	403 000		
																N56	60,9	8 830	620	8 990	634 P	9 190 P	474	6 880	634 P	9 190 P	212 000	466 000	100	100 (138)	72	99	238 000	524 000	238 000	524 000	192 000	424 000	238 000	524 000
																C66	69,0	10 000	736	10 680			563	8 170			251 000	554 000	100		72		256 000	563 000			202 000	445 000		
																P76	76,4	11 080	853	12 360	871 V	12 640 V	652	9 460	871 V	12 640 V	291 000	641 000	100	100 (136)	72	98	303 000	667 000	303 000	667 000	241 000	530 000	303 000	667 000
		34,2	23.00	10,5	0.415	118,6	4.670	115,4	4.545	33,6	22.54	1,5	3.40	−0,4	−0.90	C52	72,1	10 460	581	8 430			445	6 450			226 000	497 000	88		63		250 000	550 000			183 000	403 000		
																N56	76,9	11 160	620	8 990	683 P	10 560 P	474	6 880	652 P	9 460 P	241 000	530 000	88	100 (121)	63	87	263 000	579 000	271 000	596 000	192 000	424 000	241 000	530 000
																C66	89,1	12 920	736	10 680			563	8 170			286 000	630 000	88		63		276 000	608 000			202 000	445 000		
																P76	100,1	14 520	853	12 360	1 001 V	14 520 V	652	9 460	890 V	12 890 V	331 000	729 000	88	100 (120)	63	86	329 000	724 000	345 000	759 000	241 000	530 000	303 000	668 000
168,3	6.625	29,8	20.00	7,3	0.288	153,7	6.049	150,5	5.924	29,0	19.49	6,5	14.40	1,1	2.38	J38	20,5	2 970	288	4 180	288 N	4 180 N	280	4 060	288 N	4 180 N	143 000	315 000	100 (167)	100 (243)	90	100 (121)	170 000	374 000	170 000	374 000	170 000	374 000	170 000	374 000
																K38	20,5	2 970	288	4 180	288 N	4 180 N	280	4 060	288 N	4 180 N	143 000	315 000	100 (167)	100 (243)	90	100 (121)	205 000	453 000	205 000	453 000	205 000	453 000	205 000	453 000
		35,7	24.00	8,9	0.352	150,4	5.921	147,2	5.796	35,1	23.58	5,7	12.60	0,3	0.58	J38	31,4	4 560	352	5 110	352 N	5 110 N	280	4 060	352 N	5 110 N	173 000	382 000	100 (138)	100 (201)	74	100 (108)	205 000	453 000	205 000	453 000	177 000	390 000	205 000	453 000
																K38	31,4	4 560	352	5 110	352 N	5 110 N	280	4 060	352 N	5 110 N	173 000	382 000	100 (138)	100 (201)	74	100 (108)	249 000	548 000	249 000	548 000	224 000	494 000	236 000	520 000
																C52	38,4	5 570	481	6 970			382	5 540			236 000	520 000	100		74		265 000	583 000			224 000	494 000		
																N56	39,7	5 760	513	7 440	513 P	7 440 P	407	5 910	513 P	7 440 P	252 000	555 000	100 (138)	100 (190)	74	100 (102)	279 000	615 000	279 000	615 000	236 000	520 000	279 000	615 000
																C66	43,4	6 290	608	8 820			484	7 020			299 000	659 000	100		74		302 000	665 000			248 000	546 000		
																P76	46,3	6 710	705	10 230	705 V	10 230 V	560	8 120	705 V	10 230 V	346 000	763 000	100 (138)	100 (188)	74	100 (101)	357 000	786 000	357 000	786 000	295 000	650 000	357 000	786 000
		41,7	28.00	10,6	0.417	147,1	5.791	143,9	5.666	41,2	27.65	2,8	10.60	−0,6	−1.42	C52	54,0	7 830	570	8 260			382	5 540			277 000	610 000	100 (118)		63		310 000	683 000			224 000	494 000		
																N56	56,3	8 170	607	8 810	607 P	8 810 P	407	5 910	560 P	8 120 P	296 000	651 000	100 (118)	100 (162)	63	87	327 000	721 000	327 000	721 000	236 000	520 000	295 000	650 000
																C66	63,4	9 200	721	10 460			484	7 020			350 000	773 000	100 (118)		63		354 000	780 000			248 000	546 000		
																P76	69,9	10 140	836	12 120	836 V	12 120 V	560	8 120	764 V	11 080 V	406 000	895 000	100 (118)	100 (160)	63	86	419 000	922 000	419 000	922 000	295 000	650 000	378 000	832 000

TABLE 22 — Buttress thread casing — Dimensions and characteristics (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass: Plain end		Mass: Threads and coupling — Normal		Mass: Threads and coupling — Special clearance		Grade of steel	Pressure: Collapse		Pressure: Internal yield (87.5 % E) — Normal coupling: Same grade		Pressure: Internal yield (87.5 % E) — Normal coupling: Higher grade		Pressure: Internal yield (87.5 % E) — Special clearance coupling: Same grade		Pressure: Internal yield (87.5 % E) — Special clearance coupling: Higher grade		Load corresponding to pipe body proof stress		Joint efficiency — Normal coupling: Same grade	Joint efficiency — Normal coupling: Higher grade	Joint efficiency — Special clearance coupling: Same grade	Joint efficiency — Special clearance coupling: Higher grade	Joint strength — Normal coupling: Same grade		Joint strength — Normal coupling: Higher grade		Joint strength — Special clearance coupling: Same grade		Joint strength — Special clearance coupling: Higher grade	
										W_{pe}		e_w		e_w																									
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	%	%	%	%	daN	lbf	daN	lbf	daN	lbf	daN	lbf
168,3	6.625															C52	67,8	9 830	635	9 200			382	5 540			312 000	688 000	100 (104)		56		350 000	771 000			224 000	494 000		
		47,6	32.00	12,1	0.475	114,2	5.675	141,0	5.550	46,5	31.20	4,1	9.00	− 1,4	− 3.02	N56	71,2	10 320	677	9 820	692 P	10 040 P	407	5 910	560 P	8 120 P	333 000	734 000	100 (104)	100 (143)	56	77	370 000	814 000	370 000	814 000	236 000	520 000	295 000	650 000
																C66	81,4	11 800	804	11 660			484	7 020			396 000	872 000	100 (104)		56		400 000	880 000			248 000	546 000		
																P76	91,0	13 800	931	13 500	951 V	13 800 V	560	8 120	764 V	11 080 V	458 000	1 009 000	100 (104)	100 (142)	56	77	472 000	1 040 000	472 000	1 040 000	295 000	650 000	378 000	832 000
177,8	7.000															J38	22,5	3 270	301	4 360	301 N	4 360 N	272	3 950	301 N	4 360 N	166 000	366 000	100 (133)	100 (194)	84	100 (127)	196 000	432 000	196 000	432 000	191 000	421 000	196 000	432 000
																K38	22,5	3 270	301	4 360	301 N	4 360 N	272	3 950	301 N	4 360 N	166 000	366 000	100 (133)	100 (194)	84	100 (122)	237 000	522 000	237 000	522 000	237 000	522 000	237 000	522 000
		34,2	23.00	8,05	0.317	161,7	6.366	158,5	6.241	33,7	22.63	5,0	11.00	0,7	1.60	C52	26,0	3 770	410	5 940			371	5 380			227 000	499 000	100 (133)		84		253 000	557 000			242 000	533 000		
																N56	26,4	3 830	437	6 340	437 P	6 340 P	396	5 740	437	6 340	242 000	532 000	100 (133)	100 (187)	84	100 (115)	267 000	588 000	267 000	588 000	255 000	561 000	267 000	588 000
																C66	28,6	4 150	519	7 530			470	6 810			287 000	632 000	100 (133)		84		289 000	636 000			267 000	589 000		
																J38	29,8	4 320	343	4 980	343 N	4 980 N	272	3 950	343 N	4 980 N	188 000	415 000	100 (118)	100 (171)	74	100 (107)	222 000	490 000	222 000	490 000	191 000	421 000	222 000	490 000
																K38	29,8	4 320	343	4 980	343 N	4 980 N	272	3 950	343 N	4 980 N	188 000	415 000	100 (118)	100 (171)	74	100 (107)	269 000	592 000	269 000	592 000	242 000	533 000	255 000	561 000
																C52	36,2	5 250	468	6 790			371	5 380			257 000	566 000	100 (118)		74		286 000	631 000			242 000	533 000		
		38,7	26.00	9,2	0.362	159,4	6.276	156,2	6.151	38,2	25.66	4,4	9.60	0,1	0.20	N56	37,3	5 410	499	7 240	499 P	7 240 P	396	5 740	499 P	7 240 P	274 000	604 000	100 (111)	100 (162)	74	100 (107)	303 000	667 000	303 000	667 000	255 000	561 000	303 000	667 000
																C66	40,5	5 870	593	8 600			470	6 810			325 000	717 000	100 (118)		74		328 000	722 000			267 000	589 000		
																P76	42,8	6 210	687	9 960	687 V	9 960 V	544	7 890	687 V	9 960 V	377 000	830 000	100 (118)	100 (160)	74	100	387 000	853 000	387 000	853 000	319 000	702 000	387 000	853 000
																C52	46,6	6 760	527	7 650			371	5 380			288 000	634 000	100 (105)		66		321 000	707 000			242 000	533 000		
																N56	48,4	7 020	563	8 160	563 P	8 160 P	396	5 740	544 P	7 890 P	307 000	676 000	100 (105)	100 (145)	66	90	339 000	746 000	339 000	746 000	255 000	561 000	319 000	702 000
		43,2	29.00	10,4	0.408	157,1	6.194	153,9	6.059	42,8	28.72	3,7	8.28	− 0,5	− 1.20	C66	53,9	7 820	668	9 690			470	6 810			364 000	802 000	100 (105)		66		367 000	808 000			267 000	589 000		
																P76	58,7	8 510	774	11 220	774 V	11 220 V	544	7 890	742 V	10 760 V	422 000	929 000	100 (105)	100 (143)	66	90	434 000	955 000	434 000	955 000	319 000	702 000	408 000	898 000
																C52	56,7	8 230	547	7 930			371	5 380			317 000	699 000	95		60		354 000	779 000			242 000	533 000		
		47,6	32.00	11,5	0.453	154,8	6.094	151,6	5.969	47,2	31.68	3,1	6.80	1,2	2.60	N56	59,3	8 600	583	8 460	625 P	9 060 P	396	5 740	544 P	7 890 P	338 000	745 000	95	100 (131)	60	82	374 000	823 000	374 000	823 000	255 000	561 000	319 000	702 000
																C66	67,1	9 730	693	10 050			470	6 810			402 000	885 000	95		60		405 000	891 000			267 000	589 000		
																P76	74,2	10 760	802	11 640	859	12 460	544	7 890	742 V	10 760 V	465 000	1 025 000	95	100 (130)	60	81	478 000	1 053 000	478 000	1 053 000	319 000	702 000	408 000	898 000
																C52	67,0	9 710	547	7 930			371	5 380			373 000	822 000	87		55		378 000	833 000			242 000	533 000		
		52,1	35.00	12,7	0.498	152,5	6.004	149,3	5.879	51,5	34.58	2,5	5.60	1,7	3.80	N56	70,2	10 180	583	8 460	687 P	9 960 P	396	5 740	544 P	7 890 P	398 000	877 000	87	100 (120)	55	75	398 000	876 000	408 000	898 000	255 000	561 000	319 000	702 000
																C66	80,3	11 640	693	10 050			470	6 810			473 000	1 041 000	87		55		418 000	920 000			267 000	589 000		
																P76	89,7	13 010	802	11 640	945 V	13 700 V	544	7 890	742 V	10 760 V	547 000	1 205 000	87	100 (119)	55	74	498 000	1 096 000	522 000	1 150 000	319 000	702 000	408 000	898 000

TABLE 22 — **Buttress thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure								Load corresponding to pipe body proof stress		Joint efficiency				Joint strength							
										Plain end		Threads and coupling					Collapse		Internal yield (87.5 % E)								Normal coupling		Special clearance coupling		Normal coupling				Special clearance coupling			
												Normal		Special clearance					Normal coupling				Special clearance coupling															
																			Same grade		Higher grade		Same grade		Higher grade						Same grade		Higher grade		Same grade		Higher grade	
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	W_{pe} kg/m	W_{pe} lb/ft	e_w kg	e_w lb	e_w kg	e_w lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	%	%	%	%	daN	lbf	daN	lbf	daN	lbf	daN	lbf
177,8	7.000															C52	73,6	10 680	547	7 390			371	5 380			346 000	763 000	81		51		378 000	833 000			242 000	533 000		
		56,6	38.00	13,7	0.540	150,4	5.920	147,2	5.795	55,5	37.26	1,9	4.20	– 2,4	– 5.20	N56	78,5	11 390	583	8 460	745 P	10 800 P	396	5 740	544 P	7 890 P	370 000	814 000	81	100 (111)	51	70	398 000	876 000	439 000	968 000	255 000	561 000	319 000	702 000
																C66	92,5	13 420	693	10 050			470	6 810			438 000	966 000	81		51		418 000	920 000			267 000	589 000		
																P76	104,2	15 110	802	11 640	1 020 V	14 850 V	544	7 890	742 V	10 760 V	508 000	1 119 000	81	100 (110)	51	69	498 000	1 096 000	563 000	1 239 000	319 000	702 000	408 000	898 000
193,7	7.625															J38	19,9	2 890	285	4 140	285 N	4 140 N	285	4 140	285 N	4 140 N	188 000	414 000	100 (168)	100 (245)	100 (103)	100 (150)	219 000	483 000	219 000	483 000	219 000	483 000	219 000	483 000
																K38	19,9	2 890	285	4 140	285 N	4 140 N	285	4 140	285 N	4 140 N	188 000	414 000	100 (168)	100 (245)	100 (103)	100 (150)	264 000	581 000	264 000	581 000	264 000	581 000	264 000	581 000
		39,3	26.40	8,3	0.328	177,0	6.969	173,8	6.844	38,1	25.56	9,3	20.60	2,8	6.21	C52	22,6	3 280	390	5 650			390	5 650			256 000	564 000	100 (168)		100 (103)		283 000	624 000			283 000	624 000		
																N56	23,4	3 400	415	6 020	415 P	6 020 P	415	6 020	415 P	6 020 P	273 000	602 000	100 (168)	100 (232)	100 (103)	100 (142)	299 000	659 000	299 000	659 000	299 000	659 000	299 000	659 000
																C66	25,6	3 710	493	7 150			493	7 150			324 000	714 000	100 (168)		100 (103)		325 000	716 000			325 000	716 000		
																C52	32,2	4 670	445	6 450			424	6 140			291 000	641 000	100 (198)		91		322 000	709 000			322 000	709 000		
		44,2	29.70	9,5	0.375	174,7	6.875	171,5	6.750	43,3	29.04	8,5	18.80	2,0	4.41	N56	33,0	4 790	475	6 890	475 P	6 890 P	452	6 550	475 P	6 890 P	310 000	683 000	100 (148)	100 (204)	91	100 (125)	340 000	749 000	340 000	749 000	340 000	749 000	340 000	749 000
																C66	35,3	5 120	564	8 180			536	7 780			367 000	811 000	100 (148)		91		369 000	813 000			369 000	813 000		
																P76	36,8	5 340	653	9 470	653 V	9 470 V	621	9 000	653 V	9 470 V	427 000	940 000	100 (148)	100 (202)	91	100 (124)	436 000	960 000	436 000	960 000	436 000	960 000	436 000	960 000
																C52	43,6	6 320	510	7 400			424	6 140			331 000	729 000	100 (130)		82		366 000	805 000			334 000	735 000		
		50,2	33.70	10,9	0.430	171,9	6.767	168,7	6.640	49,2	33.04	7,7	17.00	1,2	2.61	N56	45,2	6 560	545	7 900	545 P	7 900 P	452	6 550	545 P	7 900 P	353 000	778 000	100 (130)	100 (179)	82	100 (110)	387 000	852 000	387 000	852 000	351 000	773 000	387 000	852 000
																C66	50,1	7 260	647	9 380			536	7 780			419 000	923 000	100 (130)		82		420 000	925 000			369 000	812 000		
																P76	54,1	7 850	749	10 860	749 V	10 860 V	621	9 000	749 V	10 860 V	485 000	1 069 000	100 (130)	100 (178)	82	100 (109)	496 000	1 093 000	496 000	1 093 000	439 000	967 000	496 000	1 093 000
																C52	58,1	8 430	594	8 610			424	6 140			381 000	839 000	100 (113)		69		422 000	929 000			334 000	735 000		
		58,0	39.00	12,7	0.500	168,3	6.625	165,1	6.500	56,7	38.05	6,6	14.60	0,1	0.21	N56	60,7	8 010	633	9 180	633 P	9 180 P	452	6 650	621 P	9 000 P	406 000	895 000	100 (113)	100 (156)	69	96	445 000	981 000	445 000	981 000	351 000	773 000	439 000	967 000
																C66	68,8	9 980	752	10 900			536	7 780			483 000	1 063 000	100 (113)		69		484 000	1 065 000			369 000	812 000		
																P76	76,3	11 060	870	12 620	870 V	12 620 V	621	9 000	847 V	12 280 V	559 000	1 231 00	100 (113)	100 (154)	69	95	571 000	1 258 000	571 000	1 258 000	439 000	967 000	562 000	1 237 000
219,1	8.625															J38	17,4	2 530	271	3 930	271 N	3 930 N	271	3 930	271 N	3 930 N	228 000	503 000	100 (177)	100 (258)	97	100 (141)	263 000	579 000	263 000	579 000	263 000	579 000	263 000	579 000
		47,6	32.00	8,9	0.352	201,2	7.921	198,0	7.796	46,3	31.10	12,8	28.20	2,7	6.03	K38	17,4	2 530	271	3 930	271 N	3 930 N	271	3 930	271 N	3 930 N	228 000	503 000	100 (177)	100 (258)	97	100 (141)	313 000	690 000	313 000	690 000	313 000	690 000	313 000	690 000
																J38	23,8	3 450	308	4 460	308 N	4 460 N	280	4 060	308 N	4 460 N	258 000	568 000	100 (157)	100 (229)	86	100 (125)	297 000	654 000	297 000	654 000	297 000	654 000	297 000	654 000
																K38	23,8	3 450	308	4 460	308 N	4 460 N	280	4 060	308 N	4 460 N	258 000	568 000	100 (157)	100 (229)	86	100 (125)	354 000	780 000	354 000	780 000	354 000	780 000	354 000	780 000
		53,6	36.00	10,2	0.400	198,8	7.825	195,6	7.700	52,3	35.14	11,9	28.20	1,8	4.03	C52	27,7	4 020	420	6 090			382	5 530			352 000	775 000	100 (157)		86		385 000	847 000			381 000	839 000		
																N56	28,3	4 100	447	6 490	447 P	6 490 P	407	5 900	447 P	6 490 P	375 000	827 000	100 (157)	100 (216)	86	100 (118)	406 000	895 000	406 000	895 000	401 000	883 000	406 000	895 000
																C66	30,1	4 360	532	7 710			483	7 010			446 000	982 000	100 (157)		86		443 000	976 000			421 000	927 000		

TABLE 22 — **Buttress thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure								Load corresponding to pipe body proof stress		Joint efficiency				Joint strength							
										Plain end		Threads and coupling					Collapse		Internal yield (87.5 % E)								Normal coupling		Special clearance coupling		Normal coupling				Special clearance coupling			
												Normal		Special clearance					Normal coupling				Special clearance coupling															
										W_{pe}		e_w		e_w					Same grade		Higher grade		Same grade		Higher grade															
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	Same grade %	Higher grade %	Same grade %	Higher grade %	daN	lbf	daN	lbf	daN	lbf	daN	lbf
219,1	8.625	59,5	40.00	11,4	0.450	196,2	7.725	193,0	7.600	58,5	39.29	11,0	24.20	0,9	2.03	C52	36,9	5 350	472	6 850			382	5 530			394 000	867 000	100 (140)		77		430 000	947 000			381 000	839 000		
																N56	38,1	5 520	503	7 300	503 P	7 300 P	407	5 900	503 P	7 300 P	420 000	925 000	100 (140)	100 (193)	77	100 (106)	454 000	1 001 000	454 000	1 001 000	401 000	883 000	454 000	1 001 000
																C66	41,4	6 010	598	8 670			483	7 010			498 000	1 098 000	100 (140)		77		496 000	1 092 000			421 000	927 000		
																P76	44,0	6 380	692	10 040	692 V	10 040 V	559	8 110	692 V	10 040 V	577 000	1 271 000	100 (140)	100 (191)	77	100 (105)	585 000	1 288 000	585 000	1 288 000	501 000	1 103 000	585 000	1 288 000
		65,5	44.00	12,7	0.500	193,7	7.625	190,5	7.500	64,6	43.39	10,1	22.20	0	0	C52	46,1	6 680	525	7 610			392	5 530			434 000	957 000	100 (127)		70		475 000	1 046 000			381 000	839 000		
																N56	47,9	6 950	560	8 120	560 P	8 120 P	407	5 900	559 P	8 110 P	464 000	1 021 000	100 (127)	100 (175)	70	96	502 000	1 105 000	502 000	1 105 000	401 000	883 000	501 000	1 103 000
																C66	53,3	7 730	665	9 640			483	7 010			551 000	1 213 000	100 (127)		70		548 000	1 206 000			421 000	927 000		
																P76	57,9	8 400	769	11 160	769 V	11 160 V	559	8 110	763 V	11 060 V	637 000	1 404 000	100 (127)	100 (173)	70	95	646 000	1 423 000	646 000	1 423 000	501 000	1 103 000	641 000	1 412 000
		72,9	49.00	14,2	0.557	190,8	7.511	187,6	7.386	71,5	48.00	9,0	19.80	− 1,1	− 2.37	C52	56,5	8 200	585	8 480			382	5 530			481 000	1 059 000	100 (115)		63		525 000	1 157 000			381 000	839 000		
																N56	59,1	8 570	623	9 040	623 P	9 040 P	407	5 900	559 P	8 110 P	513 000	1 129 000	100 (115)	100 (158)	63	86	555 000	1 222 000	555 000	1 222 000	401 000	883 000	501 000	1 103 000
																C66	66,8	9 690	741	10 740			483	7 010			609 000	1 341 000	100 (115)		63		605 000	1 334 000			421 000	927 000		
																P76	73,9	10 720	857	12 430	857 V	12 430 V	559	8 110	763 V	11 060 V	705 000	1 553 000	100 (115)	100 (157)	63	86	715 000	1 574 000	715 000	1 574 000	501 000	1 103 000	641 000	1 412 000
244,5	9.625	53,6	36.00	8,9	0.352	226,6	8.921	222,6	8.765	51,9	34.86	14,1	31.00	2,9	6.48	J38	13,9	2 020	243	3 520	243 N	3 520 N	243	3 520	243 N	3 520 N	256 000	564 000	100 (176)	100 (256)	96	100 (140)	290 000	639 000	290 000	639 000	290 000	639 000	290 000	639 000
																K38	13,9	2 020	243	3 520	243 N	3 520 N	243	3 520	243 N	3 520 N	256 000	564 000	100 (176)	100 (256)	96	100 (140)	343 000	755 000	343 000	755 000	343 000	755 000	343 000	755 000
		59,5	40.00	10,0	0.395	224,4	8.835	220,5	8.679	58,0	38.94	13,2	29.00	2,0	4.48	J38	17,7	2 570	272	3 950	272 N	3 950 N	252	3 660	272 N	3 950 N	286 000	630 000	100 (157)	100 (229)	87	100 (126)	324 000	714 000	324 000	714 000	324 000	714 000	324 000	714 000
																K38	17,7	2 570	272	3 950	272 N	3 950 N	252	3 660	272 N	3 950 N	286 000	630 000	100 (157)	100 (229)	87	100 (126)	383 000	843 000	383 000	843 000	383 000	843 000	383 000	843 000
																C52	20,5	2 980	372	5 390			344	4 990			390 000	859 000	100 (157)		87		420 000	925 000			420 000	925 000		
																N56	21,3	3 090	396	5 750	396 P	5 750 P	367	5 320	396 P	5 750 P	416 000	916 000	100 (157)	100 (217)	87	100 (119)	444 000	979 000	444 000	979 000	444 000	979 000	444 000	979 000
																C66	23,0	3 330	470	6 820			436	6 320			494 000	1 088 000	100 (157)		87		488 000	1 074 000			469 000	1 032 000		
		64,7	43.50	11,1	0.435	222,4	8.755	218,4	8.599	63,6	42.70	12,4	27.20	1,2	2.68	C52	25,9	3 750	409	5 930			344	4 990			428 000	942 000	100 (144)		79		461 000	1 016 000			424 000	934 000		
																N56	26,3	3 810	436	6 330	436 P	6 330 P	367	5 320	436 P	6 330 P	456 000	1 005 000	100 (144)	100 (197)	79	100 (108)	488 000	1 074 000	488 000	1 074 000	446 000	983 000	488 000	1 074 000
																C66	28,5	4 130	518	7 510			436	6 320			542 000	1 193 000	100 (144)		79		535 000	1 178 000			469 000	1 032 000		
																P76	30,5	4 430	600	8 700	600 V	8 700 V	504	7 310	600 V	8 700 V	627 000	1 381 000	100 (144)	100 (196)	79	100 (107)	630 000	1 388 000	630 000	1 388 000	558 000	1 229 000	630 000	1 388 000
		70,0	47.00	12,0	0.472	220,5	8.681	216,5	8.525	68,7	46.14	11,6	25.60	0,5	1.08	C52	31,9	4 630	444	6 440			344	4 990			462 000	1 018 000	100 (133)		73		498 000	1 098 000			424 000	934 000		
																N56	32,8	4 750	474	6 870	474 P	6 870 P	367	5 320	474 P	6 870 P	493 000	1 086 000	100 (133)	100 (183)	73	100	527 000	1 161 000	527 000	1 161 000	446 000	983 000	527 000	1 161 000
																C66	35,0	5 080	561	8 150			436	6 320			586 000	1 290 000	100 (133)		73		578 000	1 273 000			469 000	1 032 000		
																P76	36,6	5 310	651	9 440	651 V	9 440 V	504	7 310	651 V	9 440 V	678 000	1 493 000	100 (133)	100 (181)	73	99	681 000	1 500 000	681 000	1 500 000	558 000	1 229 000	681 000	1 500 000

TABLE 22 — **Buttress thread casing — Dimensions and characteristics** (*continued*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure								Load corresponding to pipe body proof stress		Joint efficiency				Joint strength							
										Plain end		Threads and coupling					Collapse		Internal yield (87.5 % E)																			
												Normal		Special clearance					Normal coupling				Special clearance coupling						Normal coupling		Special clearance coupling		Normal coupling				Special clearance coupling			
																			Same grade		Higher grade		Same grade		Higher grade								Same grade		Higher grade		Same grade		Higher grade	
										W_{pe}		e_w		e_w																									
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	%	%	%	%	daN	lbf	daN	lbf	daN	lbf	daN	lbf
244,5	9.625															C52	44,0	6 380	512	7 430			344	4 990			529 000	1 166 000	100 (133)		73		571 000	1 257 000			424 000	934 000		
		79,6	53.50	13,8	0.545	216,8	8.535	212,8	8.379	78,7	52.85	10,2	23.40	−1,0	−2.12	N56	45,6	6 620	547	7 930	547 P	7 930 P	367	5 320	504 P	7 310 P	565 000	1 244 000	100 (116)	100 (160)	64	87	603 000	1 329 000	603 000	1 329 000	446 000	983 000	558 000	1 229 000
																C66	50,5	7 330	649	9 410			436	6 320			671 000	1 477 000	100 (116)		64		662 000	1 458 000			469 000	1 032 000		
																P76	54,7	7 930	752	10 900	752 V	10 900 V	504	7 310	688 V	9 970 V	776 000	1 710 000	100 (116)	100 (158)	64	87	780 000	1 718 000	780 000	1 718 000	558 000	1 229 000	714 000	1 513 000
273	10.750															J38	10,9	1 580	216	3 130	216 N	3 130 N	216	3 130	216 N	3 130 N	286 000	629 000	100 (175)	100 (255)	96	100 (140)	318 000	700 000	318 000	700 000	318 000	700 000	318 000	700 000
		60,3	40.50	8,9	0.350	255,2	10.050	251,3	9.894	57,9	38.88	15,6	34.40	3,3	7.21	K38	10,9	1 580	216	3 130	216 N	3 130 N	216	3 130	216 N	3 130 N	286 000	629 000	100 (175)	100 (255)	96	100 (140)	372 000	819 000	372 000	819 000	372 000	819 000	372 000	819 000
																J38	14,4	2 090	247	3 580	247 N	3 580 N	227	3 290	247 N	3 580 N	325 000	715 000	100 (154)	100 (224)	85	100 (123)	361 000	796 000	361 000	796 000	361 000	796 000	361 000	796 000
		67,7	45.50	10,2	0.400	252,7	9.950	248,8	9.794	65,9	44.22	14,4	31.80	2,1	4.61	K38	14,4	2 090	247	3 580	247 N	3 580 N	227	3 290	247 N	3 580 N	325 000	715 000	100 (154)	100 (224)	85	100 (123)	423 000	931 000	423 000	931 000	423 000	931 000	423 000	931 000
																J38	18,6	2 700	278	4 030	278 N	4 030 N	227	3 290	278 N	4 030 N	364 000	801 000	100 (138)	100 (200)	76	100 (110)	405 000	891 000	405 000	891 000	373 000	822 000	405 000	891 000
																K38	18,6	2 700	278	4 030	278 N	4 030 N	227	3 290	278 N	4 030 N	364 000	801 000	100 (138)	100 (200)	76	100 (110)	474 000	1 043 000	474 000	1 043 000	473 000	1 041 000	474 000	1 043 000
																C52	21,4	3 100	379	5 490			310	4 490			496 000	1 092 000	100 (138)		76		527 000	1 160 000			473 000	1 041 000		
		75,9	51.00	11,4	0.450	250,1	9.850	246,2	9.694	73,7	49.50	13,4	29.40	1,0	2.21	N56	22,2	3 220	404	5 860	404 P	5 860 P	330	4 790	404 P	5 860 P	529 000	1 165 000	100 (138)	100 (189)	76	100 (104)	558 000	1 228 000	558 000	1 228 000	498 000	1 096 000	558 000	1 228 000
																C66	24,1	3 490	480	6 960			392	5 690			628 000	1 383 000	100 (138)		76		615 000	1 354 000			523 000	1 151 000		
																P76	25,3	3 670	556	8 060	556 V	8 060 V	454	6 580	556 V	8 060 V	727 000	1 602 000	100 (138)	100 (188)	76	100 (103)	724 000	1 594 000	724 000	1 594 000	622 000	1 370 000	724 000	1 594 000
																C52	27,2	3 950	417	6 040			310	4 490			543 000	1 196 000	100 (126)		69		577 000	1 271 000			473 000	1 041 000		
																C55	27,7	4 020	445	6 450	445 P	6 450 P	330	4 790	445 P	6 450 P	579 000	1 276 000	100 (126)	100 (173)	69	95	611 000	1 345 000	611 000	1 345 000	498 000	1 096 000	611 000	1 345 000
		82,6	55.50	12,6	0.495	247,9	9.760	243,9	9.604	80,8	54.21	12,3	27.00	−0,1	−0.19	C66	29,6	4 300	528	7 655			392	5 690			688 000	1 515 000	100 (126)		69		673 000	1 483 000			523 000	1 151 000		
																P76	31,9	4 630	611	8 860	611 V	8 860 V	454	6 580	611 V	8 860 V	796 000	1 754 000	100 (126)	100 (171)	69	94	792 000	1 745 000	792 000	1 745 000	622 000	1 370 000	792 000	1 745 000
		90,3	60.70	13,8	0.545	245,4	9.660	241,4	9.504	88,5	59.40	11,1	24.40	−1,3	−2.79	P76	40,4	5 860	673	9 760	673	9 760	454	6 580	619	8 970	873 000	1 922 000	100 (115)	100 (156)	63	86	868 000	1 912 000	868 000	1 912 000	622 000	1 370 000	796 000	1 754 000
		97,8	65.70	15,1	0.595	242,8	9.560	238,9	9.404	96,1	64.53	10,0	22.00	−2,4	−6.19	P76	51,6	7 490	734	10 650	734 V	10 650 V	454	6 580	619 V	8 970 V	948 000	2 088 000	100 (106)	100 (144)	58	79	943 000	2 077 000	943 000	2 077 000	622 000	1 370 000	796 000	1 754 000

TABLE 22 — **Buttress thread casing — Dimensions and characteristics** (*continued*)

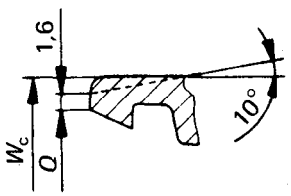
Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass				Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint *efficiency*		Joint strength			
										Plain end		Threads and coupling normal			Collapse		Internal yield (87.5 % E) normal						Normal coupling		Normal coupling			
																	Same grade		Higher grade				Same grade	Higher grade	Same grade		Higher grade	
										W_{pe}		e_w																
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	bar	lbf/in²	daN	lbf	%	%	daN	lbf	daN	lbf
298,5	11.750	69,9	47.00	9,5	0.375	279,4	11.000	275,4	10.844	67,9	45.56	16,3	35.80	J38	10,4	1 513	212	3 070	212	3 070	335 000	737 000	100 (163)	100 (266)	366 000	807 000	366 000	807 000
														K38	10,4	1 513	212	3 070	212	3 070	335 000	737 000	100 (163)	100 (266)	424 000	935 000	424 000	935 000
		80,4	54.00	11,1	0.435	276,3	10.880	272,4	10.724	78,3	52.57	14,7	32.40	J38	14,4	2 091	245	3 560	245	3 560	386 000	850 000	100 (141)	100 (237)	423 000	931 000	423 000	931 000
														K38	14,4	2 091	245	3 560	245	3 560	386 000	850 000	100 (141)	100 (237)	490 000	1 079 000	490 000	1 079 000
		89,3	60.00	12,4	0.489	273,6	10.772	269,7	10.616	87,6	58.81	13,4	29.60	J38	18,4	2 663	276	4 010	276	4 010	432 000	952 000	100 (126)	100 (206)	473 000	1 042 000	473 000	1 042 000
														K38	18,4	2 663	276	4 010	276	4 010	432 000	952 000	100 (126)	100 (206)	548 000	1 208 000	548 000	1 208 000
														C52	21,2	3 068	376	5 460			589 000	1 298 000	100 (126)		618 000	1 361 000		
														N56	21,9	3 180	402	5 830			628 000	1 384 000	100 (126)		654 000	1 440 000	654 000	1 440 000
														C66	23,7	3 440	477	6 920			746 000	1 643 000	100 (126)		725 000	1 596 000		
339,7	13.375	81,1	54.50	9,7	0.380	320,4	12.615	316,5	12.459	78,6	52.74	18,3	40.20	J38	7,8	1 130	188	2 730	188	2 730	387 000	853 000	100 (160)	100 (232)	413 000	909 000	413 000	909 000
														K38	7,8	1 130	188	2 730	188	2 730	387 000	853 000	100 (160)	100 (232)	471 000	1 038 000	471 000	1 038 000
		90,8	61.00	10,9	0.430	317,9	12.515	313,9	12.359	88,6	59.45	16,7	36.80	J38	10,6	1 540	213	3 090	213	3 090	437 000	962 000	100 (142)	100 (206)	465 000	1 025 000	465 000	1 025 000
														K38	10,6	1 540	213	3 090	213	3 090	437 000	962 000	100 (142)	100 (206)	531 000	1 169 000	531 000	1 169 000
		101,2	68.00	12,2	0.480	315,3	12.415	311,4	12.259	98,5	66.11	15,3	13.60	J38	13,4	1 950	238	3 450	238	3 450	485 000	1 069 000	100 (127)	100 (185)	518 000	1 140 000	518 000	1 140 000
														K38	13,4	1 950	238	3 450	238	3 450	485 000	1 069 000	100 (127)	100 (185)	590 000	1 300 000	590 000	1 300 000
		107,1	72.00	13,1	0.514	313,6	12.347	309,7	12.191	105,2	70.60	14,4	31.60	C52	17,9	2 590	348	5 040			707 000	1 558 000	100 (119)		725 000	1 598 000		
														N56	18,4	2 670	371	5 380			854 000	1 661 000	100 (119)		769 000	1 693 000	769 000	1 693 000
														C66	19,4	2 820	440	6 390			896 000	1 973 000	100 (119)		859 000	1 893 000		
406,4	16.000	111,6	75.00	11,1	0.438	384,1	15.124	379,4	14.936	108,3	72.72	20,7	45.60	J38	7,0	1 020	181	2 630	181	2 630	535 000	1 178 000	100 (138)	100 (200)	545 000	1 200 000	545 000	1 200 000
														K38	7,0	1 020	181	2 630	181	2 630	535 000	1 178 000	100 (138)	100 (200)	604 000	1 331 000	604 000	1 331 000

TABLE 22 — **Buttress thread casing — Dimensions and characteristics** (*concluded*)

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass				Grade of steel	Pressure						Load corresponding to pipe body proof stress		Joint efficiency		Joint strength			
										Plain end		Threads and coupling normal			Collapse		Internal yield (87.5 % E) normal						Normal coupling		Normal coupling			
																	Same grade		Higher grade				Same grade	Higher grade	Same grade		Higher grade	
										W_{pe}		e_w																
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb		N/mm^2	lbf/in^2	bar	lbf/in^2	bar	lbf/in^2	daN	lbf	%	%	daN	lbf	daN	lbf
406,4	16.000	125,0	84.00	12,6	0.495	381,3	15.010	376,5	14.822	122,1	81.97	12,0	39.60	J38	9,7	1 410	205	2 980	205	2 980	602 000	1 326 000	100 (122)	100 (178)	613 000	1 351 000	613 000	1 351 000
														K38	9,7	1 410	205	2 980	205	2 980	602 000	1 326 000	100 (122)	100 (178)	681 000	1 499 000	681 000	1 499 000
473	18.62	130,3	87.50	11,05	0.435	451,0	17.755	446,20	17.567	125,88	84.51	39,20	86.30	H28	3,1	458	113	1 640	113	1 640	395 000	996 000	100 (194)	100 (194)				
														J38	4,3	630	155	2 250	155	2 250	621 000	1 370 000	100 (194)	100 (194)	603 000	1 329 000	603 000	1 329 000
														K38	4,3	630	155	2 250	155	2 250	621 000	1 370 000	100 (194)	100 (194)	648 000	1 427 000	648 000	1 427 000
508	20.000	140,0	94.0	11,13	0.438	485,7	19.124	480,97	18.936	136,16	91.41	24,74	54.50	H28	2,6	380	106	1 530	106	1 530	488 000	1 080 000	100 (150)	100 (211)				
														J38	3,6	520	145	2 110	145	2 110	672 000	1 480 000	100 (150)	100 (204)	637 000	1 402 000	637 000	1 402 000
														K38	3,6	520	145	2 110	145	2 110	672 000	1 480 000	100 (150)	100 (218)	671 000	1 479 000	671 000	1 479 000
		158,6	106.50	12,70	0.500	482,6	19.000	477,82	18.812	155,15	104.13	21,92	48.30	H28	3,9	560	121	1 750	121	1 750	557 000	1 225 000	100 (132)	100 (182)				
														J38	5,3	770	166	2 410	166	2 410	765 000	1 685 000	100 (132)	100 (180)	725 000	1 596 000	725 000	1 596 000
														K38	5,3	770	166	2 410	166	2 410	765 000	1 685 000	100 (132)	100 (192)	764 000	1 683 000	764 000	1 683 000
		198,1	133.00	16,13	0.635	475,7	18.730	470,97	18.542	195,62	131.33	15,94	35.10	H28	7,5	1 010	153	2 225	153	2 225	702 000	1 545 000	100 (104)	100 (143)				
														J38	10,3	1 500	211	3 060	211	3 060	965 000	2 125 000	100 (104)	100 (142)	913 000	2 012 000	913 000	2 012 000
														K38	10,3	1 500	211	3 060	211	3060	965 000	2 125 000	100 (104)	100 (151)	964 000	2 123 000	964 000	2 123 000

TABLE 23 — **Buttress thread casing — Dimensions and masses of couplings**

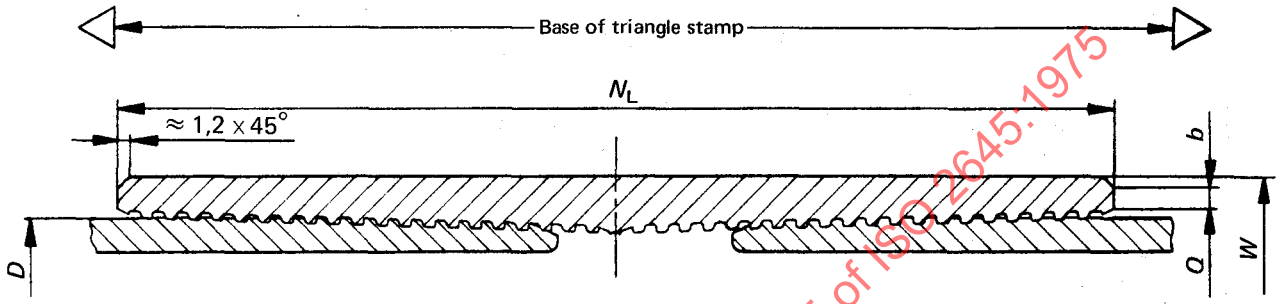
Dimensions in millimetres



Special clearance coupling

1 All corners rounded or broken

2 10° bevel (both ends) provided only when specified in the order.



Basic power-tight make-up **Hand-tight make-up**

1		2		3		4		5		6		7		8	
Nominal size[1]		Outside diameter				Length N_L		Diameter of recess Q		Width of bearing face b		Mass			
		Normal W[2]		Special clearance W_c[3]								Normal		Special clearance	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb	kg	lb
114,3	4.500	127	5.000	123,8	4.87	225,4	8.87	117,9	4.64	3,2	0.12	4,59	10.11	3,48	7.67
127	5.000	141,3	5.563	136,5	5.37	231,8	9.12	130,6	5.14	4,0	0.15	5,90	12.99	4,00	8.81
139,7	5.500	153,7	6.050	149,2	5.87	235,0	9.25	143,3	5.64	4,0	0.15	6,42	14.14	4,47	9.84
168,3	6.625	187,7	7.391	177,8	7.00	244,5	9.62	171,8	6.76	6,4	0.25	11,10	24.46	5,65	12.44
177,8	7.000	194,5	7.650	187,3	7.37	254,0	10.00	181,4	7.14	5,6	0.21	10,54	23.22	6,27	13.82
193,7	7.625	215,9	8.500	206,4	8.12	263,5	10.37	197,2	7.76	7,9	0.31	15,82	34.84	9,28	20.45
219,1	8.625	244,5	9.625	231,8	9.12	269,9	10.62	222,6	8.76	9,5	0.37	20,86	45.94	10,79	23.77
244,5	9.625	269,9	10.625	257,2	10.12	269,9	10.62	248,0	9.76	9,5	0.37	23,15	50.99	12,02	26.47
273	10.750	298,5	11.750	285,8	11.25	269,9	10.62	276,6	10.89	9,5	0.37	25,73	56.68	13,39	29.49
298,5	11.750	323,9	12.750	.....	.....	269,9	10.62	302,0	11.89	9,5	0.37	28,03	61.74	.....	.....
339,7	13.375	365,1	14.375	.....	.....	269,9	10.62	343,3	13.51	9,5	0.37	31,76	69.95	.....	.....
406,4	16.000	431,8	17.000	.....	.....	269,9	10.62	410,3	16.15	9,5	0.37	39,75	87.56	.....	.....
473,1	18.625	508	20.000	.....	.....	269,9	10.62	477,0	18.78	9,5	0.37	62,67	138.05	.....	.....
508	20.000	533,4	21.000	.....	.....	269,9	10.62	511,9	20.15	9,5	0.37	50,10	110.34	.....	.....

1) The nominal size of the coupling is equal to the corresponding outside pipe diameter D.

2) Tolerance on outside diameter W ± 1 %, but not greater than ± 3,18 mm (1/8 in).

3) Tolerance on outside diameter W_c is $^{+\ 0,8}_{-\ 0,4}$ mm ($^{+\ 1/32}_{-\ 1/64}$ in).

TABLE 24 — "Extreme-Line" casing — Dimensions and characteristics

Outside diameter		Mass per unit length		Wall thickness		Inside diameter		Drift diameter		Mass						Grade of steel	Pressure				Load corresponding to pipe body proof stress		Joint strength				Joint efficiency	
										Plain end		Upset and threads					Collapse		Internal yield (87.5 % E)				Normal		Special		Normal	Special
												Normal		Special														
										W_{pe}		E_w		E_w														
mm	in	kg/m	lb/ft	mm	in	mm	in	mm	in	kg/m	lb/ft	kg	lb	kg	lb		N/mm²	lbf/in²	bar	lbf/in²	daN	lbf	daN	lbf	daN	lbf	%	%
127	5.000	22,3	15.00	7,5	0.296	112,0	4.408	105,4	4.151	22,2	14.87	2,1	4.60			J38	38,3	5 550	393	5 700	109 000	241 000	149 000	328 000			100 (107)	
																K38	38,3	5 550	393	5 700	109 000	241 000	189 000	416 000			100 (107)	
																C52	48,1	6 970	536	7 770	149 000	328 000	189 000	416 000			100 (107)	
																N56	50,0	7 250	572	8 290	159 000	350 000	198 000	437 000			100 (107)	
																C66	55,8	8 090	678	9 840	189 000	416 000	208 000	459 000			100 (107)	
																P76	60,9	8 830	786	11 400	218 000	481 000	248 000	547 000			100 (107)	
		26,8	18.00	9,2	0.362	108,6	4.276	105,4	4.151	26,7	17.93	0,6	1.40			C52	69,0	10 000	655	9 500	180 000	396 000	202 000	446 000			89	
																N56	72,3	10 490	699	10 140	192 000	422 000	213 000	469 000			89	
																C66	63,0	12 040	830	12 040	227 000	501 000	223 000	492 000			89	
																P76	92,7	13 450	961	13 940	264 000	580 000	266 000	587 000			89	
139,7	5.500	23,1	15.50	7,0	0.225	125,7	4.950	118,2	4.653	22,86	15.35	2,6	5.80	1,9	4.20	J38	27,9	4 040	332	4 810	113 000	248 000	154 000	339 000	154 000	339 000	100 (110)	100 (110)
																K38	27,9	4 040	332	4 810	113 000	248 000	195 000	429 000	195 000	429 000	100 (110)	100 (110)
		25,3	17.00	7,7	0.304	124,3	4.892	118,2	4.653	25,1	16.87	2,2	4.80	1,5	3.20	J38	33,9	4 910	367	5 320	124 000	273 000	169 000	372 000	169 000	372 000	100 (105)	100
																K38	33,9	4 910	367	5 320	124 000	273 000	214 000	471 000	214 000	471 000	100 (105)	100
																C52	41,9	6 070	500	7 258	169 000	372 000	214 000	471 000	214 000	471 000	100 (105)	100
																N56	43,3	6 280	534	7 740	180 000	397 000	225 000	496 000	225 000	496 000	100 (105)	100
																C66	47,8	6 930	634	9 190	214 000	471 000	236 000	521 000	236 000	521 000	100 (105)	100
																P76	51,4	7 460	734	10 640	248 000	546 000	281 000	620 000	281 000	620 000	100 (105)	100
		29,8	20.00	9,2	0.361	121,4	4.778	118,2	4.653	29,5	19.81	0,6	1.40	0,1	0.20	C52	58,2	8 440	594	8 610	198 000	437 000	226 000	497 000	217 000	479 000	89	86
																N56	60,9	8 830	634	9 190	212 000	466 000	237 000	523 000	229 000	504 000	89	86
																C66	69,0	10 000	753	10 915	252 000	554 000	250 000	550 000	241 000	530 000	89	86
																P76	76,4	11 080	872	12 640	291 000	641 000	297 000	654 000	286 000	630 000	89	86
		34,2	23.00	10,5	0.415	118,7	4.670	115,4	4.545	33,6	22.54	0	0	0,7	1.60	C52	72,1	10 460	683	9 900	226 000	492 000	249 000	549 000	217 000	479 000	87	76
																N56	76,9	11 160	728	10 560	241 000	530 000	262 000	577 000	229 000	504 000	87	76
																C66	89,1	12 920	865	12 540	286 000	630 000	275 000	606 000	241 000	530 000	87	76
																P76	100,1	14 520	1 001	14 520	331 000	729 000	328 000	722 000	286 000	630 000	87	76