

INTERNATIONAL STANDARD



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Materials and equipment for petroleum and natural gas industries — Steel drill pipe for oil or natural gas wells

Matériel d'équipement pour les industries du pétrole et du gaz naturel — Tiges de forage en acier 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 2644, which incorporates Addendum 1, 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 May 1972. Addendum 1 was circulated to the Member Bodies in January 1973.

This International Standard has been approved by the Member Bodies of the following countries :

Belgium	Hungary	Spain
Brazil	India	Switzerland
Czechoslovakia	Italy	Thailand
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France	Poland	United Kingdom
Germany	Romania	U.S.S.R.

Addendum 1 has been approved by the Member Bodies of the following countries :

Bulgaria	India	Romania
Canada	Iran	Thailand
Czechoslovakia	Italy	Turkey
France	Mexico	United Kingdom
Germany	Poland	U.S.S.R.
Hungary	Portugal	Yugoslavia

No Member Body expressed disapproval of the documents.

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Materials and equipment for petroleum and natural gas industries — Steel drill pipe for oil or natural gas wells

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the characteristics of steel drill pipe and work tubing intended for use in the drilling and servicing of oil or natural gas wells.

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

It applies only to seamless drill pipe.

2 REFERENCES

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

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

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

ISO 2566, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels*.

3 DEFINITIONS

3.1 drill pipe: A metal pipe constituting an element of a drilling string.

3.2 work tubing: Small diameter pipe used in a well for servicing.

4 MANUFACTURING PROCESS

A seamless drill 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.

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:

drill pipe

- with external upsetting,
- with internal upsetting,
- with external and internal upsetting;

d) size (outside diameter) in millimetres (see table 12);

e) mass per unit length in kilograms per metre, or wall thickness in millimetres (see table 12);

f) grade of steel;

g) length range (see clause 9);

h) delivery date, shipping instructions and marking;

i) mill inspection (if required).

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

- normalizing of D 38 drill pipe;
- ladle and supplementary analyses;
- pipe coating.

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

- a) marking;
- b) special finish (lubricant, upset);
- c) non-destructive tests.

6 DESIGNATION

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

- a) its type;
- b) the type of its ends;
- c) its size (outside diameter) in millimetres;
- d) its mass per unit length in kilograms per metre, or its wall thickness in millimetres;

- e) the grade of steel;
- f) its length range;
- g) a reference to this International Standard.

Example :

Drill pipe, external upsetting, 101,6 × 8,4, D 38 range 2, according to ISO 2644.

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

A pipe shall have a maximum sulphur content of 0,060 % and a maximum phosphorus content of 0,040 % whatever its grade.

7.3 Mechanical properties

The limits of the test piece mechanical properties (see 11.3.1) are given in table 1 for each steel concerned.

TABLE 1 – Mechanical properties

Grade of steel	Proof stress, R_p	Minimum tensile strength, R_m	Minimum elongation, A , on $5,65\sqrt{S_o}$ *
	N/mm ²	N/mm ²	%
D 38	$R_p 0,5 \geq 379$	655	14,3
E 52	$R_p 0,5 \geq 517$	690	13,0
N 56	$R_p 0,5 \geq 552$	690	13,0
X 66	$660 \leq R_p 0,5 \leq 860$	730	12
G 73	$730 \leq R_p 0,6 \leq 930$	800	11,5
S 93	$930 \leq R_p 0,7 \leq 1\,140$	1\,000	9,5

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

7.4 Heat treatment

As a function of the steel quality (steelmaking and analysis), the manufacturer shall indicate the heat treatment to obtain the properties given in table 1 (normalizing, through-hardening or quenching and tempering).

8 DRILL PIPE CONDITION

8.1 Diameters, wall thicknesses and masses

The pipes supplied shall have the diameters, wall thicknesses and masses shown in table 12.

8.2 Pipe ends

Drill pipe shall be furnished with upset ends with a view to rotary connection welding. Upsetting shall be either internal or external, or internal and external. If so provided for in the order, the end finish may be different. In this case all requirements other than end finishing and mass will be maintained.

9 PERMISSIBLE DIMENSIONAL DEVIATIONS

9.1 Outside diameter

9.1.1 Drill pipe body

The tolerance on the outside diameter of the pipe shall be $\pm 0,79$ mm for $D < 114,3$ mm, and $\pm 0,75$ % for $D \geq 114,3$ mm.

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 2.

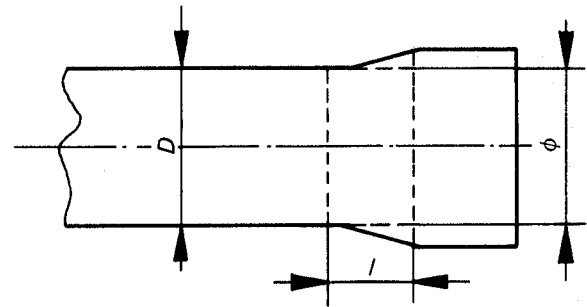


FIGURE 1 – Upset end

TABLE 2 – Tolerances on upset ends

Outside diameter D	Tolerances	on length/
$D \leq 88,9$ mm	+ 2,4 mm – 0,8 mm	127 mm
$101,6 \leq D \leq 127,0$ mm	+ 2,8 mm – 0,75 % D	
$D \geq 139,7$ mm	+ 3,2 mm – 0,75 % D	$\approx D$

NOTE – Stepping of diameter ϕ over length l shall be smooth and progressive, not abrupt.