International Standard 5226

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

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

Matériel et équipement pour les industries du pétrole et du gaz naturel — Tiges de forage en alliage d'aluminium 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 bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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

1 Scope and field of application

This International Standard specifies the characteristics of aluminium alloy drill pipes with screwed-on steel tool joints for use in the drilling of oil and natural gas wells.

2 References

ISO 2566, *Steel — Conversion of elongation values* —

Part 1: Carbon and low alloy steels.

Part 2: Austenitic steels.

ISO 3962, *Materials and equipement for petroleum and natural gas industries — Tool joints for steel drill pipe for oil or natural gas wells.*

ISO 6892, *Metallic materials — Tensile testing.*

ISO 8492, *Metallic materials — Tube — Flattening test.*[1)]

3 Drill pipe condition

Aluminium alloy drill pipes are manufactured from tubular billets by hot extrusion with a mandrel and they are supplied as

a) tubular blanks;

b) threaded tubular blanks;

c) drill pipes with screwed-on tool joints.

4 Data to be given by the purchaser

4.1 When placing orders, the purchaser shall specify the following information:

a) the reference number of this International Standard;

b) the overall length of a lot, in metres;

c) the type of drill pipe and tubular blank:

— with external thickenings of ends (see figure 1);

— with internal thickenings of ends (see figure 2);

d) the size (outside diameter), in millimetres (see table 4);

e) the wall thickness, in millimetres (see tables 5 and 6);

f) the length range (see table 3);

g) the material group (see table 1);

h) the delivery date;

j) the shipping instruction and purchaser's requirements;

k) the delivery type (see clause 3).

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

— pipe coating;

— type of protective compound.

1) At present at the stage of draft. (Revision of ISO/R 202-1961, ISO/R 955-1969 and ISO/R 1556-1971.)

5 Designation

A pipe manufactured in conformity with this International Standard shall be designated by

a) the type of its ends;

b) the size (outside diameter), in millimetres;

c) the wall thickness, in millimetres;

d) the material group;

e) the length range;

f) the reference to this International Standard.

Example:

Aluminium alloy drill pipe, with external thickenings of ends, 114 × 9, material group 1, range 2, in conformity with ISO 5226

6 Material requirements

6.1 Aluminium alloy drill pipes shall conform to the requirements specified in table 1.

They may be divided into three groups:

a) group I: without additional requirements for corrosion and heat resistance;

b) group II: with improved corrosion resistance;

c) group III: with improved heat resistance.

Table 1 — Material requirements for aluminium alloy drill pipes

Characteristic	Unit	Requirements		
		Material group		
		I	II	III
Tensile strength, min.[1] R_m	N/mm²	530	345	390
Proof stress, min.[1] R_p	N/mm²	460	275	295
Elongation after fracture, min. A ($L_0 = 5{,}65\sqrt{S_0}$)	%	8	10	12
Corrosion rate, max., in 3,5 % NaCl solution	kg/(m²·s)	—	$1{,}4 \times 10^{-8}$	—
Flattening test,[2] maximum distance between plates		0,75 D	0,70 D	0,70 D

1) Any possible change in the mechanical properties of pipe material specified by the manufacturer should be taken into account when pipes of material groups I and II are under operating conditions at a temperature over 120 °C and pipes of material group III over 140 °C.

2) D = pipe diameter.

6.2 Material for steel tool joints shall conform to the requirements specified in table 2.

Table 2 — Material requirements for steel tool joints

Characteristic	Unit	Minimum requirement
Tensile strength, R_m	N/mm²	880
Proof stress, R_p	N/mm²	735
Elongation after fracture[1] A ($L_0 = 5{,}65\sqrt{S_0}$)	%	12
Relative reduction of area Z	%	45
Impact strength, KCU	J/m²	685×10^3
Brinell hardness	HB	280

1) If other gauge lengths are used, the corresponding elongation values shall be obtained in accordance with ISO 2566. In cases of dispute, the gauge length, L_0, of $5{,}65\sqrt{S_0}$ shall be used.

7 Design and basic dimensions of pipes

7.1 Design

Designs of aluminium alloy drill pipes shall correspond to figure 1 for pipes with external thickening of ends and to figure 2 for pipes with internal thickening of ends.

7.2 Length

Drill pipe length ranges shall correspond to the requirements specified in table 3.

Table 3 — Length ranges

Pipe state at delivery	Length, L m		
	Range 1	Range 2	Range 3
Pipe with screwed-on tool joint	5,5	9,0	12,3
Pipe without tool joint	5,3	8,7	12,0

NOTE — The tolerance for pipes of all three ranges is ± 0,25 m.

7.3 Dimensions of pipes and tool joints

Aluminium alloy drill pipes and steel tool joint diameters shall conform to the dimensions specified in table 4.

Sizes of drill pipes with external and internal thickening of ends shall correspond to the data given in tables 5 and 6, respectively.

7.4 Crosswise groove

At any place on the intermediate section between the thickened end and the pipe body, a crosswise groove or collar is allowed, the height or depth of which may not increase or decrease the outside diameter by more than $^{+\,2,5}_{-\,5,0}$ mm of the nominal size, but the wall thickness shall remain unreduced at the same location.

7.5 Straightness

Pipes shall be straight. Permissible curvature of end parts on a length of 1,5 m (excluding external thickened ends) shall not exceed 1,3 mm per metre.

7.6 Ovality and eccentricity of pipes

Ovality and eccentricity of pipes shall be within the tolerances on external diameter and wall thickness (see tables 5 and 6).

7.7 End faces

If pipe blanks are supplied, deviation from the perpendicular of the end faces of the blanks shall not exceed 1°.

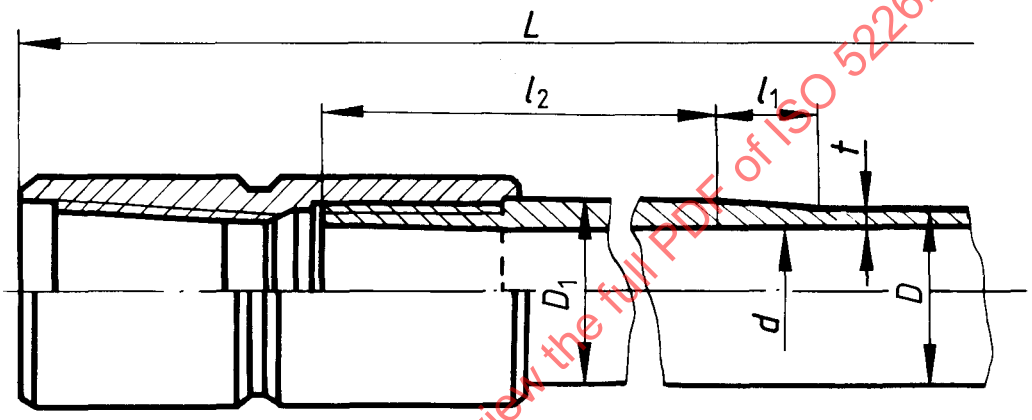

Figure 1 — Pipe with external thickening of ends

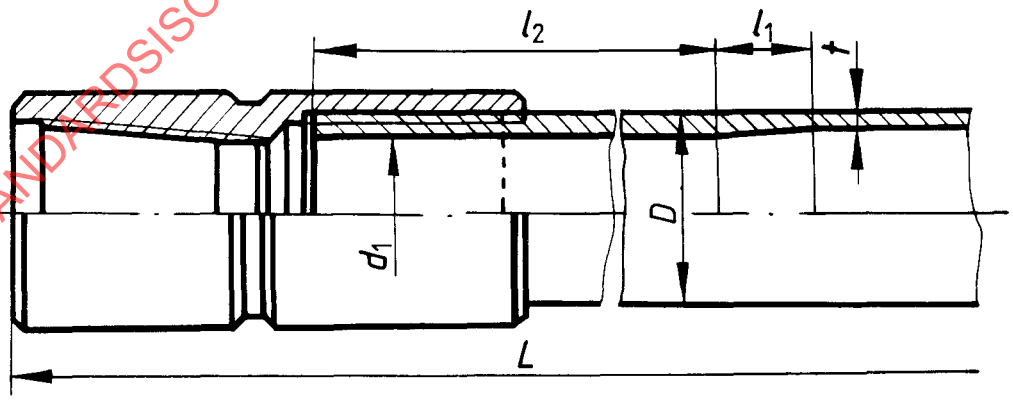

Figure 2 — Pipe with internal thickening of ends

Table 4 — Pipe and tool joint diameters

Dimensions in millimetres

Pipes with external thickening of ends		Pipes with internal thickening of ends	
Drill pipe	Tool joints	Drill pipe	Tool joints
73	108	60	80
89	118	73	90;95
102	146	89	118
114	155	102	118;133
127	178	114	140;146
		127	152;155
		140;146	172;178
		168	197;203

NOTE — Tolerance on outside diameter of all steel tool joints is ±0,5 mm.

Table 5 — Drill pipes with external thickening of ends

Dimensions of pipe body					Dimensions of thickened ends					
Outside diameter D		Wall thickness t		Inside diameter d	Outside diameter D_1		Length of transition zone l_1		Length of thickened end l_2	
mm	tol. %	mm	tol. mm	mm	mm	tol. mm	mm	tol. mm	mm	tol. mm
73	± 1	7	± 0,4	59	84	+ 2,5 − 1,0	450	+ 150 − 100	250	± 50
89		7	± 0,4	75	100					
89		8	± 0,4	73	100					
102		8	± 0,4	86	116					
102		9	± 0,4	84	116					
114		9	± 0,4	96	129	+ 3,0 − 1,2			350	+ 70 − 50
114		10	± 0,5	94	129					
127		9	± 0,4	109	142					
127		11	± 0,5	105	142					

Table 6 — Drill pipes with internal thickening of ends

Dimensions of pipe body				Dimensions of thickened ends				
Outside diameter D		Wall thickness t		Inside diameter d_1		Length of transition zone l_1 min.	Length of thickened end l_2	
mm	tol. %	mm	tol. mm	mm	tol. mm	mm	mm	tol. mm
60	± 1	7	± 0,4	36	+ 2,0 − 3,0	40	250	± 50
73		7	± 0,4	47				
89		7	± 0,4	61				
89		8	± 0,4	61				
102		8	± 0,4	74				
102		9	± 0,4	74				
114		9	± 0,4	84				
114		10	± 0,5	84	+ 2,5 − 4,0	55	350	+ 75 − 50
127		9	± 0,4	93				
127		11	± 0,5	93				
140		9	± 0,4	106				
140		11	± 0,5	106				
146		9	± 0,4	112				
146		11	± 0,5	112				
168		9	± 0,4	134				
168		11	± 0,5	134				