International Standard 6759

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

Seamless steel tubes for heat exchangers

Tubes sans soudure en acier pour échangeurs de chaleur

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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 6759 was developed by Technical Committee ISO/TC 5, *Metal pipes and fittings*, and was circulated to the member bodies in July 1979.

It has been approved by the member bodies of the following countries :

Australia	France	Romania
Austria	India	South Africa, Rep. of
Belgium	Israel	Spain
Canada	Italy	Sweden
Chile	Korea, Rep. of	Switzerland
Czechoslovakia	Mexico	United Kingdom
Denmark	Netherlands	USSR
Finland	Norway	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Japan
USA

Printed in Switzerland

Seamless steel tubes for heat exchangers

1 Scope and field of application

1.1 This International Standard specifies the characteristics of plain end seamless tubes manufactured from unalloyed and alloyed steels (including stainless steels) which are intended for use in the construction of heat exchangers.

1.2 This International Standard does not cover steel tubes intended for exposure to flame.

2 Reference

ISO 2604/2, *Steel products for pressure purposes — Quality requirements — Part 2 : Wrought seamless tubes.*

3 Material

Tubes shall be to the requirements of ISO 2604/2 and shall be cold finished and heat treated. They shall be to test category III or V, except that the hydraulic test may, at the option of the manufacturer, be replaced by a non-destructive test which ensures equivalent leak-tightness.

The steels shall preferably be selected from the following :

Unalloyed : TS2, TS5, TS9H, TS10

Alloyed : TS26, TS32, TS34, TS37, TS43, TS45

Ferritic stainless : TS39

Austenitic stainless : TS46, TS47, TS48, TS53, TS54, TS57, TS58, TS60, TS61, TS63

Other grades of steel from ISO 2604, part 2, may be supplied by agreement between the manufacturer and purchaser.

4 Dimensions, masses and tolerances

4.1 Dimensions and masses

Table 1 — Unalloyed and alloyed steels

Outside diameters mm	Thicknesses, mm				
	1,2	1,6	2,0	2,6	3,2
	Masses per unit length, kg/m				
16	0,438	0,568	0,691	—	—
20	—	0,726	0,888	1,12	—
25	—	0,923	1,13	1,44	1,72
30	—	1,12	1,38	1,76	2,11
38	—	—	1,78	2,27	2,75

NOTE — See also the annex.

Table 2 — Austenitic stainless steels

Outside diameters mm	Thicknesses, mm				
	1,2	1,6	2,0	2,6	3,2
	Masses per unit length, kg/m				
16	0,445	0,577	0,701	—	—
20	0,564	0,737	0,901	1,14	—
25	—	0,937	1,15	1,46	1,75
30	—	1,14	1,40	1,79	2,14
38	—	1,46	1,81	2,30	2,79

NOTE — See also the annex.

Table 3 — Ferritic stainless steels

Outside diameters mm	Thicknesses, mm				
	1,2	1,6	2,0	2,6	3,2
	Masses per unit length, kg/m				
16	0,431	0,559	0,681	—	—
20	0,548	0,715	0,875	1,10	—
25	—	0,909	1,11	1,42	1,69
30	—	1,10	1,36	1,73	2,08
38	—	1,42	1,75	2,24	2,71

NOTE — See also the annex.

4.2 Tolerances

The tubes shall be subject to the tolerances given below. The tolerances on outside diameter include ovality and those on thickness include eccentricity.

4.2.1 Outside diameter

4.2.1.1 Unalloyed and alloyed steel tubes

Diameter	Tolerance
Up to and including 20 mm	± 0,10 mm
Over 20 up to and including 38 mm	± 0,15 mm

4.2.1.2 Stainless steel tubes

Class 1 :

Diameter	Tolerance
Up to and including 20 mm	± 0,15 mm
Over 20 up to and including 38 mm	± 0,20 mm

Class 2 :

Diameter	Tolerance
Up to and including 30 mm	± 0,3 mm
Over 30 up to and including 38 mm	± 0,4 mm

4.2.2 Thickness

The tolerance on thickness shall be ± 10 % (minimum ± 0,2 mm) except where, by agreement, tubes are supplied to a minimum thickness when the following tolerance shall apply :

$$^{+\ 20}_{\ 0}\ \%$$

NOTE — The thicknesses and masses per unit length in tables 1, 2 and 3 are expressed in mean values. When minimum thicknesses are specified, the masses are required to be increased by 10 %.

4.2.3 Length

Where length is specified "exact" or "cut length", the tolerance on length shall be :

Length	Tolerance
Up to and including 6 000 mm	$^{+\ 3,0}_{\ 0}$ mm
Over 6 000 mm up to and including 9 000 mm	$^{+\ 4,5}_{\ 0}$ mm
Over 9 000 mm up to and including 12 000 mm	$^{+\ 6,0}_{\ 0}$ mm
Over 12 000 mm up to and including 15 000 mm	$^{+\ 7,5}_{\ 0}$ mm
Over 15 000 mm up to and including 18 000 mm	$^{+\ 9,0}_{\ 0}$ mm

5 Designation for ordering

5.1 The tubes specified in this International Standard shall be designated by the following data :

a) the denomination "tube";

b) reference to this International Standard;

c) dimensions in millimetres (outside diameter and thickness);

d) steel type.

Example :

Tube complying with ISO 6759, having an outside diameter of 20 mm and a thickness of 2 mm, made of steel TS 5 will be designated by :

Tube ISO 6759 — 20 × 2 — TS 5

5.2 This International Standard provides for some alternatives. The purchaser shall state in the order the requirements referring thereto; if no indication is given, delivery will be according to manufacturer's choice.

Annex

Metric dimensions corresponding to inch dimensions

It is recognized that the dimensions in the table below may be required when re-tubing existing heat exchangers to satisfy the critical tube to tube-sheet clearances, particularly when the latter were originally produced in inch sizes.

These dimensions are interchangeable with corresponding inch dimensions. The conditions of delivery (in particular tolerances on thicknesses) shall be subject to agreement between manufacturer and purchaser.

Outside diameters mm	**Thicknesses,** mm					
	0,89	1,25	1,65	2,11	2,77	3,41
15,9	× [1]	×	×	×		
19,05	× [1]	× [1]	×	×	×	
25,4		× [1]	×	×	×	×
31,8			×	×	×	×
38,1			×	×	×	×
50,8				×	×	×

1) Only for stainless steel tubes.

NOTE — The masses are to be calculated in accordance with ISO 4200.