INTERNATIONAL STANDARD 5252

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Steel tubes — Tolerance systems

Tubes en acier — Systèmes de tolérances

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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 5252 was developed by Technical Committee ISO/TC 5, *Metal pipes and fittings*, and was circulated to the member bodies in September 1976.

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

Australia	India	Spain
Belgium	Israel	Sweden
Brazil	Italy	Switzerland
Canada	Korea, Rep. of	Turkey
Denmark	Mexico	United Kingdom
Finland	Netherlands	U.S.S.R.
France	New Zealand	Yugoslavia
Germany	Poland	
Hungary	Romania	

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

Czechoslovakia
Japan
U.S.A.

Printed in Switzerland

This International Standard groups together the majority of the tolerances on dimensions used by ISO/TC 5/SC 1 in the drawing up of its Standards and Recommendations concerning steel tubes.

Steel tubes — Tolerance systems

0 INTRODUCTION

This International Standard is to be considered as a basic document for the drawing up of individual International Standards (product standards) concerning steel tubes.

It is consequently intended for use by ISO technical committees concerned with the standardization of steel tubes.

It cannot, therefore, be used as a standard for the definition of a product.

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard establishes the tolerance systems to be used for the standardization of steel tubes (product standards).

1.2 The tolerances used in these product standards should be chosen by selection from this International Standard although the use of a tolerance specific to a particular product is not excluded.

1.3 The choice and the combination of the different proposed tolerances should be the subject of a careful examination. Among other factors, consideration should be given to the tube manufacturing process, the intended use and dimensions of the tubes and the methods and instruments employed for the control of product conformity with specifications.

2 DEFINITIONS

2.1 The terms tolerance, deviation and nominal dimension used in this International Standard are defined in ISO/R 286, *ISO system for limits and fits — Part 1 : General, tolerances and deviations.*

2.2 For the purpose of this International Standard the following definitions apply :

2.2.1 proportional tolerance : Tolerance where the deviations with respect to the nominal dimension are specified as a percentage of the dimension.

Example applied to a thickness : 6,3 mm ± 12,5 %

2.2.2 absolute tolerance : Tolerance where the deviations with respect to the nominal dimension are specified in the form of a value expressed in the units of the dimension.

Example applied to a diameter : 30 mm ± 0,5 mm

2.2.3 joint tolerance : Tolerance where one of the deviations is given in the proportional system and the other in the absolute system.

Example applied to a thickness : 6,3 mm $^{+\ 0,5\ \text{mm}}_{-\ 15\ \%}$

2.2.4 unilateral tolerance : Tolerance where the deviations are wholly positive or wholly negative :

Example applied to a length : 6 000 mm $^{+\ 10\ \text{mm}}_{0}$

2.2.5 bilateral tolerance : Tolerance where the deviations are of opposite signs.

2.2.6 symmetrical tolerance : Bilateral tolerance where the deviations, expressed in the same unit, are equal.

Example applied to a diameter : 168,3 mm ± 1 %

2.2.7 asymmetrical tolerance : Bilateral tolerance where the deviations, expressed in the same unit, are unequal.

Example applied to a thickness : 12,5 mm $^{+\ 15\ \%}_{-\ 12,5\ \%}$

3 RULE

3.1 Unilateral or bilateral tolerances may be used, but the use of symmetrical tolerances is recommended.

3.2 For most product standards for steel tubes, the proportional tolerance is the most suitable.

3.3 The use of joint tolerance is allowed.

4 OUTSIDE DIAMETER

4.1 Five classes of proportional tolerances are standardized as follows :

D_0 = tolerance on outside diameter ± 2 % with a minimum of ± 1,0 mm

D_1 = tolerance on outside diameter ± 1,5 % with a minimum of ± 0,75 mm

D_2 = tolerance on outside diameter ± 1 % with a minimum of ± 0,50 mm

D_3 = tolerance on outside diameter ± 0,75 % with a minimum of ± 0,30 mm

D_4 = tolerance on outside diameter ± 0,50 % with a minimum of ± 0,10 mm

4.2 If not otherwise stated in a product standard, the tolerance on ovality is included in the tolerance on outside diameter.

4.3 For particular applications, for example for the diameter of precision tubes, the use of an absolute tolerance is necessary. In such cases, the tolerance shall be stated clearly for each diameter covered by the product standard. In case of doubt about the tolerance on an intermediate diameter, the tolerance on the next larger size applies.

Example : If in a product standard a table similar to that below appears

Diameter	Tolerances
30	± 0,2 mm
35	± 0,25 mm

the tolerance for a diameter of 32, between diameters 30 and 35, is ± 0,25 mm

5 THICKNESS

5.1 Six classes of proportional tolerances are standardized as follows :

T_0 = tolerance on thickness ± 20 % with a minimum of ± 1 mm

T_1 = tolerance on thickness ± 15 % with a minimum of ± 0,6 mm

T_2 = tolerance on thickness ± 12,5 % with a minimum of ± 0,4 mm

T_3 = tolerance on thickness ± 10 % with a minimum of ± 0,2 mm

T_4 = tolerance on thickness ± 7,5 % with a minimum of ± 0,15 mm

T_5 = tolerance on thickness ± 5 % with a minimum of ± 0,10 mm

5.2 If not otherwise stated in the product standard, the tolerance on eccentricity is included in the thickness tolerance.

5.3 For particular applications, for example for heat-exchanger tubes, the unilateral tolerance system is usual.

6 LENGTH

6.1 Four types of length tolerances are standardized. The product standard shall select the type or types and shall define the tolerances to be applied.

6.2.1 *Random length*

– The random length is defined of necessity by a minimum and a maximum length. By definition the difference between the lengths may not be less than 2 m.

Examples : 10 to 15 m
4 to 7 m

– This range of lengths may be supplemented by the indication of a percentage of shorter tubes, whose length shall be not less than a third limiting value.

Example : 10 to 15 m with 10 % not less than 7 m.

– Finally, the product standard may specify an average length to be guaranteed.

Example : 10 to 15 m with a guaranteed average length of 13 m.

6.2.2 *Approximate length*

For differences in length of random lengths below 2 m, the concept of approximate length, with which a symmetrical absolute tolerance is associated, is specified :

Examples : ± 500 mm
± 100 mm

6.2.3 *Exact length*

For an even more restricted range of lengths, the exact length, with which a unilateral absolute tolerance is always associated, is specified :

Examples : $^{+\ 5\ mm}_{\ 0}$
$^{+\ 15\ mm}_{\ 0}$

6.2.4 *Multiple length*

The multiple length comprises a whole number multiplied by the useful length, plus the saw cuts. The parameters (multiples and saw cuts) shall be defined on the order.