INTERNATIONAL STANDARD

ISO 10380

Second edition
2003-02-01

Pipework — Corrugated metal hoses and hose assemblies

Tuyauteries — Tuyaux et tuyauteries métalliques flexibles onduleux

Reference number
ISO 10380:2003(E)

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Published in Switzerland

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10380 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Subcommittee SC 11, *Flexible metallic hoses and expansion joints*.

This second edition cancels and replaces the first edition (ISO 10380:1994), which has been technically revised.

Introduction

It was decided to produce an International Standard under the Vienna Agreement on technical cooperation between ISO and the European Committee for Standardization (CEN) in order to maintain one document. The opportunity was taken to re-format the document and to add additional information which was not available for the first edition of ISO 10380.

The major changes to the standard are

— introduction of an extra flexibility type;

— reduction in the average number of cycles before failure in the cyclic test;

— introduction of a cyclic test for hoses in the size range DN 125 to DN 300;

— introduction of nickel materials;

— increased requirement for information to be supplied by the purchaser;

— the temperature derating factors have been modified based on values in ISO 9328-5;

— introduction of the requirement for the provision of adequate user instructions;

— the addition of equivalent European standards including those for materials and the corresponding temperature derating factors which are given in Annex A.

This International Standard is a base standard for hose and hose assemblies for general purposes. Other International Standards for specific applications are in preparation.

Pipework — Corrugated metal hoses and hose assemblies

1 Scope

This International Standard specifies the requirements for the design, manufacture and testing of corrugated metal hoses and hose assemblies for general purposes.

It also specifies sizes from DN 4 to DN 300, pressures from PN 0,5 to PN 250, pressure derating factors for elevated temperatures, two methods of construction and three types of flexibility of hose assembly.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6208, *Nickel and nickel alloy plate, sheet and strip*

ISO 7369, *Pipework — Metal hoses and hose assemblies — Vocabulary*

ISO 9328-5, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 5: Austenitic steels*

ISO 9723, *Nickel and nickel alloy bars*

ISO 9724, *Nickel and nickel alloy wire and drawing stock*

ISO 10806, *Pipework — Fittings for corrugated metallic hoses*

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels*

EN 288-1, *Specification and qualification of welding procedures for metallic materials — Part 1: General rules for fusion welding*

EN 10028-7, *Flat products made of steels for pressure purposes — Part 7: Stainless steels*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

EN 13133, *Brazing — Brazer approval*

EN 13134, *Brazing — Procedure approval*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7369 apply.

4 Information to be supplied by the purchaser

4.1 The purchaser shall state the following in enquiries and orders:

a) intended application;

b) nominal size and hose assembly length;

c) flexibility type;

d) maximum operating pressure;

e) construction method;

f) materials of construction;

g) temperature range;

h) type of fitting for hose assembly.

4.2 Dependent on application, the purchaser shall provide the following information:

a) whether vacuum or any additional testing is required;

b) service cycle life;

c) product to be conveyed;

d) product velocity;

e) any special information concerning choice of materials;

f) whether additional protection is required;

g) movement and/or vibration;

h) any additional requirements for cleaning and post-test treatment;

i) whether “water hammer” can occur;

j) requirements for test certificates;

k) if a coloured cover or other identification is required;

l) any special requirements for packaging.

5 Requirements

5.1 Materials

Materials for the manufacture of corrugated metal hose assemblies shall be selected on the basis of their suitability for fabrication, e.g. cold forming, welding, etc., and for the conditions under which they will be used (see 4.1 and 4.2).

A list of suitable materials is given in Table 1.

Alternative equivalent materials are given in Table A.1.

Table 1 — Materials

Materials of construction	Hose	Braid	End fittings [a] and ferrules
Stainless steel hose assemblies	Austenitic stainless steel in accordance with ISO 9328–5, types X 2 CrNi 18 10, X 6 CrNiTi 18 10, X 2 CrNiMo 17 12, X 5 CrNiMo 17 12 and X 6 CrNiMoTi 17 12	Austenitic stainless steel in accordance with the composition given in ISO 9328-5, types X 2 CrNi 18 10, X 5 CrNi 18 9, X 6 CrNiTi 18 10, X 2 CrNiMo 17 12, X 5 CrNiMo 17 12 and X 6 CrNiMoTi 17 12	Austenitic stainless steel in accordance with the composition given in ISO 9328-5, types X 2 CrNi 18 10, X 5 CrNi 18 9, X 6 CrNiTi 18 10, X 2 CrNiMo 17 12, X 5 CrNiMo 17 12 and X 6 CrNiMoTi 17 12 Carbon steel containing a maximum of 0,05 % sulfur and 0,05 % phosphorus[b]. Copper based alloy, if formed, deep-drawing quality.
Copper-based alloy hose assemblies	Deep-drawing quality phosphor bronze containing a minimum of 95 % copper and 1 % tin.	Phosphor bronze containing a minimum of 95 % copper and 1 % tin.	Copper-based alloy, if formed, deep-drawing quality.
Nickel alloy hose assemblies	Nickel alloy strip in accordance with ISO 6208, Nos. NW 0276 NW 4400 NW 6600 NW 6625 NW 8800 and NW 8825	Austenitic stainless steel in accordance with the composition given in ISO 9328-5, types X 2 CrNi 18 10, X 5 CrNi 18 9, X 6 CrNiTi 18 10, X 2 CrNiMo 17 12, X 5 CrNiMo 17 12 and X 6 CrNiMoTi 17 12 Nickel alloy in accordance with ISO 9724, Nos. NW 0276 NW 4400 NW 6600 NW 6625, NW 8800 and NW 8825	Austenitic stainless steel in accordance with the composition given in ISO 9328-5 types X 2 CrNi 18 10, X 5 CrNi 18 9, X 6 CrNiTi 18 10, X 2 CrNiMo 17 12, X 5 CrNiMo 17 12 and X 6 CrNiMoTi 17 12 Nickel alloy in accordance with ISO 9723, Nos. NW 0276 NW 4400 NW 6600 NW 6625, NW 8800 and NW 8825

[a] The material specified for end fittings applies only to the parts which are welded or brazed to the hose.

[b] Carbon steel shall not be used for ferrules.

5.2 Hose dimensions

5.2.1 Bore

The minimum bore size of the hose shall be at least 98 % of the nominal size DN given in Table 2.

Table 2 — DN sizes and bend radii

DN	Pliable test		Cyclic test	
	Type 1 and 2	Type 3	Type 1	Type 2
	Bend radius mm			
4	25	10	100	120
6	25	12	110	140
8	32	16	130	165
10	38	20	150	190
12	45	25	165	210
15	58	25	195	250
20	70	30	225	285
25	85	45	260	325
32	105	60	300	380
40	130	80	340	430
50	160	100	390	490
65	200	115	460	580
80	240	130	660	800
100	290	160	750	1 000
125	350	—	1 000	1 250
150	400	—	1 250	1 550
200	520	—	1 600	2 000
250	620	—	2 000	2 500
300	720	—	2 400	3 000

NOTE The dimensions listed in this table may be used for design purposes. Refer to manufacturer for confirmation.

5.2.2 Overall length

The overall length of a hose assembly shall be the length as ordered to a tolerance of $^{+3}_{-1}$ %.

5.3 Design

5.3.1 Pressure

5.3.1.1 Hose assemblies shall be designed to be in accordance with one of the following pressures PN: 0,5; 2,5; 4; 6; 10; 16; 20; 25; 40; 50; 65; 100; 150; and 250.

5.3.1.2 Pressures, in bars, at 20 °C shall be selected from the values given in 5.3.1.1.

The maximum allowable pressure of the hose assembly shall be the lowest of any component of the assembly.

5.3.1.3 The burst pressure of the hose assembly shall not be less than four times the maximum allowable pressure (see 6.4.2).

5.3.1.4 When tested in accordance with 6.4.3, and with the test pressure released, the permanent elongation shall not exceed 1 % of the test length.

NOTE The length of a hose assembly will change with pressure. For applications where the length under pressure is important, it is essential that the manufacturer be consulted.

5.3.1.5 It is essential that the maximum operating pressure, including surge pressure to which the hose assembly is subjected in service, does not exceed the specified maximum allowable pressure.

5.3.2 Temperature

The maximum allowable pressure of the hose assembly at any temperature is the lowest value of the pressure at 20 °C of each component multiplied by its appropriate derating factor.

The derating factors for the materials given in Table 1 are given in Table 3. The derating factors for materials given in Table A.1 are given in Table A.2.