SLOVENSKI STANDARD
SIST EN 14276-2:2020/oprA1:2023

01-september-2023

Tlačna oprema za hladilne sisteme in toplotne črpalke - 2. del: Cevovodi - Splošne zahteve - Dopolnilo A1

Pressure equipment for refrigerating systems and heat pumps - Part 2: Piping - General requirements

Druckgeräte für Kälteanlagen und Wärmepumpen - Teil 2: Rohrleitungen - Allgemeine Anforderungen

Équipements sous pression pour systèmes de réfrigération et pompes à chaleur - Partie 2 : Tuyauteries - Exigences générales

Ta slovenski standard je istoveten z: **EN 14276-2:2020/prA1**

ICS:

23.020.32	Tlačne posode	Pressure vessels
27.080	Toplotne črpalke	Heat pumps
27.200	Hladilna tehnologija	Refrigerating technology

SIST EN 14276-2:2020/oprA1:2023 **en,fr,de**

EUROPEAN STANDARD

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ICS

English Version

Pressure equipment for refrigerating systems and heat pumps - Part 2: Piping - General requirements

Équipements sous pression pour systèmes de réfrigération et pompes à chaleur - Partie 2 : Tuyauteries - Exigences générales

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This draft amendment is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 182.

This draft amendment A1, if approved, will modify the European Standard EN 14276-2:2020. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 14276-2:2020/prA1:2023) has been prepared by Technical Committee CEN/TC 182 “Refrigerating systems, safety and environmental requirements”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

1 Modification to Clause 1

Update the following references throughout the clause:

— EN 378-1:2016+A1:2020;

— EN 13480-3:2017/A5:2022;

— EN 13480-3:2017, including A2:2020, A3:2020 and A1:2021;

— EN 14276-1:2020/prA1:2023.

2 Modification to Clause 2

Update the following references throughout the clause:

— EN 378-1:2016+A1:2020;

— EN 378-3:2016+A1:2020;

— EN 378-4:2016+A1:2019;

— EN 764-1:2015+A1:2016;

— EN 12735-1:2020;

— EN 13445-3:2021;

— EN 13445-5:2021;

— EN 13480-2:2017;[1]

— EN 13480-3:2017;[2]

— EN ISO 2553:2019;

— EN ISO 3452-1:2021;

— EN ISO 10893-8:2011;[3]

— EN ISO 10893-11:2011;[4]

— EN ISO 17640:2018;

[1] Document impacted by A1:2018, A2:2018, A3:2018, A7:2020 and A8:2021

[2] Document impacted by A1:2021, A2:2020, A3:2020, A4:2021 and A5:2022.

[3] Document impacted by A1:2020.

[4] Document impacted by A1:2020.

— ISO 817:2014.[5]

3 Modification to Clause 3

Replace definition 3.1.1 as follows:

3.1.1
coil
heat exchanger consisting of pipe or tubing (more particularly made from one or more bent pipes) used to cool or heat air considered only as a piping

Add the following new definitions:

3.1.2
nominal diameter of the fitting
DN of the pipe connected to this fitting

3.1.3
fitting
device used in a tube system for the purpose of connecting the tubes or pipes either to each other or to a component part of the piping

3.1.4
socket
type of end defined with its internal diameter

3.1.5
male end
type of end defined with its external diameter

3.1.6
reducer
fitting or an adapter used to enable connections between pipework components of different nominal diameters

4 Modification to Clause 4

Update the following references throughout the clause:

— EN 14276-1:2020/prA1:2023;

— EN 13480-2:2017[1];

— EN 13445-2:2021.

*In 4.3.1.2, replace "*copper groups: 31, 32, 33, 34, 35t, included in EN 1653:1997, EN 12735-1:2016, EN 12735 2:2016*" with "*copper groups: 31 to 38, included in EN 1653:1997, EN 12735-1:2020, EN 12735-2:2016*".*

[5] Document impacted by A1:2017 and A2:2021.

Replace 4.3.2 as follows:

4.3.2 Special considerations including brittle fracture

The requirements of EN 14276-1:2020, shall apply as follows:

— For all materials: see 4.3.1.3 to 4.3.1.7;

— For steel: see 4.3.2;

— For aluminium: see 4.3.3;

— For copper: see 4.3.4.

The brittle fracture should be determined only when the material thickness can permit to make a test piece according to EN ISO 148-1 with a minimum section size 5 mm × 10 mm

Delete 4.4 and replace 4.5 and 4.6 as follows:

4.4 Material documentation

The requirements of EN 14276-1:2020/prA1:2023, 4.4 shall apply.

4.5 Materials for non-pressure retaining parts

The requirements of EN 14276-1:2020/prA1:2023, 4.5 shall apply.

5 Modification to Clause 5

*In the first line of Table 2 replace "*EN 14276-2:2020*" with "*EN 14276-1:2020/prA1:2023, 5.2*".*

6 Modification to Clause 6

Update the following references throughout the clause:

— EN 14276-1:2020/prA1:2023;

— EN 13480-2:2017[1];

— EN 13445-2:2021;

— EN 378-3:2016+A1:2020;

— EN 378-4:2016+A1:2019.

Replace 6.5 as follows:

6.5 Calculation temperature tc

The calculation temperature, t_c, shall be the maximum temperature likely to be reached at the mid-thickness of the piping, under normal operating conditions, at the calculation pressure p_c. The calculation temperature shall be determined as indicated below. Any heat transfer calculation shall be performed on the assumption that there is no heat loss due to wind or other external influence.

a) For externally uninsulated components, the calculation temperature shall be as follows:

   1) For fluid temperatures below 40 °C, the calculation temperature for the component shall be taken as the fluid temperature;

2) For fluid temperatures of 40 °C and above, unless a lower average wall temperature is determined with test or heat transfer calculation, the calculation temperature for uninsulated components shall be not less than the following values, but not less than 40°C:

   i) 95 % of the fluid temperature for valves, pipes, ends, welding fittings, and other components having wall thickness comparable to that of the pipe;

   ii) 90 % of the fluid temperature for flanges (except lap joint flanges) including those on fittings and valves;

   iii) 85 % of the fluid temperature for lap joint flanges;

   iv) 80 % of the fluid temperature for bolting.

b) For externally insulated piping components, the component calculation temperature shall be the fluid temperature TS_{max} unless calculations, tests, or service experience based on measurements, support the use of another temperature. Where piping is heated or cooled with tracing or jacketing, this effect shall be considered in establishing component calculation temperatures;

c) Where the piping is heated or cooled with tracing or jacketing, the calculation temperature shall be determined with test or taken to be equal to the temperature determined in a) or b) + 50 K.

The manufacturer when selecting the heater shall quantify the risk that exists of overheating for the fluid or for the material and shall take appropriate measures to restrict this risk with for example the inclusion of safety accessories and/or the inclusion of appropriate warning labels and/or adding instructions to the documentation.

Replace Table 3 as follows:

Joint coefficients	1	1	0,85	0,7
Testing groups [a]	1b	2b	3b	4
Permitted material				
Steel group	1.1/1.2/8.1	1.1/1.2/8.1	1.1/1.2/8.1	1.1/1.2/8.1
Aluminium group	21 / 22	21 / 22	21 / 22	21 / 22
Copper group	All	All	All	all
Maximum thickness per material category				
Steel group 1.1 / 8.1	Unlimited [b]	≤ 50	≤ 50	≤ 16
Steel group 1.2	Unlimited [b]	≤ 30	≤ 30	≤ 12
Aluminium group 21 22	Unlimited [b]	≤ 40	≤ 40	≤ 20
Copper group all	Unlimited [b]	≤ 40	≤ 40	≤ 20
Welding process	Unlimited [b]	Fully mechanical welding only [c]	Unlimited [b]	Unlimited [b]
Service temperatures range	Unlimited [b]	Unlimited [b]	Unlimited [b]	−50 °C + 200 °C
Groups of fluid	1/2	1/2	1/2	1/2
Extent of VT	100 %	100 %	100 %	100 %
Extent of NDT other than VT of governing welded joints	100 %	100–10 % [d e]	10 %	0 %

[a] Definition of testing groups with analogy with EN 13480-5:2017. All testing groups require visual examination.

[b] Unlimited means no additional restriction due to testing. The limitations mentioned in the table are limitations imposed with testing. Other limitations given in various clauses of this document (such as design, material limitations) shall also be taken in account.

[c] Fully mechanized and/or automatic welding process where at least the weld head and the welding consumable movement is mechanized.

[d] First figure applies initially; second figure applies after experience. For definition of experience see EN 13445-5:2021. The percentage relates to the percentage of welds of each individual vessel.

[e] The extent of NDT other than VT can be substituted with destructive testing for group 2b.

Replace 6.9.1.2 as follows:

The piping is subject to a pressure not less than 3 times *PS* without rupture.

Test temperature is done at the ambient temperature.

If the design temperature exceeds 125°C, the piping is subject to a pressure not less than $3 \times \frac{f_{test}}{f} \times PS$.

Replace 6.9.1.3 as follows:

6.9.1.3 Type fatigue proof test

The test procedure and acceptance criteria are the following if the design temperature is not higher than 125 °C:

a) 3 samples are tested at 2 times *PS*;

b) 3 other samples are subjected to the following test steps:

step 1: Test at *PS* without permanent deformation and leaks;

step 2: 250 000 cycles between 0,2 *PS* or lower and 0,7 *PS* or higher;

step 3: Test according to EN 14276-1:2020/prA1:2023, Formula (C.1).

During the test procedure, none of the 6 samples shall rupture, burst or leak.

The test procedure and acceptance criteria are the following if the design temperature is above 125 °C:

c) 3 samples are tested at $2 \times \frac{f_{test}}{f} \times PS$;

d) 3 other samples are subjected to the following test steps:

step 1: Test at $\frac{f_{test}}{f} \times PS$ without permanent deformation and leaks;

step 2: 250 000 cycles between 0,2 *PS* or lower and $0,7 \times \frac{f_{test}}{f} \times PS$ or higher;

step 3: Test according to EN 14276-1:2020/prA1:2023, Formula (C.1).

During the test procedure, none of the 6 samples shall rupture, burst or leak.

Replace 6.9.2 as follows:

6.9.2 Design with formula (DBF)

6.9.2.1 Straight piping

The minimum required thickness without corrosion allowance and tolerances, e_c for a straight pipe shall be calculated as follows:

where $D_o/D_i \leq 1,7$, according to Formula (1) or (2).

$$e_c = \frac{p_c \, D_o}{2fZ + p_c} \tag{1}$$

$$e_c = \frac{p_c \, D_i}{2fZ - p_c} \tag{2}$$

where $D_o/D_i > 1,7$, according to Formula (3) or (4).

$$e_c = \frac{D_o}{2}\left(1 - \sqrt{\frac{f\ z - p_c}{f\ z + p_c}}\right) \quad (3)$$

$$e_c = \frac{D_i}{2}\left(\sqrt{\frac{f\ z + p_c}{f\ z - p_c}} - 1\right) \quad (4)$$

6.9.2.2 Bend piping or elbow

The minimum required wall thickness without allowances and tolerances shall be calculated with:

on the intrados, according to Formula (5).

$$e_{\text{int}} = e_c \frac{(R / D_o) - 0,25}{(R / D_o) - 0,5} \quad (5)$$

on the extrados, according to Formula (6).

$$e_{\text{ext}} = e_c \frac{(R / D_o) + 0,25}{(R / D_o) + 0,5} \quad (6)$$

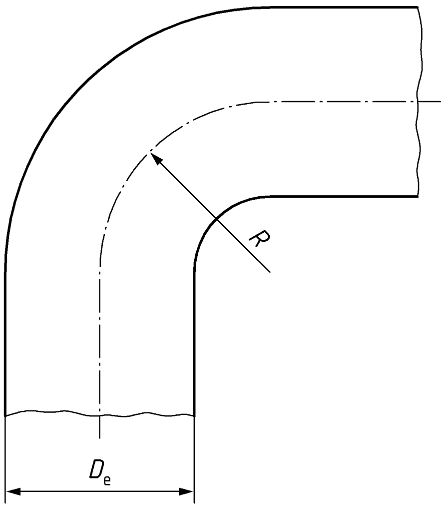
where:

e_c is calculated in accordance with 6.9.2.1 for straight pipe, in mm.

e_{int} minimum required thickness without allowances and tolerances for a bend on the intrados, in mm.

e_{ext} minimum required thickness without allowances and tolerances for a bend on the extrados, in mm.

R radius of bend or elbow, in mm.



Key

D_e external diameter of tube in mm

R radius of curvature for tube in mm

Figure 2 — Bend piping

For copper alloys other than copper group 31, the minimum required thickness before the bending without corrosion allowance, for a bend pipe shall be determined as follows:

$$e = \frac{P \times D_e}{2 \times f \times z + P}\left(1 + \frac{D_e}{4R}\right) \quad (7)$$

For copper group 31, the Formula (1) or (2) shall apply if calculation was made for annealed conditions and if there is no heat treatment in the bending zone. Otherwise, Formula (5), (6) or (7) shall be used.

Additional methods of calculating the wall thickness of pipe bends and elbows shall be in accordance with EN 13480-3:2017, Annex B.

6.9.2.3 Reducers

6.9.2.3.1 Conditions of applicability

Requirements are given in 6.9.2.3.4 to 6.9.2.3.8 for right circular cones and cone/cylinder intersections where the cone and the cylinder are on the same axis of rotation. Requirements for offset cones are given in 6.4.2.3.9.

The requirements do not apply to:

— Cones for which the half angle at the apex of the cone is greater than 60°;

— Cones for which:

$$\frac{e_a \cos\alpha}{D_c} \leq 0,001 \quad (8)$$

— Short cones joining a jacket to a shell.

Limits on the minimum distance from other major discontinuities are given in individual clauses.

6.9.2.3.2 Specific definitions

Junction between the cylinder and the cone intersection of the mid-thickness lines of cylinder and cone, extended if necessary where there is a knuckle (see Figure 3 and Figure 4 for examples at the large end).

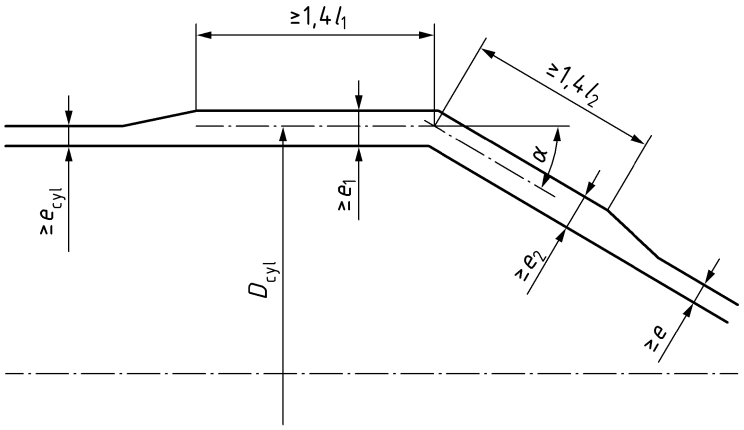


Figure 3 — Geometry of cone/cylinder intersection without knuckle – Large end