SLOVENSKI STANDARD
SIST EN 10374:2021

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Varjeni spojni elementi za živilsko in kemično industrijo - Odcepi, kolena in reducirni elementi za varjenje

Welded fittings for the food and chemical industries - Tees, bends and reducers for welding

Anschweißarmaturen in der Lebensmittel- und chemischen Industrie - T-Stücke, Bogen und Reduzierstücke zum Anschweißen

Raccords soudés pour l'industrie alimentaire et chimique - Tés, coudes et réducteurs à souder

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Welded fittings for the food and chemical industries - Tees, bends and reducers for welding

Raccords soudés pour l'industrie alimentaire et chimique - Tés, coudes et réductions à souder

Formstücke zum Anschweißen in der Lebensmittel- und chemischen Industrie - T-Stücke, Bogen und Reduzierstücke zum Anschweißen

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword

This document (EN 10374:2021) has been prepared by Technical Committee CEN/TC 459/SC 10 “Steel tubes and fittings for steel tubes”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2022, and conflicting national standards shall be withdrawn at the latest by February 2022.

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1 Scope

This document specifies dimensions, tolerances, internal and external surface characteristics and marking of welded fittings for the food and chemical industry.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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 10088-2, *Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 10204, *Metallic products - Types of inspection documents*

EN 10216-5, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 5: Stainless steel tubes*

EN 10217-7, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 7: Stainless steel tubes*

EN 10253-4, *Butt-welding pipe fittings - Part 4: Wrought austenitic and austenitic-ferritic (duplex) stainless steels with specific inspection requirements*

EN 10357, *Austenitic, austenitic-ferritic and ferritic longitudinally welded stainless steel tubes for the food and chemical industry*

EN 13018, *Non-destructive testing - Visual testing - General principles*

EN 13480 (series), *Metallic industrial piping*

EN ISO 1127, *Stainless steel tubes - Dimensions, tolerances and conventional masses per unit length (ISO 1127)*

EN ISO 4288, *Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture (ISO 4288)*

EN ISO 6520-1, *Welding and allied processes - Classification of geometric imperfections in metallic materials - Part 1: Fusion welding (ISO 6520-1)*

ISO 13715, *Technical product documentation - Edges of undefined shape - Indication and dimensioning*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 6520-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
elbow
elbow fitting to allow a change direction of the pipeline with an angle of 45 °, 90 ° or 180 °

3.1.1
elbow form BS
elbow with standard weld ends

Note 1 to entry: Short execution.

3.1.2
elbow form BL
elbow with prolonged welding ends

Note 1 to entry: Long execution.

3.2
reducer
fitting that reduces the pipeline size from larger to a smaller diameter

3.2.1
reducer form RCS
concentric reducer with short length

Note 1 to entry: Short type.

3.2.2
reducer form RCL
concentric reducer with long length

Note 1 to entry: Long type.

3.2.3
reducer form RES
eccentric reducer with short length

Note 1 to entry: Short type.

3.2.4
reducer form REL
eccentric reducer with long length

Note 1 to entry: Long type.

3.3
T-piece
T-shaped fitting with a straight run and a branch perpendicular to the run

3.3.1
T-piece form TL
T-piece with equal tube diameters

3.3.2
T-piece form TS
T-piece with a short branch and equal tube diameters

3.3.3
T-piece form TRL
T-piece with a branch tube diameter smaller than the run tube diameter

3.3.4
T-piece form TRS
T-piece with a short branch and a branch tube diameter smaller than the run tube diameter

4 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms in Table 1 shall be applied.

Table 1 — Symbols and abbreviated terms

Symbol	Unit	Description
d_1, d_2	*mm*	specified inside diameter for reducers
D, D_1, D_2	*mm*	specified outside diameter for T-pieces and elbows
l_0	*mm*	— distance from the axis of the branch outlet to the face of the centre body of the T-pieces — distance from the centre of one welding end to the centre of a 90 ° elbow form BS at the welding ends — distance from one welding end to the axis of the centre line for elbow form BS-180
l_{0BS5}	*mm*	distance from the centre of one welding end to the centre of a 90 ° elbow form BS5 at the welding ends
l_1	*mm*	— distance from the centre of one welding end to the centre of a 90 ° elbow form BL at the welding ends — distance from one welding end to the axis of the centre line for elbow form BL-180 — face to face distance of reducer form RCL
l_2	*mm*	— distance from the axis of centre line of the run to the face of the branch outlet of tees — distance from one welding end to centre for elbow form BL-45 — face to face distance of reducer form REL
l_3	*mm*	— difference between elbow form BL5–90 and BS5–90, BL-45 and BS-45, BL-90 and BS-90, BL-180 and BS-180 at the welding ends aka tangent length
l_4	*mm*	centre to centre distance for elbows 180 °
l_{1BL5}	*mm*	distance from the centre of one welding end to the centre of a 90 ° elbow form BL5 at the welding ends
l_5	*mm*	distance from the extrados of a BS-45 or a BL-45 elbow to the face of the welding end
O	%	out-of-roundness
R, R_{BS5}, R_{BL5}	*mm*	bending radius of elbows
s, s_1, s_2	*mm*	specified wall thickness at the welding ends for T-pieces, elbows and reducers

5 Designation of fittings and steel grades

5.1 Designation of fittings

Fittings are designated by their name and the following parameters.

5.2 Elbow

Elbows are designated by the following parameters:

a) form (BS, BL, BS5, BL5);

b) angle (45 °, 90 °, 180 °);

c) tube dimensions (outside diameter and wall thickness).

5.3 Reducer

Reducer are designated by the following parameters:

a) form (RCS or RCL or RES or REL);

b) tube dimensions with major diameter (outside diameter and wall thickness);

c) tube dimensions with minor diameter (outside diameter and wall thickness).

5.4 T-piece

5.4.1 T-piece form TL and form TS

T-piece equal execution are designated by the following parameters:

a) form (TL or TS);

b) tube dimensions (outside diameter and wall thickness).

5.4.2 T-piece form TRL and form TRS

T-piece reduced execution are designated by the following parameters:

a) form (TRL or TRS);

b) tube dimensions with run diameter (outside diameter and wall thickness);

c) tube dimensions with branch diameter (outside diameter and wall thickness).

5.5 Designation of steel grades

The steel designation for fittings consists of the steel name in accordance with EN 10027-1 or the steel number allocated in accordance with EN 10027-2.

6 Information to be supplied by the purchaser

6.1 Mandatory information

The following information shall be supplied by the purchaser at the time of enquiry and order:

a) quantity required (number of pieces);

b) reference to this document;

c) designation of fittings (see 5.1);

d) steel name or number according to EN 10088-1;

e) heat treatment (see 7.2.3).

6.2 Options

A number of options are specified in this document and listed below. If no options are indicated at the time of enquiry and order the products shall be supplied in accordance with the basic specification (see 6.1).

a) Welds shall be finished by grinding and/or mechanical polishing (see 7.2.2).

b) Inspection document according to EN 10204 (see 9.2).

For supplementary information related to additional ordering information on fabrication options see also Annex A (informative).

6.3 Examples of an order

Example 1

500 elbows in accordance with this document, form BS-90 for tube having an outside diameter of 41 mm and a wall thickness of 1,5 mm, made of steel grade 1.4301, with heat treatment “a”.

500 elbows — EN 10374 — BS-90 41x1,5 — 1.4301 — a.

Example 2

100 Reducers in accordance with this document, form REL, tube outside diameters of 85 mm and 70 mm and wall thickness of 2 mm, made of steel grade 1.4301, with heat treatment “a”.

100 reducers — EN 10374 — REL 85x2/70x2 — 1.4301 — a.

Example 3

300 T-pieces in accordance with document, form TS for tube having an outside diameter of 29 mm and a wall thickness of 1, 5 mm, made of steel grade 1.4301, with heat treatment “u”, welds shall be finished after welding (f), inspection certificate type 3.1 as per EN 10204 for the pre-material.

300 T-pieces — EN 10374 — TL 29x1,5 — 1.4301 — u — option 7.2.2 (f) — option 9.2 (a).

7 Requirements

7.1 Material

Fittings manufactured shall be in stainless steel.

The chemical composition of the stainless steel fittings shall be in accordance with EN 10088-1.

For guidance, the most commonly used materials are listed in Annex B (Table B.1).

7.2 Manufacturing Process

7.2.1 General

The method of manufacturing and the relevant starting product forms are left at the discretion of the manufacturer. When manufacturing fittings from welded tubes, tubes shall be supplied and delivered in accordance with EN 10357 or EN 10217-7. When manufacturing fittings from seamless tubes, tubes shall be supplied and delivered in accordance with EN 10216-5. Sheet and strip used in manufacturing shall be supplied and delivered in accordance with EN 10088-2 or EN 10028-7.

7.2.2 Welding

Welding processes used in the manufacturing of fittings may be Gas Tungsten Arc Welding (GTAW), Laser Beam Welding, or Electron Beam Welding. Welds shall be left in the as-welded condition (designator w) or finished after welding (designator f) (6.2, option a). If not specified at the time of enquiry and order the condition of the welds is at the discretion of the manufacturer. Welds used in the as-welded condition shall meet the acceptance criteria as per Table 2. Welds finished after welding shall be flush with the base metal and shall meet the acceptance criteria as per Table 2. Welds finished after welding shall be flush with the base metal and shall meet the acceptance criteria as per Table 2 and the R_a-requirements of 7.2.4.

Table 2 — Visual examination acceptance criteria for groove welds on butt joints [a]

Classification of imperfections as per EN ISO 6520-1		Requirements for fittings
Ref. No.	Designation	
100	Crack	None accepted
104	Crater crack	None accepted
2017	Surface pore	None accepted
2025	End crater pipe (crater shrinkage, shrinkage hole)	None accepted
301	Oxide island (slag inclusion)	Oxide islands are permitted as long as they are adherent to the surface
401	Lack of fusion	None accepted
4021	Incomplete root penetration	None accepted
5011	Continuous undercut	None accepted [b]
5012	Intermittent undercut	None accepted [b]
5013	Shrinkage grooves (undercuts visible on each side of the root run)	None accepted [b]
502	Excessive weld metal (convexity, butt weld)	≤ 0,15 t [b c]
504	Excessive penetration (convexity, butt weld)	≤ 0,15 t [b c]
5072	Linear misalignment between tubes	≤ 0,15 t [b c]
509	Sagging (weld metal collapse due to gravity)	≤ 0,15 t [b c]
511	Incompletely filled groove (concavity, butt weld)	≤ 0,15 t [b c]
515	Root concavity (concavity, butt weld)	≤ 0,15 t [b c]
516	Root porosity	None accepted
601	Arc strike (stray arc)	None accepted
602	Spatter	None accepted
610	Temper colours (visible oxide film)	None accepted

[a] Examination of welds is limited to visual examination of surface imperfections and measurement of geometric imperfections. Examination of imperfections inside the welds is outside the scope of this document. See EN 13018 for guidelines on visual examination.

[b] Acceptance criteria only applies to the inner surface.

[c] t = nominal wall thickness, in case of different nominal wall thicknesses the thinner wall applies.