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Welding and allied processes — Symbolic representation on drawings — Welded, brazed and soldered joints

Soudage et techniques connexes — Représentations symboliques sur les dessins — Joints soudés et brasés

[Revision of third edition (ISO 2553:1992)]

ICS 01.100.20; 25.160.40

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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.

ISO 2553 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*.

This fourth edition cancels and replaces the third edition (ISO 2553:1992), which has been substantially technically revised.

Requests for official interpretations of any aspect of this standard should be directed to the Secretariat of ISO/TC 44/SC 7 via your national standards body, a complete listing of which can be found at ww.iso.org.

Introduction

Technical drawings are intended to clearly and understandably illustrate the design-related specifications.

The symbols given in this standard shall be used in technical drawings of welded, soldered or brazed structural components. The design-related specifications, such as type, thickness, and length of weld, weld quality, surface treatment, filler material and testing specifications, can be indicated directly at the weld by means of the symbols given in this standard.

Clarity may be improved by references to collective information in the drawings or references to additional design-related documents.

The preparation of the production may require detailed welding-related planning. The type of representation described in this standard can be used for this purpose and complemented by additional production-related aspects (e.g. welding position, welding process, WPS, weld preparation, preheating …).

This information is often given in production-related documents, such as work schedules or welding procedure specifications (WPS).

Welding-related drawings should be prepared and checked by specially trained personnel (see ISO 14731).

ISO 2553 recognizes that there are two different approaches in the global market to designate the arrow side and other side on drawings, and allows for either to be used in isolation, to suit a particular market need. Application of either approach identifies a welding symbol in accordance with this International Standard. The approach in accordance with system A is based on ISO 2553:1992. The approach in accordance with system B is based upon standards used by Pacific Rim countries.

Welding and allied processes — Symbolic representation on drawings — Welded, brazed and soldered joints

1 Scope

This International Standard defines the rules to be applied for symbolic representation of welded, brazed and soldered joints in metallic materials on technical drawings. This can include information about the geometry, manufacture, quality and testing of the welds.

This International standard is a combined specification that recognizes that there are two different approaches in the global market to designate the arrow side and other side on drawings. It should be noted that:

- Clauses, Tables and Figures which carry the suffix letter "A" are applicable only to the symbolic representation system based on a dual reference line;
- Clauses, Tables and Figures which carry the suffix letter "B" are applicable only to the symbolic representation system based on a single reference line;
- Clauses, Tables and Figures which do not have the suffix letter "A" or the suffix letter "B" are applicable to both systems.

The symbols shown in this International Standard can be combined with other symbols used on technical drawings for example to show surface finish requirements.

An alternative designation method is shown which can be used to represent welded joints on drawings by specifying essential design information such as weld dimensions, quality level etc. The joint preparation and welding process(es) are then determined by the production unit in order to meet the specified requirements.

NOTE Examples given in this International Standard, including dimensions, are illustrative only and are intended to demonstrate the proper application of principles. They are not intended to represent good design practices, or to replace code or specification requirements.

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 128 (all parts), *Technical drawings – General principles of presentation*

ISO 129-1, *Technical drawings – Indication of dimensions and tolerances – Part 1: General principles*

ISO 1302, *Geometrical Product Specifications (GPS) – Indication of surface texture in technical product documentation*

ISO 3098-2, *Technical product documentation – Lettering – Part 2: Latin alphabet, numerals and marks*

ISO 4063, *Welding and allied processes – Nomenclature of processes and reference numbers*

ISO/TR 25901:2007, *Welding and related processes — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 25901:2007 and the following apply.

3.1
welding symbol
symbol consisting of an arrow line and a reference line and which may also include elementary and supplementary symbols, dimensions and/or tail, used on technical drawings to indicate welded brazed or soldered joint type, location and joint preparation

NOTE 1 See Clause 4.

3.2
basic welding symbol
symbol consisting of an arrow line, reference line and tail used when the joint is not specified and only to indicate that a welded, brazed or soldered joint is to be made

NOTE 1 See 4.2.

3.3
arrow line
leader line used to indicate the joint that is to be welded, brazed or soldered, generally drawn at 135° to the reference line

NOTE 1 See 4.5.

3.4
reference line
part of the welding symbol on which the elementary symbol is located, generally drawn parallel to the bottom edge of the drawing

NOTE 1 See 4.6.

NOTE 2 The reference line can be drawn parallel to the side edge of the drawing (whole welding symbol rotated by 90°) but should only be done when space does not permit drawing parallel to the bottom edge.

3.5
tail
V shaped element added to the end of the continuous reference line away from the arrow line

NOTE See 4.7.

3.6
arrow side
the side of the joint to which the arrow line is pointing

NOTE See 4.6.2.1.

3.7
other side
the opposite side with regards to the side to which the arrow is pointing

NOTE See 4.6.2.1.

3.8
elementary symbol
symbol forming part of the welding symbol and drawn on the reference line to indicate the type of weld and joint preparation

NOTE See 4.3.

3.9
supplementary symbol
symbol used in conjunction with elementary symbols to convey more information about the joint

NOTE See 4.4.

3.10
complementary information
non symbolic information, relevant to the welds being made, which may be included in the tail of the welding symbol

NOTE See 4.7.

3.11
intermittent weld
series of weld elements made at intervals along a joint [ISO/TR 25901:2007]

NOTE See 5.3.3.

3.11.1
chain intermittent weld
intermittent weld on each side of a joint (usually fillet welds in T and lap joints) arranged so that the welds lie opposite one another along the joint

NOTE See 5.3.3.2.

3.11.2
staggered intermittent weld
intermittent weld on each side of a joint (usually fillet welds in T and lap joints) arranged so that the welds on one side lie opposite to the spaces on the other side along the joint

NOTE See 5.3.3.3.

3.12
offset
the distance between the start of welding on one side of a staggered intermittent weld made on both sides of the joint and the start of welding on the other side

NOTE 1 See 5.3.3.3, Table 3 and Table 5, No 2.6.

NOTE 2 If the centres of the welds on one side of the joint correspond with the centres of the gaps on the opposite side of the joint, offset need not be specified.

3.13
backing run
final run deposited on the root side of a fusion weld

3.14
backing weld
backing in the form of a weld

3.15
nominal weld length
design length of a weld

3.15.1
nominal length of weld elements
in intermittent welds, the design length of the elements of the weld

3.16
nominal throat thickness, *a*
design value of the height of the largest isosceles triangle that can be inscribed in the section of a fillet weld

NOTE Other design throat thicknesses may be used, bur need to be specified.

3.17
leg length, z
distance from the actual or projected intersection of the fusion faces and the toe of a fillet weld, measured across the fusion face

3.18
penetration depth
in butt welds, the thickness of the weld metal excluding any reinforcement

3.18.1
deep penetration throat thickness, s
nominal throat thickness to which a certain amount of fusion penetration is added

3.19
flare-bevel weld
a butt weld between a joint member with a curved surface and another with a planar surface

3.20
flare-V weld
a butt weld between two members with curved surfaces

4 Welding symbol

4.1 General

The reference line and arrow line are required elements. Additional elements may be included to convey specific information. The arrow line can be joined to either end of the reference line.

It is preferable that the welding symbol is shown on the same side of the joint that the weld is to be made, i.e. the arrow side (see 4.6).

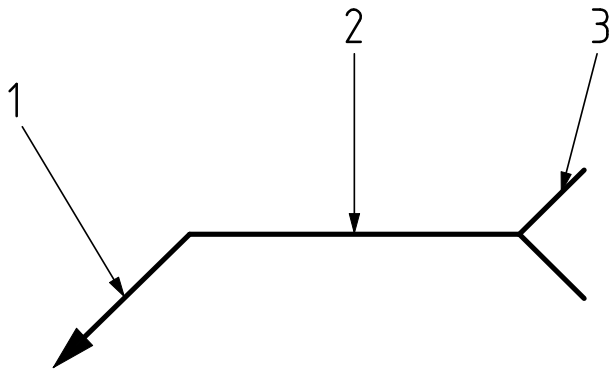
The thickness of the arrow lines, reference line, elementary symbols and lettering shall be in accordance with ISO 128 and ISO 3098-2.

NOTE In order not to overburden drawings, reference can be made to notes in the drawing or other design-related documents.

4.2 Basic welding symbol

If joint details are not specified and the only requirement is to indicate that a joint is to be welded, the basic symbol shown in Figure 1 can be used. In this case, a dual reference line is not required for system A (see 4.6.1A) as no details concerning the weld are being conveyed.

The basic welding symbol shall comprise an arrow line, reference line and a tail. However, when additional information is added to the reference line, the tail becomes optional (see 4.7).



Key
1 Arrow line
2 Reference line
3 Tail

Figure 1 — Basic welding symbol (joint details and type not specified)

NOTE 2 This symbol is often used to indicate the location of tack welds.

Examples of comprehensive welding symbols showing the location of elements are given in Figure A.1.

4.3 Welding symbol systems

This International standard is a combined specification that recognizes two different systems, A and B, to designate the arrow side and other side on drawings.

The symbolic representation in system A is based on a dual reference line consisting of a continuous line and a dashed line (see 4.7).

The symbolic representation in system B is based on a single reference line (see 4.7).

Clauses, Tables and Figures which carry the suffix "A" or "B" are applicable only to system A or system B respectively.

Clauses, Tables and Figures which do not have a suffix are applicable to both systems.

System A and B shall not be mixed and drawings shall clearly indicate which system is used including units of measurement in accordance with ISO 129-1.

4.4 Elementary symbols

4.4.1 General

Elementary symbols, in accordance with Table 1, can be added to the reference line in both Systems A and B to indicate the type of weld to be made.

NOTE Information regarding tolerances and transition points for weld types is given in Annex B.

Elementary symbols form part of the welding symbol and shall be drawn attached to the reference line generally at the mid-point.

Elementary symbols can be complemented by:

— supplementary symbols (see 4.4 and Table 3);

— dimensions (see Clause 5);

— complementary information.

The orientation of the elementary symbols shall not be changed to that shown.

Annex B gives guidance on tolerances and transition points for butt welds, edge welds and fillet welds.

If clear illustration by means of symbols is not possible, cross sections of the welds can be drawn and dimensioned.

Table 1 — Elementary symbols

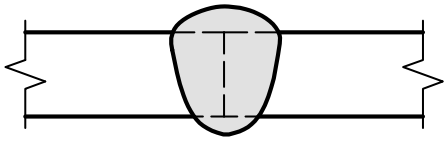
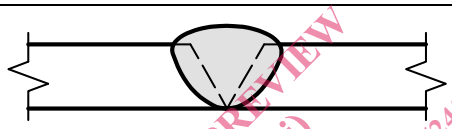
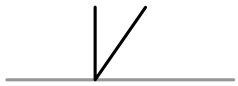
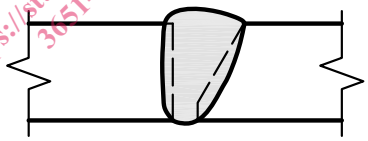
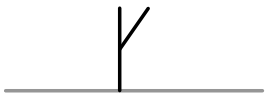
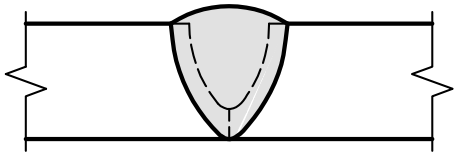
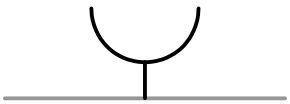
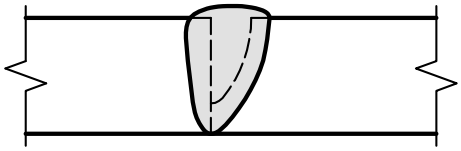
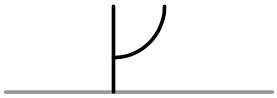
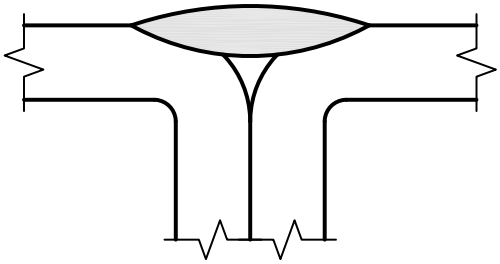
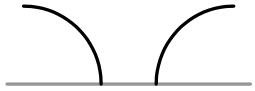
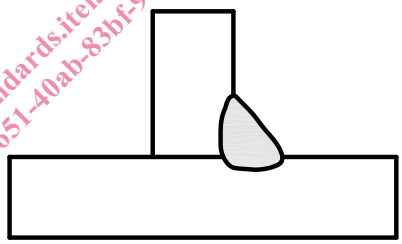
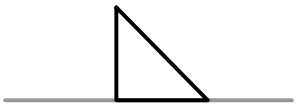
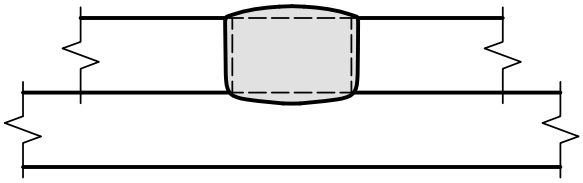
No.	Designation	Illustration (dashed lines show joint preparation prior to welding)	Symbol [a]
1	Square butt [b]		
2	Single-V butt [b]		
3	Single-V butt with broad root face [b]		
4	Single-bevel butt [b]		
5	Single-bevel butt with broad root face [b]		
6	Single-U butt [b]		
7	Single-J butt [b]		

Table 1 (*continued*)

No.	Designation	Illustration (dashed lines show joint preparation prior to welding)	Symbol [a]
8	Flare V		
9	Flare Bevel		
10	Fillet		
11	Plug (in slots or circular holes)		
12	Resistance Spot (including projection)