
**Welding and allied processes — Welding
positions**

Soudage et techniques connexes — Positions de soudage

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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 6947 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*.

This third edition cancels and replaces the second edition (ISO 6947:1990), which has been technically revised.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 7 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

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Introduction

This International Standard provides positions for standard discrete test piece orientation PA, PB, H-L045, etc. that have been specified in this International Standard since the first edition (ISO 6947:1980).

In this revision, positions are defined for production welding. These positions are flat, horizontal, vertical, and overhead. Unlike testing positions, these positions are contiguous.

The direction of welding is an essential parameter for determining the welding position, e.g. up or down.

The welding position is not dependent on the geometrical arrangement of the joint, e.g. butt or fillet joint, or that of the semi-finished product. Welds of all types and in all directions are covered.

The main positions have been given symbols which can easily be used for designation purposes; these symbols were chosen independently of possible meaningful abbreviations, i.e. they are not derived from any particular language.

The relationship between testing positions and production welding positions is specified elsewhere, e.g. in ISO 9606^[1] or ISO 15614^[2].

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Welding and allied processes — Welding positions

1 Scope

This International Standard defines welding positions for testing and production, for butt and fillet welds, in all product forms.

Annex A gives examples of the limits of the slope of a weld axis and the rotation of the weld face about the weld axis for welding positions in production welds.

Annex B provides a comparison of International, European and US designations.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

welding position

position of a weld in space, which is defined relative to the slope of the axis and rotation of the face of the weld relative to the horizontal plane

2.2

main welding position

welding position, designated PA, PB, PC, PD, PE, PF or PG

NOTE For PA, PB, PC, PD and PE, see Figure 1.

2.3

slope

S

angle of the axis of the weld relative to the main welding position

2.4

rotation

R

angle of the face of the weld relative to the main welding position

2.5

inclined angle

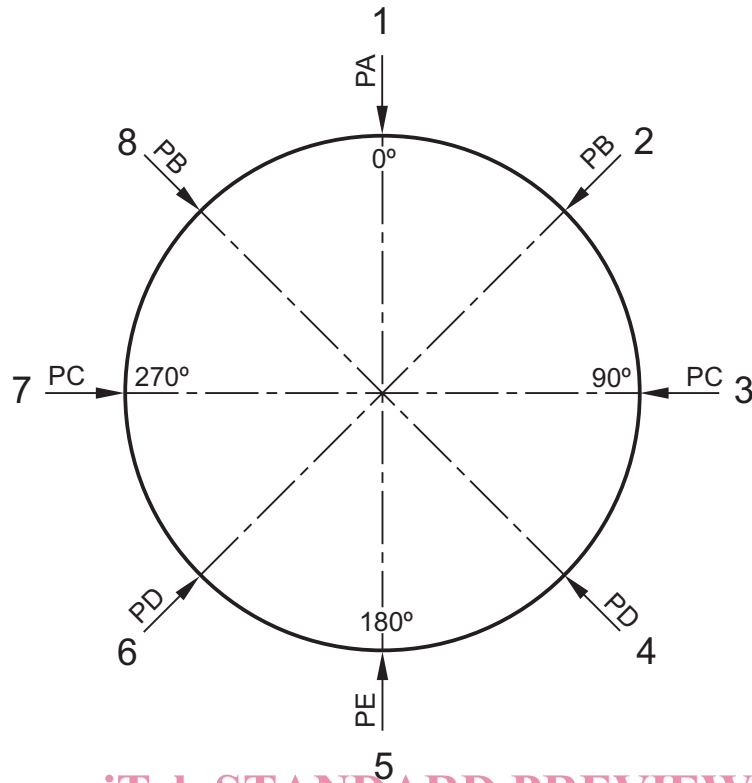
L

angle of the axis of the pipe

3 Welding positions

3.1 Main welding positions

The main welding positions are illustrated in Figure 1 with examples of their application for butt and fillet welds in Figure 2.



Key
 1 flat
 2 and 8 horizontal vertical
 3 and 7 horizontal

4 and 6 horizontal overhead
 5 overhead

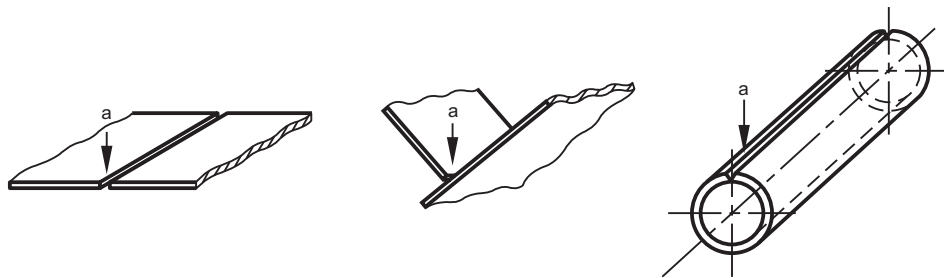
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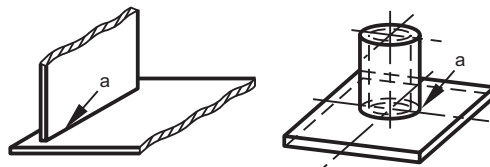
Figure 1 — Main welding positions

Examples of main welding positions for butt and fillet welds are illustrated in Figure 2.



a Arrow shows welding position.

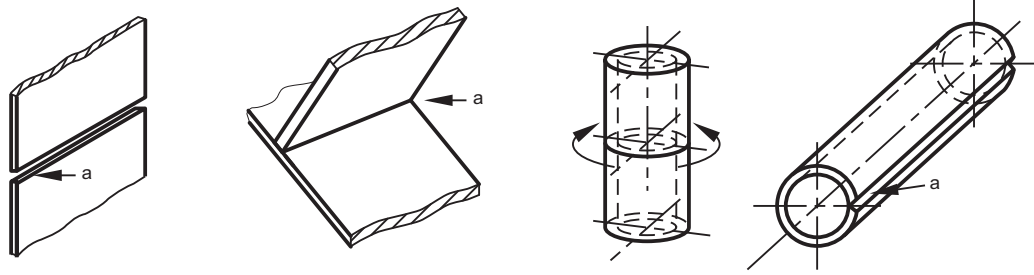
a) PA: flat position



a Arrow shows welding position.

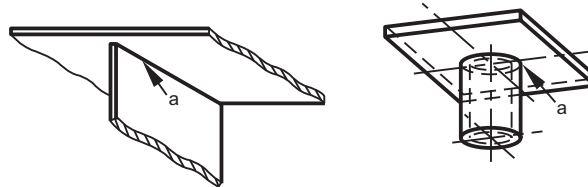
b) PB: horizontal vertical position

Figure 2 — Examples of main welding positions (continued)



a Arrow shows welding position.

c) PC: horizontal position



a Arrow shows welding position.

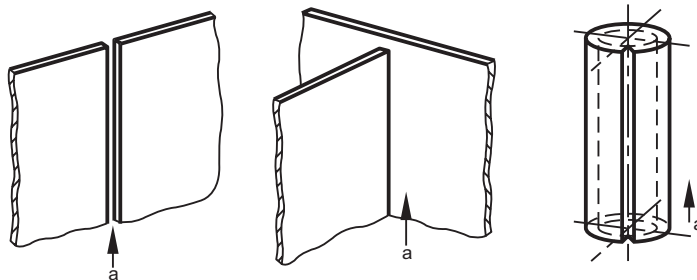
d) PD: horizontal overhead position



a Arrow shows welding position.

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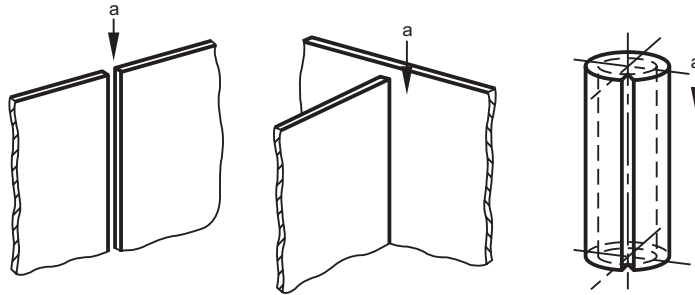
e) PE: overhead position



a Arrow shows weld progression or direction.

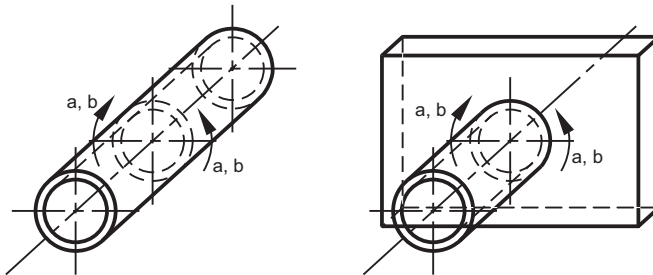
f) PF: vertical up position

Figure 2 — Examples of main welding positions (continued)



a Arrow shows weld progression or direction.

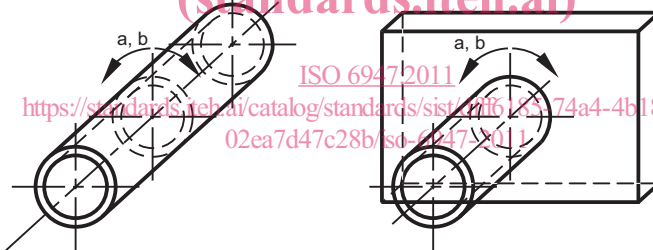
g) PG: vertical down position



a Arrow shows weld progression or direction.

b For special purposes, e. g. testing of welders; this position is regarded as a main position.

h) PH: pipe position for welding upwards
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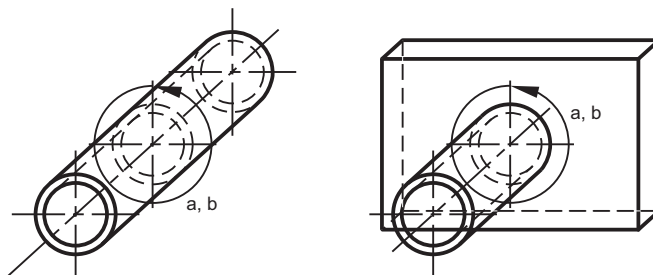


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a Arrow shows weld progression or direction.

b For special purposes, e. g. testing of welders; this position is regarded as a main position.

i) PJ: pipe position for welding downwards



a Arrow shows weld progression or direction.

b For special purposes, e. g. testing of welders; this position is regarded as a main position.

j) PK: pipe position for orbital welding

Figure 2 — Examples of main welding positions

3.2 Welding positions for production

Main welding positions can be used in other standards, e.g. ISO 9606^[1], ISO 15614^[2], to define the orientation of welds in production welding after qualifying in one of the main welding positions PA, PB, H-L045, etc. Slope and rotation ranges for welding positions in production are given in Table 1 for butt welds and in Table 2 for fillet welds (see also examples in Annex A).

NOTE For asymmetric tolerances, plus means revolving the weld surface towards the main welding position PA and minus towards the main welding position PE.

Table 1 — Slope and rotation ranges for welding positions in production butt welds

Welding position	Main welding position	Slope	Rotation
		<i>S</i>	<i>R</i>
Flat	PA	±15°	±30°
Horizontal	PC	±15°	+60° -10°
Overhead	PE	±80°	±80°
Vertical	PF, PG	+75° -10°	±100° ±180°

Table 2 — Slope and rotation ranges for welding positions in production fillet welds

Welding position	Main welding position	Slope	Rotation
		<i>S</i>	<i>R</i>
Flat	PA	±15°	±30°
Horizontal vertical	PB	±15°	+15° -10°
Horizontal	PC	±15°	+35° -10°
Horizontal overhead	PD	±80°	+35° -10°
Overhead	PE	±80°	±35°
Vertical	PF, PG	+75° -10°	±100° ±180°

3.3 Welding positions for testing

Welding positions used during welding of a test piece shall not exceed ±5° in slope and ±10° in rotation from the main welding position.

4 Designation

Main welding positions shall be designated by the appropriate symbol in accordance with Figures 1 and 2 (see Example 1). The symbol for the main welding position may be supplemented by the values for slope and rotation, given in three digits (see Example 2).

For circumferential welds in pipes with inclined axes, the indication of slope and rotation shall be simplified in accordance with Figures 1 and 2 (see Examples 3 and 4).