
**Welding and allied processes — Joint
preparation —**

Part 2:
Submerged arc welding of steels

*Soudage et techniques connexes — Préparation de joints —
Partie 2: Soudage à l'arc sous flux en poudre des aciers*



Foreword

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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.

International Standard ISO 9692-2 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*.

ISO 9692 consists of the following parts, under the general title *Welding and allied processes — Joint preparation*.

- *Part 1: Metal arc welding of steel with covered electrode (currently ISO 9692:1992)*
- *Part 2: Submerged arc welding of steels*
- *Part 3: Manual welding of aluminium and its alloys*

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Introduction

The intention of this International Standard is to use it as an addition to ISO 9692:1992 (which is to become ISO 9692-1, see Foreword) *Metal-arc welding with covered electrode, gas-shielded metal-arc welding and gas welding — Joint preparations for steel*. It follows similar rules and the same layout. Therefore, the introduction given in ISO 9692 also applies.

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Welding and allied processes — Joint preparation —

Part 2:

Submerged arc welding of steels

1 Scope

This part of ISO 9692 applies to types of joint preparation for submerged arc welding with one wire electrode (process 121 according to ISO 4063) on steel.

This part of ISO 9692 covers only the welding positions PA and PB according to ISO 6947. In case PC is used, special preparation will be necessary.

It applies to fully penetrated welds. For partly penetrated welds, types of joint preparation, shapes and dimensions may differ from the listed proposals if they are specified in the relevant application standard or agreed by parties concerned.

If the root is welded by a different arc welding process (see ISO 4063), the joint preparation according to ISO 9692 should be taken into account.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2553 : 1992, *Welded, brazed and soldered joints — Symbolic representation on drawings*.

ISO 3834-1 : 1994, *Quality requirements for welding — Fusion welding of metallic materials — Part 1: Guidelines for selection and use*.

ISO 3834-2 : 1994, *Quality requirements for welding — Fusion welding of metallic materials — Part 2: Comprehensive quality requirements*.

ISO 3834-3 : 1994, *Quality requirements for welding — Fusion welding of metallic materials — Part 3: Standards quality requirements*.

ISO 3834-4 : 1994, *Quality requirements for welding — Fusion welding of metallic materials — Part 4: Elementary quality requirements*.

ISO 4063:—¹⁾, *Welding and allied processes — Nomenclature of processes and reference numbers.*

ISO 6947:1990, *Welds — Working positions — Definitions of angles of slope and rotation.*

ISO 9692:1992²⁾, *Metal-arc welding with covered electrode, gas-shielded metal arc welding and gas welding — Joint preparations for steel.*

ISO 9956-2:1995 and Amd.1—³⁾, *Specification and approval of welding procedures for metallic materials — Part 2: Welding procedure specification for arc welding.*

3 Materials

Joint preparations recommended in this part of ISO 9692 are suitable for all types of weldable steel.

4 Types of joint preparation

The recommended types of joint preparation and dimensions are specified in tables 1 and 2.

The root gaps referred to in this part of ISO 9692 are those gaps presented after tack welding, if used.

This part of ISO 9692 gives no dimensions or type of possibly used backing materials. Root runs may also be used as backing. They may influence the quality requirements for welding (according to the relevant part of ISO 3834) and the preparation as given in tables 1 and 2. They shall be part of the welding procedure specification according to ISO 9956-2.

According to the application standard or agreement between contracting parties, it may be necessary to grind the slag before welding the next run.

NOTE — The reference numbers have been determined in accordance with the following scheme:

The first digit corresponds to the number of the table; the second digit or numerical group corresponds to the number in ISO 2553; the third indication, expressed by a letter, takes into account the variants of joint preparations.

1) To be published. (Revision of ISO 4063:1990)

2) See Foreword.

3) To be published.

Table 1 — Joint preparations for butt welds, welded from one side

Dimensions in millimetres

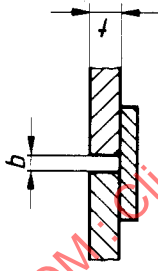
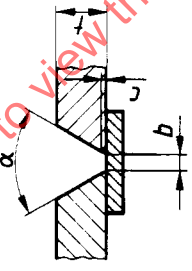
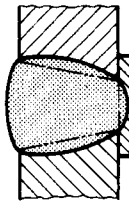
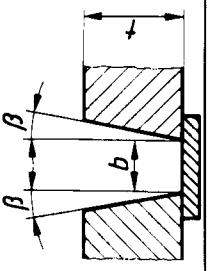
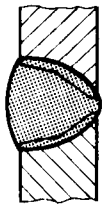
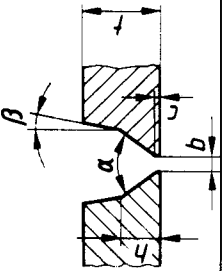
Weld				Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. No.	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h	
1.2	$3 \leq t \leq 12$	Square butt weld				—	$b \leq 0,5 t$ max. 5	—	—	With backing minimal thickness for backing: 5 mm or 0,5 t
1.3	$10 \leq t \leq 20$	Single-V butt weld	V			$30^\circ \leq \alpha \leq 50^\circ$	$4 \leq b \leq 8$	$c \leq 2$	—	With backing minimal thickness for backing: 5 mm or 0,5 t
1.14	$t > 20$	Steep-flanked single-V butt weld	∩			$4^\circ \leq \beta \leq 10^\circ$	$10 \leq b \leq 25$	—	—	With backing minimal thickness for backing: 5 mm or 0,5 t
1.3.3	$t > 12$	Single-V butt weld with V root	≧			$60^\circ \leq \alpha \leq 70^\circ$ $4^\circ \leq \beta \leq 10^\circ$	$1 \leq b \leq 4$	$0 \leq c \leq 3$	$4 \leq h \leq 6$	Root run welded with optional welding process

Table 1 (continued)

Weld					Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. No.	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h		
1.3.7	$t \geq 12$	Single-U butt weld with V root				$60^\circ \leq \alpha \leq 70^\circ$ $4^\circ \leq \beta \leq 10^\circ$	$1 \leq b \leq 4$ $5 \leq R \leq 10$	$0 \leq c \leq 3$	$4 \leq h \leq 6$	PA	Root run welded with optional welding process
1.7	$t \geq 30$	Single-U butt weld				$4^\circ \leq \beta \leq 10^\circ$	$1 \leq b \leq 4$ $5 \leq R \leq 10$	$2 \leq c \leq 3$	—	PA	With backing minimal thickness for backing: 5 mm or 0,5 t
1.4	$3 \leq t \leq 16$	Single-bevel butt welded				$30^\circ \leq \beta \leq 50^\circ$	$1 \leq b \leq 4$	$c \leq 2$	—	PA PB	With backing minimal thickness for backing: 5 mm or 0,5 t

Table 1 (concluded)

Weld						Joint preparation				Welding position (in accordance with ISO 6947)	Remarks
Ref. No.	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h		
1.15	$t \geq 16$	Steep-flanked single-bevel butt weld				$8^\circ \leq \beta \leq 10^\circ$	$5 \leq b \leq 15$	—	—	PA PB	With backing minimal thickness for backing: 5 mm or 0,5 t
1.8	$t \geq 16$	Single-J butt weld				$4^\circ \leq \beta \leq 10^\circ$	$2 \leq b \leq 4$ $5 \leq R \leq 10$	$2 \leq c \leq 3$	—	PA PB	With backing minimal thickness for backing: 5 mm or 0,5 t

Table 2 — Joint preparations for butt welds, welded from both sides

Dimensions in millimetres

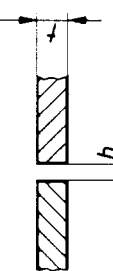
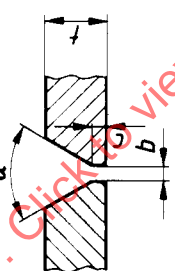
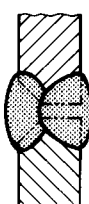
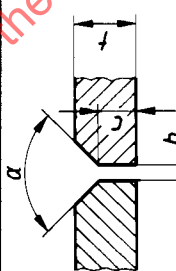
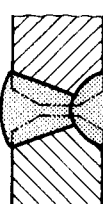
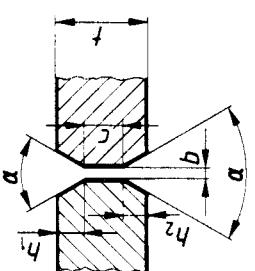
Weld				Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. No.	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h	
2.2	$3 \leq t \leq 20$	Square butt weld				—	$b \leq 2$	—	—	Width of gap shall be kept within small tolerances
2.5.9	$10 \leq t \leq 35$	Single-Y butt weld with broad root face and backing run				$30^\circ \leq \alpha \leq 60^\circ$	$b \leq 4$	$4 \leq c \leq 10$	—	Root run may be welded by another fusion welding process.
2.5.2	$10 \leq t \leq 20$	Single-V butt weld with square butt weld				$60^\circ \leq \alpha \leq 80^\circ$	$b \leq 4$	$5 \leq c \leq 15$	—	Root run may be welded by another fusion welding process.
2.5.5	$t \geq 16$	Double-V butt weld with broad root face				$30^\circ \leq \alpha \leq 70^\circ$	$b \leq 4$	$4 \leq c \leq 10$	$h_1 \approx h_2$	—

Table 2 (continued)

Weld				Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. No.	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h	
2.7.9	$t \geq 30$	Single-U butt weld with backing run				$5^\circ \leq \beta \leq 10^\circ$	$b \leq 4$ $5 \leq R \leq 10$	$4 \leq c \leq 10$	—	PA This type of joint preparation can also be produced asymmetrically in a similar manner to the asymmetrical double-V butt weld.
2.7.7	$t \geq 50$	Double-U butt weld				$5^\circ \leq \beta \leq 10^\circ$	$b \leq 4$ $5 \leq R \leq 10$	$4 \leq c \leq 10$	$h = 0.5(t - c)$	PA This type of joint preparation can also be produced asymmetrically in a similar manner to the asymmetrical double-V butt weld.
2.6.6	$t \geq 12$	Double-bevel butt weld with broad root face				$30^\circ \leq \beta \leq 50^\circ$	$b \leq 4$	$4 \leq c \leq 10$	—	PA PB This type of joint preparation can also be produced asymmetrically in a similar manner to the asymmetrical double-V butt weld. Root run may be necessary.

Table 2 (continued)

Ref. No.	Weld			Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h	
2.8.9	$t \geq 20$	Single-J butt weld with backing run				$5^\circ \leq \beta \leq 10^\circ$	$b \leq 4$ $5 \leq R \leq 10$	$4 \leq c \leq 10$	—	Root run may be necessary.
2.4.9	$t < 12$	Single bevel butt weld with backing run				$30^\circ \leq \beta \leq 50^\circ$	$b \leq 4$	$c \leq 2$	—	Root run may be necessary.
2.8.8 A	$t \geq 30$	Double-J butt weld				$5^\circ \leq \beta \leq 10^\circ$	$b \leq 4$ $5 \leq R \leq 10$	$2 \leq c \leq 7$	—	This type of joint preparation can also be produced asymmetrically in a similar manner to the asymmetrical double-V butt weld. Root run may be necessary.