International Standard

ISO 9692-2

Second edition
2024-02

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

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 9692-2:1998), of which it constitutes a minor revision. The changes are as follows:

— Clause 1, fourth paragraph revised and moved to the Introduction;

— ISO 2553, ISO 6947 and ISO 9692-1 moved from Clause 2 to the Bibliography;

— alignment in Clause 5 of the note explaining the reference numbers in Tables 1 and 2 with the corresponding text in ISO 9692-3;

— modification of the reference numbers in Tables 1 and 2 in accordance with the latest version of ISO 2553 and reordering of the lines of the tables in ascending order of the new reference numbers.

A list of all parts in the ISO 9692 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html.

Introduction

This document is intended to be used alongside ISO 9692-1. It follows similar rules and the same layout. Therefore, the introduction given in ISO 9692-1 also applies.

ISO 9692-1 specifies joint preparations for other arc welding processes (see ISO 4063), which are applicable when the root is not welded by submerged arc welding.

Welding and allied processes — Joint preparation —

Part 2: Submerged arc welding of steels

1 Scope

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

This document covers only the welding positions PA and PB according to ISO 6947. If PC is used, special preparation is necessary.

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

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.

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Materials

Joint preparations recommended in this document are suitable for all types of weldable steel.

5 Types of joint preparation

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

The root gaps referred to in this document are those gaps presented after tack welding, if used.

This document 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 the ISO 3834 series) and the preparation as given in Table 1 and Table 2. They shall be part of the welding procedure specification in accordance with ISO 15609-1.

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

The reference numbers in Tables 1 and 2 have been determined in accordance with the following scheme:

— the first digit corresponds with the number of the table (e.g. digit 1 for Table 1 with joint preparation for butt welds, welded from one side);

— the second digit or numerical group corresponds with the number in ISO 2553 (e.g. digit 1 for square butt weld as given in ISO 2553:2019, Table 1);

— the third indication, expressed by a letter, covers the variants of joint preparations.

EXAMPLE Joint preparation for a butt weld, welded from one side (1), finished for single-V butt weld (2):

1.2

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

Dimensions in millimetres

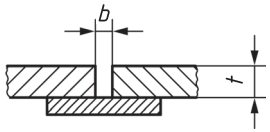
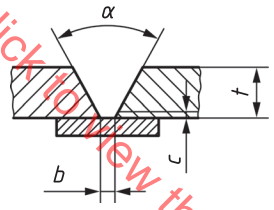
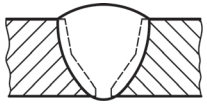
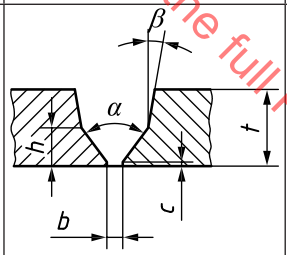
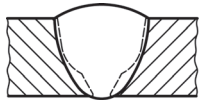
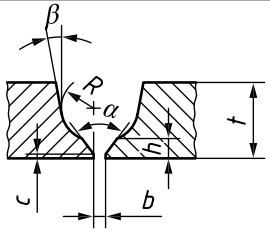
Weld					Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. no.	Work-piece thick-ness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thick-ness of root face c	Depth of prepara-tion h		
1.1	$3 \le t \le 12$	Square butt weld				—	$b \le 0{,}5\,t$ max. 5	—	—	PA	With backing minimal thickness for backing: 5 mm or 0,5 t
1.2	$10 \le t \le 20$	Single-V butt weld				$30° \le \alpha \le 50°$	$4 \le b \le 8$	$c \le 2$	—	PA	With backing minimal thickness for backing: 5 mm or 0,5 t
1.2.2	$t > 12$	Single-V butt weld with V root				$60° \le \alpha \le 70°$ $4° \le \beta \le 10°$	$1 \le b \le 4$	$0 \le c \le 3$	$4 \le h \le 6$	PA	Root run welded with optional welding process
1.2.6	$t \ge 12$	Single-U butt weld with V root				$60° \le \alpha \le 70°$ $4° \le \beta \le 10°$	$1 \le b \le 4$ $5 \le R \le 10$	$0 \le c \le 3$	$4 \le h \le 6$	PA	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		
1.4	$3 \le t \le 16$	Single-bevel butt welded	V			$30° \le \beta \le 50°$	$1 \le b \le 4$	$c \le 2$	—	PA PB	With backing minimal thickness for backing: 5 mm or 0,5 t
1.6	$t \ge 30$	Single-U butt weld	Y			$4° \le \beta \le 10°$	$1 \le b \le 4$ $5 \le R \le 10$	$2 \le c \le 3$	—	PA	With backing minimal thickness for backing: 5 mm or 0,5 t

Table 1 *(continued)*

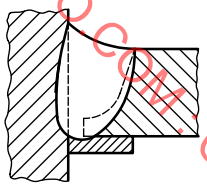
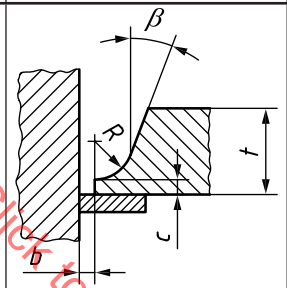
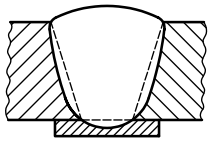
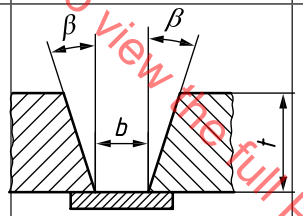
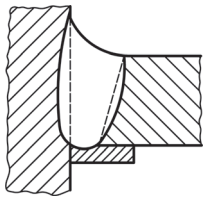
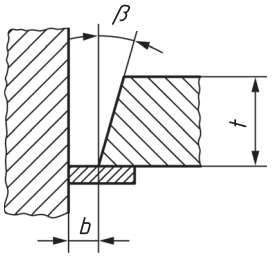
Weld					Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. no.	**Work-piece thick-ness** t	**Designation**	**Symbol** (in accordance with ISO 2553)	**Illustration**	**Cross section**	**Angle** α, β	**Gap** b **Radius** R	**Thick-ness of root face** c	**Depth of prepara-tion** h		
1.7	$t \geq 16$	Single-J butt weld				$4° \leq \beta \leq 10°$	$2 \leq b \leq 4$ $5 \leq R \leq 10$	$2 \leq c \leq 3$	—	PA PB	With backing minimal thickness for backing: 5 mm or 0,5 t
1.17	$t > 20$	Steep-flanked single-V butt weld				$4° \leq \beta \leq 10°$	$10 \leq b \leq 25$	—	—	PA	With backing minimal thickness for backing: 5 mm or 0,5 t
1.18	$t \geq 16$	Steep-flanked single-bevel butt weld				$8° \leq \beta \leq 10°$	$5 \leq b \leq 15$	—	—	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

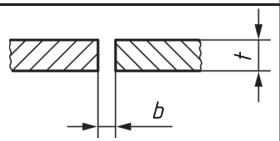
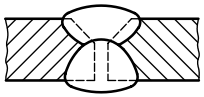
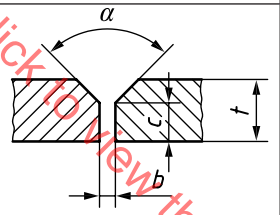
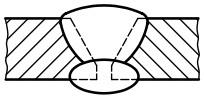
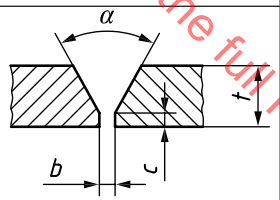
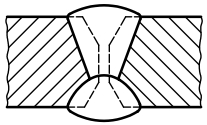
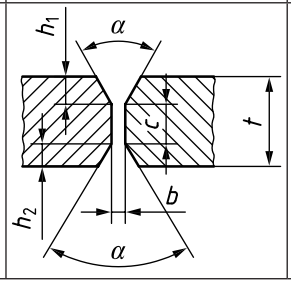
Weld					Joint preparation					Welding position (in accordance with ISO 6947)	Remarks
Ref. no.	Workpiece thickness t	Designation	Symbol (in accordance with ISO 2553)	Illustration	Cross section	Angle α, β	Gap b Radius R	Thickness of root face c	Depth of preparation h		
2.1	$3 \le t \le 20$	Square butt weld				—	$b \le 2$	—	—	PA	Width of gap shall be kept within small tolerances
2.1.2	$10 \le t \le 20$	Single-V butt weld with square butt weld				$60° \le \alpha \le 80°$	$b \le 4$	$5 \le c \le 15$	—	PA	Root run may be welded by another fusion welding process
2.2.3 A	$10 \le t \le 35$	Single-V butt weld with broad root face and backing run				$30° \le \alpha \le 60°$	$b \le 4$	$4 \le c \le 10$	—	PA	Root run may be welded by another fusion welding process
2.3.3	$t \ge 16$	Double-V butt weld with broad root face				$30° \le \alpha \le 70°$	$b \le 4$	$4 \le c \le 10$	$h_1 \approx h_2$	PA	—

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		
2.4 A	$t < 12$	Single-bevel butt weld with backing run				$30° \leq \beta \leq 50°$	$b \leq 4$	$c \leq 2$	—	PA PB	Root run may be necessary
2.5.5	$t \geq 12$	Double-bevel butt weld with broad root face				$30° \leq \beta \leq 50°$	$b \leq 4$	$4 \leq c \leq 10$	—	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
2.6 A	$t \geq 30$	Single-U butt weld with backing run				$5° \leq \beta \leq 10°$	$b \leq 4$ $5 \leq R \leq 10$	$4 \leq c \leq 10$	—	PA	

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		
2.6.6	$t \geq 50$	Double-U butt weld				$5° \leq \beta \leq 10°$	$b \leq 4$ $5 \leq R \leq 10$	$4 \leq c \leq 10$	$h = 0{,}5\,(t - c)$	PA	This type of joint preparation can also be produced asymmetrically in a similar manner to the asymmetrical double-V butt weld
2.7 A	$t \geq 20$	Single-J butt weld with backing run				$5° \leq \beta \leq 10°$	$b \leq 4$ $5 \leq R \leq 10$	$4 \leq c \leq 10$	—	PA PB	Root run may be necessary
2.7.7 A	$t \leq 30$	Double-J butt weld				$5° \leq \beta \leq 10°$	$b \leq 4$ $5 \leq R \leq 10$	$2 \leq c \leq 7$	—	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