INTERNATIONAL STANDARD

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Welding and allied processes — Types of joint preparation —

Part 3: Metal inert gas welding and tungsten inert gas welding of aluminium and its alloys

Soudage et techniques connexes — Types de préparation de joints — Partie 3: Soudage MIG et TIG de l'aluminium et de ses alliages

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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 documents 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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*.

This second edition cancels and replaces the first edition (ISO 9692–3:2000), which has been technically revised.

ISO 9692 consists of the following parts, under the general title *Welding and allied processes — Types of joint preparation*:

— *Part 1: Manual metal arc welding, gas-shielded metal arc welding, gas welding, TIG welding and beam welding of steels*

— *Part 2: Submerged arc welding of steels*

— *Part 3: Metal inert gas welding and tungsten inert gas welding of aluminium and its alloys*

— *Part 4: Clad steels*

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.

Introduction

This part of ISO 9692 defines the parameters characterizing the joint preparation and assembly of the most often encountered dimensions and shapes.

The recommendations given in this part of ISO 9692 have been compiled on the basis of experience and contain dimensions for types of joint preparation that are generally found to provide suitable welding conditions. However, the extended field of application makes it necessary to give a range of dimensions. The dimension ranges specified represent design limits and are not tolerances for manufacturing purposes. Manufacturing limits depend, for instance, on welding process, parent metal, welding position, quality level, etc. Due to the common character of this part of ISO 9692, the examples given cannot be regarded as the only solution for the selection of a joint type.

Specific fields of application and manufacturing requirements may be covered by selected ranges of dimensions specified in the relevant application standard.

Welding and allied processes — Types of joint preparation —

Part 3: Metal inert gas welding and tungsten inert gas welding of aluminium and its alloys

1 Scope

This part of ISO 9692 specifies recommended types of joint preparation for metal inert gas welding, MIG (131), and tungsten inert gas welding, TIG (141), and autogenous TIG welding (142) on aluminium and its alloys.

It applies to fully penetrated welds.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2553:2013, *Welding and allied processes — Symbolic representation on drawings — Welded joints*

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

3 Materials

Joint preparations recommended in this part of ISO 9692 are suitable for all types of aluminium and its weldable alloys.

4 Welding processes

Joint preparations recommended in this part of ISO 9692 are suitable for welding carried out in accordance with the following processes as specified in Tables 1 to 3. Combinations of different processes are possible:

— MIG welding with solid wire electrode (131);

— TIG welding with solid filler material (wire/rod) (TIG) (141);

— autogenous TIG welding (142) — only applicable for butt weld between plates with raised edges (see Table 1, 1.20)

NOTE The numbers in parentheses refer to the reference number of the welding process specified in ISO 4063.

5 Finish

Edges should be prepared by mechanical means (e.g. shearing, sawing or milling). No mineral oil-based cleaning fluids shall be used. If plasma cutting is used, consideration shall be given to the quality of cut surfaces (e.g. cracks).

The longitudinal edges of the root face should be de-burred and chamfered, especially for single-sided butt welds without backing.

6 Type of joint preparation

The recommended types of joint preparation and dimensions are specified in Tables 1 to 3.

The choice of joint details (angle, gap, thickness of root face) depends on the joint thickness, the position and the welding process. The use of larger gaps (≥1,5 mm) permits smaller angles.

If gaps are ≥1,5 mm, backing is preferably used.

For single-sided welding, backing bars should be grooved.

The reference numbers in Tables 1 to 3 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 2 for square butt weld as given in ISO 2553:2013, 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 (3):

1.3

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

Dimensions in millimetres

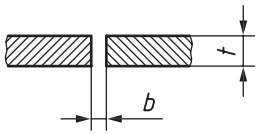
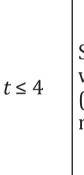
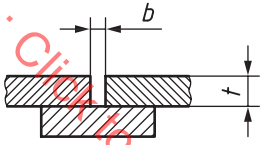
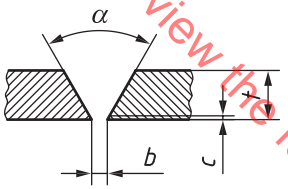
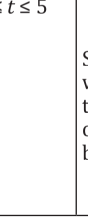
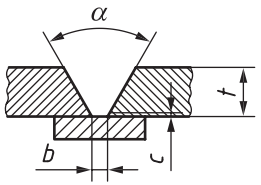
Weld					Joint preparation							
Ref. No.[a]	Workpiece thickness t	Designation	Symbol[b]	Illustration	Cross-section	Angle α, β	Gap b	Thickness of root face c	Other dimensions	Recommended welding process[c]	Remarks
1.1	$t \leq 4$	Square butt weld				—	$b \leq 1$	—	—	141	Chamfering on the root side is recommended
	$2 \leq t \leq 4$	Square butt weld with temporary (MR) or permanent (M) backing				—	$b \leq 1{,}5$	—	—	131	—
1.2	$3 \leq t \leq 5$	Single-V butt weld				$60° \leq \alpha \leq 90°$	$b \leq 2$	$c \leq 2$	—	131	—
		Single-V butt weld with removable/temporary (MR) or permanent (M) backing				$60° \leq \alpha \leq 90°$	$b \leq 4$	$c \leq 2$	—	131	—

Table 1 *(continued)*

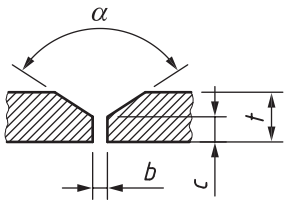
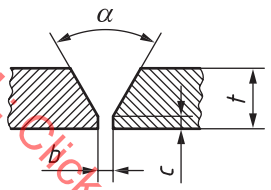
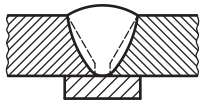
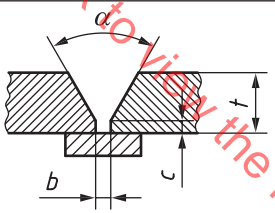
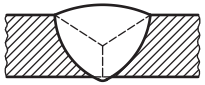
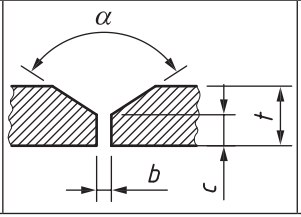
Weld					Joint preparation						
Ref. No.[a]	Workpiece thickness t	Designation	Symbol[b]	Illustration	Cross-section	Angle α, β	Gap b	Thickness of root face c	Other dimensions	Recommended welding process[c]	Remarks
1.3	$3 \le t \le 6$	Single-V butt weld				$90° \le \alpha \le 120°$	$b \le 1$	$1 \le c \le 2$	—	141	—
	$3 \le t \le 15$	Single-V butt weld with broad root face				$\alpha \ge 60°$	$b \le 2$	$c \le 2$	—	131	—
	$6 \le t \le 25$	Single-V butt weld with broad root face with temporary (MR) or permanent (M) backing				$\alpha \ge 60°$	$4 \le b \le 10$	$c \le 3$	—	131	—
	$6 \le t \le 15$	Single-V butt weld with broad root face				$90° \le \alpha \le 120°$	$b \le 1$	$2 \le c \le 4$	—	141	—

Table 1 *(continued)*

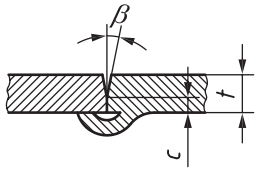
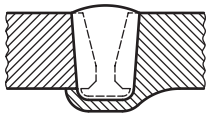
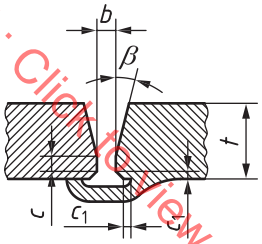
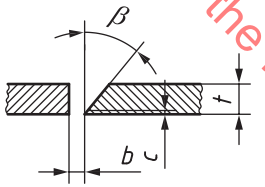
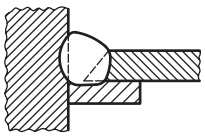
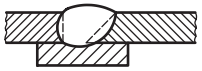
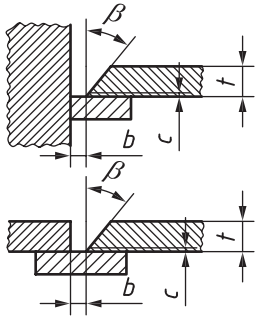
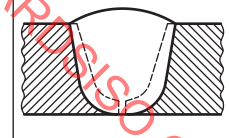
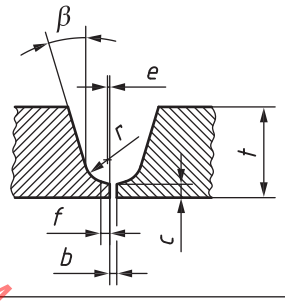
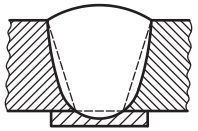
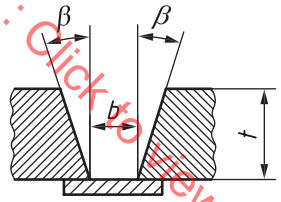
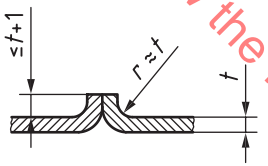
Weld					Joint preparation							
Ref. No.[a]	Workpiece thickness t	Designation	Symbol[b]	Illustration	Cross-section	Angle α, β	Gap b	Thickness of root face c	Other dimensions	Recommended welding process[c]	Remarks
1.3 A	$2 \le t \le 20$	Single-V butt weld on extruded profile				$20° \le \beta \le 40°$	$b \le 3$	$1 \le c \le 3$	—	131 141	—
1.3 B	$6 \le t \le 40$	Single-V butt weld on extruded profile				$20° \le \beta \le 45°$	$0 \le b \le 3$	$2 \le c \le 3$	$c_1 \ge 1$	131 141	—
1.4	$4 \le t \le 10$	Single-bevel butt weld				$\beta \ge 50°$	$b \le 3$	$c \le 2$	—	131	—
	$3 \le t \le 20$	Single-bevel butt weld with temporary (MR) or permanent (M) backing	 	 		$50° \le \beta \le 70°$	$3 \le b \le 8$	$c \le 2$	—	131 141	—

Table 1 *(continued)*

Weld					Joint preparation						
Ref. No.[a]	Workpiece thickness t	Designation	Symbol[b]	Illustration	Cross-section	Angle α, β	Gap b	Thickness of root face c	Other dimensions	Recommended welding process[c]	Remarks
1.6	plate $t \geq 12$ t pipe $t \geq 5$	Single-U butt weld (sloping sides)				$15° \leq \beta \leq 20°$	$b \leq 1$	$2 \leq c \leq 4$	$4 \leq r \leq 6$ $3 \leq f \leq 4$ $0 \leq e \leq 4$	141	—
	$15 \leq t \leq 30$					$15° \leq \beta \leq 20°$	$1 \leq b \leq 3$	$2 \leq c \leq 4$	$4 \leq r \leq 6$ $3 \leq f \leq 4$ $0 \leq e \leq 4$	131	Preferable root run: 141.
1.17	$8 \leq t \leq 20$	Steep-flanked single-V butt weld with temporary (MR) or permanent (M) backing				$15° \leq \beta \leq 20°$	$3 \leq b \leq 10$	—	—	131	—
1.20	$t \leq 2$	Butt weld between plates with raised edges				—	—	—	—	141 142	—

[a] As explained in Clause 6.

[b] In accordance with ISO 2553.

[c] Reference number in accordance with ISO 4063.

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

Dimensions in millimetres

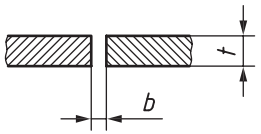
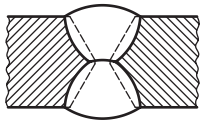
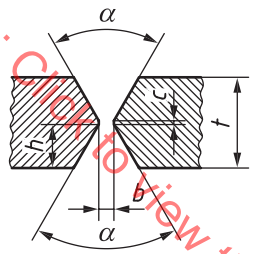
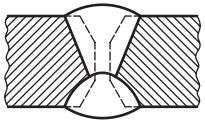
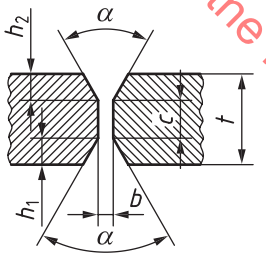
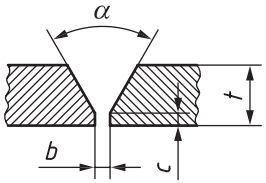
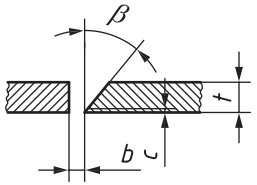
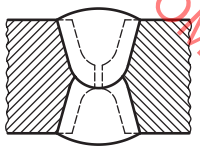
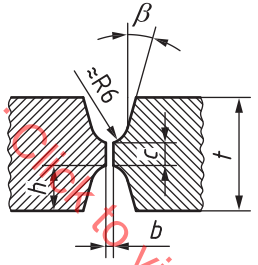
Weld					Joint preparation							
Ref. No.[a]	Workpiece thickness t	Designation	Symbol[b]	Illustration	Cross-section	Angle α, β	Gap b	Thickness of root face c	Other dimensions	Recommended welding process[c]	Remarks
2.1	$6 \le t \le 10$	Square butt weld				—	$6 \le b \le 8$	—	—	141	Simultaneous welding both sides vertical.
2.2.2	$6 \le t \le 15$	Double-V butt weld				$\alpha \ge 60°$	$b \le 3$	$c \le 2$	—	141	—
	$t > 15$					$\alpha \ge 70°$		$c \le 2$		131	
2.2.3	$6 \le t \le 15$	Double-V butt weld with broad root face				$\alpha \ge 60°$	$b \le 1$	$2 \le c \le 4$	$h_1 \approx h_2$	141	—
	$t > 15$					$60° \le \alpha \le 70°$		$2 \le c \le 6$		131	
2.3	$6 \le t \le 15$	Single-V butt weld with broad root face and backing run				$\alpha \ge 60°$	$b \le 3$	$2 \le c \le 4$	—	141 131	—

Table 2 *(continued)*

Weld					Joint preparation						
Ref. No.[a]	Workpiece thickness t	Designation	Symbol[b]	Illustration	Cross-section	Angle α, β	Gap b	Thickness of root face c	Other dimensions	Recommended welding process[c]	Remarks
2.4	$3 \le t \le 15$	Single-bevel butt weld with backing run				$\beta \ge 50°$	$b \le 3$	$c \le 2$	—	131	—
2.6	$t \ge 15$	Double-U butt weld				$15° \le \beta \le 20°$	$b \le 1$	$2 \le c \le 4$	$h \approx 0{,}5$ $(t - c)$	131	—

[a] As explained in Clause 6.

[b] In accordance with ISO 2553.

[c] Reference number in accordance with ISO 4063.