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**Welding and allied processes —  
Recommendations for joint  
preparation —**

Part 1:

**Manual metal-arc welding, gas-shielded  
metal-arc welding, gas welding, TIG  
welding and beam welding of steels**

*Soudage et techniques connexes — Recommandations pour la  
préparation de joints —*

*Partie 1: Soudage manuel à l'arc avec électrode enrobée, soudage à  
l'arc avec électrode fusible sous protection gazeuse, soudage aux gaz,  
soudage TIG et soudage par faisceau des aciers*



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Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

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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 9692-1 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*.

This first edition of ISO 9692-1 cancels and replaces ISO 9692:1992 which has been technically revised.

ISO 9692 consists of the following parts, under the general title *Welding and allied processes — Recommendations for 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*

## Introduction

This part of ISO 9692 defines the parameters characterizing the joint preparation and the collection of frequently recurring values 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 lead to 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. Because of 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 (e.g. pipeline construction) may be covered by selected ranges specified in other standards adapted from this basic part of ISO 9692.

Request for an official interpretation of technical aspects of this part of ISO 9692 should be directed to the relevant secretariat of ISO/TC 44/SC 7 via the user's national standardization body; a listing of these bodies can be found at [www.iso.org](http://www.iso.org).

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# Welding and allied processes — Recommendations for joint preparation —

## Part 1:

# Manual metal-arc welding, gas-shielded metal-arc welding, gas welding, TIG welding and beam welding of steels

## 1 Scope

This part of ISO 9692 specifies types of joint preparation for metal-arc welding with covered electrode, gas-shielded metal-arc welding, gas welding, TIG welding and beam welding of steel (see Clauses 3 and 4).

It applies to joint preparation for full penetration butt welds and for fillet welds. For partial penetration butt welds, types of joint preparation and dimensions differing from those specified in this part of ISO 9692 may be stipulated.

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

Consideration should be given to altering the joint preparation details (where appropriate) to facilitate temporary backing, “one-sided welding”, etc.

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

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

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

## 3 Materials

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

## 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 4; combinations of different processes are possible.

- a) (3) gas welding; oxyfuel gas welding;
- b) (111) manual metal arc welding (metal arc welding with covered electrode); shielded metal arc welding;
- c) (13) gas-shielded metal arc welding; gas metal arc welding includes:
  - (131) metal inert gas welding; MIG welding; gas metal arc welding;
  - (135) metal active gas welding; MAG welding; gas metal arc welding;
  - (136) tubular cored metal arc welding with active gas shield; flux cored arc welding;
  - (137) tubular cored metal arc welding with inert gas shield; flux cored arc welding;
- d) (141) tungsten inert gas welding; TIG welding; gas tungsten arc welding;
- e) (5) beam welding:
  - (51) electron beam welding;
  - (512) electron beam welding in atmosphere;
  - (52) laser welding; laser beam welding.

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

## 5 Finish

The longitudinal edges of the root face should be de-burred and may be chamfered (up to 2 mm).

## 6 Type of joint preparation

The recommended types of joint preparation and dimensions are specified in Tables 1 to 4.

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

Ref. No.	Material thickness	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Recommended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thickness of root face	Depth of preparation			
1.1	$t$ mm $\leq 2$	raised edges			$\alpha, \beta$	$b$ mm	$c$ mm	$h$ mm	3		Usually without filler metal
									111		
1.2.1	$\leq 4$	Square preparation			—	$\approx t$	—	—	3		Where applicable with backing strip
									111		
									141		
									13		
1.2.2	$3 < t \leq 8$ $\leq 15$	Square preparation			—	$6 \leq b \leq 8$	—	—	141 <sup>c</sup>		Where applicable with backing strip
									$\approx t$		
									$\leq 1^d$		
											0

Table 1 (continued)

Ref. No.	Material thickness $t$ mm	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Recom- mended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thick- ness of root face	Depth of prepa- ration			
1.2.3	$t$ mm	Square preparation with backing			—	—	—	—		—	
		Square preparation with centering lip									
1.2.4	$t$ mm	Single-V preparation			—	—	—	—		Where applicable with backing strip	
											$40^\circ \leq \alpha$ $\leq 60^\circ$
1.3	$3 < t \leq 10$ $8 < t \leq 12$	Steep-flanked single-V preparation			—	—	—	—		With backing strip	
											$6^\circ \leq \alpha$ $\leq 8^\circ$

Table 1 (continued)

Ref. No.	Material thickness $t$ mm	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Recom-mended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thick-ness of root face	Depth of prepa-ration			
1.5	$5 \leq t \leq 40$	Single-V preparation with broad root face			$\alpha \approx 60^\circ$	$1 \leq b \leq 4$	$2 \leq c \leq 4$	—		—	
1.6	$> 12$	Single-U preparation with V root			$60^\circ \leq \alpha \leq 90^\circ$ $8^\circ \leq \beta \leq 12^\circ$	$1 \leq b \leq 3$	—	$\approx 4$		$6 \leq R \leq 9$	
1.7	$> 12$	Single-V preparation with V root			$60^\circ \leq \alpha \leq 90^\circ$ $10^\circ \leq \beta \leq 15^\circ$	$2 \leq b \leq 4$	$> 2$	—		—	

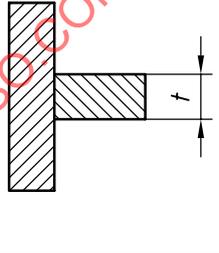
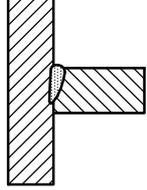
Table 1 (continued)

Ref. No.	Material thickness $t$ mm	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Recommended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thickness of root face	Depth of preparation			
1.8	$t$ mm	Single-U preparation			$\alpha, \beta$	$b$ mm	$c$ mm	$h$ mm	111 13 141		—
1.9.1	$3 < t \leq 10$	Single-bevel preparation			$8^\circ \leq \beta \leq 12^\circ$	$\leq 4$	$\leq 3$	—	111 13 141		—
1.9.2					$35^\circ \leq \beta \leq 60^\circ$	$2 \leq b \leq 4$	$1 \leq c \leq 2$	—			

Table 1 (continued)

Ref. No.	Material thickness	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Recom-mended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thick-ness of root face	Depth of prepa-ration			
1.10	$t$ mm	Steep-flanked single-bevel preparation			$\alpha, \beta$	$b$ mm	$c$ mm	$h$ mm	111		With backing strip
	$15^\circ \leq \beta \leq 60^\circ$				$6 \leq b \leq 12$	—	—	13 141			
1.11	$> 16$	Single-J preparation			$10^\circ \leq \beta \leq 20^\circ$	$2 \leq b \leq 4$	$1 \leq c \leq 2$	—	111 13 141		—
	$\approx 12$				—	—	52				
1.12	$\leq 15$	Square preparation			—	—	—	—	51		—
	$\leq 100$				—	—	—				

Table 1 (continued)

Ref. No.	Material thickness	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Recommended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thickness of root face	Depth of preparation			
1.13	$t$ mm	Square preparation	—e		$\alpha, \beta$	$b$ mm	$c$ mm	$h$ mm	52		—
	$\leq 15$				—	—	—	51			
	$\leq 100$										

a Angles are also larger and/or asymmetric for welding in position PC according to ISO 6947 (horizontal position).

b Dimensions given apply to the tacked condition.

c The indication of the welding process does not mean that it is applicable for the whole range of workpiece thicknesses.

d With filler metal.

e Symbol and number not yet standardized in ISO 2553:1992.

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

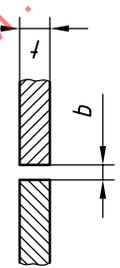
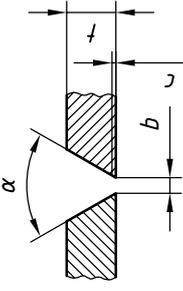
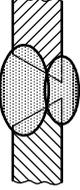
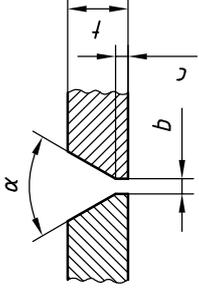
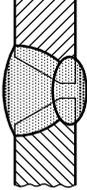
Ref. No.	Material thickness	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Dimensions				Depth of preparation	Recommended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
					Angle <sup>a</sup>	Gap <sup>b</sup>	Thickness of root face	Thick-				
2.1	$t$ mm	Square preparation			$\alpha, \beta$	$b$ mm	$c$ mm	$h$ mm	111 141 13		—	
	$\approx \frac{t}{2}$											$\leq \frac{t}{2}$
2.2	$3 \leq t \leq 40$	Single-V preparation			$\alpha \approx 60^\circ$	$\leq 3$	$\leq 2$	—	111 141 13		sealing run is indicated	
	$40^\circ \leq \alpha \leq 60^\circ$				$1 \leq b \leq 3$							$2 \leq c \leq 4$
2.3	$> 10$	Single-V preparation with broad root face			$\alpha \approx 60^\circ$	$1 \leq b \leq 3$	$2 \leq c \leq 4$	—	111 141 13		In special cases, also possible for smaller work-piece thicknesses and welding process 3. Sealing run is indicated.	
	$40^\circ \leq \alpha \leq 60^\circ$											

Table 2 (continued)

Ref. No.	Material thickness $t$ mm	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Angle <sup>a</sup> $\alpha, \beta$	Dimensions			Depth of preparation $h$ mm	Recommended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
						Gap <sup>b</sup> $b$ mm	Thick-ness of root face $c$ mm	Thick-ness of root face $c$ mm				
2.4	> 10	Double-V preparation with broad root face			$\alpha \approx 60^\circ$	$1 \leq b \leq 4$	$2 \leq c \leq 6$	$h_1 = h_2 = \frac{t-c}{2}$	111		—	
					$40^\circ \leq \alpha \leq 60^\circ$				141			
2.5.1	> 10	Double-V preparation			$\alpha \approx 60^\circ$	$1 \leq b \leq 3$	$\leq 2$	$\approx \frac{t}{2}$	111		—	
					$40^\circ \leq \alpha \leq 60^\circ$				141			
2.5.2	> 10	Asymmetrical double-V preparation			$\alpha_1 \approx 60^\circ$ $\alpha_2 \approx 60^\circ$	$1 \leq b \leq 3$	$\leq 2$	$\approx \frac{t}{3}$	111		—	
					$40^\circ \leq \alpha_1 \leq 60^\circ$ $40^\circ \leq \alpha_2 \leq 60^\circ$				141			

Table 2 (continued)

Ref. No.	Material thickness	Type of preparation	Symbol (in accordance with ISO 2553)	Cross-section	Angle <sup>a</sup>	Dimensions			Depth of preparation	Recommended welding process (reference number in accordance with ISO 4063)	Weld illustration	Remarks
						Gap <sup>b</sup>	Thickness of root face	Thick-ness of root face				
2.6	$t$ mm	Single-U preparation			$\alpha, \beta$	$b$ mm	$c$ mm	$h$ mm	—	111 13		Sealing run is indicated
					$1 \leq b \leq 3$	$\approx 5$	—	141 <sup>c</sup>				
2.7	$\geq 30$	Double-U preparation			$8^\circ \leq \beta \leq 12^\circ$	$\leq 3$	$\approx 3$	$\approx \frac{0-c}{2}$	—	111 13 141 <sup>c</sup>		This type of joint preparation can also be produced asymmetrically in a similar manner to the asymmetrical double-V preparation
					$8^\circ \leq \beta \leq 12^\circ$	$\leq 3$	$\approx 3$	$\approx \frac{0-c}{2}$				
2.8	$3 \leq t \leq 30$	Single-bevel preparation			$35^\circ \leq \beta \leq 60^\circ$	$1 \leq b \leq 4$	$\leq 2$	—	—	111 13 141 <sup>c</sup>		Sealing run is indicated