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

**Part 4:  
Clad steels**

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

*Partie 4: Aciers plaqués*

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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 9692-4 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

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*

The Bibliography provides a list of corresponding International and European Standards for which equivalents are not given in the text.

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## Foreword

This document (EN ISO 9692-4:2003) has been prepared by Technical Committee CEN/TC 121, "Welding", the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

EN ISO 9692 "*Welding and allied processes – Recommendations for joint preparation*" consists of the following Parts:

- *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*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.



## 1 Scope

This Part of this European Standard gives recommendations for types of joint preparation for clad steels.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revision of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1011-5, Welding – Recommendations for welding of metallic materials – Part 5: Welding of clad steels

## 3 Materials

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

## 4 Types of joint preparation

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

Details concerning welding recommendations for clad steels are given in EN 1011-5.

Figures showing the completed joint are given in Table 4 for clarity.

In certain cases, where the welding process may produce a brittle phase e.g. clad steels with cladding of titanium, zirconium and their alloys, a deviation from the weld preparations shown may be necessary.

Table 1 — Joint preparation for clad steels welded from both sides

Dimensions in millimetres

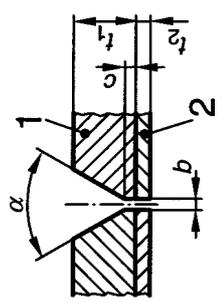
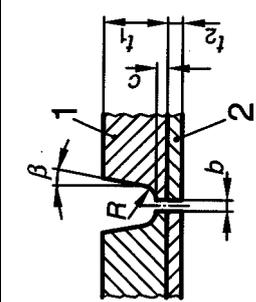
Ref. No.	Parent metal thickness $t_1$	Joint preparation	Cross section	Angle $\beta$	Gap $b$ Radius $R$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
1.1	$t_1 \leq 18$	Single V-butt weld With broad root face		$50^\circ < \alpha < 70^\circ$	$4 < R < 8$	$2 \leq c \leq 4$	-	-	Back grinding or machining from the clad side.
1.2		Single U-butt weld		$5^\circ < \beta < 15^\circ$	$b \leq 3$				

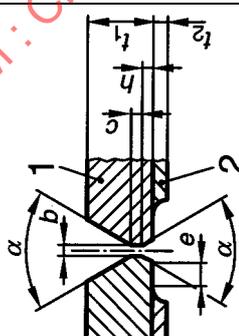
Table 1 — Joint preparation for clad steels welded from both sides (concluded)

Ref. No.	Parent metal thickness $t_1$	Joint preparation	Cross section	Angle $\beta$	Gap $b$ Radius $R$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
1.3	$t_1 > 18$	Double V-butt weld With broad root face		$50^\circ \leq \alpha \leq 70^\circ$  $5^\circ \leq \beta \leq 15^\circ$	$4 \leq R \leq 8$  $b \leq 3$	$2 \leq c \leq 6$	$h = 3$	-	
1.4		Single U-butt weld with V-root							
<b>Key</b> 1 Parent metal 2 Cladding $t_2$ Cladding thickness									

Table 2 — Joint preparation for clad steels welded from both sides with cladding removal  
 Dimensions in millimetres

Ref. No.	Parent metal thickness $t_1$	Joint preparation	Cross section	Angle $\alpha, \beta$	Gap $b$ Radius $R$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
2.1	$t_1 \leq 18$	Single V-butt weld		$50^\circ \leq \alpha \leq 70^\circ$  $5^\circ \leq \beta \leq 15^\circ$	$3 \leq b \leq 5$  $4 \leq R \leq 8$	$c \leq 2$	—	$e \geq 4$	Back grinding or machining is recommended. Adjacent clad surfaces should be protected against grinding particles. Where submerged arc welding is used, the cladding removal, $e$ , should be at least 8 mm.
2.2		Single U-butt weld							

Table 2 — Joint preparation for clad steels welded from both sides with cladding removal (concluded)

Ref. No.	Parent metal thickness $t_1$	Joint preparation	Cross section 	Angle $\alpha, \beta$	Gap $b$ Radius $R$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
2.3	$t_1 > 18$	Double V-butt weld		$50^\circ \leq \alpha \leq 70^\circ$	$3 \leq b \leq 5$	$c \leq 2$	$h \approx \left[ \frac{1}{3} t_1 \right]$	$e \geq 4$	
<b>Key</b> 1 Parent metal 2 Cladding $t_2$ Cladding thickness									

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Table 3 — Joint preparation for clad steels welded from one side

Dimensions in millimetres

Ref. No.	Parent metal thickness $t_1$	Joint preparation	Cross section	Angle $\beta_1, \beta_2$	Gap $b$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
3.1	$t_1 < 8$	Single V-butt weld		$20^\circ \leq \beta_1 \leq 45^\circ$ $20^\circ \leq \beta_2 \leq 45^\circ$	$2 \leq b \leq 4$	—	—	$e \geq 3$	
3.2		Single V-butt weld with V-root		$20^\circ \leq \beta_1 \leq 45^\circ$ $20^\circ \leq \beta_2 \leq 45^\circ$					

Table 3 — Joint preparation for clad steels welded from one side (concluded)

Ref. No.	Parent metal thickness $t_1, t_2$	Joint preparation	Cross section	Angle $\beta_1, \beta_2$	Gap $b$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
3.3	$t_1 \leq 18$ $1 \leq t_2 \leq 4$	Pipe weld		$30^\circ \leq \beta_1 \leq 40^\circ$ $20^\circ \leq \beta_2 \leq 45^\circ$	$1 \leq b \leq 4$	$c \leq 2$	—	$e \geq 2$	Suitable for pipe welding
<b>Key</b> 1 Parent metal 2 Cladding $t_2$ Cladding thickness									

Table 4 – Joint preparation for clad steels incorporating a backing, insert or cover strip  
 Dimensions in millimetres

Ref. No.	Parent metal thickness $t_1$	Joint preparation	Cross section	Angle $\alpha$	Gap $b$ Radius $R$	Depth of root face $c$	Depth of preparation $h$	Cladding removal $e$	Remarks
4.1	$t_1 \leq 18$	Single V-butt weld		$50^\circ \leq \alpha \leq 70^\circ$	$b \leq 3$	$c \leq 2$	–	–	In order to complete the joint, an insert of dimensions $d \approx (b + 10)t_2$ is placed into the joint preparation on the clad side of the joint, after cladding removal.  $t_3 \geq t_2$