



# SLOVENSKI STANDARD

## SIST EN 1708-1:1999

01-december-1999

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Welding - Basic weld joint details in steel - Part 1: Pressurized components

Schweißen - Verbindungselemente beim Schweißen von Stahl - Teil 1:  
Druckbeanspruchte Bauteile

Soudage - Descriptif de base des assemblages soudés en acier - Partie 1: Composants  
soumis a la pression

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Ta slovenski standard je istoveten z: <sup>SIST EN 1708-1:1999</sup> EN 1708-1:1999

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**ICS:**

25.160.40      Varjeni spoji in vari      Welded joints

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 1708-1

March 1999

ICS 25.160.40

English version

## Welding - Basic weld joint details in steel - Part 1: Pressurized components

Soudage - Descriptif de base des assemblages soudés en acier - Partie 1: Composants soumis à la pression

Schweißen - Verbindungselemente beim Schweißen von Stahl - Teil 1: Druckbeanspruchte Bauteile

This European Standard was approved by CEN on 30 October 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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РЕПУБЛИКА БЪЛГАРИЯ  
МИНИСТЕРСТВО НА ОБРАЗОВАНИЕТО И НАУКАТА  
ОБЛАСТНО УПРАВЛЕНИЕ НА ОБРАЗОВАНИЕТО И НАУКАТА  
ВРАЦА

1999 - 07 - 01 .....



## Foreword

This European Standard 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 September 1999, and conflicting national standards shall be withdrawn at the latest by September 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This European Standard is composed of the two following parts:

- Part 1: Pressurized components;
- Part 2: Non internal pressurized components.

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## 1 Scope

The purpose of this standard is to exemplify commonly accepted welded connections in pressure systems. It does not promote the standardization of connections that may be regarded as mandatory or restrict development in any way. Stress analysis rules are to be considered if necessary.

This standard contains examples of connections welded by:

- Metal-arc welding with covered electrode (111);
- Submerged arc welding with wire electrode (121);
- Metal-arc inert gas welding; MIG-welding (131);
- Metal-arc active gas welding; MAG-welding (135);
- Flux-cored wire metal-arc welding with active gas shield (136);
- Flux-cored wire metal-arc welding with inert gas shield (137);
- Tungsten inert gas arc welding; TIG-welding (141);

processes (process numbers according to EN 24063) in steel pressure systems. Other processes by agreement.

The estimation of the suitability of welded connections for special service conditions, for example corrosion, creep, low temperature and fatigue are not specially considered.

## 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.

EN 24063

Welding, brazing, soldering and braze welding of metals – Nomenclature of processes and reference numbers for symbolic representation on drawings (ISO 4063 : 1990)

EN 25817

Arc-welded joints in steels – Guidance on quality levels for imperfections (ISO 5817 : 1992)

EN 29692

Metal-arc welding with covered electrode, gas shielded metal-arc welding and gas welding – Suggested joint preparations for steel (ISO 9692 : 1992)

EN ISO 9692-2

Welding and allied processes – Joint preparation – Part 2: Submerged arc welding of steel (ISO 9692-2 : 1998)

## 3 Requirements

### 3.1 Selection of detail

Connections are not considered to be equally suitable for all service conditions, nor is the order in which they are shown indicative of their relative characteristics. In selecting the appropriate detail to use from the several alternatives shown for each type of connection, consideration shall be given to existing fabrication and service conditions that pertain.

### 3.2 Joint preparation (geometry and size)

#### 3.2.1 General

The limitations quoted in weld profiles and sizes are based on commonly accepted practice, but they may be subjected to modifications if required by special welding techniques or design conditions, which should be included in the design documents and in the welding procedure specifications (WPS).

#### 3.2.2 Joint preparation geometry

Examples of recommended joint preparation geometry (e.g. bevel angles, root radius, presents of backing strips, root faces) are referred to EN 29692 when applicable and to EN ISO 9692-2 relative to submerged arc welding process. Missing dimensions of preparations are in accordance with EN 29692.

In case where full penetration butt joints are indicated, it is intended that they shall be back chipped or gouged and back welded, or alternatively that the welding procedure shall be such as to ensure sound, effective root penetration.

For relevant difference of thickness (generally a difference of about 3 mm (see table 1, No. 1.1.1 to 1.1.6) could be considered relevant; in any case the thickness of material has to be taken into account, as well as the shape of the joint) of parts to be butt welded, the thickest element shall be shaped with a slope of 1:5 up to 1:2.

The smaller values are applicable in severe service conditions.

### 3.2.3 Weld sizes

The thickness of welds (in particular of fillet welds), which are not determined by their profile, are based on the assumption that the connection need not to be stronger than the connected parts.

### 3.3 Presentation

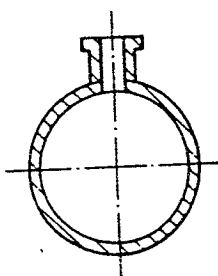


Figure 1: Transversal section

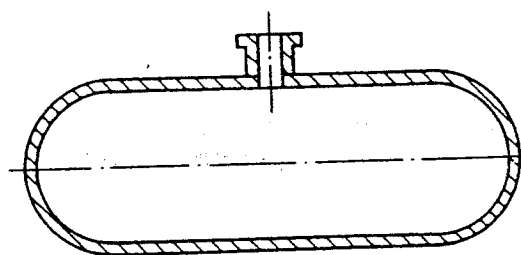


Figure 2: Longitudinal section

The drawings of the nozzle and branch connections (see tables 2 and 3) show a transversal section of the connection (see figure 1) and a longitudinal section of the connection (see figure 2).

### 3.4 Removal of internal sharp edges in branch bores

It will be noted that the internal edges on the bores of branches are shown partially radiused (for example see table 2, No. 2.1.6) because a stress concentration occurs at this point. This precaution (grinding away the sharp edge) is recommended when the branch connection is subjected to severe service conditions like fatigue, creep and stress corrosion.

### 3.5 Preparation of holes in shell for set-in and set-through branches

In case of set-in and set-through branches (according to table 2, No. 2.2 and No. 2.3) holes in the shell may be cut and profiled in two ways as follows:

- The depth of the grooves  $h_1$  and  $h_2$  may be constant around the hole as shown in figure 3.

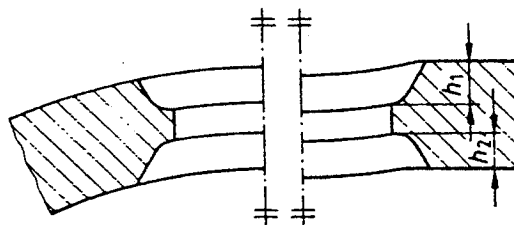


Figure 3: Preparation of holes in the shell

– The roots of the joint preparations may be in one plane, as for example when they are machine drilled, in which case the depths of the grooves will vary around the hole as shown in figure 4.

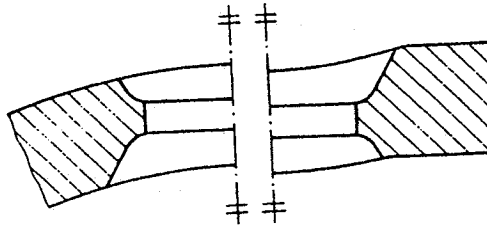


Figure 4: Preparation of holes in the shell

### 3.6 Welds for smooth transition

In some cases it is convenient to foresee a fillet weld providing smooth geometric transition from the surface of one welded part to the surface of the other one, e.g. from branch to shell. Its purpose is to soften the notch effect in the branch-shell edge and therefore the throat thickness is not presented on the figure concerned.

### 3.7 Oblique and tangential branches

The welded connections are contained in the tables 1 to 13. Regarding branches, the oblique and tangential ones are not specially considered as their preparation is similar to that reported on tables 2 and 3 for radial branches. Only some significant cases are therefore considered (see table 2, No. 2.2).

NOTE 1: The welds are only blackened in the following tables when the figures do not give information about the dimension of the values for the preparation.

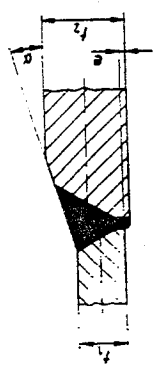
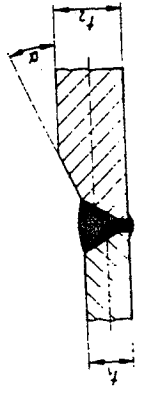
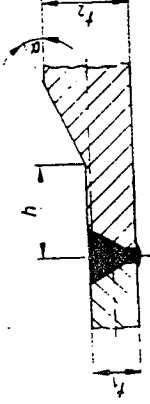
NOTE 2: It is not intended that the values of the dimension given in the tables should be measured precisely but rather the general philosophy should be applied.

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Table 1: Butt joints in plates of different thickness

No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
<b>1.1 Butt joints in plates of different thickness</b>				
1.1.1		$\alpha \leq 30^\circ$ $t_1 < t_2$	In case of severe service conditions the design shall be in accordance with figures 1.1.2 and 1.1.3.  $e \leq 0,1 t_1$  max. 2 mm (for one side welding)	1.5 and 2.5.9
1.1.2		$\alpha \leq 30^\circ$ $t_1 < t_2$		1.5, 2.5.9 and 2.3.3
1.1.3		$\alpha \leq 30^\circ$ $t_1 < t_2$	for ultrasonic test $h \geq 2 t_1$ , but min. 30 mm  for radiographic test $h \geq t_1$	1.5, 2.5.9 and 2.3.3

(continued)

Table 1 (concluded)

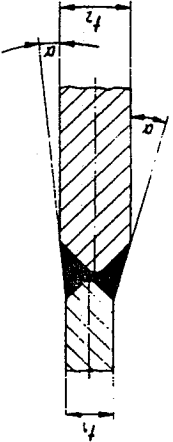
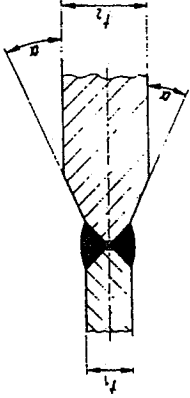
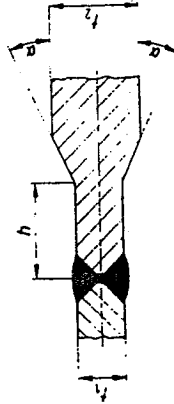
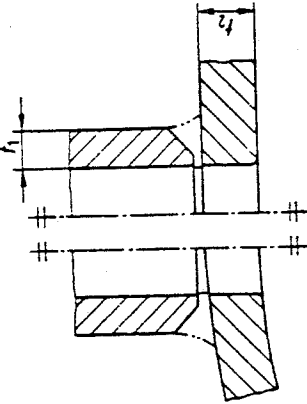
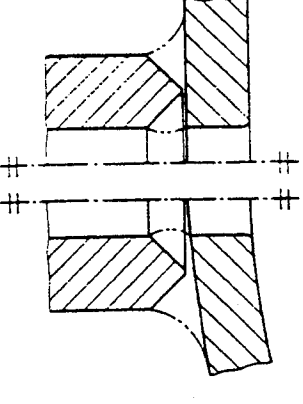
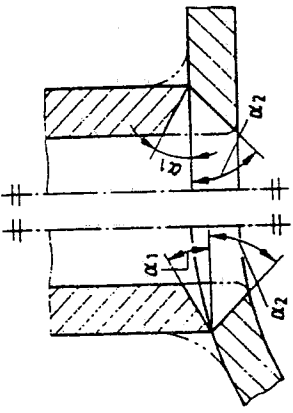
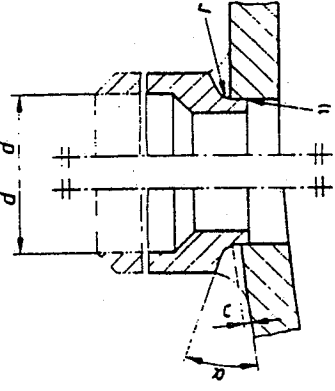
No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
1.1.4		$\alpha_1 \leq 30^\circ$	see 1.1.1	2.3.3
1.1.5	<p style="text-align: center;">SIST EN 1708-1:1999  <a href="https://standards.iteh.ai/catalog/standards/sist/23fb4b6-0dda-424b-b565-31b2c99a9329/sist-en-1708-1-1999">https://standards.iteh.ai/catalog/standards/sist/23fb4b6-0dda-424b-b565-31b2c99a9329/sist-en-1708-1-1999</a></p> 	$\alpha_1 \leq 30^\circ$		2.3.3
1.1.6		$\alpha_1 \leq 30^\circ$	for ultrasonic test $h \geq 2 r_1$ , but min. 30 mm for radiographic test $h \geq r_1$	2.3.3

Table 2: Branches without compensation rings

No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
These connections include the provision of compensation by thickening of the branch and/or shell.				
<b>2.1 Set-on branches (for special branch connections see 13.2)</b>				
2.1.1		$t_2 \leq 3 t_1$		1.4 or 1.8 one side welding
2.1.2			These details are recommended only where the bore of the branch is readily accessible for welding. The joint should be back-gouged from the side most accessible and suitable for this purpose, generally from the outside.	2.4.4 or 2.8.8

(continued)

Table 2 (continued)

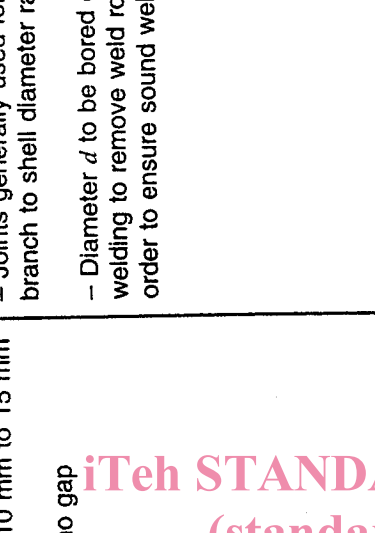
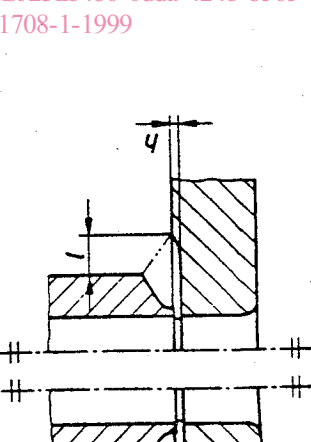
No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
2.1.3		$\alpha_1 = 30^\circ$ $\alpha_2 = 45^\circ$	see 2.1.2	
2.1.4		1) no gap $c \geq 1,5 \text{ mm}$ $r \geq 5 \text{ mm}$ $\alpha = 30^\circ$	- Joints generally used for small branch to shell diameter ratios. - Diameter $d$ to be bored out after welding to remove the weld root, in order to ensure sound weld.	

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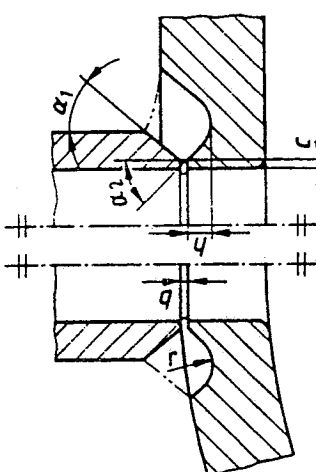
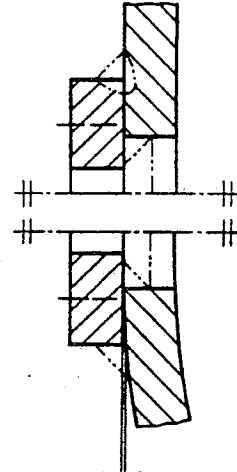
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Table 2 (continued)

No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
2.1.5	 <p style="text-align: center;">SIST EN 1708-1:1999  <a href="https://standards.iteh.ai/catalog/standards/sist/23ffb4b6-0dda-424b-b565-31b2c99a9329/sist-en-1708-1-1999">https://standards.iteh.ai/catalog/standards/sist/23ffb4b6-0dda-424b-b565-31b2c99a9329/sist-en-1708-1-1999</a></p>	$l = 10 \text{ mm to } 15 \text{ mm}$ 1) no gap	– Joints generally used for small branch to shell diameter ratios. – Diameter $d$ to be bored out after welding to remove weld root, in order to ensure sound weld.	1.4 or 1.8 one side welding
2.1.6		$l = 10 \text{ mm to } 15 \text{ mm}$ $h \geq 3 \text{ mm}$	Joints generally used for small branch to shell diameter ratios.	1.8 one side welding

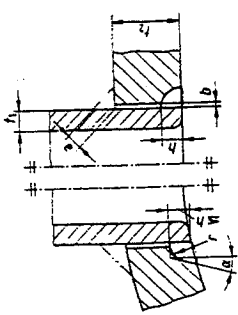
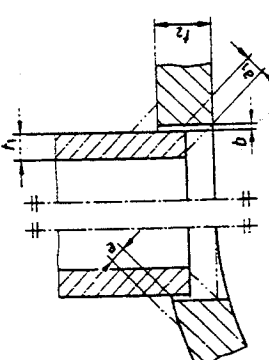
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Table 2 (continued)

No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
2.1.7	 <p style="text-align: center;">SIST EN 1708-1:1999  <a href="https://standards.iteh.ai/catalog/standards/sist/23ffb4b6-0dda-424b-b565-31b2c99a9329/sist-en-1708-1-1999">https://standards.iteh.ai/catalog/standards/sist/23ffb4b6-0dda-424b-b565-31b2c99a9329/sist-en-1708-1-1999</a></p>	For branches up to approximately 100 mm bore. $b = 1 \text{ mm to } 3 \text{ mm}$ $h \leq 5 \text{ mm}$ $c = 1 \text{ mm}$ $r = 7 \text{ mm}$ $\alpha_1 \leq 45^\circ$ $\alpha_2 \leq 45^\circ$	Generally used for the attachment of branches to thick-walled shells.	
2.1.8		$h \leq 3 \text{ mm}$	The sizes of the fillet welds should be based on the loads transmitted, paying due regard to other fabrication and service requirements.	

(continued)

Table 2 (continued)

No.	Figure	Application/ condition	Note	Reference to EN 29692 and EN ISO 9692-2
<p><b>2.2 Set-in branches (for special branch connection see 13.2)</b></p>				
<p>As a general recommendation all set-in branches should be welded on the inside of the shell as shown e.g. in figures 2.2.1 and 2.2.2 if they are accessible for the purpose, otherwise preference should be given to set-on branch connections as shown e.g. in figure 2.1.1.</p>				
2.2.1		$a = 0,5 t_1$ $h = t_1$ $r \geq 8 \text{ mm}$ $b \leq 1 \text{ mm}$ $\alpha \approx 10^\circ \text{ to } 20^\circ$	<p>For partial penetration welded connection.</p> <p>Generally used when <math>t_1</math> is less than <math>t_2/2</math>. For small diameter branches attention is drawn to the details shown in table 3 which may provide a preferable solution.</p>	1.8 and 3.10 A
2.2.2		$a = 0,5 t_1$ , but $\geq 3 \text{ mm}$ $a_1 < 0,7 t_1$ $b \leq 1 \text{ mm}$	<p>For partial penetration welded connection.</p> <p>Limited application:</p> <ul style="list-style-type: none"> <li>- internal diameter of shell <math>\leq 200 \text{ mm}</math>;</li> <li>- wall thickness of branch <math>t_1 \leq 5 \text{ mm}</math>.</li> </ul>	3.10 A and 3.10 B

(continued)