



SLOVENSKI STANDARD

SIST EN 1708-3:2012

01-maj-2012

Varjenje - Opisi zvarnih spojev na jeklu - 3. del: Platiranje, nanašanje vmesnih slojev in oblaganje komponent tlačne opreme

Welding - Basic weld joint details in steel - Part 3: Clad, buttered and lined pressurized components

Schweißen - Verbindungselemente beim Schweißen von Stahl - Teil 3: Plattierungen, Pufferungen, Auskleidungen druckbeanspruchter Bauteile

Soudage - Descriptif de base des assemblages soudés en acier - Partie 3: Composants plaqués, beurrés et doublés soumis à la pression

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Ta slovenski standard je istoveten z: EN 1708-3:2012

ICS:

25.160.40 Varjeni spoji in vari Welded joints

SIST EN 1708-3:2012

en,fr,de

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EUROPEAN STANDARD

EN 1708-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2012

ICS 25.160.40

English Version

Welding - Basic weld joint details in steel - Part 3: Clad, buttered and lined pressurized components

Soudage - Descriptif de base des assemblages soudés en acier - Partie 3: Composants plaqués, beurrés et doublés soumis à la pression

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This European Standard was approved by CEN on 28 January 2012.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
4 Requirements	5
4.1 General.....	5
4.2 Dissimilar metal joints.....	5
4.3 Welds for clad steel	6
4.4 Weld design examples	6
Bibliography	18

Tables

Table 1— Clad steels.....	6
Table 2 — Linings	8
Table 3 — Dissimilar metal joints	11
Table 4 — Complex connections.....	14

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Foreword

This document (EN 1708-3:2012) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN.

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 2012, and conflicting national standards shall be withdrawn at the latest by September 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

EN 1708, 'Welding - Basic weld joint details in steel' consists of the following parts :

Part 1: Pressurized components

Part 2: Non internal pressurized components

Part 3: Clad, buttered and lined pressurized components

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

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EN 1708-3:2012 (E)**1 Scope**

This European Standard complements EN 1708-1 with regard to applications in industrial, chemical and pharmaceutical sectors. It specifies established examples on how to construct claddings, linings and dissimilar joints and complex connections relevant to the welding technology and with regard to pressurized components (e.g. vessels, boilers and piping). In the following text therefore the term pressurized components will be used.

These examples can also be used for other applications provided the relevant requirements are taken into account. For exceptional cases such as specific problems concerning corrosion or materials in need of special processes, other solutions can be necessary which are to be agreed upon between purchaser and manufacturer.

Appropriate national regulations and corresponding design specifications are to be followed when selecting design examples as well as, if applicable, different or further requirements.

This European Standard does not override conditions on dimensioning of welded joints regarding strength (e.g. according to EN 12952, EN 12953, EN 13445 and EN 13480). It is to be applied in accordance with the specified application limits for pressurized components subject to compression stress with bearing wall thicknesses ≤ 30 mm. This limit is chosen for structural reasons and not for the heat treatment that may be required. The wall thickness limit applies to butt welds in the bearing vessel wall only and does not apply to flanges, torispherical heads, flat ends or other similar parts.

This European Standard applies to the following types of steel:

- non alloyed steels with a minimum tensile strength of $R_m \leq 450$ MPa,
- P295GH and 16Mo3 according to EN 10028-2;
- fine-grain steels according to EN 10028-3 with a minimum yield point $R_{eL} \leq 355$ MPa;
- austenitic steels according to EN 10028-7.

This European Standard can also be applied to other steels and/or larger wall thicknesses, provided that an agreement has been made between the manufacturer and the purchaser/operating authority.

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.

EN 1011-5, *Welding — Recommendations for welding of metallic materials — Part 5: Welding of clad steel*

EN 1708-1:2010, *Welding — Basic welded joint details in steel — Part 1: Pressurized components*

EN 10028-2, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10028-7, *Flat products made of steels for pressure purposes — Part 7: Stainless steels*

ISO/TR 25901:2007, *Welding and related processes — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 25901:2007 and the following apply.

3.1

heterogeneous joint

welded joint in which the weld metal and parent material have significant differences in mechanical properties and/or chemical composition

[SOURCE: ISO/TR 25901:2007, 2.180]

3.2

homogeneous joint

Welded joint in which the weld metal and parent material have no significant differences in mechanical properties and/or chemical composition

[SOURCE: ISO/TR 25901:2007, 2.186]

3.3

lining

metallic stratum (e. g. sheet, plate, tube or stripe) partly connected to the inner surface of a component

4 Requirements

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4.1 General

The examples in Table 1 to Table 4 are based on commonly accepted practice and give general information for design conditions and welding procedures. Other welding or design conditions should be included in the welding procedure specification (WPS) and have to be specified.

NOTE Metallic materials are assigned to groups in Welding Guidelines. Specifications of this grouping system are defined by the Technical Report CEN ISO/TR 15608. For European material designations the material groups with the corresponding material designations or material numbers and the technical delivery conditions can be found in the Technical Report CEN ISO/TR 20172.

In many industrial sectors, in particular corrosion resistance shall also be guaranteed for pressurized components. The selection of appropriate materials and their use in established wall thicknesses or designs thus plays an important role. Knowledge gained through experience has been pivotal regarding the material types and wall thickness ranges mentioned above for applications with design elements described in this European Standard.

4.2 Dissimilar metal joints

Regarding the welding of non alloy steels to austenitic steels, the filler metals to be chosen are determined by one of the following cases:

- a) If the weld is not post weld heat-treated and the operating temperature ≤ 300 °C throughout, then austenitic filler metals which have been tested for suitability can be chosen.
- b) If the weld is post weld heat-treated and/or subject to operating temperatures > 300 °C, then filler metals which have been tested for suitability, such as nickel-based high alloys or other metals, can be used.

Strength values of the filler metals which differ from that of the base material may need to be taken into account during calculations.

EN 1708-3:2012 (E)

4.3 Welds for clad steel

EN 1011-5 is applicable to the welding of clad steel.

Care shall be taken concerning the suitability of filler metals used when welding the butter positions.

If a post-weld heat treatment is planned, or if the weld is to be applied at operating temperatures $> 300\text{ }^{\circ}\text{C}$, then particular specifications are required.

The welding consumables for buttering can also be applied beyond the filling run, even for final runs, if the corrosion resistance is known to be sufficient.

In general, the weld surface of the buttering does not need to be machined.

Special surface conditions (such as grinded or polished) shall be specified in the manufacturing documents.

4.4 Weld design examples

Examples of weld design are given in Tables 1 through 4.

Table 1— Clad steels

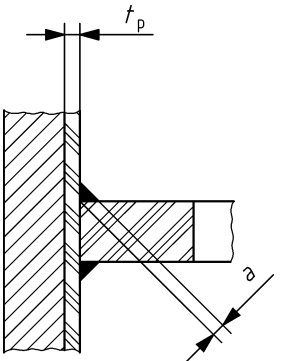
1	Clad connections Observe the supplementary design rules according to No 3.1 and No 3.2 in Table 3.		
<p>The thickness of austenitic cladding t_p is in general 2 mm to 4 mm. The proportion of austenitic weld metal in the bearing cross-section has to be taken into account for the calculation according to the calculation rules. Differences in wall thickness are to be compensated on the base material side.</p> <p>NOTE The adhesion quality of the cladding should be checked by ultrasonic test (UT) prior to welding.</p>			
No	Figure	Application	Condition
1.1		For fixing on a clad surface (e.g. bearing rings, apex seals)	$a \approx t_p$
<p>Comment: Agreement with purchaser required for low exposure level to stress.</p>			

Table 1 (continued)

No	Figure	Application	Condition	Comment
1.2		<p>For local introduction of greater strengths (e. g. brackets for flow breakers)</p>	<p> $a_1 \approx t_p$ $a_2 \leq t_2 \times 0,7$ $R \geq 10 \text{ mm}$ $t_2 \geq 4 \text{ mm}$ $f \geq t_1$, however 20 mm at a minimum </p>	

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Table 2 — Linings

2	Welds and connections for linings Observe the supplementary design rules according to No 3.1 and No 3.2 in Table 3.			
<p>In case of vacuum stresses, the calculation for the bearing capacity of the lining has to be checked separately; thermal stresses is to be taken into account as well.</p> <p>As a rule the lining thickness t_1 should be 2 mm as a minimum.</p> <p>When selecting the lining thickness and the weld strip thickness, the root penetration depth and the welding sensitivity of the carrier material, if applicable, have to be taken into account dependent on the welding procedure and the welds.</p> <p>Cavities between ferritic base metal and austenitic liner shall be avoided for elevated temperature applications.</p> <p>M is a heterogeneous joint between the ferritic base metal and an austenitic liner</p> <p>V is a homogeneous joint between two austenitic liners.</p> <p>Proceed accordingly with casings.</p>				
No	Figure	Application	Condition	Comment
2.1			$t_1 \leq 3 \text{ mm}$ $l \geq 3 t_1$, however 5 mm at a minimum	
2.2			$t_1 \leq 3 \text{ mm}$ $b \geq 20 \text{ mm}$ $l \geq 3 t_1$, however 5 mm at a minimum	
2.3		For a low exposure level to corrosion. Do not remove the excess weld metal	$t_1 < 4 \text{ mm}$ $b \approx 3 t_1$, however 5 mm at a minimum	Applies to $t_1 \geq 4 \text{ mm}$ with multi-run welding, even with normal demands on corrosion resistance

Table 2 (continued)

No	Figure	Application	Condition	Comment
2.4		Tailored blank design required. To be used also if, for instance, a type of heat treatment is to be applied or for higher operating loads	$t \geq 3 \text{ mm}$ $b \geq 20 \text{ mm}$ $V =$ at least 2 layers like clad material	Wall thickness weaknesses and stress concentration factors are also to be taken into account, if applicable
2.5		Plug welding	$d_1 \geq 15 \text{ mm}$ $t_1 \geq 2 \text{ mm}$ $d \approx d_1 + 10 \text{ mm}$	
2.6		Plug welding if tailored blank design is required. To be used also if a type of heat treatment is to be applied	$t \geq 3 \text{ mm}$ $d_1 \geq 15 \text{ mm}$ $d \approx d_1 + 10 \text{ mm}$ $V =$ at least 2 layers like lining material	For smaller parts (e.g. blank flanges), $d \approx d_1 + 5 \text{ mm}$, may be sufficient
2.7		Plug welding for low exposure level to corrosion.	$t_1 < 4 \text{ mm}$ $d_1 \geq 15 \text{ mm}$	Applies to $t_1 \geq 4 \text{ mm}$ with multi-run welding, even with normal demands on corrosion resistance Excess weld metal shall not be removed