



# SLOVENSKI STANDARD

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Qualification test of welders - Fusion welding - Part 1: Steels

Prüfung von Schweißern - Schmelzschweißen - Teil 1: Stähle

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**ICS:**

25.160.01

Varjenje, trdo in mehko  
spajkanje na splošno

Welding, brazing and  
soldering in general

**SIST EN 287-1:2011**

**en,fr,de**

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EUROPEAN STANDARD  
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**Qualification test of welders - Fusion welding - Part 1: Steels**

Epreuve de qualification des soudeurs - Soudage par  
fusion - Partie 1 : Aciers

Prüfung von Schweißern - Schmelzschweißen - Teil 1:  
Stähle

This European Standard was approved by CEN on 16 June 2011.

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**EN 287-1:2011 (E)****Foreword**

This document (EN 287-1:2011) 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of an identical text or by endorsement, at the latest by January 2012, and conflicting national standards shall be withdrawn at the latest by January 2012.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.

This document supersedes EN 287-1:2004.

This document 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 document.

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 and the United Kingdom.

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## Introduction

The ability of a welder to follow verbal or written instructions and verification of a person's skills is an important factors in ensuring the quality of the welded product.

The testing of a welder's skill in accordance with this standard depends on welding techniques and conditions used in which uniform rules are complied with and standard test pieces are used.

The principle of this standard is that a qualification test qualifies the welder not only for the conditions used in the test, but also for all joints which are considered easier to weld on the presumption that the welder has received a specific training and/or has industrial practice within the range of qualification.

The qualification test can be used to qualify a welding procedure and a welder provided that all the relevant requirements, e.g. test piece dimensions and testing requirements are satisfied (see EN ISO 15614-1).

At the end of its period of validity, the existing and valid qualification testing of welders in accordance with the requirement of the previous edition of this standard may be revalidated according to the previous edition. Alternatively, the range of qualification may be updated in accordance with this edition. All new qualifications and re-qualifications shall be in accordance with this edition.

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**EN 287-1:2011 (E)****1 Scope**

This European Standard defines the qualification testing of welders for the fusion welding of steels.

It provides a set of technical rules for a systematic qualification test of the welder, and enables such qualifications to be uniformly accepted independently of the type of product, location and examiner/examining body.

When qualifying welders, the emphasis is placed on the welder's ability to manually manipulate the electrode / welding torch / welding blowpipe and thereby producing a weld of acceptable quality.

The welding processes referred to in this standard include those fusion-welding processes which are designated as manual or partly mechanized welding. It does not cover fully mechanized and automated welding processes (see EN 1418).

**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.

EN 1320:1996, *Destructive tests on welds in metallic materials — Fracture test*

EN 1435:1997, *Non-destructive examination of welds — Radiographic examination of welded joints*

EN ISO 4063:2009, *Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:2009)*

EN ISO 5173:2010, *Destructive tests on welds in metallic materials — Bend tests (ISO 5173:2009)*

EN ISO 5817:2007, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2003, corrected version:2005, including Technical Corrigendum 1:2006)*

EN ISO 6947, *Welding and allied processes — Welding positions (ISO 6947:2011)*

CEN ISO/TR 15608, *Welding — Guidelines for a metallic materials grouping system (ISO/TR 15608:2005)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15609-2:2001, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 2: Gas welding (ISO 15609-2:2001)*

EN ISO 17637, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637:2003)*

ISO 857-1:1998, *Welding and allied processes — Vocabulary — Part 1: Metal welding processes*

**3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

**3.1****welder**

person who holds and manipulates the electrode holder, welding torch or blowpipe by hand



[ISO/TR 25901:2007]

### 3.2

#### **manufacturer**

person or organization that is responsible for the welding production

[EN ISO 15607:2003]

### 3.3

#### **examiner**

qualified person who has been appointed to verify compliance with the applicable standard

NOTE In certain cases, an external independent examiner can be required.

### 3.4

#### **examining body**

organization that has been appointed to verify compliance with the applicable standard

NOTE In certain cases, an external independent examining body can be required.

[ISO/TR 25901:2007]

### 3.5

#### **material backing**

backing using material for the purpose of supporting molten weld metal

### 3.6

#### **layer**

stratum of weld metal consisting of one or more runs

[ISO/TR 25901:2007]

### 3.7

#### **root run**

in multi layer welding, the run(s) of the first layer deposited in the root

[ISO/TR 25901:2007]

### 3.8

#### **filling run**

in multi layer welding, the run(s) deposited after the root run(s) and before the capping run(s)

[ISO/TR 25901:2007]

### 3.9

#### **capping run**

in multi layer welding, the run(s) visible on the weld face(s) after completion of welding

[ISO/TR 25901:2007]

### 3.10

#### **deposited thickness**

thickness of the weld metal excluding any reinforcement

[ISO/TR 25901:2007]

### 3.11

#### **leftward welding**

gas welding technique in which the filler rod is moved ahead of the blow pipe in relation to the welding direction

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**EN 287-1:2011 (E)**

[ISO/TR 25901:2007]

**3.12****rightward welding**

gas welding technique in which the filler rod is moved behind the blow pipe in relation to the welding direction

[ISO/TR 25901:2007]

**3.13****branch connection**

joint of one or two tubular parts at an angle of less than 180°

**3.14****fillet weld**

triangular weld in a square preparation for making a T-joint, corner joint or lap joint

[ISO/TR 25901:2007]

**3.15****verification**

confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

[ISO 9000:2005]

**3.16****filler material**

welding consumable added during welding to form the weld

[ISO/TR 25901:2007]

**3.17****butt weld**

weld other than a fillet weld (3.14) made in a groove or in a square preparation

[ISO/TR 25901:2007]

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**4 Reference numbers, symbols and abbreviated terms****4.1 General**

The following abbreviations and reference numbers shall be used when completing the welder's qualification test certificate (see Annex A).

**4.2 Reference numbers of welding processes**

This standard covers the following manual or partly mechanized welding processes (reference numbers of welding processes for symbolic representation are listed in EN ISO 4063:2009):

- 111 manual metal arc welding;
- 114 self-shielded tubular-cored arc welding;
- 121 submerged arc welding with solid wire electrode (partly mechanized);
- 125 submerged arc welding with tubular cored electrode (partly mechanized);
- 131 MIG welding with solid wire electrode;

135	MAG welding with solid wire electrode;
136	MAG welding with flux cored electrode;
138	MAG welding with metal cored electrode;
141	TIG welding with solid filler material;
142	Autogenous TIG welding;
143	TIG welding with tubular cored filler material;
145	TIG welding using reducing gas and solid filler material;
15	plasma arc welding;
311	oxy-acetylene welding.

NOTE The principles of this standard can be applied to other fusion welding processes.

### 4.3 Symbols and abbreviations

#### 4.3.1 For test pieces

BW	butt weld
$D$	outside pipe diameter
FW	fillet weld
$l_1$	length of test piece
$l_2$	half width of test piece
$l_f$	examination length
P	plate
$R_{eH}$	yield strength
$s_1$	deposited thickness of weld metal for welding process 1
$s_2$	deposited thickness of weld metal for welding process 2
$t$	material thickness of test piece (plate or wall thickness)
T	pipe <sup>1)</sup>

#### 4.3.2 For consumables

nm	no filler metal
A	acid covering

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1) The word "pipe" alone or in combination, is used to mean "pipe", "tube" or "hollow section".

**EN 287-1:2011 (E)**

B	basic covering or electrode core - basic
C	cellulosic covering
M	electrode core - metal powder
P	electrode core - rutile, fast freezing slag
R	rutile covering or electrode core – rutile, slow freezing slag
RA	rutile-acid covering
RB	rutile-basic covering
RC	rutile-cellulosic covering
RR	rutile-thick covering
S	solid wire/rod
V	electrode core - rutile or basic / fluoride
W	electrode core - basic / fluoride, slow freezing slag
Y	electrode core - basic / fluoride, fast freezing slag
Z	electrode core - other types

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**4.3.3 For other weld details**

bs	welding from both sides
lw	leftward welding
mb	welding with backing
ml	multi layer
nb	welding without backing
rw	rightward welding
sl	single layer
ss	single-side welding

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**4.3.4 For bend tests**

<i>A</i>	minimum tensile elongation required by the material specification
<i>d</i>	diameter of the former or the inner roller
<i>t<sub>s</sub></i>	thickness of the bend test specimen

## 5 Essential variables and range of qualification

### 5.1 General

The qualification of welders is based on essential variables. For each essential variable a range of qualification is defined. All test pieces shall be welded using the essential variables independently, except for 5.7 and 5.8. If the welder has to weld outside the range of qualification a new qualification test is required. The essential variables are:

- welding process(es);
- product type (plate and pipe);
- type of weld (butt and fillet);
- material group;
- filler material;
- dimension (material thickness and outside pipe diameter);
- welding position;
- weld detail (backing, single side welding, both side welding, single layer, multi layer, leftward welding, rightward welding).

### 5.2 Welding processes (standards.iteh.ai)

Welding processes are defined in ISO 857-1 and listed in 4.2.

<https://standards.iteh.ai/catalog/standards/sist/67a199c-722d-4cf7-9580-11e401205c4d/iso-857-1-2007>

Each qualification test normally qualifies only one welding process. A change of welding process requires a new qualification test. Exceptions are as follows:

- a change from solid wire electrode 135 to a metal cored electrode 138 or vice versa does not require requalification. (see Table 4);
- welding with 141, 143 or 145 qualifies for 141, 142, 143 and 145 but 142 only qualifies for 142.

However, it is permitted for a welder to be qualified for two or more welding processes by welding a single test piece (multi process joint) or by two or more separate qualification tests. The ranges of qualification concerning the deposited thickness of weld metal for each welding process used and for the multi process joint for butt welds are given in Table 1 (see also Table 5).