



SLOVENSKI STANDARD
SIST EN 1011-1:1999
01-december-1999

JUfYbY!Df]dcfc]UnUj UfYbY_cj]bg_l `a UHf]Ucj '!%rXY. Gd`cybY`ga Yfb]W
nUcVc bc`j UfYbY

Welding - Recommendations for welding of metallic materials - Part 1: General guidance for arc welding

Schweißen - Empfehlungen zum Schweißen metallischer Werkstoffe - Teil 1: Allgemeine Anleitungen für Lichtbogenschweißen

iTeh STANDARD PREVIEW

(standards.iteh.ai)
Soudage - Recommandations pour le soudage des matériaux métalliques - Partie 1: Lignes directrices générales pour le soudage à l'arc

[SIST EN 1011-1:1999](https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-ab51942c00c/sist-en-1011-1-1999)

Ta slovenski standard je istoveten z: **EN 1011-1:1998**

ICS:

25.160.10 Varilni postopki in varjenje Welding processes

SIST EN 1011-1:1999

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1011-1:1999

<https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1999>

EUROPEAN STANDARD

EN 1011-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 1998

ICS 25.160.10

Descriptors: welding, arc welding, fusion welding, metals, specifications

English version

Welding - Recommendations for welding of metallic materials - Part 1: General guidance for arc welding

Soudage - Recommandations pour le soudage des
matériaux métalliques - Partie 1: Lignes directrices
générales pour le soudage à l'arc

Schweißen - Empfehlungen zum Schweißen metallischer
Werkstoffe - Teil 1: Allgemeine Anleitungen für
Lichtbogenschweißen

This European Standard was approved by CEN on 26 January 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1011-1:1998

<https://standards.iteh.ai/catalog/standards/sist/c67d85e2-9597-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1998>

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

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

Contents

	Page
Foreword	3
Introduction	4
1 Scope	4
2 Normative references	4
3 Definitions	5
4 Abbreviations and symbols	6
5 Provision of quality requirements	6
6 Storage and handling of parent materials	6
7 Fusion welding processes	6
8 Welding consumables	7
8.1 General	7
8.2 Supply, storage and handling	7
9 Equipment	7
10 Fabrication	7
10.1 General	7
10.2 Butt weld	7
10.3 Fillet weld	8
11 Preparation of joint	8
12 Assembly for welding	8
13 Preheat and inter-pass temperature	8
14 Tack welds	8
15 Temporary attachments	9
16 Run-on and run-off plates	9
17 Arcing	9
18 Inter-run cleaning and treatment	9
19 Heat input	9
20 Welding procedures	10
21 Traceability	10
22 Peening	10
23 Inspection and testing	10
24 Quality requirements	10
25 Correction of non-conformity	10
26 Distortion	11
27 Post-weld heat treatment	11
28 Post-weld cleaning	11
Annex A (informative) Information and items to be agreed and to be available prior to the start of fabrication	12

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1011-1:1999](https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1999)

<https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1999>

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 August 1998, and conflicting national standards shall be withdrawn at the latest by August 1998.

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).

This standard presently consists of the following parts:

- Part 1: General guidance for arc welding;
- Part 2: Arc welding of ferritic steels;
- Part 3: Arc welding of stainless steels;
- Part 4: Arc welding of aluminium and aluminium alloys.

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1011-1:1999

<https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1999>

Introduction

This European Standard is being issued in several parts in order that it may be extended to cover the different types of metallic materials which will be produced to all European Standards for weldable metallic materials.

When this standard is referenced for contractual purposes the ordering authority or contracting parties should state the need for compliance with the relevant parts of this standard and such other annexes as are appropriate.

This standard gives general guidance for the satisfactory production and control of welding and details some of the possible detrimental phenomena which may occur, with advice on methods by which they may be avoided. It is generally applicable to fusion welding of metallic materials and is appropriate regardless of the type of fabrication involved, although the relevant application standard or the contract may have additional requirements. More information is contained in other parts of this standard. Permissible design stresses in welds, methods of testing and acceptance levels are not included because they depend on the service conditions of the fabrication. These details should be obtained from the relevant application standard or by agreement between the contracting parties.

It has been assumed in the drafting of this standard that the execution of its provisions is entrusted to appropriately qualified, trained and experienced personnel.

1 Scope

This European Standard gives general guidance for fusion welding of metallic materials in all forms of product (e.g. cast, wrought, extruded, forged).

The processes and techniques referred to in this part of EN 1011 may not all be applicable to all materials. Additional information relevant to specific materials is given in the relevant parts of the standard.

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 revisions 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 287-1

Approval testing of welders – Fusion welding – Part 1: Steels

EN 287-2

Approval testing of welders – Fusion welding – Part 2: Aluminium and aluminium alloys

prEN ISO 9606-3

Approval testing of welders – Fusion welding – Part 3: Copper and copper alloys

prEN ISO 9606-4

Approval testing of welders – Fusion welding – Part 4: Nickel and nickel alloys

prEN ISO 9606-5

Approval testing of welders – Fusion welding – Part 5: Titanium and titanium alloys, zirconium and zirconium alloys

EN 288-2

Specification and approval of welding procedures for metallic materials – Part 2: Welding procedure specification for arc welding

EN 439

Welding consumables – Shielding gases for arc welding and cutting

EN 729-1

Quality requirements for welding – Fusion welding of metallic materials – Part 1: Guidelines for selection and use

EN 729-2

Quality requirements for welding – Fusion welding of metallic materials – Part 2: Comprehensive quality requirements

EN 729-3

Quality requirements for welding – Fusion welding of metallic materials – Part 3: Standard quality requirements

iTeh STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 1011-1:1999

<https://standards.iteh.ai/catalog/standards/sist/c2-9599-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1999>

ab519ff2e00c/sist-en-1011-1-1999

EN 729-4

Quality requirements for welding – Fusion welding of metallic materials – Part 4: Elementary quality requirements

EN 1418

Welding personnel – Approval testing of welding personnel for fully mechanized and automatic welding of metallic materials

EN ISO 13916

Welding – Guidance for the measurement of preheating temperature, interpass temperature and preheat maintenance temperature during welding (ISO 13916 : 1996)

EN 22553

Welded, brazed and soldered joints – Symbolic representation on drawings (ISO 2553: 1992)

EN 24063

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

3 Definitions

For the purposes of this standard the following definitions apply:

3.1 arc welding current I : Current passing through the electrode.

3.2 arc voltage U : Electrical potential between contact tip or electrode holder and workpiece.

3.3 interpass temperature T_i : Temperature in a multi-run weld and adjacent parent metal immediately prior to the application of the next run.

3.4 heat input Q : Energy introduced into the weld region during welding per unit run length.

3.5 preheat temperature T_p : Temperature of the workpiece in the weld zone immediately prior to any welding operation.

3.6 thermal efficiency k : Ratio of heat energy introduced into the weld to the electrical energy consumed by the arc.

3.7 welding speed v : Travel speed of the weld pool.

3.8 detrimental effect: Imperfections and other harmful influences in the welded area.

3.9 run-on plate: Piece of metal so placed as to enable the full section of weld metal to be obtained at the beginning of a joint.

3.10 run-off plate: Piece of metal so placed as to enable the full section of weld metal to be maintained up to the end of a joint.

3.11 wire feed rate w_f : Length of wire consumed per unit time.

3.12 contract: A contract is: [SIST EN 1011-1:1999](https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-1b1987-09/construction/1011-1-1998)
<https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-1b1987-09/construction/1011-1-1998>

- either the agreed requirements for constructions ordered by a customer;
- or the manufacturer' basic specification for constructions manufactured in series for several customers, unknown to the manufacturer at the time of design and production.

The contract is, in both cases, assumed to include reference to all relevant regulatory requirements.

NOTE: The role of the independent body is considered to be a matter which is determined by the contracting parties and/or the application standard.

3.13 welding consumables: Materials consumed in the making of a weld, including filler metals, fluxes and gases.

4 Abbreviations and symbols

Abbreviations and symbols	Term	Unit
I	Arc welding current	A
k	Thermal efficiency factor	-, -
l	Length of a run	mm
Q	Heat input	kJ/mm
d	Material thickness	mm
T_i	Interpass temperature	°C
T_p	Preheat temperature	°C
U	Arc voltage	V
v	Welding speed	mm/s
w_f	Wire feed rate	mm/min or m/min
WPS	Welding procedure specification	-

5 Provision of quality requirements

The contract shall give the information necessary for the execution of the welding. If the manufacturer is recommended to have a quality system, the information should be in accordance with the appropriate part of EN 729 (see annex A for further information).

6 Storage and handling of parent materials

Storage and handling shall be carried out so that the parent material is not adversely affected.

7 Fusion welding processes

This standard covers welds made by one of the following welding processes in accordance with EN 24063 or by a combination of those processes:

- 111 manual metal-arc welding with covered electrode;
 - 114 flux-cored wire metal-arc welding without gas shield;
 - 12 submerged arc welding;
 - 131 metal-arc inert gas welding; MIG welding;
 - 135 metal-arc active gas welding; MAG welding;
 - 136 flux-cored wire metal-arc welding with active gas shield;
 - 137 flux-cored wire metal-arc welding with inert gas shield;
 - 138 metal-cored wire metal-arc welding with active gas shield;
 - 139 metal-cored wire metal-arc welding with inert gas shield;
 - 141 tungsten inert gas arc welding; TIG welding;
 - 15 plasma arc welding;
- other fusion welding processes by agreement.

8 Welding consumables

8.1 General

Welding consumables should be designated in accordance with the relevant European Standard. Consumables shall be selected with regard to the particular application, e.g. joint design, welding position and the properties required to meet the service conditions. Any special recommendations given by the manufacturer/supplier shall be observed.

In some cases it may be possible to weld without the addition of filler metal.

8.2 Supply, storage and handling

All consumables shall be stored and handled with care and in accordance with the relevant standards and/or the manufacturer's/supplier's recommendations.

Covered electrodes, wire electrodes, rods and fluxes, etc., as well as their packaging, which show signs of damage or deterioration shall not be used.

Examples of damage or deterioration are cracked or flaked coatings on covered electrodes, rusty or dirty wire electrodes and wire with flaked or damaged protective coatings.

Consumables returned to the stores shall be treated in accordance with the manufacturer's/supplier's recommendations before re-issue.

9 Equipment

The manufacturer carrying out the fabrication shall be responsible for ensuring that the capacity of the welding plant and ancillary equipment is adequate for the welding procedure to be used. The welding plant shall be regularly checked and maintained.

All electrical plant used in connection with the welding operation shall be adequately earthed. The welding return cable from the workpiece shall be of adequate cross-section, connected as close as possible to the point of welding.

Means of measuring the welding parameters shall be available, either as part of the welding equipment, or by the provision of portable instruments. Such parameters may include arc voltage, welding current, wire feed rate, welding speed, shielding/purging gas flow rates and temperature of parent/weld metal.

10 Fabrication

10.1 General

Fabrication facilities shall be protected from adverse weather, e.g. wind, rain snow, draughts, etc and shall be kept dry. Facilities shall be suitable for the work and adequate precautions shall be taken to ensure that contamination from other materials does not occur.

Surfaces shall be dry and free from condensation and any other material that would adversely affect the quality of the welds. If necessary, forming tools, welding fixtures, clamps or manipulators should be cleaned before use.

When using gas shielded welding processes, the weld zone shall be protected from the effects of draught or other air movements. Air currents even at low speed can remove the shielding gas and therefore welding zones shall be protected.

When inert gas backing is necessary to prevent oxidation of the reverse side of a weld, purging using a suitable gas supply in accordance with EN 439 shall be carried out.

<https://standards.iteh.ai/catalog/standards/sist/ee7d85e2-9597-4842-b2a4-ab519ff2e00c/sist-en-1011-1-1999>

10.2 Butt weld

The details of all butt welds, e.g. type of joint, which may include partial penetration joints, included angle and root gap between parts, shall be arranged to permit the use of a satisfactory welding technique and the combination of weld detail and welding technique shall be such that the resultant joint will comply with the requirements of the design.

The ends of butt joints shall be welded to provide the full weld thickness. This may be achieved by the use of run-off and/or run-on plates.