# Keevitus. Soovitused metalsete materjalide keevitamiseks. Osa 1: Üldjuhised kaarkeevituseks

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

**EESTI STANDARDI EESSÕNA** **NATIONAL FOREWORD**

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| Käesolev Eesti standard EVS-EN 1011-1:1999 sisaldab Euroopa standardi EN 1011-1:1998 ingliskeelset teksti.<br><br>Käesolev dokument on jõustatud 23.11.1999 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.<br><br>Standard on kättesaadav Eesti standardiorganisatsioonist. | This Estonian standard EVS-EN 1011-1:1999 consists of the English text of the European standard EN 1011-1:1998.<br><br>This document is endorsed on 23.11.1999 with the notification being published in the official publication of the Estonian national standardisation organisation.<br><br>The standard is available from Estonian standardisation organisation. |

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| **Käsitlusala:**<br>Käesolev Euroopa standard annab üldjuhised kõikide valmistusmeetodite (valamine, survetöötlemine, ekstrudeerimine, sepistamine) teel valmistatud metalsetest materjalidest toodete sulakeevituse kohta. Protsessid ja sooritustehnikad, millele on viidatud käesolevas EN 1011 osas, ei pruugi olla rakendatavad kõikide materjalide korral. Erimaterjale puudutav asjakohane lisainfo on esitatud standardi vastavasisulistes osades. | **Scope:** |

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## 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.

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

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## 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.

## 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

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:

– 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.