

**Keevitamine. Soovitused metallmaterjalide
keevitamiseks. Osa 2: Ferriitteraste kaarkeevitus**

**Welding - Recommendations for welding of metallic
materials - Part 2: Arc welding of ferritic steels**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 1011-2:2001+A1:2004 sisaldab Euroopa standardi EN 1011-2:2001+EN 1011-2:2001/A1:2003 ingliskeelset teksti.	This Estonian standard EVS-EN 1011-2:2001+A1:2004 consists of the English text of the European standard EN 1011-2:2001+EN 1011-2:2001/A1:2003.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 24.01.2001.	Date of Availability of the European standard is 24.01.2001.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 25.160.10

Võtmesõnad: handling, materials, metallic, metals, principles of execution, quality assurance, quality management, specification (approval), specifications, steel welding, steels, testing conditions, welded joints, welding, welding engineering, welding processes,

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

ICS 25.160.10

English version

Welding

Recommendations for welding of metallic materials

Part 2: Arc welding of ferritic steels

Soudage – Recommandations pour le soudage des matériaux métalliques –
Partie 2: Soudage à l'arc des aciers ferritiques

Schweißen – Empfehlungen zum Schweißen metallischer Werkstoffe –
Teil 2: Lichtbogenschweißen von ferritischen Stählen

This European Standard was approved by CEN on 2000-07-06.

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 Management Centre or to any CEN member.

The European Standards exist 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 Management Centre has the same status as the official versions.

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

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Management Centre: rue de Stassart 36, B-1050 Brussels

Contents

Page

Foreword	3
Introduction	4
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Symbols and abbreviations	5
5 Parent metal	6
6 Weldability factors	6
7 Handling of welding consumables	6
8 Weld details	6
9 Welds in holes or slots	7
10 Preparation of joint face	7
11 Alignment of butt welds before welding	8
12 Preheating	8
13 Tack welds	8
14 Temporary attachments	8
15 Heat input	8
16 Welding procedure specification	9
17 Identification	9
18 Inspection and testing	9
19 Correction of non-conforming welds	9
20 Correction of distortion	9
21 Post weld heat treatment	9
Annex A (informative) Possible detrimental phenomena resulting from welding of steels, not covered by other annexes	10
Annex B (informative) Guidance on joint detail design (when there is no application standard)	11
Annex C (informative) Avoidance of hydrogen cracking (also known as cold cracking)	13
Annex D (informative) Heat affected zone toughness and hardness	40
Annex E (informative) Avoidance of solidification cracking	47
Annex F (informative) Avoidance of lamellar tearing	49
Annex G (informative) References in the annexes	55
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	56
Bibliography	56

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 July 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.

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.

Introduction

This European Standard supplements Part 1. It is issued with several annexes in order that it can be extended to cover the different types of steel which are produced to all the European steel standards for ferritic steels (see clause 5).

This standard gives general guidance for the satisfactory production and control of welds in ferritic steels. Details concerning the possible detrimental phenomena which can occur are given with advice on methods by which they can be avoided. This standard is generally applicable to all ferritic steels and is appropriate regardless of the type of fabrication involved, although the application standard can have additional requirements.

1 Scope

This European Standard gives guidance for manual, semi-mechanised, mechanised and automatic arc welding of ferritic steels (see clause 5), excluding ferritic stainless steels, in all product forms.

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 (including amendments).

EN 288-2:1997, *Specification and approval of welding procedures for metallic materials — Part 2: Welding procedure specification for arc welding*

EN 1011-1:1998, *Welding — Recommendations for welding of metallic materials — Part 1: General guidance for arc welding*

EN 29692, *Metal-arc welding with covered electrode, gas-shielded metal-arc — welding and gas welding — Joint preparations for steel (ISO 9692:1992)*

EN ISO 13916, *Welding — Guidance for the measurement of preheating temperature, interpass temperature and preheat maintenance temperature (ISO 13916:1996)*

CR ISO 15608, *Welding — Guidelines for a metallic material grouping system (ISO/TR 15608:2000)*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions listed in EN 1011-1:1998 and the following apply:

3.1

cooling time $t_{8/5}$

the time taken, during cooling, for a weld run and its heat affected zone to pass through the temperature range from 800 °C to 500 °C

3.2

run out length

the length of a run produced by the melting of a covered electrode