

Welding - Recommendation for welding of metallic materials - Part 6: Laser beam welding

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

Welding - Recommendation for welding of metallic materials - Part 6: Laser beam welding

Soudage - Recommandations pour le soudage des matériaux métalliques - Partie 6 : Soudage par faisceau laser

Schweißen - Empfehlungen zum Schweißen metallischer Werkstoffe - Teil 6: Laserstrahlschweißen

This European Standard was approved by CEN on 29 July 2018.

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European foreword

This document (EN 1011-6:2018) has been prepared by Technical Committee CEN/TC 121 “Welding and allied processes”, 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of an identical text or by endorsement, at the latest by June 2019 and conflicting national standards shall be withdrawn at the latest by June 2019.

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

This document supersedes EN 1011-6:2005.

The main changes compared to the previous edition are as follows:

- a) the normative references and bibliography have been updated;
- b) subclause 12.3 (Assembling and fixtures) has been modified;
- c) fiber laser has been added in Annex A (Equipment).

EN 1011 consists of the following parts, under the general title *Welding — Recommendations for welding of metallic materials*:

- *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;*
- *Part 5: Welding of clad steel;*
- *Part 6: Laser beam welding;*
- *Part 7: Electron beam welding;*
- *Part 8: Welding of cast irons.*

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

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

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

This document gives general guidance for the satisfactory production and control of welding and associated processes and details of some of the possible detrimental phenomena that can occur, with advice on methods by which they can be avoided. It is generally applicable to laser beam processing of metallic materials and also to some extent for non-metallic materials. It is appropriate regardless of the type of fabrication involved, although the relevant product standard, structural code or the design specification can have additional requirements. Permissible design stresses, methods of testing and inspection 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 the standard that the execution of its provisions is entrusted to appropriately qualified, experienced and trained personnel.

1 Scope

This document gives general guidance for laser beam welding and associated processes of metallic materials in all forms of product (e.g. cast, wrought, extruded, forged).

NOTE Some guidance on laser beam cutting, drilling, surface treatment and cladding is given in Annex F.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 14717, *Welding and allied processes - Environmental check list*

EN ISO 636, *Welding consumables - Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels - Classification (ISO 636)*

EN ISO 3834-2, *Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements (ISO 3834-2)*

EN ISO 3834-5, *Quality requirements for fusion welding of metallic materials - Part 5: Documents with which it is necessary to conform to claim conformity to the quality requirements of ISO 3834-2, ISO 3834-3 or ISO 3834-4 (ISO 3834-5)*

EN ISO 6520-1, *Welding and allied processes - Classification of geometric imperfections in metallic materials - Part 1: Fusion welding (ISO 6520-1)*

EN ISO 9013, *Thermal cutting - Classification of thermal cuts - Geometrical product specification and quality tolerances (ISO 9013)*

EN ISO 11145:2016, *Optics and photonics - Lasers and laser-related equipment - Vocabulary and symbols (ISO 11145)*

EN ISO 13919-1, *Welding - Electrons and laser beam welded joints - Guidance on quality levels for imperfections - Part 1: Steel (ISO 13919-1)*

EN ISO 13919-2, *Welding - Electron and laser beam welded joints - Guidance on quality levels for imperfections - Part 2: Aluminium and its weldable alloys (ISO 13919-2)*

EN ISO 13920, *Welding - General tolerances for welded constructions - Dimensions for lengths and angles - Shape and position (ISO 13920)*

EN ISO 14175, *Welding consumables - Gases and gas mixtures for fusion welding and allied processes (ISO 14175)*

EN ISO 14232-1, *Thermal spraying - Powders - Part 1: Characterization and technical supply conditions (ISO 14232-1)*

EN ISO 14341, *Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification (ISO 14341)*

EN ISO 14343, *Welding consumables - Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels - Classification (ISO 14343)*

EN ISO 14732, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*

EN ISO 14919, *Thermal spraying - Wires, rods and cords for flame and arc spraying - Classification - Technical supply conditions (ISO 14919)*

EN ISO 15609-4, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 4: Laser beam welding (ISO 15609-4)*

EN ISO 15614-11, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 11: Electron and laser beam welding (ISO 15614-11)*

EN ISO 15616-1, *Acceptance tests for CO₂-laser beam machines for high quality welding and cutting - Part 1: General principles, acceptance conditions (ISO 15616-1)*

EN ISO 15616-2, *Acceptance tests for CO₂-laser beam machines for high quality welding and cutting - Part 2: Measurement of static and dynamic accuracy (ISO 15616-2)*

EN ISO 15616-3, *Acceptance tests for CO₂-laser beam machines for high quality welding and cutting - Part 3: Calibration of instruments for measurement of gas flow and pressure (ISO 15616-3)*

EN ISO 16834, *Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels - Classification (ISO 16834)*

EN ISO 17632, *Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels - Classification (ISO 17632)*

EN ISO 17633, *Welding consumables - Tubular cored electrodes and rods for gas shielded and non-gas shielded metal arc welding of stainless and heat-resisting steels - Classification (ISO 17633)*

EN ISO 17634, *Welding consumables - Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels - Classification (ISO 17634)*

EN ISO 17662, *Welding - Calibration, verification and validation of equipment used for welding, including ancillary activities (ISO 17662)*

EN ISO 18273, *Welding consumables - Wire electrodes, wires and rods for welding of aluminium and aluminium alloys - Classification (ISO 18273)*

EN ISO 18274, *Welding consumables - Solid wire electrodes, solid strip electrodes, solid wires and solid rods for fusion welding of nickel and nickel alloys - Classification (ISO 18274)*

EN ISO 18276, *Welding consumables - Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high strength steels - Classification (ISO 18276)*

EN ISO 21952, *Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels - Classification (ISO 21952)*

EN ISO 22827-1, *Acceptance tests for Nd:YAG laser beam welding machines - Machines with optical fibre delivery - Part 1: Laser assembly (ISO 22827-1)*

EN ISO 22827-2, *Acceptance tests for Nd:YAG laser beam welding machines - Machines with optical fibre delivery - Part 2: Moving mechanism (ISO 22827-2)*

EN ISO 24373, *Welding consumables - Solid wires and rods for fusion welding of copper and copper alloys - Classification (ISO 24373)*