

**Aerospace series - Weldments and brazements for
aerospace structures - Joints of metallic materials by
laser beam welding - Quality of weldments**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 4678:2011 sisaldab Euroopa standardi EN 4678:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 29.07.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 20.07.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 4678:2011 consists of the English text of the European standard EN 4678:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 29.07.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 20.07.2011.

The standard is available from Estonian standardisation organisation.

ICS 49.025.05

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English Version

Aerospace series - Weldments and brazements for aerospace structures - Joints of metallic materials by laser beam welding - Quality of weldments

Série aérospatiale - Assemblages soudés et brasés pour constructions aérospatiales - Assemblages de matériaux métalliques soudés par faisceaux laser - Qualité des assemblages soudés

Luft- und Raumfahrt - Schweiß- und Lötverbindungen für die Luft- und Raumfahrt - Laserstrahlschweißen - Qualität der Schweißverbindungen

This European Standard was approved by CEN on 9 July 2010.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 4678:2011) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

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of an identical text or by endorsement, at the latest by January 2012, and conflicting national standards shall be withdrawn at the latest by January 2012.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.

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

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.

1 Scope

This European Standard defines the rules to be observed to ensure the quality of aerospace structures in metallic materials by (solid reference number **521** and gas reference number **522** and diode laser Semiconductor **523** according to EN ISO 4063) laser beam welding, implemented automatically, semi-automatically or manually.

It is applicable without any restriction for the manufacturing of new parts or repair parts, these operations being under the responsibility of an approved design authority or repairer.

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 reference document (including any amendments) applies.

EN 1011-6, *Welding — Recommendation for welding of metallic materials — Part 6: Laser beam weld*

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

EN 4179, *Aerospace series — Qualification and approval of personnel for non-destructive testing*

EN 4632-001, *Aerospace series — Welded and brazed assemblies for aerospace constructions — Weldability and brazeability of materials — Part 001: General requirements*

EN 4632-002, *Aerospace series — Welded and brazed assemblies for aerospace constructions — Weldability and brazeability of materials — Part 002: Homogeneous assemblies aluminium and aluminium alloys*

EN 4632-003, *Aerospace series — Weldability and brazeability of materials in aerospace constructions — Part 003: Welding and brazing of homogeneous assemblies of unalloyed and low alloy steels¹⁾*

EN 4632-004, *Aerospace series — Welded and brazed assemblies for aerospace constructions - Weldability and brazeability of materials — Part 004: Homogeneous assemblies highly alloyed steels* Error! Bookmark not defined.)

EN 4632-005, *Aerospace series — Weldability and brazeability of materials in aerospace constructions — Part 005: Homogeneous assemblies of heat resisting Ni or Co base alloys* Error! Bookmark not defined.)

EN 4632-006, *Aerospace series — Weldability and brazeability of materials in aerospace constructions — Part 006: Homogeneous assemblies of titanium alloys* Error! Bookmark not defined.)

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

EN ISO 4063, *Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:2009, Corrected version 2010-03-01)*

EN ISO 4136, *Destructive tests on welds in metallic materials - Transverse tensile test (ISO 4136:2001)*

ISO 4969, *Steel — Macroscopic examination by etching with strong mineral acids*

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

1) Published as ASD-STAN Prestandard at the date of publication of this standard by Aerospace and Defense Industries Association of Europe-Standardization (ASD-STAN), (www.asd-stan.org).

EN ISO 6520-1, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding (ISO 6520-1:2007)*

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

EN ISO 9015-2, *Destructive tests on welds in metallic materials - Hardness testing - Part 2: Microhardness testing of welded joints (ISO 9015-2:2003)*

EN ISO 9016, *Destructive tests on welds in metallic materials - Impact tests - Test specimen location, notch orientation and examination (ISO 9016:2001)*

EN ISO 11145, *Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols (ISO 11145:2006)*

EN ISO 14731, *Welding coordination — Tasks and responsibilities (ISO 14731:2006)*

EN ISO 15609-4, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 4: Laser beam welding (ISO 15609-4:2009)*

EN ISO 15616-1, *Acceptance tests for CO₂-laser beam machines for high quality welding and cutting — Part 1: General principles, acceptance conditions (ISO 15616-1:2003)*

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 15616-2:2003)*

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 15616-3:2003)*

ISO 17636, *Non-destructive testing of welds — Radiographic testing of fusion-welded joints*

ISO 17639, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds*

EN ISO 17640:2, *Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment (ISO 17640:2010)*

ISO 22826, *Destructive tests on welds in metallic materials — Hardness testing of narrow joints welded by laser and electron beam (Vickers and Knoop hardness tests)*

EN ISO 22827-1, *Acceptance tests for Nd:YAG laser beam welding machines — Machines with optical fibre delivery — Part 1: Laser assembly (ISO 22827-1:2005)*

EN ISO 22827-2, *Acceptance tests for Nd:YAG laser beam welding machines — Machines with optical fibre delivery — Part 2: Moving mechanism (ISO 22827-2:2005)*

ISO 24394, *Welding for aerospace applications — Qualification test for welders and welding operators — Fusion welding of metallic components*

ISO/TR 25901, *Welding and related processes — Vocabulary*

NAS 410, *Certification and qualification of non-destructive test personnel*²⁾

2) Published by: National Standards Association, Inc., 1200 Quince Orchard Blvd, Gaithersburg, MD 20878, United States.