SLOVENSKI STANDARD
SIST EN 4867:2019

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Aeronavtika - Lasersko označevanje na površinah z razbarvanjem

Aerospace series - Laser surface marking by discoloration

Luft- und Raumfahrt - Lasermarkierung durch Verblassen

Série aérospatiale - Marquage au laser par décoloration

Ta slovenski standard je istoveten z: **EN 4867:2019**

ICS:

49.025.01	Materiali za letalsko in vesoljsko gradnjo na splošno	Materials for aerospace construction in general

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English Version

Aerospace series - Laser surface marking by discoloration

Série aérospatiale - Marquage au laser par décoloration

Luft- und Raumfahrt - Lasermarkierung durch Verblassen

This European Standard was approved by CEN on 18 February 2019.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 4867:2019) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

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.

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of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

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1 Scope

This European Standard specifies the marking rules for aerospace products, semi-finished products, and ready to use parts, which need surface marking by discoloration using a laser source to identify the part and/or enhance its traceability.

This type of marking can be used on a wide range of materials (both metallic and non-metallic) and coatings (paints, varnishes…). It is in line with the part definition.

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
marking
action of affixing one or more marks on a surface

Note 1 to entry: This type of marking can be composed of one or several laser beam pulse on the same marking area.

3.2
marking area
authorized area of the part where to perform the marking

3.3
working distance
(beam welding) distance between the surface of the workpiece and a standard reference point of the equipment which is traceable to the true focusing lens or mirror centre

Note 1 to entry: This is a practical reference distance only.

3.4
mark
information which is applied on the marking area

3.5
permanent mark
mark which remains intelligible throughout the life of the part

Note 1 to entry: No further operations on the marked surface will be carried out (machining, grinding, etc.).

3.6
temporary mark
mark which is not intended to be intelligible throughout the life of the part

3.7
manufacturer
the organization which makes the material and/or the product in the form and condition in which it is delivered to the purchaser, either directly or through a supplier

[SOURCE: ISO 8591-1:1989, definition 2.1.9]

3.8
supplier
person or corporate body party to a business venture, contract, or order they have accepted which commits them, with respect to the customer, to carrying out the provisions stated therein

3.9
mask
physical pattern located between the laser source and the part, which drives the intensity of the transmission of the laser beam to the part

4 Principle

4.1 General description of the process

The main objective of laser surface marking by discoloration is to allow the identification of products and/or their manufacturer to ensure the origin of the part and an adequate level of traceability.

4.2 Applicability and limitations of the process

The laser marking process is applicable on:

— metallic materials;

— non-metallic materials;

— composites (organic matrix composite, ceramic matrix composite and metallic matrix composite);

— polymers;

— elastomers;

— ceramics;

— paints and varnishes;

— coatings;

— welded parts;

— finished parts.

It is not applicable on:

— soft materials as gels, foams;

— transparent materials for laser;

— non cohesive materials (e.g.: powder).

5 Technical requirements

5.1 Information for the processor

— material standard reference;

— heat treatment (if necessary);

— surface treatment (if necessary);

— areas to be marked;

— forbidden area for marking;

— specification for testing parts and/or samples.

5.2 Materials and equipment

For the application of discoloration marking, the recommended device can be equipped with a laser source, with a scanning system and optical positioning system.

The laser beam power by surface unit (in Watt per surface unit) needs to be adapted depending on the material to be marked. In addition, the spot needs to be adapted to the size of the mark by setting a lenses system.

The marking can be performed without any mask. The use of a mask may allow to obtain more complex markings.

The product to be marked and the mask shall be maintained in a fix position during the marking operation.

The mask can be permanent or disposable, it also shall resist to the laser beam. In case of deterioration, it needs to be replaced by a new mask. The mask can be composed of all type of material. It shall not contaminate the surface of the product to be marked.

The marking operation assembly is composed of a laser marking device, a mask and the product to be marked. It can also support a mirrors system and a lenses system in order to adjust the laser beam onto the surface of the product to be marked.

It is authorized to move the product between two marking operations, for example when a product needs many markings, for one or several areas; or also if the pattern marking is divided into several by-patterns (for example a large size pattern that oversizes the maximum pattern's size obtainable by the laser marking device).

The mask shall be located between the laser source and the part, as indicated in Figure 1.

Operators shall take every precautions in regards to the utilization of a laser source device, and shall be qualified in order to ensure that the mark is readable.

All required parameter settings of the marking laser equipment shall be made by the operator on his own in accordance with the marking specification.

The mask shall be controlled periodically, the periodicity is in function of the laser's power and of the nature of the mask.

The material that compose the mask shall not interact with the material to be marked.

If the material to be marked is to be in contact with the mask, materials that constitute the marking operation assembly (adhesive, paste, tackifying resin…) shall not pollute the material to be marked or in this case shall be eliminated (e.g. by an appropriate solvent).

The deterioration of the mask shall not decrease the marking quality.

5.2.1 Laser marking equipment setting

Identification of any equipment:

— type of source (for example Nd: YAG), model, manufacturer;

— nominal power;

— number of lasers combined;

— manufacturer's or measured values (e.g. wavelength, beam divergence).

5.2.2 Beam delivery and focusing system

The operator shall set the equipment and save the following parameters list:

— distance from beam source to focusing system, if necessary;

— beam diameter on entrance to focusing system;

— focusing optics;

— focal length;

— nominal focal spot size and method of measuring, if required;

— beam path protection system;

— pulse width;

— forward speed;

— pulse overlap;

— laser energy (in Joules);

— laser power delivered at the surface (in W.cm-2).