SLOVENSKI STANDARD
SIST EN 2002-16:2020

01-februar-2020

Aeronavtika - Kovinski materiali - Preskusne metode - 16. del: Neporušitvene preiskave - Preskušanje s penetranti

Aerospace series - Metallic materials - Test methods - Part 16: Non-destructive testing - Penetrant testing

Luft- und Raumfahrt - Metallische Werkstoffe - Prüfverfahren - Teil 16: Zerstörungsfreie Prüfung - Eindringprüfung

Série aérospatiale - Matériaux métalliques - Méthodes d'essais - Partie 16 : Essais non destructifs - Examen par ressuage

Ta slovenski standard je istoveten z: **EN 2002-16:2019**

ICS:

19.100	Neporušitveno preskušanje	Non-destructive testing
49.025.05	Železove zlitine na splošno	Ferrous alloys in general
49.025.15	Neželezove zlitine na splošno	Non-ferrous alloys in general

SIST EN 2002-16:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 2002-16

November 2019

ICS 49.025.05; 49.025.15

English Version

Aerospace series - Metallic materials - Test methods - Part 16: Non-destructive testing - Penetrant testing

Série aérospatiale - Matériaux métalliques - Méthodes d'essais - Partie 16 : Essais non destructifs - Examen par ressuage

Luft- und Raumfahrt - Metallische Werkstoffe - Prüfverfahren - Teil 16: Zerstörungsfreie Prüfung - Eindringprüfung

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

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European foreword

This document (EN 2002-16:2019) 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of an identical text or by endorsement, at the latest by May 2020, and conflicting national standards shall be withdrawn at the latest by May 2020.

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.

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Introduction

This document is part of the series of EN metallic material standards for aerospace applications. The general organization of this series is described in EN 4258.

1 Scope

This document specifies the requirements for penetrant testing of metallic materials for aerospace applications. It is limited to the direction of surface-breaking defects, e.g. cracks, laps, seams and inclusions.

It shall be applied when referred to in the EN technical specification or material standard unless otherwise specified on the drawing, order or inspection schedule.

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 1330-1, *Non destructive testing — Terminology — Part 1: List of general terms*

EN 1330-2, *Non-destructive testing — Terminology — Part 2: Terms common to the non-destructive testing methods*

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

EN 4258, *Aerospace series — Metallic materials — General organization of standardization — Links between types of EN standards and their use*

EN 4259, *Aerospace series — Metallic materials — Definition of general terms* [1]

EN ISO 3059, *Non-destructive testing — Penetrant testing and magnetic particle testing — Viewing conditions*

EN ISO 12706, *Non-destructive testing — Penetrant testing — Vocabulary*

ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles* [2]

ISO 3452-2, *Non-destructive testing — Penetrant testing — Part 2: Testing of penetrant materials* [2]

ISO 3452-3, *Non-destructive testing — Penetrant testing — Part 3: Reference test blocks* [2]

ISO 3452-4, *Non-destructive testing — Penetrant testing — Part 4: Equipment* [2]

ASTM E433-71, *Standard Reference Photographs for Liquid Penetrant Inspection* [3]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4259 apply.

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1 Published as ASD-STAN Standard at the date of publication of this standard by AeroSpace and Defence industries Association of Europe - Standardization (ASD-STAN) (http://www.asd-stan.org/).

2 Published by: ISO International Organization for Standardization http://www.iso.ch/

3 Published by: American Society for Testing and Materials (ASTM), 1916 Race St., Philadelphia, PA 19103.

For the other terms, see EN 1330-1, EN 1330-2 and EN ISO 12706.

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

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

4 Health and safety

Resources, test pieces, test samples, test materials, test equipment and test procedures shall comply with the current health and safety regulations/laws of the countries where the test is carried out.

Where equipment, materials and/or reagents which may be hazardous to health are specified, appropriate precautions in conformity with local regulations/laws shall be taken.

5 Principle

The method requires application of a dye or fluorescent penetrant to reveal surface-breaking discontinuities, e.g. cracks, laps, seams, and some damage resulting from corrosion.

6 Testing requirements

6.1 Resources

The resources shall be appropriate for fixed installation or portable system for used on-site.

6.1.1 Equipment/plant

The equipment/plant shall be manually operated, semi-automated or automated. It may normally consist of a series of units placed in sequence to enable the items to be passed from a receiving area to penetrant testing area (surface preparation application, draining, removal, drying developer application and viewing, e.g. lighting). The equipment shall be checked periodically in accordance with ISO 3452-4.

6.1.1.1 Surface preparation

Shall be appropriate to the task (e.g., degreasing, cleaning, etching …) and comply with local environmental regulations/laws.

6.1.1.2 Penetrant testing equipment

Shall be appropriate to the task.

6.1.1.3 Lighting equipment

The general requirements of EN ISO 3059 apply.

6.1.1.3.1 Dye penetrant lighting conditions

Uniform visible lighting, daylight and/or artificial lighting with close spectral daylight approximation shall be used. The specific requirements of ISO 3452-1 shall be applied.

The use of monochromatic light sources, e.g. sodium bulbs are not acceptable.

A minimum of 1 000 lux is required at each point of the surface undergoing testing.

6.1.1.3.2 Fluorescent penetrant lighting condition

The specific requirements of ISO 3452-1 shall be applied.

The intensity of the UV-A radiation at any point of the test surface, irrespective of the distance from the UV-A source, shall be within the range 16 W/m² to 40 W/m².

The UV-A light sources shall be operated for a period sufficient to establish stable operating conditions before measurements are made.

The UV-A radiation shall be measured using a radiometer (see 6.1.1.4.1) checked weekly.

Measurements shall be made at the smallest and greatest distances from the UV-A source(s).

The UV-A light sources are to be replaced as soon as the above requirements are not met. Sources with broken or defective filters/glasses are to be replaced immediately.

For on-site or in-service test conditions, the ambient white light may be increased due to prevailing conditions. Under these circumstances, visible white light up to 100 lux is permitted providing that the UV-A specific power is increased proportionally up to a maximum of 40 W/m².

6.1.1.3.3 UV-A radiation

Medium or high pressure mercury discharge lamps shall be used, which generate a strong UV-A radiation. The output of this lamps with a peak wavelengths around 365 nm.

Only the UV-A range (wavelengths from 400 nm to 315 nm) shall be used for fluorescent penetrant testing.

Fluorescent tubes producing UV-A radiation may only be used as a background supporting illumination.

Specially designed filter glasses shall be used in combination with the UV-A radiation source in order to minimize other wavelengths.

6.1.1.4 Radiation and visible white light meters

Only radiometers and luxmeters with a release or calibration certificate certifying compliance with the following shall be used.

6.1.1.4.1 Radiometers

The ultraviolet radiation shall be measured with a radiometer accurate to ± 10 % in the measurement range. The radiometer sensor shall be calibrated for the highest spectral sensitivity in the wavelength range 365 nm ± 10 nm.

The sensitivity of the sensor to wavelengths outside this range shall be limited to ± 10 % of the indicated value.

6.1.1.4.2 Luxmeters

Luxmeters shall be equipped with a sensor for wavelengths from approximately 400 nm to 700 nm (visible light spectrum) and shall the accurate to ± 10 % in this range. The sensitivity response shall follow the CIE (Commission Internationale de l'Eclairage) curve characteristics shown in Figure A.1.