



SLOVENSKI STANDARD
SIST EN 2951:2019

01-september-2019

Aeronavtika - Kovinski materiali - Mikrografsko ugotavljanje deleža nekovinskih vključkov

Aerospace series - Metallic materials - Micrographic determination of content of non-metallic inclusions

Luft- und Raumfahrt - Metallische Werkstoffe - Mikrographische Bestimmung von nichtmetallischen Einschlüssen

Série aérospatiale - Matériaux métalliques - Détermination par micrographie de la distribution d'inclusions non-métalliques

[SIST EN 2951:2019](https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-80a9ee0157e9/sist-en-2951-2019)

[https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-](https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-80a9ee0157e9/sist-en-2951-2019)

Ta slovenski standard je istoveten z: EN 2951:2019

ICS:

49.025.10 Jekla

Steels

SIST EN 2951:2019

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 2951:2019

<https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019>

EUROPEAN STANDARD

EN 2951

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2019

ICS 49.025.10

English Version

Aerospace series - Metallic materials - Micrographic determination of content of non-metallic inclusions

Série aérospatiale - Matériaux métalliques -
Détermination par micrographie de la distribution
d'inclusions non-métalliques

Luft- und Raumfahrt - Metallische Werkstoffe -
Mikrographische Bestimmung von nichtmetallischen
Einschlüssen

This European Standard was approved by CEN on 30 December 2018.

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 CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of 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 United Kingdom.



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

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

Contents	Page
European foreword	3
Introduction	4
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions	5
4 Health and safety.....	5
5 Test method	6
6 Classification of inclusions	6
7 Acceptance criteria.....	6
Annex A (normative) Acceptance criteria – Categories.....	8
A.1 Categories of acceptance	8
A.2 Example of the use of combined field ratings.....	9
Annex B (informative) Standard evolution form.....	10

iTech STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 2951:2019](https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019)

<https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019>

European foreword

This document (EN 2951:2019) 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 November 2019, and conflicting national standards shall be withdrawn at the latest November 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.

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 2951:2019](https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019)

<https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019>

EN 2951:2019 (E)

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 2951:2019](https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019)

<https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019>

1 Scope

This document specifies the general requirements for the micrographic determination of content of non-metallic inclusions of metallic materials for aerospace applications.

It also gives tables of standard acceptance criteria for particular steel types.

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.

This document is mainly applicable to steel but may be used on other metallic materials.

This document is not normally applicable to austenitic corrosion resisting steel, other than precipitation hardening, or to free-machining steel unless invoked in the material standards.

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 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⁾

ASTM E45, *Standard Test Methods for Determining the Inclusion Content of Steel*²⁾

3 Terms and definitions

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

4 Health and safety

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

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

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

2) Published by: ASTM National (US) American Society for Testing and Materials <http://www.astm.org/>

EN 2951:2019 (E)

5 Test method

Microscopical method A or method D of ASTM E45 is used.

The method used depends on the melting route and/or the requirement of the material standard and shall be in accordance with Table 1.

Table 1 — Selection of microscopical methods

Melting route	Method
Air melted	A
Remelted (Vacuum and/or electroslag)	A or D

Sampling, test specimen geometry and preparation of specimens shall be according to ASTM E45.

6 Classification of inclusions

See Table 2.

Table 2 — Inclusion types

Inclusion types	A	Sulphides
	B	Aluminates
	C	Silicates
	D	Globular oxides

Each inclusion type is classified in two groups of picture series based on the thickness of the inclusions:

- thin,
- heavy.

Method A: Counting shall be carried out on the worst field according to Method A of ASTM E45 standard over a surface of 160 mm².

Method D: Counting shall be carried out according to Method D of ASTM E45 standard over a surface of 160 mm² (i.e. 320 fields).

Other counting method shall be used prior agreement, in that case maximum series (thin and thick) allowed on 20 mm² (40 fields).

7 Acceptance criteria

7.1 Steels

Unless otherwise specified in the material standard or order the standard acceptance criteria according Table 3 and Annex A shall be used.

The maximum number of fields allowed with fine or coarse series inclusions is specified for each inclusion class concerned in the applicable standard.

Table 3 — Categories for inclusion content in steel

Melting route	Steel types	Category
Air melted	Carbon and low alloy	1
	Non corrosion resisting martensitic high alloy	1
	Corrosion resisting martensitic	2
	Corrosion resisting precipitation hardening	2
Single vacuum remelt	All	3
Double vacuum remelt	All	5
Electroslag remelt	Carbon and low alloy	3
	Non corrosion resisting martensitic high alloy	4
	Corrosion resisting martensitic	4
	Corrosion resisting precipitation hardening	4

7.2 Other metallic materials

The acceptance criteria shall be defined in the material standard or order.

SIST EN 2951:2019
<https://standards.iteh.ai/catalog/standards/sist/91a0f4af-c1d4-414a-95d9-90a9ec0157e9/sist-en-2951-2019>