SLOVENSKI STANDARD
SIST EN 3683:2009

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Aeronavtika - Preskusne metode - Gneteni izdelki iz titanove zlitine - Določanje primarnega Ŭ-deleża - Metoda s štetjem točk in metoda s presekom premice

Aerospace series - Test methods - Titanium alloy wrought products - Determination of primary Ŭ content - Point count method and line intercept method

Luft- und Raumfahrt - Prüfverfahren - Kneterzeugnisse aus Titanlegierungen - Bestimmung von Primär-Ŭ-Anteilen - Punktzählverfahren und Linienschnittverfahren

Série aérospatiale - Méthodes d'essais - Demi-produits corroyés en alliages de titane - Détermination de la teneur en Ŭ primaire - Méthode par comptage de points et méthode par interception de lignes

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Aerospace series - Test methods - Titanium alloy wrought products - Determination of primary a content - Point count method and line intercept method

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Foreword

This document (EN 3683:2007) 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of an identical text or by endorsement, at the latest by September 2007, and conflicting national standards shall be withdrawn at the latest by September 2007.

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1 Scope

This standard specifies two methods, the point count method and the line intercept method, for optical microscope determination of primary α content of titanium alloy wrought products, for aerospace applications.

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 referenced document (including any amendments) applies.

EN 3114-001, *Aerospace series — Test method — Microstructure of (α + β) titanium alloy wrought products — Part 001: General requirements.*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 3114-001 apply.

4 Principle

Micrographic examination for determination of the primary α content by:

— Counting the number of points of a specified point grid, enclosed in α particles, point count method (Method A);

— Determining the lengths of lines of a specified line grid intercepted by α particles, line intercept method (Method B).

5 Sampling and sample preparation

The test sample shall have a size such that the section to be examined shall not be less than 10 mm in diameter or square.

The surface of the section shall be prepared according to EN 3114-001.

6 Test methods

6.1 Point count method (Method A)

Superimpose the specified point grid (see example in Figure 1) on the section to be examined.

Adjust magnification so that each primary α particle does not coincide with more than one point of the grid:

Assessment is carried out as follows:

— all those points on the grid which are enclosed by a primary α particle are counted;

— a point lying exactly on a phase boundary is counted as 0,5 point;

— the sum N (α) of these points divided by the total number N of the grid points equals the amount of primary α, Np;

— Np corresponds to the volume (V_V) of primary α on the surface area covered by the point grid.

$$V_V \approx \frac{N(\alpha)}{N} = Np$$

See Figure 1 for an example of the calculation.

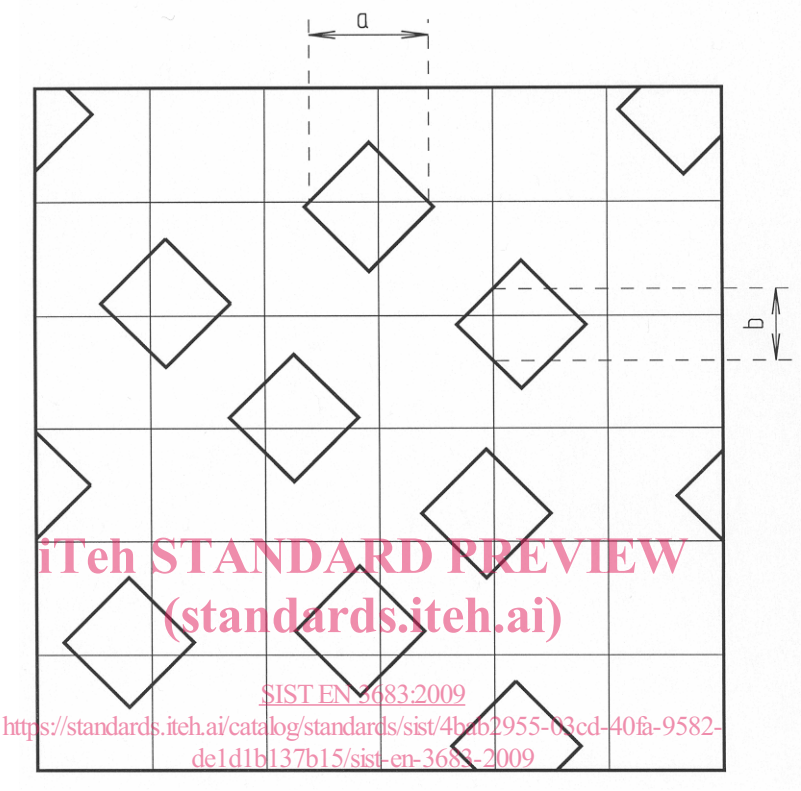

Figure 1 — Illustration of the point count method

The diamonds represent α particles.

The dots represent points of the grid.

The crosses represent points enclosed within α particles.

EXAMPLE

Total number of points in the grid N = 25

The number of points enclosed by an α particle N (α) = 7

Calculation of the content of α:

$$Np = \frac{N(\alpha)}{N} = \frac{7}{25} = 0{,}28$$

The statistical error (ΔV_V) is calculated as follows:

$$\Delta V_v = 2 \times \sqrt{\frac{Np \times (1 - Np)}{N}}$$

It is recommended that the count be carried out at several locations within the surface under examination to improve the accuracy of the determination by averaging.

6.2 Line intercept method (Method B)

Superimpose the specified line grid (see example in Figure 2) on the section to be examined.

Adjust magnification so that each primary α particle in not intersected by more than one grid line in each direction.

Assessment is carried out as follows:

— the lengths of all portions of the grid lines which lie over an α particle are added to produce the total S (α);

— this count shall be carried out in both directions of the grid;

— the value S (α) divided by the total length S of all the grid lines within the surface under examination equals the grid line portion content N_L attributable to the primary α content and corresponds to the volume (V_V) of primary α on the surface area covered by the line grid.

$$V_V \approx \frac{S(\alpha)}{S} = N_L$$

See Figure 2 for an example of the calculation

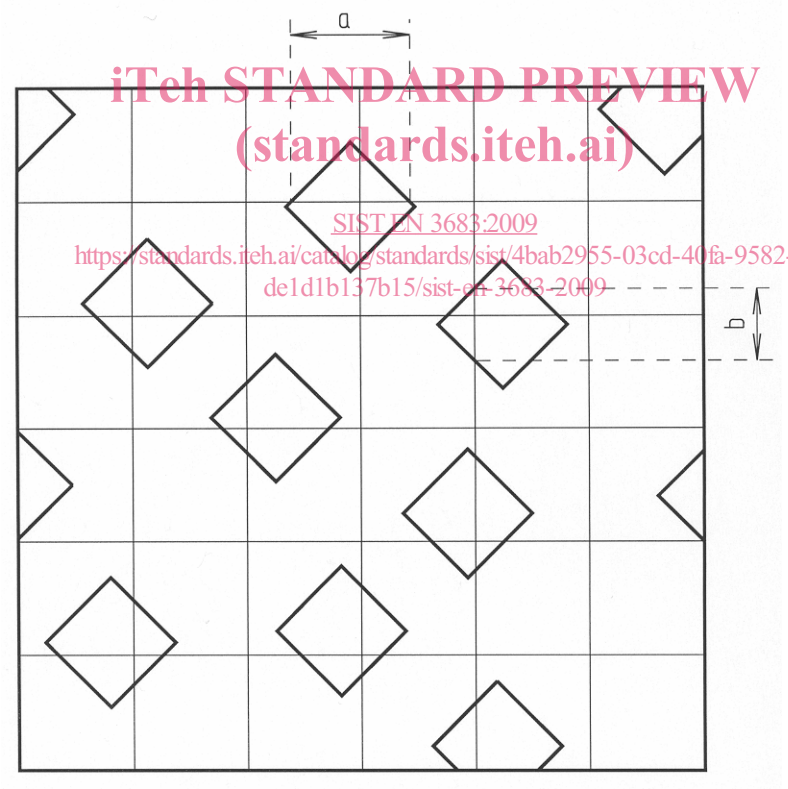

Figure 2 — Illustration of the line intercept method

The diamonds represent α particles.

The square lines represent the grid.

a + b = the length of the grid lines S(α).