

Aerospace series — Test methods — Titanium and titanium alloys —

Part 009: Determination of surface contamination

The European Standard EN 2003-009:2007 has the status of a
British Standard

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National foreword

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A list of organizations represented on ACE/61/-/49 can be obtained on request to its secretary.

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Part 009: Determination of surface contamination**

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de titane - Partie 009 : Détermination de la contamination
de surface

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Titanlegierungen - Teil 009: Bestimmung der
Oberflächenverunreinigung

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Foreword

This document (EN 2003-009:2007) 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.

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Introduction

Contamination caused by an α -stabilizer occurs in an environment containing oxygen, nitrogen or carbon when the product surface reaches a temperature which allows these elements to diffuse into the product surface. It leads to the formation of an α -stabilized surface which is hard and brittle, seldom exceeding 0,2 mm and is detrimental to the product.

1 Scope

This standard specifies two methods of determining surface contamination caused by an α -stabilizer on titanium and titanium alloys, 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 2002-7, *Aerospace series — Metallic materials — Test methods — Part 7: Hardness test*. ¹⁾

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

3 Terms and definitions

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

4 Principle

Determination of surface contamination is carried out by:

— micrographic examination (Method A);

or

— hardness testing (Method B).

1) Published as ASD Prestandard at the date of publication of this standard.

5 Micrographic examination (Method A)

5.1 Sampling

Unless otherwise specified the product shall be sampled in the delivery condition, such that the product surface can be examined at its transverse section.

The location of the sample shall be at the discretion of the manufacturer, unless otherwise specified.

The sampling procedure shall not result in any heating which may lead to a contamination of the test sample.

5.2 Procedure

5.2.1 Preparation of the micro-section

The micro-section selected from the test sample shall be prepared by mechanical polishing. The method of preparation shall not cause any damage to the microstructure. It shall lead to sharp edges.

The micro-section shall be etched, using an appropriate solution e.g.:

- 2 % to 5 % HF (hydrofluoric acid);
- 40 % to 50 % 2-Propanol (isopropylalcohol);
- water.

or

- 2 % to 5 % HF (hydrofluoric acid);
- 10 % to 20 % HNO₃ (nitric acid);
- water.

5.2.2 Micro-examination

Optical micro-examination shall be carried out with a magnification of 100 times to 500 times.

5.3 Expression of results

Report any appearance of a white layer or an area with a high density of light colour α -phase (see annex), indicating the presence of surface contamination.

6 Hardness testing (Method B)

6.1 Sampling

See 5.1.

6.2 Procedure

6.2.1 Preparation of the specimen

The section to be inspected shall be prepared by mechanical polishing. This preparation shall not cause any alteration. It shall lead to sharp edges.

6.2.2 Tests

Unless otherwise specified, Vickers hardness measurements shall be carried out under a load of 0,200 kg according to EN 2002-7 at the following locations:

- at least, three points at a distance $\leq 0,1$ mm from the section surface;
- at least, three points at about mid-thickness of the section.

The average value of these measurements shall be calculated for each location.

6.3 Expression of results

Report the difference between the two average values. A difference between these values $> 50 \text{ HV}_{0,2}$, indicates surface contamination.

7 Test report

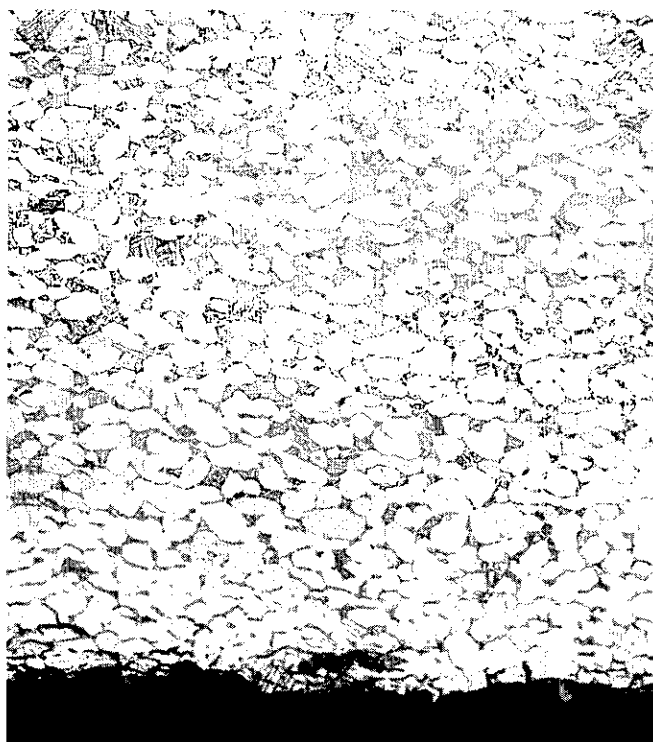
The test report shall refer to this standard and shall include:

- complete identification of the tested product, including the manufacturer's name, designation and batch number;
- method used : micrographic examination (Method A) or hardness testing (Method B);
- location of test sample;
- method of test sample preparation;
- all relevant test sample dimensions;
- date of test and traceability to individuals performing the test work;
- equipment used;
- for micrographic examination (Method A) the etchant used;
- for hardness test (Method B), recorded individual and average hardnesses for the two test locations and the difference between the two averages;
- test results;
- any factor which may have affected the results and any deviation from the test method.

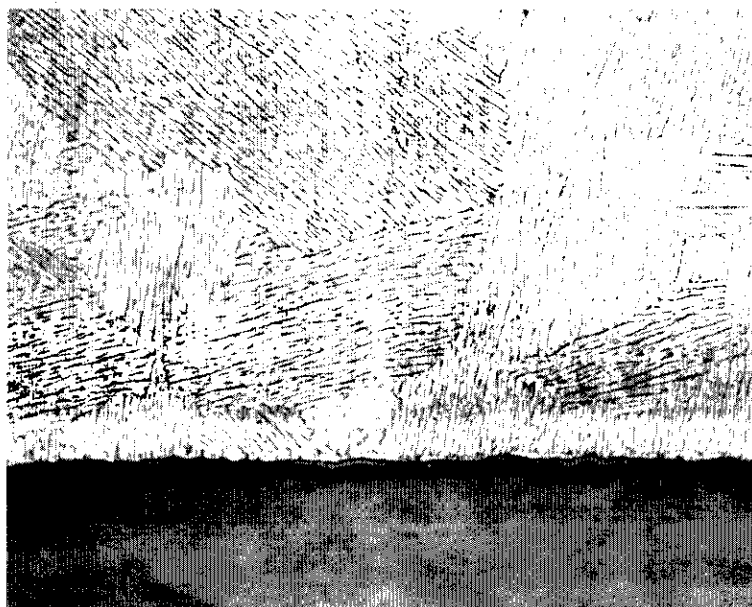
Annex A (informative)

Examples of contamination

EXAMPLE 1 (X 400)



EXAMPLE 2 (X 250)



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W4 4AL