



SLOVENSKI STANDARD
SIST EN 2545-1:2001
01-januar-2001

**Aerospace series - Titanium and titanium alloy remelting stock and castings -
Technical specification - Part 1: General requirements**

Aerospace series - Titanium and titanium alloy remelting stock and castings - Technical
specification - Part 1: General requirements

Luft- und Raumfahrt - Vormaterial und Gußstücke aus Titan und Titanlegierungen -
Technische Lieferbedingungen - Teil 1: Allgemeine Anforderungen

Série aérospatiale - Produits pour refusion et pièces moulées en titane et alliages de
titane - Spécification technique - Partie 1: Exigences générales

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Ta slovenski standard je istoveten z: EN 2545-1:1995

ICS:

49.025.30 Titan Titanium

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

May 1995

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English version

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aus Titan und Titanlegierungen - Technische
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Anforderungen

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
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Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, 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of an identical text or by endorsement, at the latest by November 1995, and conflicting national standards shall be withdrawn at the latest by November 1995.

According to CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies the general requirements for the manufacture, inspection and testing of remelting stock intended for the production of castings in titanium and titanium alloys.

Particular requirements are defined in EN 2545-2 and EN 2545-3.

This standard shall be applied in conjunction with EN material standards unless otherwise specified on the drawing, order or inspection schedule.

By agreement between the manufacturer and the purchaser it may also be applied to other materials or delivery conditions not covered by EN standards. This agreement shall be formalised by reference to this standard on the drawing, order or inspection schedule.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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|-----------|---|
| EN 2000 | Aerospace series - Quality assurance - EN aerospace product - Approval of the quality system of manufacturers |
| EN 2078 | Aerospace series - Metallic materials - Manufacturing schedule - Inspection schedule - Inspection and test report - Description and rules for use |
| EN 2545-2 | Aerospace series - Titanium and titanium alloy remelting stock and castings - Technical specification - Part 2 : Remelting stock |
| EN 2545-3 | Aerospace series - Titanium and titanium alloy remelting stock and castings - Technical specification - Part 3 : Pre-production and production castings |

3 Definitions

For the purposes of this standard, the following definitions apply :

The chart given in annex A completes the following definitions.

3.1 Charge

Different products that make up a furnace charge to be melted in order to obtain a parent-cast or castings.

3.2 Melt

A mass of homogeneous liquid metal from a single charge.

3.3 Remelt

Solid metal resulting from a single melt.

3.4 Parent-cast

A cast of remelting stock to be used for the production of castings.

3.5 Remelting stock

Metal supplied in cast or wrought form, the composition of which has been established by chemical analysis.

3.6 Casting

A part manufactured by vacuum arc remelting (VAR) or electron beam melting (EBM).

3.7 Pre-production castings

Castings produced to a particular procedure which qualify the method of manufacture and mould configuration and demonstrate that the requirements of the purchaser can be met.

3.8 Batches

3.8.1 Batch of re-melting stock

Re-melting stock of the same form, the same nominal dimensions and from the same parent-cast.

3.8.2 Batch of castings

Castings of the same part number, from the same melting operation for EBM process or from the same electrode without alteration of the melting conditions for VAR process. They have been submitted together to hot isostatic pressing and, if applicable, to heat treatment.

3.8.3 Batch of scrap

Materials of the same type (see 4.2), the same chemical composition and, if necessary, submitted to the same conditioning operations.

3.9 Inspection schedule

See EN 2078.

3.10 Manufacturing schedule

See EN 2078.

3.11 Inspection and test report

See EN 2078.

4 Quality assurance

4.1 Approval of the quality system of manufacturers

See EN 2000.

4.2 Scrap approval

Scrap shall be :

- prepared according to a procedure approved by the purchaser. The procedure shall include verification of chemical composition, freedom from contamination and the absence of foreign material;

- approved by :

- the scrap purchaser;
- the purchaser of remelting stock electrodes (VAR process), or
- the purchaser of the casting (EBM process).

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Additional requirements are given in EN 2545-2 and in EN 2545-3.

5 Manufacture

5.1 The method of melting shall be in accordance with EN 2545-2 or EN 2545-3.

5.2 The details of manufacture shall be recorded in the manufacturing schedule.

5.3 When a manufacturing schedule has been adopted, no change shall be made without the written agreement of the purchaser.

5.4 Unless otherwise agreed and stated on the drawing, order and/or manufacturing schedule, the product shall be delivered in the heat treatment condition specified in the material standard.

5.5 If a temperature (value and tolerance) is stated, that temperature shall be mandatory.

If a temperature range is stated, a temperature within that range, reduced by the furnace tolerances, shall be selected to give the required properties.

Unless otherwise specified, the furnace charge shall be maintained at the temperature subject to the tolerances in table 1, for the period stated.

Table 1

Selected temperature °C	Tolerances °C
$\theta < 550$	± 5
$550 \leq \theta \leq 1250$	± 10

6 Traceability

6.1 Each remelting stock shall be traceable to its charge

6.2 Each casting shall be traceable to its charge and batch at all stages of manufacture and delivery.

7 Freedom from defects

All remelting stock and castings shall be free from harmful defects. Notwithstanding previous acceptance complying with this standard, any remelting stock or casting found, at a later stage, to contain such defects may be rejected.

8 Testing

The tests required by the material standard, order, inspection schedule or drawing, shall be made in accordance with the relevant test standard. If a test standard does not exist, the method to be used shall be agreed between the manufacturer and the purchaser.

Unless otherwise stated on the drawing or inspection schedule, the frequency of testing shall be as specified in EN 2545-2 or EN 2545-3.

The location of test samples shall be as indicated on the drawing or inspection schedule. The test samples and corresponding test pieces shall be marked in such a manner as to ensure that their identity and location with respect to the product and the batch is maintained.

8.1 Chemical composition

It shall conform with the material standard and shall be determined on each melt or parent-cast by means of representative samples.

The method of analysis shall be selected by the manufacturer but in case of dispute, the method defined in the relevant ISO standard shall be used. If no ISO standard exists, a fundamental method of chemical analysis shall be used.

Elements not specified in the material standard shall not be added without the agreement of the purchaser.

8.2 Mechanical testing

Preparation of test samples and test pieces :

8.2.1 If the test samples have to be heat treated this shall be done in accordance with the heat treatment for use condition specified in the material standard.

8.2.2 The mechanical test pieces shall be machined in the heat treatment for use condition in accordance with the requirements of the relevant EN standard. Their surface shall be absolutely free from contamination.

8.2.3 The strain rate up to the proof stress shall be within the range of 0,3 %/min to 0,7 %/min. In case of dispute, a strain rate of 0,5 %/min shall be used. After proof stress, the speed may be increased up to 5 %/min or such that failure occurs within approximately 1 min.

8.3 Special tests

Special tests and inspections may be required by the purchaser (e.g. micro and macro structure examination). In this case, after agreement between the purchaser and the manufacturer, the nature of test, methods, frequency, acceptance criteria and re-test procedure shall be specified on the order, drawing or inspection schedule.

8.4 Re-tests

If any requirement is not met, re-tests shall be carried out under the following conditions :

- if the test procedure or test piece preparation is faulty, testing shall be re-applied at the original frequency after identification of the failure cause;
- if the incorrect result cannot be attributed to faulty test procedure or test piece preparation, further test samples shall be taken but at twice the original frequency;
- at least one of the samples shall be taken from the product(s) on which the incorrect results were obtained (unless already rejected by the manufacturer after suitable identification of the cause of failure).

If all results are satisfactory, the batch shall be accepted.

If one or more results are unsatisfactory, the batch shall be :

- rejected, or
- re-heat treated and tested as a new batch, except for chemical composition and radiographic examination.

8.5 Re-heat treatment

With the exception of stress relieving no product or test sample shall be re-heat treated more than twice without the agreement of the purchaser.

9 Marking

See :

- EN 2545-2 for remelting stock;
- EN 2545-3 for castings.

The frequency of examination adopted by the manufacturer shall be sufficient to permit him to certify compliance with the requirements.