

Titanium and titanium alloy remelting stock and castings — Technical specification

Part 3. Pre-production and production castings

The European Standard EN 2545-3 : 1995 has the status of a
British Standard

ICS : 49.040.10
UDC 669.295-4 : 620.1

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ACE/61, Inspection and testing requirements for aerospace metallic materials, upon which the following bodies were represented:

Aluminium Federation
British Forging Industry Association
British Investment Casting Association
British Iron and Steel Producers' Association
British Steel Industry
Copper Development Association
Light Metal Founders' Association
Ministry of Defence
Seamless Steel Tube Association
Society of British Aerospace Companies Ltd.

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 December 1995

© BSI 1995

The following BSI references relate to the work on this standard:
Committee reference ACE/61
Draft for comment 91/77417 DC

ISBN 0 580 24076 2

Amendments issued since publication

Amd. No.	Date	Text affected

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of EN 2545-3	3

National foreword

This British Standard has been prepared by Technical Committee ACE/61 and is the English language version of EN 2545-3 : 1995 *Aerospace series — Titanium and titanium alloy remelting stock and castings — Technical specification — Part 3 : Pre-production and production castings*, published by the European Committee for Standardization (CEN).

EN 2545-3 was produced as a result of international discussions in which the United Kingdom took an active part.

Cross-references. The British Standards corresponding to the European Standards referred to in the text are identical in number and title to those given in clause 2, with the exception of the few Parts of EN 2002 and EN 2003.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

ICS 49.040.10

Descriptors: Aircraft industry, titanium, titanium alloy, forging, casting, melting, specification

English version

Aerospace series — Titanium and titanium alloy remelting stock and castings — Technical specification — Part 3: Pre-production and production castings

Série aérospatiale — Produits pour refusion
et pièces moulées en titane et alliages de
titane — Spécification technique —
Partie 3: Pièces types et pièces de série

Luft- und Raumfahrt — Vormaterial und
Gußstücke aus Titan und Titanlegierungen —
Technische Lieferbedingungen —
Teil 3: Ausfallmuster- und Seriengußstücke

This European Standard was approved by CEN on 1994-11-25. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1995 All rights of reproduction and communication in any form and by any means reserved in all countries to CEN and its members.

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 the Common CEN/CENELEC Rules, 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, United Kingdom.

Contents

	Page
1 Scope	3
2 Normative references	3
3 Recommendation for casting development	4
4 Pre-production castings	4
5 Manufacture of production castings	4
6 Inspection and testing of production castings	6
7 Welding repair	11
8 Marking	11
Annex A (normative)	13
Annex B (normative)	14
Annex C (normative)	15
Annex D (normative)	16
Annex E (normative)	17

1 Scope

This standard specifies the particular requirements for pre-production and production castings in titanium and titanium alloys.

This standard shall be used in conjunction with EN 2545-1. Where remelting stock is used it shall conform to EN 2545-2.

Unless otherwise required by the order, drawing or inspection schedule, the castings shall be supplied to quality level 2 (see table 3).

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.

EN 2002-1	Aerospace series - Test methods for metallic materials - Part 1 : Tensile testing at ambient temperature ¹⁾
EN 2002-2	Aerospace series - Test methods for metallic materials - Part 2 - Tensile testing at elevated temperature ¹⁾
EN 2002-5	Aerospace series - Test methods for metallic materials - Part 5 : Uninterrupted creep and rupture testing ¹⁾
EN 2002-16	Aerospace series - Test methods for metallic materials - Part 16 : Dye penetrant testing ²⁾
EN 2002-21	Aerospace series - Test methods for metallic materials - Part 21 : Radiographic testing on cast components ¹⁾
EN 2003-10	Aerospace series - Test methods for products in steel, titanium, titanium alloys and heat resisting alloys - Part 10 : Sampling for determination of hydrogen content in titanium and titanium alloys ²⁾
EN 2078	Aerospace series - Manufacturing schedule - Inspection schedule - Inspection and test report - Description and rules for use
EN 2545-1	Aerospace series - Titanium and titanium alloy remelting stock and castings - Technical specification - Part 1 : General requirements
EN 2545-2	Aerospace series - Titanium and titanium alloy remelting stock and castings - Technical specification - Part 2 : Remelting stock
ASTM E 192-91	Standard reference diagrams of investment steel castings of aerospace applications ³⁾

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

2) In preparation at the date of publication of this standard

3) Published by: American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19 103

3 Recommendation for casting development

It is strongly recommended that a technical representative of the manufacturer is given the opportunity to examine the casting drawing at the initial stages of design and to advise on the optimum design which will facilitate consistent production of acceptable castings.

The dimensional tolerances of the castings shall be as agreed between the purchaser and the manufacturer and indicated on the drawing or inspection schedule.

4 Pre-production castings

4.1 General

4.1.1 The following requirements shall be specified on the order, drawing and/or inspection schedule in addition to those specified in EN 2545-1 :

- number of castings to be examined;
- who shall perform the examination;
- heat treatment condition;
- type and frequency of inspection and testing necessary to evaluate and qualify the manufacturing process (dimensions, mechanical and metallurgical properties, etc.).

4.1.2 The inspection and testing of pre-production castings shall be carried out and recorded to allow the definition of the optimum techniques to be used for production castings.

4.1.3 The inspection and tests carried out on pre-production castings shall include those which will be carried out on production castings.

4.2 Inspection and test report

In addition to the information required by EN 2078, the inspection and test report on the pre-production castings shall provide all technical information to allow evaluation of the quality of these parts, e.g. radiographs, results of dimensional measurements.

4.3 Acceptance of pre-production castings

When all inspection and test results relative to pre-production castings have been reported and accepted as satisfactory, the purchaser shall give his written agreement for series production.

The inspection schedule and if required the manufacturing schedule shall be agreed between the manufacturer and the purchaser.

5 Manufacture of production castings

5.1 At the start of production, the manufacturing schedule may be completed to allow the manufacturer to guarantee the reproducibility of the product with more certainty.

All information, however minor, shall be recorded in the manufacturing schedule.