

Aerospace series — Bolts in heat resisting steel FE-PA2601 (A286) — Classification: 1 100 MPa/650 °C — Technical specification

ICS 49.030.20

National foreword

This British Standard is the UK implementation of EN 3685:2008.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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**Aerospace series - Bolts in heat resisting steel FE-PA2601
(A286) - Classification: 1 100 MPa/650 °C - Technical
specification**

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PA26HT (A286) - Classification: 1 100 MPa/650 °C -
Spécification technique

Luft- und Raumfahrt - Schrauben aus hochwarmfestem
Stahl FE-PA2601 (A286) - Klasse: 1 100 MPa/650 °C -
Technische Lieferbedingungen

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Foreword

This document (EN 3685:2008) 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of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by October 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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1 Scope

This standard specifies the technical, qualification and quality assurance requirements for bolts in material FE-PA2601 (A286) of tensile strength class 1 100 MPa at room temperature, maximum test temperature of material 650 °C.

Primarily for aerospace applications it is applicable to such bolts when referenced on the product standard or definition document.

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.

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*.

ISO 3452, *Non-destructive testing — Penetrant inspection — General principles*.

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*.

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*.

ISO 7961, *Aerospace — Bolts — Test methods*.

ISO 9000, *Quality management systems — Fundamentals and vocabulary*.

EN 2002-8, *Aerospace series — Metallic materials — Test methods — Part 8: Micrographic determination of grain size*. ¹⁾

EN 3041, *Aerospace series — Propulsion standard parts — Manufacturing process change procedure for qualified parts*. ²⁾

EN 3761, *Aerospace series — Heat resisting alloy FE-PA2601 — Softened and cold worked — Bar for forged fasteners — $D \leq 50 \text{ mm}$ — $1\,100 \text{ MPa} \leq R_m \leq 1\,300 \text{ MPa}$* . ¹⁾

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts*.

TR 3040-1, *Aerospace series — Quality Assurance — EN aerospace products — Part 1: List of approved manufacturers*. ³⁾

ASTM E 112-96, *Standard Test Methods for Determining Average Grain Size*. ⁴⁾

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

production batch

quantity of finished parts fabricated by the same process from a single material cast (single heat of alloy), having the same basic part number and diameter, heat treated together to the same specified condition and produced as one continuous run

3.2

inspection lot

quantity of parts from a single production batch of the same part number which completely defines the parts

3.3 Surface discontinuities

3.3.1

crack

rupture in the material which may extend in any direction and which may be intercrystalline or transcrystalline in character

3.3.2

seam

longitudinal surface defect in the form of an unwelded open fold in the material

3.3.3

lap

surface defect caused by folding over metal fins or sharp corners and then rolling or forging them into the surface

3.3.4

inclusion

non-metallic particles originating from the material making process. They may exist as discrete particles or strings of particles extending longitudinally.

3.4

test temperature

ambient temperature, unless otherwise specified

3.5

simple random sampling

the taking of n items from a population of N items in such a way that all possible combinations of n items have the same probability of being chosen

3.6

critical defect

a defect that according to judgement and experience, is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the considered product, or that is likely to prevent performance of the function of a major end item

3.7

major defect

a defect other than critical, that is likely to result in a failure or to reduce materially the usability of the considered product for its intended purpose

3.8

minor defect

a defect that is not likely to reduce materially the usability of the considered product for its intended purpose, or that is a departure from established specification having little bearing on the effective use or operation of this product

3.9

sampling plan

a plan according to which one or more samples are taken in order to obtain information and possibly to reach a decision

3.10

limiting quality (LQ₁₀)

in a sampling plan, a quality limit which corresponds to a specified and relatively low probability of acceptance in this case 10 % probability of acceptance. It is the limiting lot quality characteristic that a lot of this if quality would occur.

3.11

acceptance quality limit (AQL)

a quality limit which in a sampling plan corresponds to a specified but relatively high probability of acceptance

It is the maximum per cent defective (or the maximum number of defects per hundred units) that, for purposes of sampling inspection, can be considered satisfactory as a process average.

3.12

finished bolt

a bolt ready for use, inclusive of any possible treatments and/or surface coatings, as specified in the dimensional standard or definition document

4 Certification and quality assurance

4.1 Qualification

4.1.1 Purpose

The purpose of qualification tests is to ensure that the bolt design and bolt manufacturing conditions allow the bolt to comply with the requirements of this standard.

4.1.2 Conditions

The qualification tests summarized in Table 3 shall be performed on each type and diameter of bolt. Proposed changes in manufacturing source or procedure shall be subject to the requirements of EN 3041.

25 bolts selected from a single inspection lot by simple random sampling shall be subjected to the qualification tests.

The number of bolts to be subjected to each test as well as the method(s) to be used are specified in Table 1.

The tests to be applied to each bolt are shown in Table 4.

The test programme may possibly be reduced, this decision will be based on the comparison of results obtained from parts of similar design, size and manufacturing conditions.

All or part of these tests may also be performed for production acceptance, when a reinforced inspection seems to be necessary, or to survey bolts that have not proved satisfactory in use.