



BSI Standards Publication

Aerospace series — Titanium alloy TI-P64001 (Ti-6Al-4V) — Not heat treated — Forging stock, for annealed forgings — $D_e \leq 360$ mm

National foreword

This British Standard is the UK implementation of EN 3310:2011. It supersedes BS3TA12:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/61/-/49, Titanium and its Alloys for Aerospace Purposes.

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

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ISBN 978 0 580 75191 2

ICS 49.025.30

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2011.

Amendments issued since publication

Date	Text affected
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EUROPEAN STANDARD

EN 3310

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2011

ICS 49.025.30

English Version

Aerospace series - Titanium alloy TI-P64001 (Ti-6Al-4V) - Not heat treated - Forging stock, for annealed forgings - $De \leq 360$ mm

Série aérospatiale - Alliage de titane TI-P64001 (Ti-6Al-4V)
- Non traité - Demi-produits destinés à la forge, pour pièces forgées à l'état recuit - $De \leq 360$ mm

Luft- und Raumfahrt - Titanlegierung TI-P64001 (Ti-6Al-4V)
- Nicht wärmebehandelt - Schmiedevormaterial, für geglühte Schmiedestücke - $De \leq 360$ mm

This European Standard was approved by CEN on 22 July 2011.

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Foreword

This document (EN 3310:2011) 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of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by May 2012.

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Introduction

This European Standard is part of the series of EN metallic material standards for aerospace applications. The general organization of this series is described in EN 4258.

This European Standard has been prepared in accordance with EN 4500-4.

1 Scope

This European Standard specifies the requirements relating to:¹⁾

Titanium alloy TI-P64001 (Ti-6Al-4V)
Not heat treated
Forging stock, for annealed forgings
 $D_e \leq 360$ mm

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 2032-2, *Aerospace series — Metallic materials — Part 2: Coding of metallurgical condition in delivery condition*

EN 2954-002, *Aerospace series — Macrostructure of titanium and titanium alloy wrought products — Part 002: Macrostructure of bar, section, forging stock and forgings*

EN 3114-002, *Aerospace series — Test method — Microstructure of ($\alpha + \beta$) titanium alloy wrought products — Part 002: Microstructure of bars, sections, forging stock and forgings*

EN 4258, *Aerospace series — Metallic materials — General organization of standardization — Links between types of EN standards and their use*

EN 4500-4, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 4: Specific rules for titanium and titanium alloys*²⁾

EN 4800-005, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 005: Forging stock*²⁾

1) Grade 2 according to EN 4800-005.

2) Published as ASD-STAN Standard at the date of publication of this standard by Aerospace and Defence Industries Association of Europe-Standardization (ASD-STAN), (www.asd-stan.org).

1	Material designation		Titanium alloy TI-P64001 (Ti-6Al-4V)										
2	Chemical composition %	Element	Al	V	O+2N	N	H	Fe	C	Y	Others		Ti
											Each	Total	
		min.	5,50	3,50	–	–	–	–	–	–	–	–	–
max.	6,75	4,50	0,25	0,03	0,010 0	0,30	0,08	0,005 0	0,10	0,40			
3	Method of melting		Grade 2 – see EN 4800-005.										
4.1	Form		Forging stock										
4.2	Method of production		–										
4.3	Limit dimension(s)	mm	$D_e \leq 360$										
5	Technical specification		EN 4800-005										

6.1	Delivery condition		Not heat treated									
	Heat treatment		–									
6.2	Delivery condition code		U ^a									
7	Use condition		Delivery condition									
	Heat treatment		–									

Characteristics

8.1	Test sample(s)		See EN 4800-005.											
8.2	Test piece(s)		Heat treated before machining											
8.3	Heat treatment		See line 29.											
9	Dimensions concerned	mm	–											
10	Thickness of cladding on each face	%	–											
11	Direction of test piece		See EN 4800-005.											
12	Temperature	θ	°C	Ambient										
13	Proof stress	$R_{p0,2}$	MPa	≥ 830										
14	T	Strength	R_m	MPa	$900 \leq R_m \leq 1\ 160$									
15		Elongation	A	%	≥ 10									
16		Reduction of area	Z	%	≥ 25									
17		Hardness		–										
18	Shear strength	R_c	MPa	–										
19	Bending	k	–	–										
20	Impact strength		–											
21	Temperature	θ	°C	–										
22	Time		h	–										
23	C	Stress	σ_a	MPa	–									
24		Elongation	a	%	–									
25		Rupture stress	σ_R	MPa	–									
26		Elongation at rupture	A	%	–									
27	Notes (see line 98)		a											

29	Reference heat treatment	–	Annealed $690\text{ °C} \leq \theta \leq 840\text{ °C}/t \geq 30\text{ min/AC}$ or cool in inert atmosphere			
30	Microstructure	–	See EN 4800-005.			
		1	EN 3114-002			
		7	D_e mm	Acceptable microstructure	Not acceptable microstructure	To be submitted for approval
			≤ 50	2 T1 to 2 T9 occasionally 2 T100	2 T10 to 2 T15 2 T101 to 2 T117 2 T200 to 2 T201	
			$50 < D \leq 110$	2 T1 to 2 T12 occasionally 2 T13 to 2 T14, 2 T100, 2 T102	2 T15 2 T103 to 2 T117 2 T200 to 2 T201	
			$110 < D \leq 200$	2 T1 to 2 T12 occasionally 2 T100, 2 T102 to 2 T109	2 T110 to 2 T117 2 T200 to 2 T201	
$200 < D \leq 360$	2 T1 to 2 T15 2 T100, 2 T 102 to 2 T111	2 T112 to 2 T117 2 T200 to 2 T201				
44	External defects	–	See EN 4800-005.			
51	Macrostructure	–	See EN 4800-005.			
		1	EN 2954-002			
		7	D_e mm	Maximum acceptable macrostructure	Not acceptable macrostructure	To be submitted for approval
			≤ 50	2 MA 2	2 MA 80 to 2 MA 84 and 2 MA 100	
			$50 < D \leq 150$	2 MA 3		
			$150 < D \leq 250$	2 MA 5		
$250 < D \leq 360$	2 MA 6					
61	Internal defects	–	See EN 4800-005.			
		1	EN 4050-4			
82	Batch uniformity (Material verification)	–	See EN 4800-005.			
95	Marking inspection	–	See EN 4800-005.			
96	Dimensional inspection	–	See EN 4800-005.			
98	Notes	–	^a According to EN 2032-2.			
99	Typical use	–	–			

100	–	Product qualification	–	See EN 4800-005.
				Qualification programme to be agreed between manufacturer and purchaser.

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