BS EN 3456:2012

BSI Standards Publication

Aerospace series — Titanium alloy TI-P64001 (Ti-6Al-4V) — Annealed — Sheet and strip, hot rolled — a ≤ 6 mm

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National foreword

This British Standard is the UK implementation of EN 3456:2012. It supersedes BS EN 3456:2009 which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Date	Text affected

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EN 3456

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English Version

Aerospace series - Titanium alloy TI-P64001 (Ti-6Al-4V) - Annealed - Sheet and strip, hot rolled - a ≤ 6 mm

Série aérospatiale - Alliage de titane TI-P64001 (Ti-6Al-4V) - Recuit - Tôles et bandes, laminées à chaud - a ≤ 6 mm

Luft- und Raumfahrt - Titanlegierung TI-P64001 (Ti-6Al-4V) - Geglüht - Bleche und Bänder, warmgewalzt - a ≤ 6 mm

This European Standard was approved by CEN on 23 March 2012.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 3456:2012) 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of an identical text or by endorsement, at the latest by January 2013, and conflicting national standards shall be withdrawn at the latest by January 2013.

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.

This document supersedes EN 3456:2009.

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Introduction

This document 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 standard has been prepared in accordance with EN 4500-004.

1 Scope

This European Standard specifies the requirements relating to:

Titanium alloy TI-P64001 (Ti-6Al-4V)
Annealed
Sheet and strip, hot rolled
$a \leq 6$ mm

for aerospace applications.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

EN 2338, *Aerospace series — Sheets, hot rolled in titanium and titanium alloys — Thickness 0,8 mm ≤ a ≤ 6 mm — Dimensions*

EN 3114-004, *Aerospace series — Test method — Microstructure of ($\alpha + \beta$) titanium alloy wrought products — Part 004: Microstructure of sheet for superplastic forming*

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

EN 4500-004, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 004: Specific rules for titanium and titanium alloys* [1)]

EN 4800-001, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 001: Plate, sheet and strip*

[1)] Published as ASD-STAN Prestandard 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	–	–	–	–	–	–	–	–	Base
		max.	6,75	4,50	0,25	0,03	0,012 5	0,30	0,08	0,005 0	0,10	0,40	
3	Method of melting		See EN 4800-001.										
4.1	Form		Sheet and strip										
4.2	Method of production		Hot rolled										
4.3	Limit dimension(s)	mm	$a \leq 6$										
5	Technical specification		EN 4800-001 - EN 2338										

6.1	Delivery condition	Annealed
	Heat treatment	700 °C ≤ θ ≤ 840 °C / t ≥ 30 min / AC in inert atmosphere
6.2	Delivery condition code	U [a]
7	Use condition	Delivery condition
	Heat treatment	–

Characteristics

8.1	Test sample(s)				See EN 4800-001.	
8.2	Test piece(s)				See EN 4800-001.	
8.3	Heat treatment				Use condition	
9	Dimensions concerned			mm	$a \leq 5$	$5 < a \leq 6$
10	Thickness of cladding on each face			%	–	
11	Direction of test piece				See EN 4800-001.	
12	T	Temperature	θ	°C	Ambient	
13		Proof stress	$R_{p0,2}$	MPa	≥ 870	
14		Strength	R_m	MPa	$920 \leq R_m \leq 1\,180$	
15		Elongation	A	%	$A_{50\,mm} \geq 8$	
16		Reduction of area	Z	%	–	
17	Hardness				–	
18	Shear strength		R_c	MPa	–	
19	Bending		k	–	5; $\alpha = 105°$	–
20	Impact strength				–	
21	C	Temperature	θ	°C	–	
22		Time		h	–	
23		Stress	σ_a	MPa	–	
24		Elongation	a	%	–	
25		Rupture stress	σ_R	MPa	–	
26		Elongation at rupture	A	%	–	
27	Notes (see line 98)				a	

30	Microstructure	–	See EN 4800-001.	
		1	EN 3114-004	
		3	L-ST and LT-ST section	
		7	Acceptable microstructure	Unacceptable microstructure
			4L1A to 4L7A	4L8A to 4L12A
			No grain boundary α, blocky α, α stringers or β fleck.	
34	Grain size	–	See EN 4800-001.	
		1	EN 2002-8	
		3	L- ST and LT-ST section	
44	External defects	–	See EN 4800-001.	
61	Internal defects	–	See EN 4800-001.	
74	Surface contamination	–	See EN 4800-001.	
		6	5 mm < a ≤ 6 mm	
95	Marking inspection	–	See EN 4800-001.	
96	Dimensional inspection	–	See EN 4800-001.	
98	Notes	–	[a] According to EN 2032-2.	
99	Typical use	–	–	

100	–	Product qualification	–	–
				Qualification programme to be agreed between manufacturer and purchaser.

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