

**Aerospace series - Titanium alloy TI-P64001 (Ti-6Al-4V) -
Annealed - Bar and wire for forged fasteners - $D_e \leq 50$
mm**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 3813:2013 sisaldab Euroopa standardi EN 3813:2013 ingliskeelset teksti.	This Estonian standard EVS-EN 3813:2013 consists of the English text of the European standard EN 3813:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 16.01.2013.	Date of Availability of the European standard is 16.01.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 49.025.30

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

ICS 49.025.30

English Version

**Aerospace series - Titanium alloy TI-P64001 (Ti-6Al-4V) -
Annealed - Bar and wire for forged fasteners - $De \leq 50$ mm**

Série aérospatiale - Alliage de titane TI-P64001 (Ti-6Al-4V)
- Recuit - Barre et fil pour éléments de fixations forgées -
 $De \leq 50$ mm

Luft- und Raumfahrt - Titanlegierung TI-P64001 (Ti-6Al-4V)
- Geglüht - Stangen und Drähte zum
Warmstauchschmieden für Verbindungselemente - $De \leq 50$
mm

This European Standard was approved by CEN on 10 March 2011.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Foreword.....3

Introduction4

1 Scope5

2 Normative references5

Foreword

This document (EN 3813:2013) 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 July 2013, and conflicting national standards shall be withdrawn at the latest by July 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.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

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

1 Scope

This standard specifies the requirements relating to:

Titanium alloy Ti-6Al-4V
Annealed
Bar and wire for forged fasteners
 $D_e \leq 50$ 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 2032-2, *Aerospace series — Metallic materials — Part 2: Coding of metallurgical condition in delivery condition*

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 4050-004, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 004: Acceptance criteria*

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*

EN 4800-002, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 002: Bar and section*

EN 4800-004, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 004: Wire*

1	Material designation		Titanium alloy 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	0,008 0	0,30	0,08	0,005 0	0,10	0,40		
3	Method of melting		See EN 4800-002 and EN 4800-004.											
4.1	Form		Bar and wire											
4.2	Method of production		Wrought											
4.3	Limit dimension(s)	mm	$D_e \leq 50$											
5	Technical specification		EN 4800-002 and EN 4800-004											

6.1	Delivery condition		Annealed										
	Heat treatment		$700\text{ °C} \leq \theta \leq 790\text{ °C} / 1\text{ h} \leq t \leq 2\text{ h} / \text{AC}$ or 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 4800-002 and EN 4800-004. Location for test sample ^b			
8.2	Test piece(s)			See EN 4800-002 and EN 4800-004.			
8.3	Heat treatment			Use condition	See line 29.		
9	Dimensions concerned	mm		$D_e \leq 50$	$D_e < 25$	$D_e \geq 25$	
10	Thickness of cladding on each face	%		—			
11	Direction of test piece			See EN 4800-002 and EN 4800-004.			
12	T	Temperature	θ	°C	Ambient		
13		Proof stress	R _{p0,2}	MPa	≥ 860	$\geq 1\ 030$	≥ 965
14		Strength	R _m	MPa	≥ 930	$\geq 1\ 100$	$\geq 1\ 030$
15		Elongation	A	%	≥ 8	≥ 8	≥ 8
16		Reduction of area	Z	%	≥ 25	≥ 20	≥ 20
17	Hardness			—			
18	Shear strength	R _c	MPa	—	≥ 690	≥ 660	
19	Bending	k	—	—			
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, b			