



# SLOVENSKI STANDARD SIST EN 3456:2010

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<https://standards.iteh.ai/catalog/standards/sist/201cf4cf-5951-4793-b74a-d81f906424bf/sist-en-3456-2010>

Ta slovenski standard je istoveten z: EN 3456:2009

**ICS:**

49.025.30 Titan Titanium

SIST EN 3456:2010 en,de

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EUROPEAN STANDARD

EN 3456

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2009

ICS 49.025.30

English Version

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

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

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

This European Standard was approved by CEN on 5 October 2009.

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 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 Management Centre has the same status as the official versions.

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

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

## Foreword

This document (EN 3456:2009) 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 April 2010, and conflicting national standards shall be withdrawn at the latest by April 2010.

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 organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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## 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 4500-4.

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**EN 3456:2009 (E)****1 Scope**

This European Standard specifies the requirements relating to:

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

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 2338, *Aerospace series — Sheets, hot rolled in titanium and titanium alloys — Thickness  $0,8 \text{ mm} \leq a \leq 6 \text{ mm}$  — 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 4800-001, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 001: Plate, sheet and strip<sup>1)</sup>*

EN ISO 643, *Steels — Micrographic determination of the apparent grain size (ISO 643:2003)*

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

|      |                         |         |                                      |      |        |      |      |                   |                   |        |       |    |
|------|-------------------------|---------|--------------------------------------|------|--------|------|------|-------------------|-------------------|--------|-------|----|
| 1    | Material designation    |         | Titanium alloy Ti-P64001 (Ti-6Al-4V) |      |        |      |      |                   |                   |        |       |    |
| 2    | Chemical composition %  | Element | Al                                   | V    | O+2N   | N    | H    | Fe                | C                 | Others |       | Ti |
|      |                         |         |                                      |      |        |      |      |                   |                   | Each   | Total |    |
|      |                         | min.    | 5,50                                 | 3,50 | –      | –    | –    | –                 | –                 | –      | –     | –  |
| max. | 6,75                    | 4,50    | 0,25                                 | 0,03 | 0,0125 | 0,30 | 0,08 | 0,10 <sup>a</sup> | 0,40 <sup>a</sup> |        |       |    |
| 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 ≤ 6                                |      |        |      |      |                   |                   |        |       |    |
| 5    | Technical specification |         | EN 2338 - EN 4800-001                |      |        |      |      |                   |                   |        |       |    |

|     |                         |  |  |  |  |  |  |  |  |  |  |
|-----|-------------------------|--|--|--|--|--|--|--|--|--|--|
| 6.1 | Delivery condition      |  | Annealed   |  |  |  |  |  |  |  |  |
|     | Heat treatment          |  | 700 °C ≤ $\theta$ ≤ 840 °C / t ≥ 30 min / AC or inert atmosphere |  |  |  |  |  |  |  |  |
| 6.2 | Delivery condition code |  | U  |  |  |  |  |  |  |  |  |
| 7   | Use condition           |  | Delivery condition   |  |  |  |  |  |  |  |  |
|     | Heat treatment          |  | –  |  |  |  |  |  |  |  |  |

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|     |                                    |                       |   |                         |                              |  |  |           |   |  |  |  |
|-----|------------------------------------|-----------------------|---|-------------------------|------------------------------|--|--|-----------|---|--|--|--|
| 8.1 | Test sample(s)                     |                       | –   |                         |                              |  |  |           |   |  |  |  |
| 8.2 | Test piece(s)                      |                       | –<br><small>SIST EN 3456:2010<br/><a href="https://standards.iteh.ai/catalog/standards/sist/201c7fcf-5951-4793-b74a-d81f906424bf/sist-en-3456-2010">https://standards.iteh.ai/catalog/standards/sist/201c7fcf-5951-4793-b74a-d81f906424bf/sist-en-3456-2010</a></small> |                         |                              |  |  |           |   |  |  |  |
| 8.3 | Heat treatment                     |                       | Use condition   |                         |                              |  |  |           |   |  |  |  |
| 9   | Dimensions concerned               | mm                    | a ≤ 5   |                         |                              |  |  | 5 < a ≤ 6 |   |  |  |  |
| 10  | Thickness of cladding on each face | %                     | –   |                         |                              |  |  |           |   |  |  |  |
| 11  | Direction of test piece            |                       | See EN 4800-001.  |                         |                              |  |  |           |   |  |  |  |
| 12  | Temperature                        | $\theta$              | °C  | Ambient                 |                              |  |  |           |   |  |  |  |
| 13  | Proof stress                       | R <sub>p0,2</sub>     | MPa   | ≥ 870                   |                              |  |  |           |   |  |  |  |
| 14  | T                                  | Strength              | R <sub>m</sub>  | MPa                     | 920 ≤ R <sub>m</sub> ≤ 1 180 |  |  |           |   |  |  |  |
| 15  |                                    | Elongation            | A   | %                       | A <sub>50 mm</sub> ≥ 8       |  |  |           |   |  |  |  |
| 16  |                                    | Reduction of area     | Z   | %                       | –                            |  |  |           |   |  |  |  |
| 17  |                                    | Hardness              |   | –                       |                              |  |  |           |   |  |  |  |
| 18  | Shear strength                     | R <sub>c</sub>        | MPa   | –                       |                              |  |  |           |   |  |  |  |
| 19  | Bending                            | k                     | –   | 5; $\alpha = 105^\circ$ |                              |  |  |           | – |  |  |  |
| 20  | Impact strength                    |                       | –   |                         |                              |  |  |           |   |  |  |  |
| 21  | C                                  | Temperature           | $\theta$  | °C                      | –                            |  |  |           |   |  |  |  |
| 22  |                                    | Time                  | h   | –                       |                              |  |  |           |   |  |  |  |
| 23  |                                    | Stress                | $\sigma_a$  | MPa                     | –                            |  |  |           |   |  |  |  |
| 24  |                                    | Elongation            | a   | %                       | –                            |  |  |           |   |  |  |  |
| 25  |                                    | Rupture stress        | $\sigma_R$  | MPa                     | –                            |  |  |           |   |  |  |  |
| 26  |                                    | Elongation at rupture | A   | %                       | –                            |  |  |           |   |  |  |  |
| 27  | Notes (see line 98)                |                       | a   |                         |                              |  |  |           |   |  |  |  |

## EN 3456:2009 (E)

|   |                       |   |   |  |  |
|---|-----------------------|---|---|--|--|
| 30  | Microstructure        | – | See EN 4800-001.  |  |  |
|   |                       | 1 | EN 3114-004   |  |  |
|   |                       | 3 | L and LT  |  |  |
|   |                       | 7 | Acceptable microstructure   | Unacceptable microstructure                        |  |
|   |                       |   | 4L1A to 4L7A  | 4L8A to 4L12A                                      |  |
|   |                       |   | No grain boundary $\alpha$ , blocky $\alpha$ , $\alpha$ stringers or $\beta$ fleck. |  |  |
| 34  | Grain size            | – | EN ISO 643  |  |  |
|   |                       | 7 | $G \geq 6$  |  |  |
| 44  | External defects      | – | See EN 4800-001.  |  |  |
| 61  | Internal defects      | – | See EN 4800-001.  |  |  |
| 74  | Surface contamination | – | See EN 4800-001.  |  |  |
|   |                       | 6 | $5 \text{ mm} < a \leq 6 \text{ mm}$  |  |  |
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| 98  | Notes                 | – | <sup>a</sup>  | Determination not required for routine acceptance. |  |
| 99  | Typical use           | – | –   |  |  |



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

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