



SLOVENSKI STANDARD SIST EN 3678:2009

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Ta slovenski standard je istoveten z: EN 3678:2007

ICS:

49.025.10 Jekla Steels

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EUROPEAN STANDARD

EN 3678

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2007

ICS 49.025.10

English Version

**Aerospace series - Steel FE-PM3801 (X5CrNiCu17-4) - Air
melted - Solution treated and precipitation treated - Forgings - a
or $D \leq 200$ mm - $R_m \geq 930$ MPa**

Série aérospatiale - Acier FE-PM3801 (X5CrNiCu17-4) -
Élaboré à l'air - Mis en solution et vieilli - Pièces forgées et
pièces matricées - a ou $D \leq 200$ mm - $R_m \geq 930$ MPa

Luft- und Raumfahrt - Stahl FE-PM3801 (X5CrNiCu17-4) -
Lufterschmolzen - Lösungsgeglüht und ausgehärtet -
Schmiedestücke - a oder $D \leq 200$ mm - $R_m \geq 930$ MPa

This European Standard was approved by CEN on 5 October 2006.

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: rue de Stassart, 36 B-1050 Brussels

EN 3678:2007 (E)**Foreword**

This document (EN 3678:2007) 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 September 2007, and conflicting national standards shall be withdrawn at the latest by September 2007.

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 4500-5.

1 Scope

This standard specifies the requirements relating to:

Steel FE-PM3801 (X5CrNiCu17-4)
Air melted
Solution treated and precipitation treated
Forgings
 a or $D \leq 200$ mm
 $R_m \geq 930$ MPa

for aerospace applications.

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2 Normative references (standards.iteh.ai)

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 3163, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted — Softened — Forging stock — a or $D \leq 300$ mm.* ¹⁾

EN 4050-4, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 4: Acceptance criteria.* ¹⁾

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

EN 4500-5, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 5: Specific rules for steels.* ¹⁾

EN 4700-006, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 006: Pre-production and production forgings.* ²⁾

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

2) In preparation at the date of publication of this standard.

EN 3678:2007 (E)

1	Material designation		Steel FE-PM3801 (X5CrNiCu17-4)										
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb+Ta	Fe
		min.	–	–	–	–	–	15,0	–	3,0	3,0	5 × C	Base
		max.	0,07	1,00	1,00	0,030	0,015	17,5	0,50	5,0	5,0	0,45	
3	Method of melting		Air melted										
4.1	Form		Forgings										
4.2	Method of production		Forged from forging stock EN 3163										
4.3	Limit dimension(s)	mm	a or $D \leq 200$										
5	Technical specification		EN 4700-006										

6.1	Delivery condition		Solution treated				Solution treated and precipitation treated					
	Heat treatment		1 025 °C ≤ θ ≤ 1 055 °C / t ≥ 30 min / AC or OQ + cool to θ ≤ 30 °C				1 025 °C ≤ θ ≤ 1 055 °C / t ≥ 30 min / AC or OQ + cool to θ ≤ 30 °C + 610 °C ≤ θ ≤ 630 °C / t ≥ 4 h / AC					
6.2	Delivery condition code		W				U					
7	Use condition		Solution treated and precipitation treated				Delivery condition					
	Heat treatment		Delivery condition + 610 °C ≤ θ ≤ 630 °C / t ≥ 4 h / AC				–					

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Characteristics

8.1	Test sample(s)		See EN 4700-006.										
8.2	Test piece(s)		See EN 4700-006.										
8.3	Heat treatment		Solution treated				Use condition						
9	Dimensions concerned	mm	a or $D \leq 200$				a or $D \leq 75$		$75 < a$ or $D \leq 200$				
10	Thickness of cladding on each face	%	–				–		–				
11	Direction of test piece		–				L		L		T		
12	Temperature	θ	°C		–				Ambient		Ambient		
13	Proof stress	$R_{p0,2}$	MPa		–				≥ 725		≥ 725		
14	T Strength	R_m	MPa		–				≥ 930		≥ 930		
15	Elongation	A	%		–				≥ 14		≥ 12		
16	Reduction of area	Z	%		–				≥ 50		≥ 50		
17	Hardness		≤ 363 HB				277 ≤ HB ≤ 352		277 ≤ HB ≤ 352				
18	Shear strength	R_c	MPa		–				–		–		
19	Bending	k	–		–				–		–		
20	Impact strength		–				KV ≥ 40 J; Notch direction T		KV ≥ 20 J; Notch direction T				
21	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)		–										

30	Microstructure	–	See EN 4700-006.
		2	One per cast
		7	δ -ferrite content shall not exceed 5 %
34	Grain size	–	See EN 4700-006.
		7	$G \geq 4$
44	External defects	–	See EN 4700-006.
50	Cleanliness/inclusion content (micro-cleanness)	–	See EN 4700-006.
		1	EN 2951
		2	One per cast
		7	Category 2
61	Internal defects	–	See EN 4700-006.
		1	EN 4050-4
		6	a or $D \leq 200$ mm may be tested either on the product or at an earlier stage of manufacturing
		7	Class 2
82	Batch uniformity	–	See EN 4700-006.
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95	Marking inspection	–	See EN 4700-006.
96	Dimensional inspection	–	See EN 4700-006.
98	Notes	–	–
99	Typical use	–	–

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