



SLOVENSKI STANDARD
SIST EN 3491:2009

01-maj-2009

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Ta slovenski standard je istoveten z: EN 3491:2006

ICS:

49.025.10 Jekla Steels

SIST EN 3491:2009 en,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 3491

December 2006

ICS 49.025.10

English Version

**Aerospace series - Steel FE-PM3901 (X15CrNi17-3) - Air melted
- Hardened and tempered - Forgings - $De \leq 100$ mm - 900 MPa
 $\leq R_m \leq 1\ 100$ MPa**

Série aérospatiale - Acier FE-PM3901 (X15CrNi17-3) -
Élaboré à l'air - Trempé et revenu - Pièces forgées et
pièces matricées - $De \leq 100$ mm - 900 MPa $\leq R_m \leq 1\ 100$
MPa

Luft- und Raumfahrt - Stahl FE-PM3901 (X15CrNi17-3) -
Lufterschmolzen - Gehärtet und angelassen - Gesenk- und
Freiformschmiedestücke - $De \leq 100$ mm - 900 MPa $\leq R_m \leq$
 $1\ 100$ 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

This document (EN 3491:2006) 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 June 2007, and conflicting national standards shall be withdrawn at the latest by June 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, 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,

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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-PM3901 (X15CrNi17-3)
Air melted
Hardened and tempered
Forgings
 $D_e \leq 100$ mm
 $900 \text{ MPa} \leq R_m \leq 1\,100 \text{ MPa}$

for aerospace applications.

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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 2157-3, *Aerospace series — Steel — Forging stock and forgings — Technical specification — Part 3: Pre-production and production forgings.*

EN 3365, *Aerospace series — Steel FE-PM3901 (X15CrNi17-3) — Air melted — Softened — Forging stock — a or D ≤ 300 mm.* ¹⁾

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

EN 4436, *Aerospace series — Steel — Test methods — Determination of δ ferrite content.* ¹⁾

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

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

EN 3491:2006 (E)

1	Material designation		Steel FE-PM3901 (X15CrNi17-3)								
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni	Fe
		min.	0,12	–	–	–	–	15,0	–	2,00	Base
		max.	0,20	1,00	1,00	0,030	0,025	17,0	–	3,00	
3	Method of melting		Air melted								
4.1	Form		Forgings								
4.2	Method of production		Forged from forging stock EN 3365								
4.3	Limit dimension(s)	mm	$D_e \leq 100$								
5	Technical specification		EN 2157-3								

6.1	Delivery condition		Softened				Hardened and tempered			
	Heat treatment		–				$950\text{ °C} \leq \theta \leq 1\ 040\text{ °C} / \text{OQ}^a$ $+ 635\text{ °C} \leq \theta \leq 685\text{ °C} / \text{OQ or WQ}$ $+ 585\text{ °C} \leq \theta \leq 615\text{ °C} / \text{OQ or WQ}$			
6.2	Delivery condition code		A				U			
7	Use condition		Hardened and tempered				Delivery condition			
	Heat treatment		Delivery condition $+ 950\text{ °C} \leq \theta \leq 1\ 040\text{ °C} / \text{OQ}^a$ $+ 635\text{ °C} \leq \theta \leq 685\text{ °C} / \text{OQ or WQ}$ $+ 585\text{ °C} \leq \theta \leq 615\text{ °C} / \text{OQ or WQ}$				–			

Characteristics
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8.1	Test sample(s)		See EN 2157-3.									
8.2	Test piece(s)		See EN 2157-3.									
8.3	Heat treatment		Softened				Use condition					
9	Dimensions concerned	mm	a or $D \leq 100$				$D_e \leq 100$					
10	Thickness of cladding on each face	%	–				–					
11	Direction of test piece		–				L					
12	Temperature	θ	°C		–				Ambient			
13	Proof stress	$R_{p0,2}$	MPa		–				≥ 700			
14	T Strength	R_m	MPa		–				$900 \leq R_m \leq 1\ 100$			
15	Elongation	A	%		–				≥ 12			
16	Reduction of area	Z	%		–				–			
17	Hardness		$\leq 293\text{ HB}$				$262 \leq \text{HB} \leq 331$					
18	Shear strength	R_c	MPa		–				–			
19	Bending	k	–		–				–			
20	Impact strength		–				$\text{KV} \geq 20\text{ J}$; 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)		a									

30	Microstructure	1	EN 4436
		2	One per batch
		7	The δ -ferrite shall not exceed 5 %
34	Grain size	–	See EN 2157-3.
44	External defects	–	See EN 2157-3.
61	Internal defects	–	See EN 2157-3.
82	Batch uniformity	–	See EN 2157-3.
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95	Marking inspection	–	See EN 2157-3.
96	Dimensional inspection	–	See EN 2157-3.
98	Notes	–	^a For $D_e \leq 30$ mm may be AC.
99	Typical use	–	–

EN 3491:2006 (E)

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