



SLOVENSKI STANDARD

SIST EN 3979:2005

01-november-2005

Aerospace series - Aluminium alloy AL-P8090-O2 - Sheet for superplastic forming (SPF) - 0,8 mm < a < 6 mm

Aerospace series - Aluminium alloy AL-P8090-O2 - Sheet for superplastic forming (SPF) - 0,8 mm < a < 6 mm

Luft- und Raumfahrt - Aluminiumlegierung AL-P8090-O2 - Bleche für superplastische Formgebung (SPF) - 0,8 mm < a < 6 mm

Série aérospatiale - Alliage d'aluminium AL-P8090-O2 - Tôles pour formage superplastique (FSP) - 0,8 mm < a < 6 mm

Ta slovenski standard je istoveten z: EN 3979:2005

ICS:

49.025.20

Aluminij

Aluminium

SIST EN 3979:2005

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 3979

June 2005

ICS 49.025.20

English version

Aerospace series - Aluminium alloy AL-P8090-O2 - Sheet for
superplastic forming (SPF) - $0,8 \text{ mm} \leq a \leq 6 \text{ mm}$

Série aérospatiale - Alliage d'aluminium AL-P8090-O2 -
Tôles pour formage superplastique (FSP) - $0,8 \text{ mm} \leq a \leq 6$
mm

Luft- und Raumfahrt - Aluminiumlegierung AL-P8090-O2 -
Bleche für superplastische Formgebung (SPF) - $0,8 \text{ mm} \leq a$
 $\leq 6 \text{ mm}$

This European Standard was approved by CEN on 22 April 2005.

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.

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

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Foreword

This document (EN 3979:2005) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 AECMA, 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 December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

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, 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 4500-2.

1 Scope

This standard specifies the requirements relating to:

Aluminium alloy AL-P8090-
O2
Sheet for superplastic forming (SPF)
 $0,8 \text{ mm} \leq a \leq 6 \text{ mm}$

for aerospace application.

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

EN 4400-2, *Aerospace series — Aluminium and aluminium alloy wrought products — Technical specification — Part 2: Sheet and strip.* ¹⁾

EN 4500-2, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 2: Specific rules for aluminium, aluminium alloys and magnesium alloys.* ¹⁾

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

EN 3979:2005 (E)

1	Material designation		Aluminium alloy AL-P8090-												
2	Chemical composition %	Element	Si	Fe	Cu	Mn	Mg	Cr	Zn	Li	Zr	Ti	Others		Al
													Each	Total	
		min.	–	–	1,0	–	0,6	–	–	2,2	0,04	–	–	–	Base
max.	0,20	0,30	1,6	0,10	1,3	0,10	0,25	2,7	0,16	0,10	0,05 ^a	0,15			
3	Method of melting		–												
4.1	Form		Sheet												
4.2	Method of production		Rolled and thermomechanically processed to enhance superplastic forming capability												
4.3	Limit dimension(s)	mm	0,8 ≤ a ≤ 6												
5	Technical specification		EN 4400-2												

6.1	Delivery condition		O2											
	Heat treatment		Thermomechanically processed to enhance superplastic forming capability											
6.2	Delivery condition code		F											
7	Use condition		O2											
	Heat treatment		Delivery condition											

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8.1	Test sample(s)				See EN 4400-2.			
8.2	Test piece(s)				See EN 4400-2.			
8.3	Heat treatment				T62 (see line 29)			
9	Dimensions concerned		mm		0,8 ≤ a ≤ 6			
10	Thickness of cladding on each face		%		—			
11	Direction of test piece				L		LT	
12	T	Temperature	θ	°C	Ambient		Ambient	
13		Proof stress	R _{p0,2}	MPa	≥ 330 ^b		≥ 330 ^b	
14		Strength	R _m	MPa	≥ 410 ^b		≥ 410 ^b	
15		Elongation	A	%	A _{50 mm} ≥ 4 ^b		A _{50 mm} ≥ 4 ^b	
16		Reduction of area	Z	%	—		—	
17	Hardness				—			
18	Shear strength		R _c	MPa	—			
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			

29	Reference heat treatment	–	Delivery condition ^b + 525 °C ≤ θ ≤ 535 °C / WQ θ ≤ 40 °C + 165 °C ≤ θ ≤ 185 °C / 20 h ≤ t ≤ 40 h			
30	Microstructure	–	See EN 4400-2.			
		2	One sample per batch unless agreement is reached between the manufacturer and purchaser that the "capability clause" may apply.			
		4	The sample shall be taken from a region of the tensile specimen tested at line 63 representing a level of strain to be agreed between manufacturer and purchaser.			
		6	The sample shall be examined in the un-etched condition.			
		7	Cavitation acceptance levels shall be agreed between manufacturer and purchaser.			
34	Grain size	–	See EN 4400-2.			
		2	One sample per batch unless agreement is reached between the manufacturer and purchaser that the "capability clause" may apply.			
		7	G > 6			
44	External defects	–	See EN 4400-2.			
63	Superplastic forming capability	–	See EN 4400-2. Superplastic forming capability shall be assessed by an elevated temperature tensile test.			
		6	– Testing temperature: 520 °C ≤ θ ≤ 540 °C – Soaking time: 15 min ≤ t ≤ 45 min – Constant crosshead velocity: $v = \dot{\epsilon} \times L_{\text{start}}$ where: $L_{\text{start}} = L_0 + 2R$ and strain rate, $\dot{\epsilon} \geq 6.10^{-4} \text{ s}^{-1}$			
		7	Elongation	A_{L_0}	%	≥ 300
68	Density	–	See EN 4400-2.			
		7	$\rho \leq 2,56 \text{ kg/dm}^3$			
82	Batch uniformity	–	See EN 4400-2.			
		5	T6			
		7	Electrical conductivity	See EN 4400-2.		
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95	Marking inspection	–	See EN 4400-2.			
96	Dimensional inspection	–	See EN 4400-2.			
98	Notes	–	^a Na ≤ 10 ppm, Ca ≤ 120 ppm. ^b This heat treatment and specified minimum mechanical properties relate to release testing by the sheet manufacturer. The minimum mechanical properties may not necessarily be achieved in all parts of all superplastically formed components.			
99	Typical use	–	Superplastically formed components			

EN 3979:2005 (E)

100	–	Product qualification	–	See EN 4400-2.
				Qualification programme to be agreed between manufacturer and purchaser.

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