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**Aeronavtika - Aluminijeva zlitina AL-P2024-T351 - Platirana pločevina in trakovi z izboljšanimi lastnostmi za kemično rezkanje  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$**

Aerospace series - Aluminium alloy AL-P2024-T351 - Clad sheet and strip with improved chemical milling capability  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$

Luft- und Raumfahrt - Aluminiumlegierung AL-P2024-T351 - Bleche und Bänder, plattiert mit besserer Eignung zum chemischen Fräsen  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$

Série aérospatiale - Alliage d'aluminium AL-P2024-T351 - Tôles et bandes plaquées avec aptitude améliorée à l'usinage chimique  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$

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**Ta slovenski standard je istoveten z: EN 4001:2007**

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**ICS:**

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EUROPEAN STANDARD

EN 4001

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2007

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## Aerospace series - Aluminium alloy AL-P2024-T351 - Clad sheet and strip with improved chemical milling capability $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$

Série aérospatiale - Alliage d'aluminium AL-P2024-T351 -  
Tôles et bandes plaquées avec aptitude améliorée à  
l'usinage chimique  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$

Luft- und Raumfahrt - Aluminiumlegierung AL-P2024-T351  
- Bleche und Bänder, plattiert mit besserer Eignung zum  
chemischen Fräsen  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$

This European Standard was approved by CEN on 12 June 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN 4001:2007) 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.

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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**EN 4001:2007 (E)****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-P2024-T351 — Clad sheet and strip with improved chemical milling capability  $1,6 \text{ mm} \leq a \leq 6 \text{ mm}$  for aerospace applications.

The material is manufactured to a minimum residual stress requirement for chemical milling 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 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*<sup>1)</sup>

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*<sup>1)</sup>

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<sup>1)</sup> Published as ASD Prestandard at the date of publication of this standard.

1	Material designation		Aluminium alloy AL-P2024-										
2	Chemical composition %	Element	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others		Al
		min.	—	—	3,8	0,30	1,2	—	—	—	—	—	
		max.	0,50	0,50	4,9	0,9	1,8	0,10	0,25	0,15	0,05	0,15	Base
3	Method of melting		—										
4.1	Form		Clad sheet and strip										
4.2	Method of production		Rolled										
4.3	Limit dimension(s)	mm	$1,6 \leq a \leq 6$										
5	Technical specification		See EN 4400-2.										

6.1	Delivery condition	T351	
	Heat treatment	$490\text{ °C} \leq \theta \leq 500\text{ °C} / \text{WQ } \theta \leq 40\text{ °C}$ $+ 0,5\% \leq \text{controlled stretched} \leq 3\%$ $+ \theta = \text{ambient} / t \geq 5\text{d}$	
6.2	Delivery condition code	U	
7	Use condition	T351	
	Heat treatment	Delivery condition	

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Characteristics

8.1	Test sample(s)	See EN 4400-2.	
8.2	Test piece(s)	See EN 4400-2.	
8.3	Heat treatment	Use condition	
9	Dimensions concerned	mm	$1,6 \leq a \leq 3,2$
10	Thickness of cladding on each face	%	$\geq 2$
11	Direction of test piece	LT	
12	Temperature	$\theta$	°C
13	Proof stress	$R_{p0,2}$	MPa
14	Strength	$R_m$	MPa
15	Elongation	$A$	%
16	Reduction of area	$Z$	%
17	Hardness	—	
18	Shear strength	$R_c$	MPa
19	Bending	$k$	—
20	Impact strength	—	
21	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)	—	

## EN 4001:2007 (E)

38	Intergranular corrosion	—	See EN 4400-2.										
		7	Dimensions (mm)			1,6 < a ≤ 3,2			3,2 < a ≤ 6				
44	External defects	—	See EN 4400-2.										
62	Diffusion in the cladding	—	See EN 4400-2.										
65	Chemical millability	—	See EN 4400-2.										
		7	Measurement of residual stress: h ≤ 4 mm										
72	Cladding chemical composition %	—	See EN 4400-2.										
		7	Material designation	Aluminium AL-P1050A									
			Element	Si	Fe	Cu	Mn	Mg	Zn	Ti	Others		Al
											Each	Total	
			min.	—	—	—	—	—	—	—	—	—	99,50
		max.	0,25	0,40	0,05	0,05	0,05	0,07	0,05	0,03	—	—	
		or as an alternative, if agreed between manufacturer and purchaser											
		7	Material designation	Aluminium AL-P1145-									
			Element	Si + Fe	Cu	Mn	Mg	Zn	V	Ti	Others		Al
											Each	Total	
min.	—		—	—	—	—	—	—	—	—	99,45		
max.	0,55	0,05	0,05	0,05	0,05	0,05	0,03	0,03	—	—			
or as an alternative, if agreed between manufacturer and purchaser													
7	Material designation	Aluminium AL-P1230-											
	Element	Si + Fe	Fe	Cu	Mn	Mg	Zn	Ti	V	Others		Al	
										Each	Total		
	min.	—	—	—	—	—	—	—	—	—	—	99,30	
max.	0,70	0,10	0,10	0,05	0,05	0,10	0,03	0,05	0,03	—	—		
82	Batch uniformity	—	See EN 4400-2.										
		7	Electrical conductivity				See EN 4400-2						
95	Marking inspection	—	See EN 4400-2.										
96	Dimensional inspection	—	See EN 4400-2.										
98	Notes	—	—										
99	Typical use	—	For parts manufactured by chemically milling through the thickness, necessitating control of residual stress.										