



# RAFFMETAL

THE ALUMINIUM EVOLUTION



**Leghe di alluminio in colata continua. Continuous casting aluminium alloys**

Standard: **UNI EN 1676 and 1706**

Alloy group: **Al Si 9 Cu**

Alloy designation: **EN AB and AC 46000 - Al Si 9 Cu 3 (Fe)**

Replaces: **DIN 226 D - GD Al Si 9 Cu 3**

### CHEMICAL COMPOSITION %

ALLOY		ELEMENTS												
		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	Individual impurities	Global impurities
EN AB 46000	min	8,0	0,6	2,0		0,15								
	max	11,0	1,1	4,0	0,55	0,55	0,15	0,55	1,2	0,35	0,15	0,20	0,05	0,25
DIN 226 D	min	8,0		2,00	0,10	0,10								
	max	11,0	1,0	3,50	0,5	0,50	0,10	0,30	1,20	0,20	0,10	0,15	0,05	0,25

### MECHANICAL FEATURES DETECTED FROM SEPARATE CASTING TEST SPECIMENS

Casting process	Temper designations	Rm Tensile strenght		Sp 0,2 Yield strenght		A Elongation		HB Brinell hardness	
		EN 1706	DIN 1725	EN 1706	DIN 1725	EN 1706	DIN 1725	EN 1706	DIN 1725
		Mpa	N/mm2	Mpa	N/mm2	%	%	HBW	HB
SAND (as cast)									
Annealed									
SHELL (as cast)									
Annealed									
PRESSURE DIE (as cast)	F	240	240 - 310	140	140 - 240	1	0,5 - 3	80	80 - 120

### PHYSICAL PROPERTIES (indicative values subject to the UNI EN and ex DIN Standards)

DENSITY	2.76 Kg/dm <sup>3</sup>
MELTING RANGE or MELTING POINT	500 °C 600 °C
SPECIFIC HEAT (at 100)°	0.88 J/Gk
LINEAR SHRINKAGE IN SAND	
LINEAR SHRINKAGE IN SHELL PROCES	
LINEAR SHRINKAGE IN HIGH PRESSUR	0.4 - 0.6 %
ELECTRIC CONDUCTIVITY	13 - 17 MS/m
MODULUS OF ELASTICITY	7500 Kg/mm <sup>2</sup>

THERMAL CONDUCTIVITY at 20°C	110 - 120 W/(m K)
LINEAR THERMAL EXPANSION from 20 t 100°C	21 10-6/°K
LINEAR THERMAL EXPANSION from 20 t 200°C	
LINEAR THERMAL EXPANSION from 20 t 300°C	
SUGGESTED MAXIMUM TEMPERATURE	750 °C
SUGGESTED CASTING TEMPERATURE	
°in sand	
°in shell	
°in pressure die	630-710 °C

### TECHNOLOGICAL FEATURES, QUALITATIVE INDICATIONS

STRENGTH AT ELEVATED TEMPERATURE (to 200°C)	GOOD
GENERAL RESISTANCE TO CORROSION	LOW
MACHINABILITY	EXCELLENT
CASTABILITY	GOOD
POLISHING	MEDIUM

RESISTANCE TO HOT TEARING	MEDIUM
PRESSURE TIGHTNESS	MEDIUM
WELDABILITY	GOOD
DECORATIVE ANODISING	INSUFFICIENT
PROTECTIVE ANODISING	MEDIUM

**AZIENDA CON SISTEMA DI GESTIONE PER LA QUALITÀ CERTIFICATO DA DNV = UNI EN ISO 9001:2008 =**

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**AZIENDA CON SISTEMA DI GESTIONE AMBIENTALE CERTIFICATO DA DNV = UNI EN ISO 14001:2004 =**



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### GENERALITIES REGARDING USE

The ingot recasting process must be carried out as quickly as possible and overheating must be avoided (maximum melting temperature 750°C).

The iron tools that can come into contact with the liquid metal must be appropriately painted to prevent contamination of the alloy.

The best results for refining the alloy are reached by treatments with inert gases such as nitrogen and/or argon with the intent of removing the hydrogen dissolved and the oxides present in the bath of molten metal. Better distribution of the gas in the molten metal is obtained by the use of relevant rotors. Pay particular attention that all transfer operations of the molten metal are performed with less turbulence possible. It is recommended to leave the molten metal at rest for a few minutes before starting casting. Careful skimming operations of the bath are recommended.

The re-cycling of risers and casting appendixes is allowed but within the limits of 40% of the total weight of the load.

The EN 46000 alloy is delivered by RAFFMETAL exclusively under the form of ingots produced with Continuous Casting, this has the following advantages:

- Lower presence of oxides with consequent reduced aptitude for the formation of HARD POINTS
- Fine and even structure with reduced quantity and dimension intermetallic compounds
- Reduced hydrogen content in relation to the high solidification speed.
- Possibility of customising according to different options of the dimensions and geometry of the stack
- Less risk of explosion of the ingot in the melting phase owing to the smaller presence of open shrinkage cavities.
- Improved metal yield owing to the excellent surface quality of the ingot

### SPECIFICITY REGARDING USE

The EN 46000 alloy is among the great "worldwide" classics of the pressure die casting aluminium alloys. It is relatively easy to use and requests simple general attentions that characterise the foundry aluminium alloys. The EN Standard envisions Mg as an alloy element, to make it able to respond to a heat treatment. The latter is a delicate operation with its critical specifications. In this case it is good practice to operate with due attention in terms of temperatures and process times so that the Mg is kept "well" within the limits of the Standard.

### TYPICAL USE

Alloy for pressurised casting with many uses, such as for the production of complex casting and with thin walls; resistant to high temperatures. tourism and building sectors.

Alloy **not in compliance with the EN 601** foodstuff Standard

### COMPARISON WITH EQUIVALENT OR SIMILAR FOREIGN STANDARDS

	ITALY	GERMANY	FRANCE	G.B.R.	USA	ISO	JAPAN	TURKEY
	UNI	(Din1725/5-86)	(NFA57-105)	(BS1490-88)	(ASTM B179-82)	(3522-84)	(JIS H2211-92)	(ETIAL)
Equivalent	-	DIN 226 D	-	-	-	-	-	-
Similar	UNI 5075	DIN 226 A	AS9U3	LM 24	333.1 - 332.0			ETIAL - 160

### HEAT TREATMENTS

Heat treatments are not generally performed on this alloy; however, the following treatments can be performed to increase the mechanical properties of the same:

- 10 hours
- for 8 - 12 hours.

Hardening at 520°C for 6  
Complete Artificial Aging at 160 °C

#### Limitation of liability

The contents of these technical sheets gave an informative purpose and do not constitute a warranty regarding the properties stated. The decisions based on this information are taken under the responsibility and risk of the user and do not exclude it from the verification. If the former are not carried out, we do not assume any liability.

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