



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 46400 - Al Si 9 Cu 1 Mg**

Replaces: **UNI 7369/3 - SG Al Si 9 Cu 1**

CHEMICAL COMPOSITION %

ALLOY		ELEMENTS											Individual impurities	Global impurities
		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti		
EN AB 46400	min	8,3		0,8	0,15	0,30						0,10		
	max	9,7	0,7	1,3	0,55	0,65	-	0,20	0,8	0,10	0,10	0,18	0,05	0,25
UNI 7369/3	min	8,3		0,80	0,20	0,30						0,10		
	max	9,7	0,7	1,30	0,5	0,60	-	0,20	0,70	0,10	0,10	0,20		0,8*

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	UNI 7369/3	EN 1706	UNI 7369/3	EN 1706	UNI 7369/3	EN 1706	UNI 7369/3
		Mpa	N/mm2	Mpa	N/mm2	%	%	HBW	HB
SAND (as cast)	F	135	145-165	90	90-110	1	1-1,5	60	60-80
SHELL (as cast)	F	170	215-235	100	135-155	1	3-4	75	70-80
	T6	275	295-315	235	245-255	1,5	2-3	105	105-130
PRESSURE DIE (as cast)									

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

DENSITY	2.8 Kg/dm ³
MELTING RANGE or MELTING POINT	540 °C 575 °C
SPECIFIC HEAT (at 100)°	0.23 cal/g °C
LATENT HEAT OF MELTING	93 cal/g
LINEAR SHRINKAGE	~1.30 %
ELECTRIC CONDUCTIVITY	16 - 22 MS/m
MODULUS OF ELASTICITY	7600 Kg/mm ²

THERMAL CONDUCTIVITY at 20°C	130 - 150 W/(m K)
LINEAR THERMAL EXPANSION from 20 t 100°C	20.5x10-6/°C
LINEAR THERMAL EXPANSION from 20 t 200°C	21.5x10-6/°C
LINEAR THERMAL EXPANSION from 20 t 300°C	22.5x10-6/°C
SUGGESTED MAXIMUM TEMPERATURE	780 °C
SUGGESTED CASTING TEMPERATURE	
°in sand	690-730 °C
°in shell	690-730 °C
°in pressure die	

TECHNOLOGICAL FEATURES, QUALITATIVE INDICATIONS

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

RESISTANCE TO HOT TEARING	SMALL
PRESSURE TIGHTNESS	MEDIUM
WELDABILITY	
DECORATIVE ANODISING	LOW
PROTECTIVE ANODISING	MEDIUM

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

Raffmetal S.p.a.
via malpaga, 82 25070 Casto (BS)
tel:0365.890.100 fax 0365.899.327
qualita@raffmetal.it
vendite@raffmetal.it

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 780°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 46400 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 46400 alloy 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 "abundantly" within the limits of the Standard.

For the realisation of casting with sensitive thickness, it is recommended to envision "modification" treatment.

If Strontium is used as the modifying element, it is recommended to operate with Strontium that do not exceed 300 ppm in order to prevent excess reactivity of the alloy in the liquid state with consequent oxidation and gassing phenomena of the bath.

Remember that the contents of Strontium exceeding 100 ppm are normally sufficient to obtain a well-modified structure.

TYPICAL USE

Alloy suitable for the realisation of casting in sand and shell susceptible to hardening and tempering. Use mainly in the motor sector for the construction of motors, manifolds or casting where pressurised sealing is required.

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	7369/3							
Similar				LM 26	328.1 333.1			

HEAT TREATMENTS

Water quenching from 510 to 530 °C after heating for 1-4 hours.

Artificial aging

via heating from 185-200 °C to 1-4 hours and successive natural cooling in the air.

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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