



# RAFFMETAL

THE ALUMINIUM EVOLUTION



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

Standard: **UNI EN 1676 and 1706**

Alloy group: **Al Si 7 Mg**

Alloy designation: **EN AB and AC 42000 - Al Si 7 Mg**

Replaces: **UNI 3599 - G Al Si 7 Mg**

### CHEMICAL COMPOSITION %

ALLOY		ELEMENTS												Individual impurities	Global impurities
		Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti			
EN AB 42000	min	6,5				0,25						0,05			
	max	7,5	0,45	0,15	0,35	0,65	-	0,15	0,15	0,15	0,05	0,20	0,05	0,15	
UNI 3599	min	6,5			0,40	0,30						0,10			
	max	7,5	0,5	0,05	0,6	0,45	-	0,05	0,05			0,20		0,15*	

\*Exc.Fe

### 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 3599	EN 1706	UNI 3599	EN 1706	UNI 3599	EN 1706	UNI 3599
		Mpa	N/mm2	Mpa	N/mm2	%	%	HBW	HB
SAND (as cast)	F	140	145-165	80	100-120	2	2-3	50	55-70
	T6	220	215-245	180	175-205	1	2-3	75	70-90
SHELL (as cast)	F	170	165-195	90	110-125	2,5	4-6	55	65-80
	T6	260	255-295	220	175-205	1	6-10	90	90-110
	T64	240	-	200	-	2	-	80	-
PRESSURE DIE (as cast)									

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

DENSITY	2.68 Kg/dm <sup>3</sup>
MELTING RANGE or MELTING POINT	559 °C 620 °C
SPECIFIC HEAT (at 100)°	0.23 cal/g °C
LATENT HEAT OF MELTING	93 cal/g
LINEAR SHRINKAGE	~1.20 %
ELECTRIC CONDUCTIVITY	19 - 25 MS/m
MODULUS OF ELASTICITY	7400 Kg/mm <sup>2</sup>

THERMAL CONDUCTIVITY at 20°C	150 - 170 W/(m K)
LINEAR THERMAL EXPANSION from 20 t 100°C	21.6x10 <sup>-6</sup> /°C
LINEAR THERMAL EXPANSION from 20 t 200°C	22.6x10 <sup>-6</sup> /°C
LINEAR THERMAL EXPANSION from 20 t 300°C	23.4x10 <sup>-6</sup> /°C
SUGGESTED MAXIMUM TEMPERATURE	780 °C
SUGGESTED CASTING TEMPERATURE	
°in sand	690-740 °C
°in shell	680-730 °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	GOOD
WELDABILITY	GOOD
DECORATIVE ANODISING	MEDIUM
PROTECTIVE ANODISING	SUFFICIENT

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  
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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 42000 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

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

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

Considering the relative level of purity of the alloy's chemical composition (reduced content of Cu - Zn) it is important to consider the level of cleanliness of the melting furnaces and the attention of the re-cycling of the risers in order to prevent induced pollution that could jeopardise the technical properties of the alloy.

### TYPICAL USE

Alloy suitable for realising casting with complex design, obtaining high mechanical features; good pressurised sealing and weldability. It is used in the motor, railways, aeronautical and armaments industries (heads and bases of combustion engines, pumps, etc.). It is susceptible to hardening and tempering

EN 42000 alloy is 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	3599		AS 7 G	LM 25	356.1	Al Si 7 Mg	AC 4 C	
Similar	8024	GAISI7Mg		(L 99)	SAE 323			L-2652

### HEAT TREATMENTS

Water quenching (hot for particularly complex casting) from 530-550°C after pre-heating of at least 12 hours for sand casting and at least 8 hours for shell casting. Artificial aging

155 - -170°C for 4 - -12 hours in normal conditions.

Stabilisation at 350-390 °C for 4-8 hours in normal conditions.

#### 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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