



**MAL HUNGARIAN ALUMINIUM  
PRODUCTION AND TRADE CO. LTD.**

**PRODUCT BROCHURE**



## ALUMINIUM-HYDROXIDES

The aluminium-trihydroxide production is based on own Bayer process, where the raw material is bauxite. Aluminium-trihydrate (ATH) is produced in different grades: wet, dried, ground, viscosity optimized and fine precipitated ones.

Most important characteristics of ATHs are:

- non-toxic
- medium abrasive power
- soft (Mohs' hardness appr. 2.5)
- chemically bounded water, loses appr. 35 % water-content between 200-400 °C
- strong adsorption of oil and water



## WET AND DRIED HYDRATES

Wet and dried hydrates are mainly used as raw material in the production of:

- synthetic zeolites
- aluminium compounds
- glasses, ceramics, refractories
- other chemical products

PRODUCT TYPE			WET TYPES		DRIED TYPES	
			ALH-D80	ALH-W90	ALOLT 01	ALOLT 1AF
Al(OH) <sub>3</sub> *	min.	%	99.5 **	99.5 **	99.5	99.5
SiO <sub>2</sub>	max.	%	0.01 **	0.01 **	0.01	0.01
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.02 **	0.01 **	0.02	0.01
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.2 **	0.3 **	0.2	0.3
Moisture	max.	%	10	10	0.2	0.2
Bulk density	max.	kg/m <sup>3</sup>			1400	1300
Average particle size d <sub>50</sub>		µm	50 - 85	45 - 70	40 - 80	35 - 65
Whiteness	min.	%	75 **	90 **	75	90

\* By difference

\*\* Determined in dried material at 105 °C

ALH-001-110801

## GROUND, VISCOSITY OPTIMIZED AND FINE PRECIPITATED HYDRATES

Ground and finely precipitated hydrates are mainly used as environmentally friendly flame retardant filler materials in the production of:

- cable insulation
- cross-linked elastomers
- PVC
- polyester resins
- epoxy resins
- thermoplastics
- polyurethanes
- water-based dispersions
- papers
- paints

All these grades are white (whiteness > 90 %)

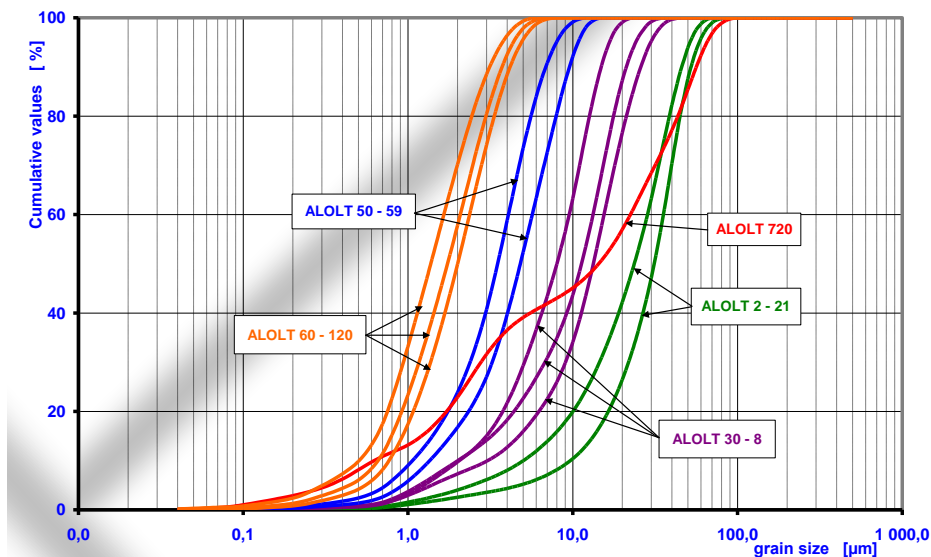
### GROUND HYDRATES

PRODUCT TYPE			ALOLT 21AF	ALOLT 2AF	ALOLT 28AF	ALOLT 8AF	ALOLT 38AF	ALOLT 30AF	ALOLT 50AF	ALOLT 59AF
Al(OH) <sub>3</sub> *	min.	%	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5
SiO <sub>2</sub>	max.	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Moisture	max.	%	0.2	0.2	0.3	0.3	0.3	0.5	0.6	0.7
Bulk density max.		kg/m <sup>3</sup>	1150	1050	1000	900	850	700	500	400
Aver. particle size d <sub>50</sub>		µm	25 - 35	15 - 25	12 - 18	10 - 15	8 - 13	5 - 10	3 - 6	2 - 4
Whiteness	min.	%	91	91	92	92	92	93	94	95

\* By difference

ALH-001-110801

### GROUND AND FINELY PRECIPITATED HYDRATES



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**Headquarters**  
 H-8400 Ajka, Gyártelep 598/15 hrsz.  
 Post address: H-8401 Ajka Pf.:124  
 Tel.: +36 (88) 522-400  
 Fax: +36 (88) 311-634

**Trade Center**  
 H-1012 Budapest, Logodi u. 34/B  
 Tel.: +36 (1) 309-4200  
 Fax: +36 (1) 309-4211



# HUNGARIAN ALUMINIUM

MAL Hungarian Aluminium Production and Trade Company Limited by Shares

## VISCOSITY OPTIMIZED HYDRATES

PRODUCT TYPE			ALOLT 704	ALOLT 710	ALOLT 714	ALOLT 716	ALOLT 720	ALOLT 730
Al(OH) <sub>3</sub> *	min.	%	99.5	99.5	99.5	99.5	99.5	99.5
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.3	0.3	0.3	0.3	0.3	0.3
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.03	0.03	0.03	0.03	0.03	0.03
SiO <sub>2</sub>	max.	%	0.03	0.03	0.03	0.03	0.03	0.03
Moisture	max.	%	0.4	0.3	0.3	0.3	0.3	0.3
Bulk density	max.	kg/m <sup>3</sup>	650	750	750	850	850	900
Whiteness	min.	%	95	92	92	90	90	90
Oil absorption	max.	ml/100g	23	20	22	22	18	16
Average particle d <sub>50</sub> **		µm	4	10	14	14	15	18
+45 µm (wet sieve) max.		%	0.5	20	5	15	35	60
+100 µm (wet sieve) max.		%	-	-	-	0.5	-	-
+200 µm (wet sieve) max.		%	-	-	-	-	-	0.1

\* By difference

\*\* Only for information

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## FINE PRECIPITATED HYDRATES

PRODUCT TYPE			ALOLT 60F	ALOLT 60DLS	ALOLT 60P	ALOLT 90F	ALOLT 90DLS	ALOLT 120F
Al(OH) <sub>3</sub> *	min.	%	99.5	99.5	99.3	99.4	99.5	99.4
SiO <sub>2</sub>	max.	%	0.02	0.02	0.02	0.02	0.02	0.02
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.02	0.02	0.02	0.02	0.02	0.02
Moisture	max.	%	0.5	0.5	0.5	0.5	0.5	0.5
Whiteness	min.	%	98.5	98.5	98.5	98.5	98.5	98.5
Bulk density		kg/m <sup>3</sup>	250 - 500	350 - 500	350 - 500	200 - 450	250 - 450	250 - 400
Average particle size d <sub>50</sub>		µm	1 - 2.2	1 - 2.2	1 - 2.2	1 - 2	1 - 2	0.8 - 1.5
Specific surface area BET		m <sup>2</sup> /g	3 - 5	3 - 5	3 - 5	5 - 8	5 - 8	8 - 12
Electrical conductivity max.		µS/cm	100	60	60	200	150	200

\* By difference

Certain surface treatment for special request is available.

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Post address: H-8401 Ajka Pf.:124  
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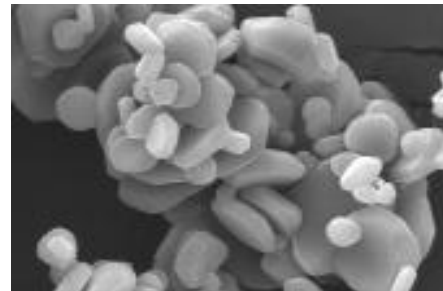
**Trade Center**  
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Fax: +36 (1) 309-4211

## ALUMINIUM-OXIDES

The alumina production is based on wet hydrate resulted from own Bayer process. To fulfill the different requirements we produce a wide range of alumina and ground alumina with normal and low soda content, controlled specific surface area and different particle size distribution.

Important characteristics of aluminium-oxides are:

- non-toxic
- medium to high abrasive power
- Mohs' hardness appr. 9
- high chemical resistance
- good fire-resistance
- good ceramic properties



## UNGROUND- AND GROUND ALUMINAS

Ground and unground aluminas are mainly used in the production of:

- fused white, ruby and pink corundum
- tabular alumina
- glazes and frits
- glasses
- household ceramics
- engineering-ceramics
- refractories
- polishing and abrasive materials

## CALCINED ALUMINAS

PRODUCT TYPE			ALO-B15	ALO-Ex30	ALO-Ex31	ALO-Ex32	ALO-Ex325	ALO-Ex33	ALO-GB1	ALO-GB1-K	ALO-Ex34	ALO-Ex35 LS
Al <sub>2</sub> O <sub>3</sub> *	min.	%	98.6***	98.6	98.6	99.3	99.3	99.5	99.5	99.5	99.5	99.6
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.4	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.1
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.03	0.05	0.04	0.025	0.025	0.025	0.03	0.03	0.03	0.05
SiO <sub>2</sub>	max.	%	0.03	0.03	0.03	0.015	0.015	0.015	0.03	0.03	0.03	0.05
CaO	max.	%				0.04	0.04	0.04	0.04	0.04	0.04	0.04
α-Al <sub>2</sub> O <sub>3</sub>		%	≤ 8	20 - 70	30 - 60	45 - 70	≥ 70	≥ 88	95 **	98 **	98 **	98 **
L.O.I.	max.	%	10	1	0.7	0.5	0.5	0.2	0.2	0.2	0.2	0.2
BET		m <sup>2</sup> /g	130-180		15 - 45	12 - 30	6 - 12	3 - 6	1.0 - 2.5	0.6-1.0	≤ 1	≤ 0.7
Prim. crystal size		µm							0.9 - 1.6	1.3-2.5	2.0 - 4.5	2 - 6
d <sub>50</sub>		µm	≤ 85	45 - 85	45 - 85	45 - 85	45 - 85	45 - 85	≤ 75	≤ 75	≤ 75	≤ 70

\* By difference

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\*\*\* Determined after ignition at 1100 °C

ALO-001-110801

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# HUNGARIAN ALUMINIUM

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## GROUND ALUMINAS 1

PRODUCT TYPE			ALO-DN-10	ALO-DN-7P	ALO-G4-4G	ALO-DN-4F ALO-DN-4S	ALO-DN-3S	ALO-KN-4F ALO-KN-4S	ALO-EL-7P	ALO-EL-4F ALO-EL-4S	ALO-EL-3S
Al <sub>2</sub> O <sub>3</sub> *	min.	%	99.5	99.5	99.5	99.5	99.5	99.5	99.6	99.6	99.6
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
SiO <sub>2</sub>	max.	%	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
CaO	max.	%	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
L.O.I.	max.	%	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
BET	max.	m <sup>2</sup> /g	1.3	1.3	1.3	1.3	1.4	1.5	1.2	1.2	1.3
d <sub>50</sub>		µm	7 - 13	5 - 10	4 - 7	4 - 7	3.8 - 4.6	3 - 6	4 - 9	3 - 7	3.0 - 4.5
d <sub>90</sub>		µm	≤ 40				≤ 10				
+ 45 µm (wet sieve)		%				F: ≤ 3 S: ≤ 0.1	≤ 0.1	F: ≤ 3 S: ≤ 0.1		F: ≤ 3 S: ≤ 0.1	≤ 0.1
+ 63 µm (wet sieve)		%		≤ 3					≤ 3		

\* By difference

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## GROUND ALUMINAS 2

PRODUCT TYPE			ALO-G22-10	ALO-G2-2	ALO-G32-2	ALO-G5-4
Al <sub>2</sub> O <sub>3</sub> *	min.	%	98.6**	99.4	99.4	99.5
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.4	0.3	0.3	0.3
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.04	0.03	0.03	0.04
SiO <sub>2</sub>	max.	%	0.04	0.02	0.02	0.04
CaO	max.	%		0.04	0.04	0.04
Loss on ignition L.O.I.	max.	%	10	0.5	0.5	0.2
Specific surface area BET		m <sup>2</sup> /g	140 - 190	12 - 30	6 - 12	max. 2
Average particle size d <sub>50</sub>		µm	7 - 13	2 - 5	2 - 5	2 - 5
+ 45 µm (wet sieve)	max.	%	1	1	1	1

\* By difference

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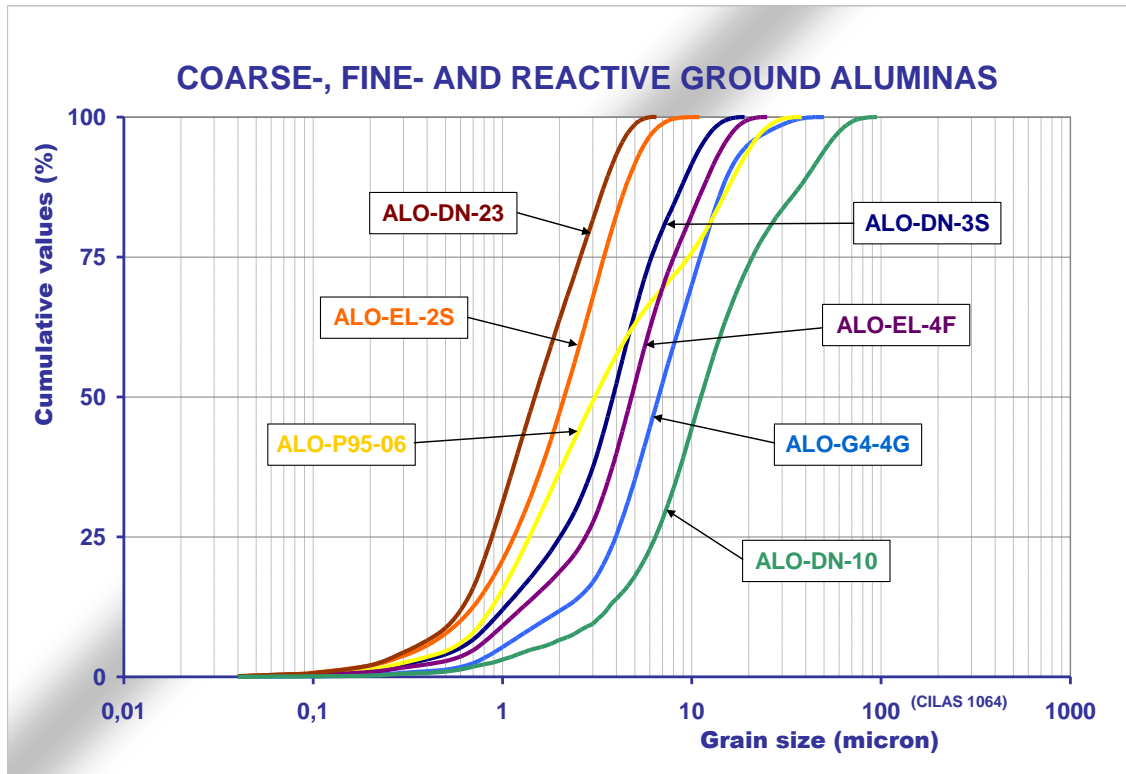
## REACTIVE ALUMINAS

PRODUCT TYPE			ALO-EL-2S	ALO-DN-2S	ALO-DN-21	ALO-DN-23	ALO-KN-2S	ALO-BN-2F	ALO-BN-2S
Al <sub>2</sub> O <sub>3</sub> *	min.	%	99.6	99.5	99.5	99.5	99.5	99.5	99.5
Na <sub>2</sub> O <sub>total</sub>	max.	%	0.1	0.3	0.3	0.3	0.3	0.3	0.3
Fe <sub>2</sub> O <sub>3</sub>	max.	%	0.05	0.04	0.04	0.04	0.04	0.04	0.04
SiO <sub>2</sub>	max.	%	0.05	0.04	0.04	0.04	0.04	0.04	0.04
CaO	max.	%	0.05	0.04	0.04	0.04	0.04	0.04	0.04
Specific surface area BET		m <sup>2</sup> /g	1.5 - 3	1.5 - 3	2.0 - 3.5	3.0 - 4.5	1.5 - 3	6 - 16	6 - 16
Average particle size d <sub>50</sub>		µm	1.7 - 2.5	1.7 - 2.5	1.6 - 2.0	1.2 - 1.8	1.7 - 2.5	2.5 - 3.7	2.3 - 3.5
d <sub>90</sub>		µm	4 - 7	4 - 7	4 - 6	3 - 5	4 - 6		
+ 20 µm (wet sieve)		%							≤ 3
+ 45 µm (wet sieve)		%						≤ 3	
Green Density / 100MPa**		g/cm <sup>3</sup>	2.4	2.4			2.5		
Fired Density at 1600°C/2h**		g/cm <sup>3</sup>	3.3	3.3			3.4		

\* By difference

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ALO-001-000801



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## POLISHING ALUMINAS

PRODUCT TYPE	Calcination degree	Average grain size $d_{50}$ ( $\mu\text{m}$ )	Sieve analysis residue on		BET ( $\text{m}^2/\text{g}$ )	Oil adsorption ( $\text{ml}/100\text{g}$ )	Bulk density ( $\text{kg}/\text{m}^3$ )
ALO-P90	low	45 - 85	+250 $\mu\text{m}$	max. 0.5 %	6 - 12	45 - 55	900-1100
ALO-P90-20	low	15 - 30	+200 $\mu\text{m}$	max. 0.1 %	6 - 15	35 - 45	600-800
ALO-DF2	low	10 - 20	+90 $\mu\text{m}$	max. 1 %	6 - 15	35 - 45	500-800
ALO-P90-06	low	4 - 8	+32 $\mu\text{m}$	max. 20 %	6 - 15	35 - 45	400-600
ALO-P90-02	low	2 - 5	+20 $\mu\text{m}$	max. 5 %	6 - 15	32 - 42	300-500
ALO-P95	medium	45 - 85	+250 $\mu\text{m}$	max. 0.5 %	3 - 6	45 - 55	1000-1150
ALO-DF223	medium	15 - 35	+100 $\mu\text{m}$	max. 0.1 %	3 - 6	35 - 45	800-1050
ALO-P95-08	medium	5 - 10	+63 $\mu\text{m}$	max. 0.5 %	3 - 8	30 - 40	400-600
ALO-P95-06	medium	4 - 8	+63 $\mu\text{m}$	max. 0.5 %	3 - 8	30 - 40	400-600
ALO-P95-01	medium	2 - 4	+45 $\mu\text{m}$	max. 0.1 %	3 - 8	32 - 42	300-500
ALO-DFC	high	40 - 70	+250 $\mu\text{m}$	max. 0.5 %	max. 0.7	40 - 55	800-1100
ALO-P54	high	20 - 70	+250 $\mu\text{m}$	max. 0.5 %	max. 1	35 - 50	650-900
ALO-DFM	high	6 - 12	+63 $\mu\text{m}$ +125 $\mu\text{m}$	max. 15 % max. 3 %	max. 1	15 - 25	700-1000
ALO-P54-04	high	3 - 6	+45 $\mu\text{m}$	max. 0.5 %	max. 1.2	15 - 25	600-800

$\text{Al}_2\text{O}_3$  min. 99%

$\text{Na}_2\text{O}$  max. 0.3%

$\text{Fe}_2\text{O}_3$  max. 0.04%

$\text{SiO}_2$  max. 0.04%

PALO-001-110801



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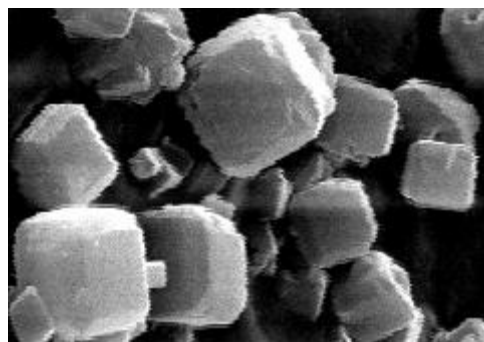


## SYNTHETIC ZEOLITE

Connected to the Bayer process we produce synthetic zeolite type 4A.

Important characteristics of synthetic 4A and 4A-W zeolites are:

- high purity
- special crystal structure
- high ion exchange ability
- gas and vapour adsorption affinity
- environmental friendly behaviour



Based on these properties zeolite is used as:

- water softener
- detergent builder
- catalyst
- gas and vapour adsorbent

PRODUCT TYPE		Zeolon P4A	Zeolon P4A-W for adsorbent use
Al <sub>2</sub> O <sub>3</sub>	%	28 - 30	28 - 30
Na <sub>2</sub> O	%	16 - 18	16 - 18
SiO <sub>2</sub>	%	32 - 34	32 - 34
L. O. I. (1h at 800°C)	%	18 - 22	18 - 22
Ca ion exchange capacity at 20 °C	mg/g	min. 160	-
Water adsorption*	%	-	min. 24
Whiteness (R460)	%	min. 95	min. 95
Average particle size d <sub>50</sub>	µm	3 - 5	3 - 5
+ 45 µm (wet sieve)	%	max. 0.5	max. 0.5
Total Fe content	ppm	max. 250	max. 250
Bulk density **	kg/m <sup>3</sup>	350 - 500	350 - 500

\* After 24 hours at 55% of relative air humidity

\*\* Only for information

ZEO-001-110801

## GALLIUM

Gallium is a relatively rarely occurring element. Our company is one of the few primary gallium producers in the world. As a result of different purification process, metal gallium is produced with purity of 99.99 to 99.99999 %.

The main application fields of gallium are:

- optoelectronic devices, LEDs
- semi-conductors
- very high frequency communication devices
- computing (IT) equipments



## GALLIUM 4N

Elements	Detection limit ppm (weight)
Al	max. 1
Mg	max. 1
Si	max. 1
Fe	max. 1
Ni	max. 1
Cu	max. 5
Zn	max. 10
Hg	max. 12
Pb	max. 2

GAL-001-110801



## GALLIUM 6N, 7N

**GALLIUM 6N** and **7N** with much less impurities content (measured in ppb) than Gallium 4N are also produced by MAL and were certified by the National Research Council Canada.

Characteristics in ppb (weight)

Elements	Warrantied value		Detection limit
	6N	7N	
Li	ND	ND	0.1
Be	ND	ND	0.1
B	max. 1	ND	0.2
F	ND	ND	10
Na	max. 3	max. 1	0.2
Mg	max. 3	max. 1	0.2
Al	max. 5	max. 2	0.2
Si	max. 5	max. 2	0.3
P	max. 2	max. 1	0.3
S	max. 5	max. 2	0.3
Cl	max. 5	max. 2	0.5
K	ND	ND	30
Ca	max. 5	max. 3	2
Sc	ND	ND	0.1
Ti	max. 2	max. 0.5	0.1
V	max. 1	max. 0.5	0.1
Cr	max. 1	max. 0.5	0.3
Mn	max. 1	max. 0.5	0.1

Characteristics in ppb (weight)

Elements	Warrantied value		Detection limit
	6N	7N	
Fe	max. 10	max. 5	0.1
Co	ND	ND	0.1
Ni	max. 5	max. 2	0.2
Cu	max. 5	max. 2	0.5
Zn	max. 5	max. 2	0.6
Ge	ND	ND	10
As	ND	ND	0.5
Se	ND	ND	15
Br	ND	ND	5
Rb	ND	ND	0.2
Sr	ND	ND	0.7
Y	ND	ND	0.2
Zr	ND	ND	0.6
Nb	ND	ND	0.2
Mo	ND	ND	0.5
Ag	ND	ND	50
Cd	ND	ND	2
In	max. 10	max. 2	0.3

Characteristics in ppb (weight)

Elements	Warrantied value		Detection limit
	6N	7N	
Sn	max. 10	ND	2
Sb	max. 5	ND	0.6
Te	max. 10	max. 3	1
I	ND	ND	0.2
Cs	ND	ND	0.2
Ba	ND	ND	1
La	ND	ND	0.2
Ce	ND	ND	20
Hf	ND	ND	0.3
W	max. 10	max. 2	0.3
Pt	max. 5	ND	0.6
Au	ND	ND	15
Hg	max. 20	max. 5	2
Tl	ND	ND	0.3
Pb	max. 15	max. 3	0.3
Bi	max. 5	max. 2	0.3
Th	ND	ND	0.4
U	ND	ND	0.4

ND: not detectable / below detection limit

GAL-001-110801

## ALUMINIUM CASTING ALLOYS

The ALU-FÉM Division produces on demand aluminium casting alloys from purchased scrap for metal foundries with its good experiences, modern equipments and well-tried technology.

**Typical qualities:** DIN 226, DIN 230, DIN 231, DIN 239, ADC 10, ADC 12; A 383, A 390  
AS13, AS10G, AS9U3G

AlSi18CuNiMg

Analysis of alloys: ARL 3460 type optical emission spectrometer

**Weight and measurements:** 7 kg  
665 x 90 x 50 mm

**Packing:** bundled and strapped with steel and plastic band

**Delivery:** by truck and rail

**Other:** On separate customer order: analysis for 29 elements within 48 hours at the qualities Al 99.5-99.7; AlSi; AlSiCu; AlMgSi; AlMg2-5

The technical delivery conditions are agreed in every case when concluding the contract. Special customer requirements can be met as well.





**MAL HUNGARIAN ALUMINIUM PRODUCTION AND  
TRADE COMPANY LIMITED BY SHARES  
IS EXPECTING YOUR KIND INQUIRIES  
AT THE FOLLOWING ADDRESSES:**

**HEADQUARTERS**

**H-8400 AJKA GYÁRTELEP HRSZ 598/15. (P.O. BOX 124.)**

**PHONE: +36 88 522 400**

**FAX: +36 88 311 634**

**E-MAIL: mal@mal.hu      malker@mal.hu**

**TRADE CENTER**

**H-1012 BUDAPEST LOGODI U. 34/B.**

**PHONE: +36 1 309 4200**

**FAX: +36 1 309 4211**



**www.mal.hu**

**mal@mal.hu**

**malker@mal.hu**