

# DATA SHEETS

## Aluminium



Special Material:

# FORMODAL<sup>®</sup> 023

cast plates

Applications:

- tool making, mould making, model making



ALUMINIUM

COPPER

BRASS

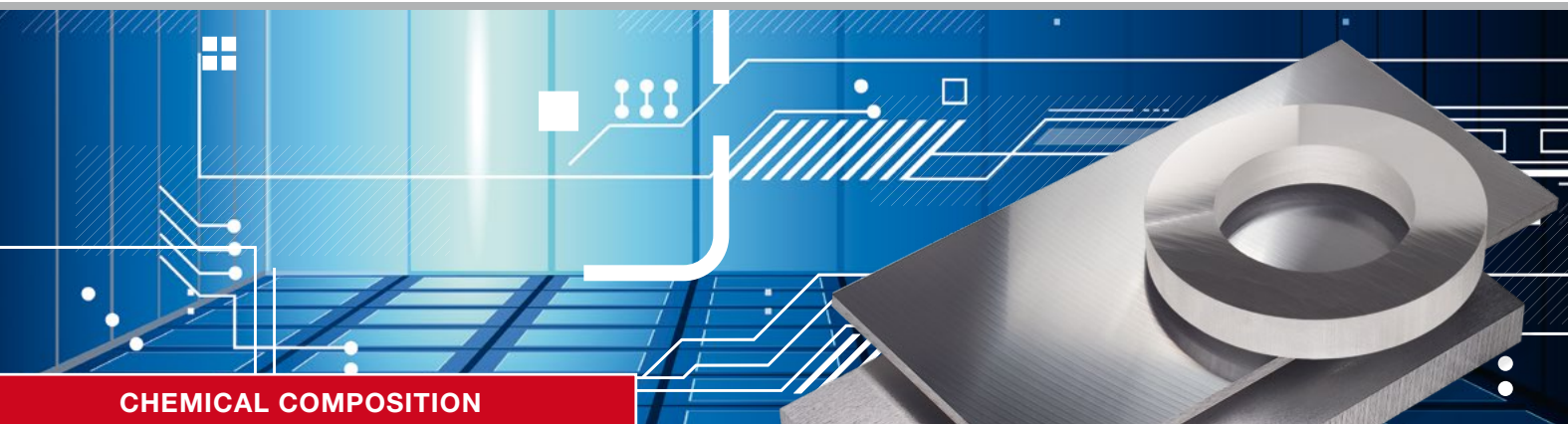
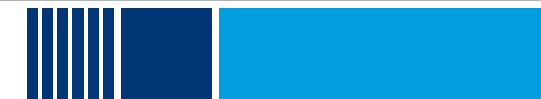
BRONZE

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## CHEMICAL COMPOSITION

### Aluminium and aluminium alloys

Specially for tool making, mould making and model making cast plates



#### Alloy designation:

EN AW	5083
EN AW	Al Mg4,5 Mn0,7
Old designation	Al Mg4,5 Mn
Material no. according to DIN	3.3547
Great Britain BS	N8
Italy UNI	7790
Spain	L-3321
Sweden	144140
Norway	17215
France AFNOR	A-G4,5MC
Colour code	RAL 8002 Signal Brown

#### Typical physical properties:

Density [g/cm³]		2,66
Elastic modulus [GPa]		70
Thermal conductivity [W/m*K]		110 – 140
Thermal expansion coefficient [K <sup>-1</sup> *10 <sup>-6</sup> ]	-50°C – 20°C	
	20°C – 100°C	23,5
	20°C – 200°C	
	20°C – 300°C	
Specific heat J/(kg * K)		900
Electrical conductivity [m/Ω*mm²]		16 – 18

#### Chemical composition\* (EN 573-3):

Specifications in %												Remainder: Aluminium		Other	
Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Ga	V	Note	Individual	Total <sup>2</sup>		
0,40	0,40	0,10	0,40 – 1,0	4,0 – 4,9	0,05 – 0,25	-	0,25	0,15	-	-	-	0,05	0,15		

<sup>x</sup> Chemical specifications as perc. of weight. If no ranges are specified, the alloy content has the maximum value.

<sup>2</sup> Includes all items listed for which no limit values are specified.

#### Special features of this material:

- Cast plates
- Very good machinability
- Excellent corrosion resistance
- Good welding properties
- Low stress and dimensionally stable

#### Applications:

- Tool making, mould making and model making
- Blow moulds and injection moulds
- Laminating tools
- Moulds for elastomer materials
- Moulds and heat-stressed parts
- Moulds with welded construction
- Refrigeration technology

#### Available forms:

**Sheets · Plates · Cuttings · Circular blanks · Rings · Parts from drawings**

#### Heat treatment:

Soft annealing / recrystallisation annealing	
Annealing temperature	380°C – 420°C
Heating-up time	0,5 – 3 hours
Cooling conditions	30°C/h - 50°C/h

Hardening	
Solution annealing	-
Quenching	-
Natural ageing treatment	-
Artificial ageing treatment	-

#### Other data:

##### Processing / machinability

Homogenised and stress relieved	1 – 2
Dimensional stability	1
<b>Erosion</b>	1

##### Surface treatment

Anodising - (protective anodisation)	2
Special anodising quality (EQ) <sup>EQ</sup>	-
Anodising - decorative	5
Painting / coating	4
Polishing	2 – 3

##### Welding

		Filler metal
Gas	4	
WIG	2	S-Al 5183 S-Al 5356 S-Al 5087
MIG	2	
Resistance welding	2	

##### Solder

Brazing with flux	-
Brazing without flux	-
Abrasion soldering	-
Soft soldering with flux	-

#### Corrosion resistance

In a normal atmosphere/ weather conditions	1
Sea water atmosphere	1

#### Metal forming

Cold forming		Delivery condition
Bending	5	
Pressure forming	5	
Deep drawing (condition-based)	5	
Upsetting (condition-based)	5	
Impact extrusion	5	
Hot forming		
Drop forging	-	
Extrusion moulding	-	
Hammer forging	-	

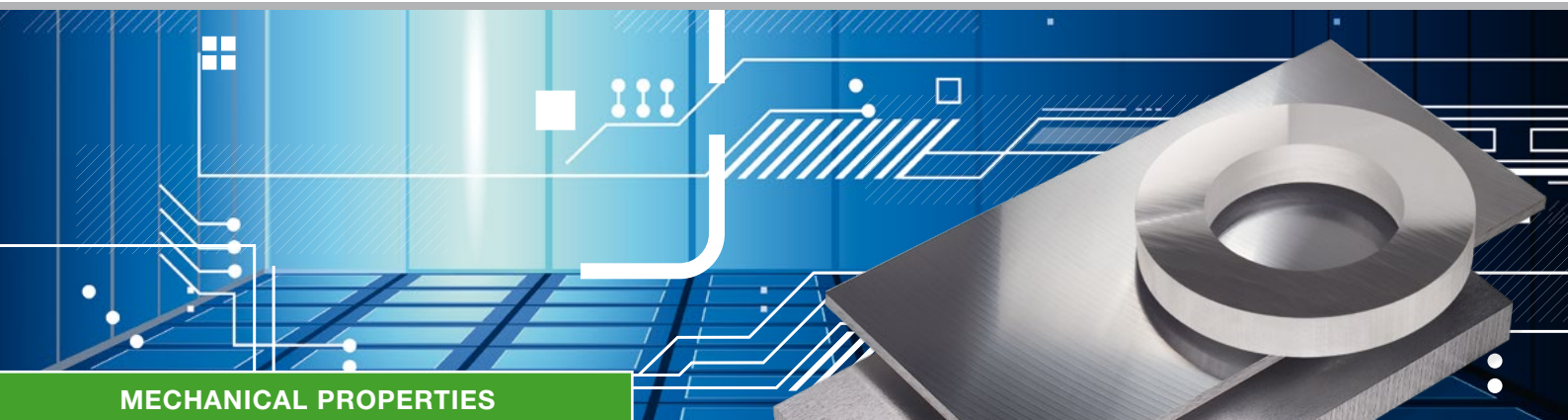
Suitable for food industry according to DIN EN 602	yes
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#### Legend:

- 1 very good
- 2 good
- 3 moderate
- 4 poor
- 5 unsuited
- EQ anodising quality must be ordered separately and confirmed

The specifications in our data sheets are subject to correction and are only valid as references. Liability is excluded in this regard. We reserve the right to make changes to the standards and informative values. The agreements of our order confirmation are always authoritative. With regard to anodic oxidisability, we point out that we accept no liability for the anodisation result and the colour formation for decorative applications. The same applies to the corrosion resistance. Special arrangements must be made in writing.

# FORMODAL® 023 cast



## MECHANICAL PROPERTIES

### Aluminium and aluminium alloys

Specially for tool making, mould making and model making cast plates



### Typical mechanical properties:

Delivery condition <sup>5</sup>	Nominal thickness mm		Tensile strength $R_m$ MPa		Elastic limit $R_{p0.2}$ MPa		Elongation % min.		Bending radius <sup>9</sup>		Hardness <sup>9</sup> HBW
	over	to	min.	max.	min.	max.	A10 mm	A	180°	90°	
O3	6	1000	230	290	110	130	15	-			70 – 80

<sup>9</sup> For information only

### We supply aluminium sheets and plates of alloy FORMODAL® 023 in the following dimensions:

Thickness mm	Length x Width mm
5 - 570	3.020 x 1.520
5 - 1.070	3.200 x 1.730
5 - 570	3.670 x 1.570
5 - 800	4.000 x 1.570
10 - 570	4.000 x 2.160
10 - 570	6.000 x 2.160
10 - 470	6.100 x 1.520

### Tolerances:

Cut to size by band saw		Plates
Thickness: -0/+3 mm	Length x Width: -0/+3 mm	Length x Width: ± 20 mm

### Available forms:

**Sheets · Plates · Cuttings · Circular blanks · Rings · Parts from drawings**