

WE CREATE QUALITY
MORE THAN ALUMINIUM FOR YOUR SUCCESS.

ALUMINIUM IS OUR PASSION

A 'young' metal with incredible potential is still at the beginning of a promising career. For several years, we have put our trust in aluminium as the material of the 21st century.

Aluminium helps our community to build using light, resource-saving and cost-effective materials. Furthermore it is 100% recyclable and meets all the requirements of a modern metal.

The use of a modern and innovative material often gives rise to questions concerning processing. Therefore it is even more important to have the aluminium experts of GLEICH Aluminium at his side: our core business is the development, production and the global distribution of G.AL® precision machined aluminium plates. The brand name G.AL® stands for extremely low distortion, form stability and homogeneous precision-machined, sawn and ground cast plates with a consistent quality.

G.AL® aluminium plates are suitable for many different fields of applications, especially for machine building, laser and optical industries, medical technology, mould-making, toolmaking and for architecture. Due to the weight savings gained by using aluminium, GLEICH Aluminium helps to save valuable resources. At the same time the ease of machining compared with steel is a cost and time advantage use by our customers.

We create quality. Stay competitive and count on our passion.



OUR COMPONENTS FOR YOUR SUCCESS:

- Research and development of new materials: always at the cutting edge
- Entire process chain: from ingot/blocks to CNC processing
- Traceable: 3.1 certificates according to EN 10204:2004
- Highest quality standards: DIN EN ISO 9001:2008 certified
- Resource-saving: DIN EN ISO 14001:2009 certified
- State-of-the-art: fully automated production facilities
- Own heat treatment facility: consistently high quality
- Qualified contact persons: experts in aluminium at your side
- Blocks, plates and cut to sizes according to your specification: quickly available
- CNC processing: from prototypes up to small series

G.AL® PRECISION MACHINED CAST ALUMINIUM PLATES

G.AL® C250, G.AL® C250GS – Highest precision with a minimum of residual stresses
Alloy: EN AW 5083

Our concept of precision ...

Apart from the high requirements regarding thickness, tolerance, flatness, parallelism and roughness, we put our focus on the 'inner' material characteristics: the physical, metallurgical and technological properties. The result is a repeatable maximum of internal and external precision for each plate and each cutting.

G.AL® C250 is characterised by an excellent form stability, very good machinability, extremely low residual stresses and high strengths. The very fine-grained and homogeneous microstructure is nearly without any microporosity. Therefore **G.AL® C250** is a very good solution for precision parts with high demands and a very good form stability and extremely low residual stresses.

G.AL® C250 is two sides precision machined and PVC-foiled on both sides. The excellent flatness and thickness tolerance allows the shortest production times in areas such as mechanical engineering, gauge production and the construction of jigs and fixtures in all kinds of capital goods industries.

Cost- and time-effective machining with **G.AL® C250**.

G.AL® C250GS has been belt-sanded on both surfaces in the longitudinal direction, to receive a neutral surface, thus eliminating any milling marks.

SPECIFIC NOTES

- Precision machined surface
- Excellent flatness
- High stress relief
- High strength
- Very good level of homogeneity
- Very good corrosion resistance
- Excellent form stability
- Very small tolerances in flatness, thickness and parallelism

FIELDS OF APPLICATION

Typical fields of application are mechanical engineering, gauge construction, electronic industry, optical industry and medical technology.

- Components requiring a lot of machining
- All kinds of side- and backboards
- All kinds of base and table plates
- Transfer and indexing plates
- All kinds of gauges
- Displays for screens
- Mounting plates

USAGE



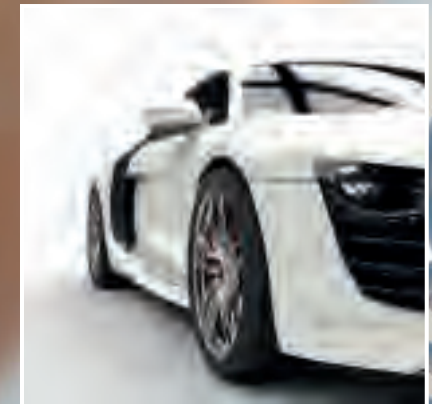
Not as fast as the production of food, but we have achieved the shortest production times by using **G.AL® C250** precision machined cast aluminium plates.



We can not conquer the universe, but we can ensure a little more safety with our materials: electronic boards in **G.AL® C250**.



What are the commonalities of aluminium plates and a production line for electronics components? Base plates, work-holding fixture, translation stages, assembly tables in **G.AL® C250**.



Behind the quality you can see there is the quality that needs to be tested: checking gauges and jigs in **G.AL® C250**.

G.AL® PRECISION MACHINED CAST ALUMINIUM PLATES

G.AL® C250 ELOX^{PLUS} – For optimal anodising results
Alloy: EN AW 5083

G.AL® C250 ELOX^{PLUS}: optical demands meet precision!

The requirements of technical and visual anodising have increased steadily in recent years. By offering excellent properties for anodising and hard anodising, as well as reliable G.AL® C250 quality, G.AL® C250 ELOX^{PLUS} is an ideal solution and will help you to stay competitive and to satisfy your customers.

Due to a very special casting procedure with pre-cleaned melting and a following homogenisation we developed a superior anodising quality. We have tightened controls in regards to chemical and physical properties of the output material. For this reasons G.AL® C250 ELOX^{PLUS} stands for an optimal anodising quality.

G.AL® C250 ELOX^{PLUS} is precision machined on two sides and foiled on both sides. The excellent flatness and thickness tolerance allows the shortest production times, for example in mechanical engineering, gauge production and the construction of jigs and fixtures in all kinds of capital goods industries.

Cost- and time-effective machining with G.AL® C250 ELOX^{PLUS}.



EXPERT ADVICE

If the components must be reproducible and optically error free, there is no better opportunity than using G.AL® C250 ELOX^{PLUS}!
Please consider our guidelines for anodising on www.gleichaluminium.com.

Sven Flaake, Technical Product Management

SPECIFIC NOTES

- Excellent anodising
- Highest reproducibility
- Very fine-grained structure
- Very good polishability
- Two surfaces precision milled
- Excellent flatness
- Stress relieved
- Elevated strength
- Very homogeneous
- Outstanding corrosion resistance

FIELDS OF APPLICATION

Typical fields of application are electronics, the laser, packaging and optical industries and the medical and laboratory technology.

- Displays and front frames
- Pressure plates
- Laser modules
- All kinds of base and table plates
- Cover plates
- Holders of microscopes and telescopes

USAGE



Colour accents for a friendly working environment. **G.AL® C250 ELOX^{PLUS}** for highest precision and optical design in automation.



Antibiotics against lack of reproducibility: Excellent anodising results in medical technology with **G.AL® C250 ELOX^{PLUS}**.



Not only the sound makes the music enjoyable. The combination of acoustics, design and **G.AL® C250 ELOX^{PLUS}** provides excellent optical characteristics.



For optical details: **G.AL® C250 ELOX^{PLUS}** with unique characteristics for your advances in optics and technology.

G.AL® PRECISION MACHINED CAST ALUMINIUM PLATES

G.AL® C330 – Excellent precision, highest strength
Alloy: EN AW 7021

Strength vs. precision: G.AL® C330 combines both!

To use all the advantages of **G.AL® precision machined cast aluminium plates** in applications requiring higher strength levels, we developed **G.AL® C330**. The high strength values combined with very low residual stresses are unique and reduce the production time significantly. In addition **G.AL® C330** has a very good corrosion resistance because of the temper of T79.

For this reason, in the last few years **G.AL® C330** became a better alternative to standard rolled plates as they increase production profitability.

Because of the time saved, you can reduce manufacturing costs by using **G.AL® C330**, especially in mechanical engineering and jig making.

SPECIFIC NOTES

- Precision machined surface
- High stress relief
- Very high strength
- Very good homogeneity
- Excellent form stability
- Two surfaces precision milled and foiled on both sides

FIELDS OF APPLICATION

Typical fields of application are mechanical engineering, jig making and tooling technology.

- Highly stressed machine components
- Components requiring a lot of machining
- All kinds of base and table plates
- Transfer and indexing plates
- Components requiring high strength values combined with very low residual stresses
- Tool holders

USAGE



Always on time: the very high strength of **G.AL® C330** guarantees stability in production and assembly technology.



Do not drop!
Gripping elements in **G.AL® C330**.



Corking machines with impeller and mandrel wheel in **G.AL® C330**.



Even under high pressure: **G.AL® C330** ensures high quality components in printing machines.

G.AL[®] MEDIUM STRENGTH, SIX-SIDES SAWN ALUMINIUM CAST PLATES

G.AL[®] C210R, G.AL[®] C210E – Excellent form stability, shortest machining times
Alloy: EN AW 5083

G.AL[®] C210R: universally applicable - the solution for medium strength applications!

Because of the specific in-house heat treatment, G.AL[®] products get a homogeneous micro-structure over the entire ingot cross section. This is an important distinctive feature of rolled plates. The strength of rolled plates decreases towards the ingot core.

G.AL[®] medium-strength, six-sides sawn aluminium plates are characterised by an excellent form stability, very good machinability, very good corrosion resistance and good anodising quality. Therefore **G.AL[®] C210R** is an excellent solution for mechanical engineering and mould-making. Uniform properties over the entire plate cross section guarantee a high quality of manufactured products. Restricted process parameters in the production ensure a very high reproducibility over long production periods.

Available in thicknesses up to 1,070 mm / 141.73 in. G.AL[®] C210R can also be used for high-volume projects.

For shorter production times the one-sided precision machined cast aluminium plate **G.AL[®] C210E** is available. The milling of a reference plane and cost-intensive set-up times are therefore eliminated.

SPECIFIC NOTES

- Extremely stress relieved
- Excellent form stability
- Very good corrosion resistance
- Six-sides sawn

FIELDS OF APPLICATION

Typical fields of application are mould-making (plastics industry / automotive industry) and mechanical engineering.

- Injection moulds for prototypes
- Deep drawing and casting moulds for the plastics industry
- Foaming and blowing moulds (for low pressure)
- Components requiring a lot of machining

USAGE



Staying cool: the excellent form stability and very good thermal conductivity of **G.AL® C210R** guarantees precise temperature conditions in the electronics and semiconductor industry.



So fresh, stay fresh! Deep-drawing, vacuum moulds and thermo moulds in **G.AL® C210R** produce hygienic packaging units in the packaging and food industry.



Base plates in **G.AL® C210E** for systems and machinery in automation technology.



Shortest process times and low costs do not only apply to the food industry with **G.AL® C210R**.

G.AL® HIGH STRENGTH, SIX-SIDES SAWN ALUMINIUM CAST PLATES

G.AL® C330R – High strength, excellent form stability
Alloy: EN AW 7021

Strength is the difference ...

If the requirements towards the strength are high and the component must endure heavy loads, **G.AL® C330R** is the ideal solution.

The six-sides sawn cast aluminium plate **G.AL® C330R** is characterised by a very good machinability, very high strength and very low residual stresses. Therefore **G.AL® C330R** is an excellent solution for multiple applications under heavy loads in mechanical engineering and mould-making. The very good ability for polishing leads to excellent product quality and a very long lifetime of injection and foaming moulds. Even components with excessive machining can be realised easily.

SPECIFIC NOTES

- Excellent form stability
- Stress relieved
- High strength
- Very good machinability
- Six-sides sawn

FIELDS OF APPLICATION

One typical field of application is mould-making in plastics and the automotive industry.

- Injection moulds (for low and medium pressure)
- Deep drawing and casting moulds
- Foaming and blowing moulds (for low pressure)
- Tool-changing equipment
- Bearing blocks and fittings for bigger loads

USAGE



Moulds and jigs in **G.AL® C330R** guarantee cost minimisation and process optimization e.g. in the footwear industry.



Time-saving production of moulds and machinery and the shortest cycle times in the plastics industry with **G.AL® C330R**.



Moulds and assembly jigs in **G.AL® C330R** for the automotive industry, rail vehicle engineering and aviation engineering.



Very good machinability and very low residual stresses: **G.AL® C330R** is an excellent solution for components in almost all sectors of the capital goods industry.

G.AL® DYNAMIC

G.AL® C210 DYNAMIC, G.AL® C330 DYNAMIC – The special products for highly sensitive applications
Alloy: EN AW 5083, EN AW 7021

We set new standards: increase service life, reduce production times!

Component failure by cracking especially under dynamic loads is a common problem. Here you can find the solution! **G.AL® DYNAMIC** materials have a lifetime that is up to 40 times higher, very good polishing properties and the excellent machinability of aluminium cast plates.

G.AL® C210 DYNAMIC was especially developed for components in the sensitive field of vacuum, pneumatics and laser techniques. The very good damping characteristics make it ideally suited for applications under dynamic loads.

G.AL® C330 DYNAMIC, with its elevated strength values, is suitable for applications bearing high dynamic loads. The good thermal conductivity predestines **G.AL® C330 DYNAMIC** for blow moulds and injection moulds.

G.AL® DYNAMIC: There are no comparable materials combining a high endurance strength and excellent machining abilities. The pore-free structure of **G.AL® DYNAMIC** makes it ideally suited for the vacuum technology and for all applications bearing dynamic loads.



EXPERT ADVICE

G.AL® DYNAMIC has completely isotropic properties and is therefore first choice for fluid-carrying parts like cooling circuits or in hydraulics.

Sven Flaake, Technical Product Management

FIELDS OF APPLICATION G.AL® C210 DYNAMIC

Typical fields of application are mould-making (plastics industry), medical engineering and laser technology.

- Vacuum technology
- Pneumatics
- Injection moulds for prototypes
- Deep drawing and casting moulds for the plastics industry
- Foaming and blowing moulds (for low pressure)

FIELDS OF APPLICATION G.AL® C330 DYNAMIC

Typical fields of application are mould-making (plastics industry), mechanical engineering and jig making.

- Vacuum technology
- Pneumatics and hydraulics
- Bearing blocks
- All kinds of gear boxes
- Tool holders and carriers
- All kinds of moulds (for low and medium pressure)

USAGE



Because of its very good homogeneity and its pore-free structure, **G.AL® DYNAMIC** is very well suited for vacuum technology.



The higher rupture strength of **G.AL® DYNAMIC** minimises the failure risk of controls, adjusting elements and brackets.



Because of the very good damping characteristics of **G.AL® DYNAMIC** lets fast-moving assembly heads do their work quietly and precisely.



High-precision manufactured hydraulic control elements in **G.AL® C210 DYNAMIC** (up to 250 bar) and in **G.AL® C330 DYNAMIC** (up to 450 bar).



THE ALUMINIUM COMPLETE PACKAGE:

Increase your competitiveness in co-operation with our experts in aluminium!

Development cycles become shorter, the requirements for innovative applications even higher. Our research and development focus is unique on the market: the perfect integration of research and development, plate manufacturing and CNC machining optimises our material properties and manufacturing techniques at the same time.

Product innovations like **G.AL® C250 ELOX^{PLUS}** or **G.AL® DYNAMIC** are developed internally and then subjected to in-depth testing on their product usability. Moreover, we test innovative joining techniques in co-operation with adhesive material manufacturers and new aluminium tools in co-operation with tool manufacturers. With these experiences, we support you from the development of components to complex assemblies.

YOUR OPTIONS

Our service portfolio:

- G.AL® aluminium plates and blocks
- Aluminium cut to size
- CNC machining
- CNC drilling
- Water-jet cutting
- Welding / electron beam welding
- Sandblasting / grinding / polishing
- Anodising / hard anodising / powder coating
- Assembly work of modules

USAGE



Latest CNC technology with optimal tuned parameters for aluminium machining.



In co-operation with tool manufacturers, we test innovative tools for their suitability.



Years of experience in the machining of aluminium together with knowledge of the material: we begin where others give up!



Precision is our focus: precision plates machined with precision tools make for satisfied customers!

PRODUCT OVERVIEW

		PRECISION MACHINED CAST ALUMINIUM PLATES			SIX-SIDES SAWN ALUMINIUM PLATES	
PRODUCT NAME		G.AL® C250 <small>Also available in G.AL® C250GS (ground on two sides)*</small>	G.AL® C250 ELOX ^{PLUS}	G.AL® C330	G.AL® C210R <small>Also available in G.AL® C210E (milled on one side)*</small>	G.AL® C330R
Alloy (according to EN 573-3)	EN AW Chemical symbol Material no. Type	5083 AlMg4,5Mn0,7 3.3547 not heat-treatable	5083 AlMg4,5Mn0,7 3.3547 not heat-treatable	7021 AlZn5,5Mg1,5 heat-treatable	5083 AlMg4,5Mn0,7 3.3547 not heat-treatable	7021 AlZn5,5Mg1,5 heat treatable
Temper		homogenised and stress relieved, o3	homogenised and stress relieved	solution heat-treated, quenched, artificially aged, T79	homogenised and stress relieved, O3	hardened T79
Surface	Texture Roughness R _a	two surfaces precision milled 0.4 µm / 0.000016 in.	two surfaces precision milled 0.4 µm / 0.000016 in.	two surfaces precision milled 0.4 µm / 0.000016 in.	six-sides sawn < 15 µm / <0.000591 in.	six-sides sawn < 15 µm / <0.000591 in.
Mechanical Properties¹⁾						
Yield strength R _{p0,2}	[MPa] / [ksi]	110 – 130 / 16 – 19	110 – 130 / 16 – 19	290 – 340 / 42 – 47	110 – 130 / 16 – 19	290 – 340 / 42 – 47
Ultimate tensile strength R _m	[MPa] / [ksi]	230 – 290 / 33 – 42	230 – 260 / 33 – 38	320 – 380 / 46 – 55	230 – 290 / 33 – 42	320 – 380 / 46 – 55
Elongation A	[%]	10 – 15	10 – 15	2.5 – 4.5	10 – 15	2.5 – 4.5
Hardness HBW	[2.5/62.5]	68 – 75	68 – 73	110 – 120	68 – 75	110 – 120
Physical Properties¹⁾						
Density	[g/cm³] / [lbs/cu. in.]	2.66 / 0.096	2.66 / 0.096	2.80 / 0.101	2.66 / 0.096	2.80 / 0.101
Module of elasticity	[GPa] / [ksi · 10 ³]	70 / 10.2	70 / 10.2	70 / 10.2	70 / 10.2	70 / 10.2
Electrical conductivity	[m/Ω · mm²] / [% IACS]	16 – 18 / 29 – 32	16 – 18 / 29 – 32	21 – 24 / 38 – 43	16 – 18 / 29 – 32	21 – 24 / 38 – 43
Coefficient of thermal expansion	[K ⁻¹ · 10 ⁻⁶] / [10 ⁻⁶ / °F]	23.3 / 13.1	23.3 / 13.1	23.0 / 12.9	23.3 / 13.1	23.0 / 12.9
Thermal conductivity	[W/m · K] / [BTU in. / ft²hr °F]	110 – 130 / 64 – 75	110 – 130 / 64 – 75	125 – 155 / 72 – 90	110 – 130 / 64 – 75	125 – 155 / 72 – 90
Specific heat capacity	[J/kg · K] / [BTU/lb °F]	900 / 0.212	900 / 0.212	875 / 0.206	900 / 0.212	875 / 0.206
Processing Characteristics²⁾						
Form stability		1	1	2	1	2
Machining		2	2	1 – 2	2	1 – 2
Welding (Gas / TIG / MIG / resistance / EB)		4 / 2 / 2 / 2 / 1	4 / 2 / 2 / 2 / 1	6 / 5 / 2 / 6 / 1	4 / 2 / 2 / 2 / 1	6 / 5 / 2 / 6 / 1
Corrosion resistance (seawater / weather / stress cracking)		1 / 1 / 3	1 / 1 / 3	4 / 3 / 4	1 / 1 / 3	4 / 3 / 4
Use at temperatures ³⁾ (max. °C long / short therms) / (max. °F long / short therms)		180 / 280 / 356 / 536	180 / 280 / 356 / 536	120 / 140 / 248 / 284	180 / 280 / 356 / 536	120 / 140 / 248 / 284
Anodising ⁴⁾ (technical / decorative / hard-)		2 / 4 / 2	1 / 2 / 1	3 / 6 / 2	2 / 4 / 2	3 / 6 / 2
Polishing		2 – 3	2 – 3	1 – 2	2 – 3	1 – 2
Etching		4 – 5	4 – 5	2 – 3	4 – 5	2 – 3
Contact with food (according to EN 602)		yes	yes	no	yes	no
Tolerances						
Thickness in [mm] / [in.]		+/-0.10 / +/-0.004	+/-0.10 / +/-0.004	+/-0.10 / +/-0.004	Plates ≤ 150 mm: -0/+2.5 mm Plates > 150 mm: -0/+5 mm Plates ≤ 5.90 in.: -0/+0.1 Plates > 5.90 in.: -0/+0.2	
Flatness [mm/m ²] / [in.]		5 mm: 0.80 / 0.197 in.: 0.031 6 – 12.7 mm: 0.40 / 0.236 – 0.500 in.: 0.016 > 12.7 mm: 0.13 / > 0.50 in.: 0.005	5 mm: 0.80 / 0.197 in.: 0.031 6 – 12.7 mm: 0.40 / 0.236 – 0.500 in.: 0.016 > 12.7 mm: 0.13 / > 0.50 in.: 0.005	10 – 15 mm: 0.40 / 0.394 – 0.591 in.: 0.016 > 15 mm: 0.25 / > 0.591 in.: 0.010	-	
Plate tolerances width / length [mm] / [in.]		-0/+10 -0/+20 / -0/+0.394 -0/+0.787 according to DIN ISO 2768-1m			-0/+10 -0/+20 / -0/+0.394 -0/+0.787	
Sawing tolerance width / length [mm] / [in.]					Thickness ≤ 150 mm = DIN ISO 2768-1m / Thickness > 150 mm = -0/+5 mm Thickness ≤ 5.9 in. = -0/+ 0.1 / Thickness > 5.9 in. = -0/+ 0.2	

G.AL® DYNAMIC

G.AL® C210 DYNAMIC

G.AL® C330 DYNAMIC

5083
AlMg4,5Mn0,7
3.3547
not heat-treatable

7021
AlZn5,5Mg1,5
heat-treatable

O3

T79

six-sides sawn
< 15 µm / <0.000591 in.

six-sides sawn
< 15 µm / <0.000591 in.

115 – 130 / 17 – 19
250 – 280 / 36 – 41
18 – 25
75 – 80

290 – 330 / 42 – 48
350 – 370 / 51 – 54
5 – 8
110 – 115

2.66 / 0.096
70 / 10.2
16 – 18 / 29 – 32
23.3 / 13.1
110 – 130 / 64 – 75
900 / 0.212

2.80 / 0.101
70 / 10.2
21 – 24 / 38 – 44
23.0 / 12.9
125 – 155 / 72 – 90
875 / 0.206

1
1 – 2
4 / 2 / 2 / 2 / 1
1 / 1 / 2
180 / 280 / 356 / 536

2
1
6 / 5 / 2 / 6 / 1
4 / 3 / 2
120 / 140 / 248 / 284

2 / 4 / 2
2
3 – 4
yes

3 / 6 / 2
1
2
no

≤ 150 mm: -0/+2.5 mm > 150 mm: -0/+5 mm /
≤ 5.90 in.: -0/+0.1 > 5.90 in.: -0/+0.2

*A current datasheet and more technical information about the products G.AL® C250GS and G.AL® C210E you can find under www.glechaluminium.com. UNIDAL® and CERTAL® are registered trademarks of Constellium VERLAI S.A.

- 1) Typical values at room temperature.
- 2) A50.
- 3) Ratings from 1 (very good) to 6 (inapplicable).
- 4) Stress corrosion cracking.
- 5) Without loss of strength after cooling down.
- 6) Under dynamic loads 70/90 °C (158/194 °F).
- 7) No warranty towards optical demands (analogous to the „classical“ anodising quality of rolled material, colour uniformity can also with G.AL® C250 ELOX^{PLUS} only be achieved within one batch).
- 8) Depends on the thickness.
- 9) The flatness tolerances are measured exclusively on full plates with a digital measuring instrument per one meter.

Thickness ≤ 150 mm = DIN ISO 2768-1m / Thickness > 150 mm = -0/+5 mm
Thickness ≤ 5.90 in = DIN ISO 2768-1m / Thickness > 5.90 in. = -0/+0.2

STANDARD STOCK SIZES

Stock sizes mm / in.

1540 × 3048
60.5 × 120.0

1540 × 3670
60.5 × 144.5

2160 × 4000
85.0 × 157.4

Maximum thickness mm / in.

G.AL® C250 ELOX^{PLUS}: 450 / 17.7

G.AL® C250, G.AL® C210R: 1070 / 42.1

G.AL® C330, G.AL® C330R: 570 / 22.4

Other sizes upon request

FURTHER PRODUCTS

Aluminium rolled plates are also integrated into our product portfolio. Rolled plates are available in various alloys: EN AW 5754, EN AW 5083 and EN AW 6082. As a supplement to our precision machined cast aluminium plates, we offer the precision machined rolled aluminium plates G.AL® 7075 GF (EN AW 7075) and UNIDAL® (EN AW 7019). The high-strength rolled plates EN AW 7075, CERTAL® and CERTAL SPC® complete our selection of rolled plates.

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