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Constellium



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# INDUSTRY

## Enhance your business performance with advanced aluminium solutions.

Constellium

# Our ultimate goal: helping your business to be more efficient.

Constellium has developed a full range of engineered solutions that offer multiple combination of outstanding features.

Whatever your need is, we have the solution.

**WE LOOK FORWARD TO WORKING TOGETHER.**

A practically infinite number of industrial fields could be mentionned for Constellium's aluminium products usage. Whether you design and manufacture molds for the plastic industry, vacuum chambers for semi-conductors, machinery, automatic robots, or tooling, or any general engineering application, Constellium certainly has the solution to answer your requirement.

Because we understand that every industrial applications requires specific benefits, Constellium has designed a customized aluminium product portfolio to meet your every need, in a cost-effective way.

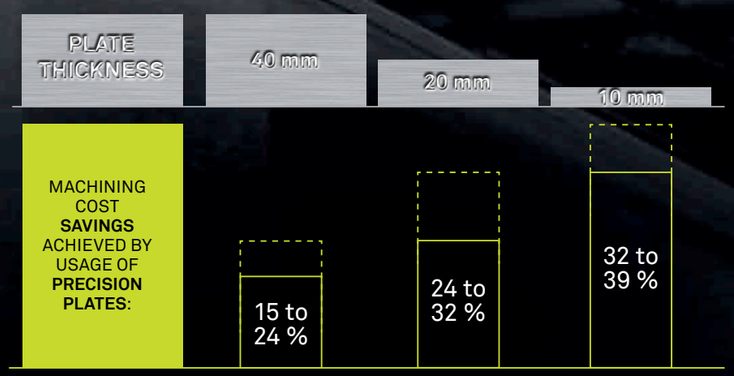
You may need to increase your machining efficiency, to achieve weight savings, to obtain state-of-the-art flatness level, to reach superior aesthetics, or a combination thereof, we have a solution. More than a material supplier, we want to be your innovative partner.

# General engineering

## Customised solutions to meet every need

Our range of solutions relies on targeted properties that deliver direct benefits to your operational performance:

| | OX | PLAN | PLANOXAL | PRECISION PLATES |
|---|---|---|---|---|
| Precision-milled on both sides<br>Ready-to-use precision | | | | ● |
| Outstanding dimensional stability<br>Superior machining efficiency | | ● | ● | ● |
| Excellent anodising capability<br>Excellent aesthetics and protection | ● | | ● | ● |
| Delivered with protective foil<br>Easier handling without damage | | | ● | ● |




### PRECISION PLATES

Our Precision Plates represent **the best solution to optimize your machining efficiency** with ready-to-use precision and shorter and more reproducible machining times.

**Unidal**, on top of the above mentioned advantages, also features a very-high strength that can meet very demanding applications and allow weight savings for mobile parts.

Leveraging on the long-time success of Unidal and Alplan, Constellium now offers 6 Precision Plates variants:

- **Unidal**
- **Alplan-5083**
- **Alplan-5754**
- **Alplan-6061**
- **Alplan-6082**
- **Alplan-7075**

### PLANOXAL

The PLANOXAL range **combines the ability for shorter machining time with the excellent readiness for anodising applications**.

To enhance the aesthetics potential of Planoxal it is already chemical etched and delivered with a protective foil.

The Planoxal line is available in two alloys:

- **Planoxal-50**
- **Planoxal-60**

### PLAN

The PLAN range has been developed for **applications solely focused on machining efficiency** in the most cost-effective way

An extensive offering of Plan range is available with the following alloys:

**2017A, 2024, 5052, 5083, 5754, 6061, 6082, 7075**

### OX

The OX range **focuses on the anodising capability** for applications primarily targeted on that objective.

Two variants of products are available: the **5083-OX** and **5754-OX** alloys.

# Semi-conductors, flat and solar panels processing

## Processing performance through durability and minimum contamination

- VACUUM CHAMBERS
- FUNCTIONAL PARTS
- CONSUMABLE PARTS

**Constellium has positionned itself as a aluminium solution provider for the manufacturing needs of this sector, leveraging its products to deliver:**

- **Purity, so that contamination of your process is avoided**
- **Durability, to make your investment efficient**
- **Tighness, obtained by very low roughness**
- **Easier machining with a better shape stability**
- **Reproductibility through very tight and consistent chemical composition**
- **A wide range of dimensional capabilities**

Constellium offers a wide range of solutions to cover all applications, for vacuum chambers as well as functional and consumable parts, in the following alloys:

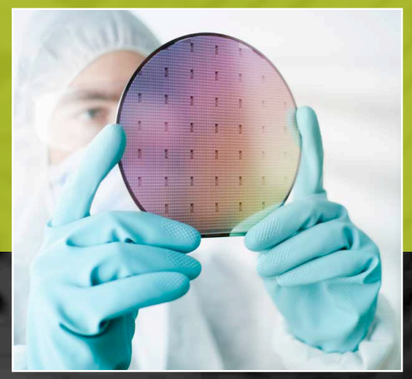
- **DOKIMA® and DOKIMA®+**
- **2219**
- **2618A**
- **3003**
- **KO68 (6061 extra thickness)**

### DOKIMA® AND DOKIMA®+

Constellium's latest efforts to push the technical frontiers of its solutions have resulted in the development of the DOKIMA® solution. DOKIMA incorporates an excellent purity level, an excellent corrosion resistance, a very good dimensional stability and high thermal and electrical conductivity

### DOKIMA®+: THE SYNERGY EFFECT

DOKIMA®+ results from the combination and synergy of the DOKIMA alloy with our proprietary anodising solution. By accompanying our customers in the anodisation process, Constellium will provide you with a much greater anodic coating resistance, leading to a superior part durability and higher processes efficiency.



# Molds

## Boosting your mold efficiency

**ACHIEVABLE GAINS** WITH CONSTELLIUM's MOLD SOLUTIONS

| | |
|---|---|
| Machining time and cost | - 20 to - 40 % |
| Cost of the mold | - 20 to - 40 % |
| Cycle time | - 20 to - 60 % |
| Overall production cost | - 20 to - 60 % |

Constellium has developed a dedicated range of aluminium solutions to address the needs of the molding industry:

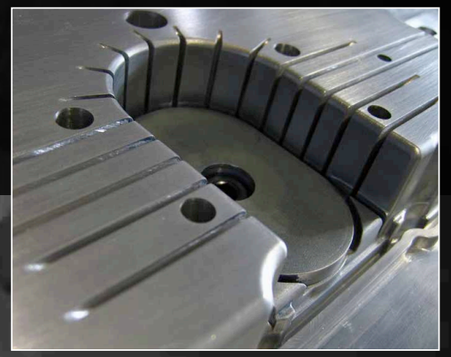
- **Alumold-350**
- **Alumold-500**
- **Alumold-600**
- **Certal SPC**
- **Alcast**
- **Fibral**

These solutions incorporate the key characteristics that will enable your molds to be economically efficient during the mold production and during its operational life:

**ENHANCED MOLD MACHINABILITY:**
the high machinability of our solutions accelerates the molds production time and drives mold manufacturing costs down.

**MOLDING CYCLE EFFICIENCY:**
the high thermal conductivity and diffusivity offered by our aluminium solutions will boost the plastic parts manufacturing rate.

Additional attributes are available for specific molding requirements, such as high-strength (especially for the Alumold-500, Alumold-600 and Certal SPC), corrosion resistance and weldability (Fibral).



IMPROVED TIME TO MARKET

# Product range

## SPECIALITY PRODUCTS

| Category | Product | Advanced features | | Alloy EN / AA | Temper | Yield strength $R_{p0,2}$ (MPa) (typical for 20mm thickness) | Tensile strength $R_m$ (MPa) (typical for 20mm thickness) | Thickness range (mm) | Maximum width (mm) | Maximum length (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **PRECISION PLATES** | Unidal | Outstanding dimensional stability<br>Tight thickness tolerance | Excellent flatness & high mechanical strength | 7019 | T651 | 355 | 410 | 8 - 120 | 1520 | 3020 |
| | Alplan -5083 | | Excellent flatness | 5083 | H111 | 150 | 285 | 6 - 120 | 1520 | 3020 |
| | Alplan -5754 | | Excellent flatness | 5754 | H111 | 105 | 205 | 6 - 120 | 1520 | 3020 |
| | Alplan -6061 | | Very good flatness | 6061 | T651 | 295 | 325 | 10 - 80 | 1520 | 3020 |
| | Alplan -6082 | | Very good flatness | 6082 | T651 | 305 | 350 | 10 - 80 | 1520 | 3020 |
| | Alplan -7075 | | Very good flatness & high mechanical strength | 7075 | T651 | 510 | 575 | 10 - 80 | 1520 | 3020 |
| **PLANOXAL** | Planoxal -50 | Very good dimensional stability and flatness<br>Excellent surface aspect and anodising performance | | 5083 | H111 | 150 | 285 | 5 - 100 | 1520 | 3020 |
| | Planoxal -60 | | | 6082 | T651 | 305 | 350 | 5 - 80 | 1520 | 3020 |
| **PLAN** | 2017A Plan | Very good dimensional stability and flatness | | 2017A | T451 | 270 | 415 | 5 - 100 | 1520 | 3020 |
| | 2024 Plan | | | 2024 | T351 | 300 | 440 | 5 - 100 | 1520 | 3020 |
| | 5052 Plan | | | 5052 | H112 | 105 | 195 | 5 - 150 | 1520 | 3020 |
| | 5083 Plan | | | 5083 | H111 | 150 | 285 | 5 - 150 | 1520 | 3020 |
| | 5754 Plan | | | 5754 | H111 | 105 | 205 | 5 - 150 | 1520 | 3020 |
| | 6061 Plan (A 6061 P) | | | 6061 | T651 | 295 | 325 | 4 - 150 | 1520 | 3020 |
| | 6082 Plan | | | 6082 | T651 | 305 | 350 | 4 - 150 | 1520 | 3020 |
| | 7075 Plan | | | 7075 | T651 | 510 | 575 | 5 - 100 | 1520 | 3020 |
| **OX** | 5083 Ox | Excellent surface aspect and anodising performance | | 5083 | H111 | 150 | 285 | 5 - 100 | 1520 | 3020 |
| | 5754 Ox | | | 6082 | T651 | 305 | 350 | 5 - 80 | 1520 | 3020 |
| **TOOLING / HIGH STRENGTH** | Certal | Superior resistance | Enhanced corrosion resistance and anodizing performance | 7022 | T651 | 495 | 555 | 8 -140 | 2020 | 10000 |
| | Fortal | | Maximum mechanical strength | 7075<br>type 7010 | T651<br>T7651 | 525 | 590 | 25 - 200 | 2020 | 10000 |
| **MOLDS** | Alumold-350 | Excellent machinability<br>Excellent thermal conductivity<br>Consistent strength across high thicknesses | High-temperature processes | 2219 | T851 / T852 | 330 [1] | 420 [1] | 8 - 305 | 1520 | 4000 |
| | Alumold-500 | | High-pressure processes (injection moulding) and medium to large series | type 7010<br>7041 | T651 / T652<br>T652 | 510 [1] | 555 [1] | 25 - 305<br>320 - 700 | 1520 | 4000 |
| | Alumold-600 | | | 7449 | T651 | 580 | 630 | 12.5 - 102 | 2020 | 4000 |
| | Certal SPC | | | 7122<br>7041 | T651 / T652<br>T652 | 460 [1] | 530 [1] | 140-700 | 1520 | 3020 |
| | Alcast | | Low-pressure processes and prototype moulds | 7xxx | T6 | 320 | 350 | 150 - 600 | 2020 | 4020 |
| | Fibral | | | 5083 | O3 | 115 | 235 | 150 - 600 | 2020 | 4020 |
| **SEMI-CONDUCTORS, FLAT & SOLAR PANELS PROCESSING** | DOKIMA / DOKIMA+ | Robust tailor-made solutions for vacuum chambers and functional/consumable parts | High durability (high purity, low contamination) | 6063 | T651 | 260 | 300 | 4 - 150 | 2020 | 10000 |
| | EN AW-2219 | | Mechanically loaded parts at 200-300°C | 2219 | T851 | 365 | 465 | 8 - 200 | 2020 | 10000 |
| | EN AW-2618A | | Mechanically loaded parts at 100-200°C | 2618A | T851 | 400 | 440 | 4 - 140 | 2020 | 10000 |
| | 3003 | | High service temperatures (>300°C) | 3003 | H112 | 55 | 110 | 4 -150 | 2200 | 10000 |
| | K068<br>(6061 high thickness) | | Optimized reliability for thick gages | 6061 | T6 / T651 | 207 [2] | 262 [2] | 203 - 406 | 2565 | 10160 |
| **ELECTRICAL CONDUCTORS** | EN AW-1350 | Excellent electrical and thermal conductivity | | 1350 | H111 | 40 | 75 | 4 - 150 | 2200 | 10000 |
| | EN AW-6101B | | Improved mechanical strength | 6101B | T7 | 140 | 175 | 4 - 150 | 2020 | 10000 |

[1] strength values for 200 mm thickness – [2] strength values for thickness > 250 mm

## STANDARD

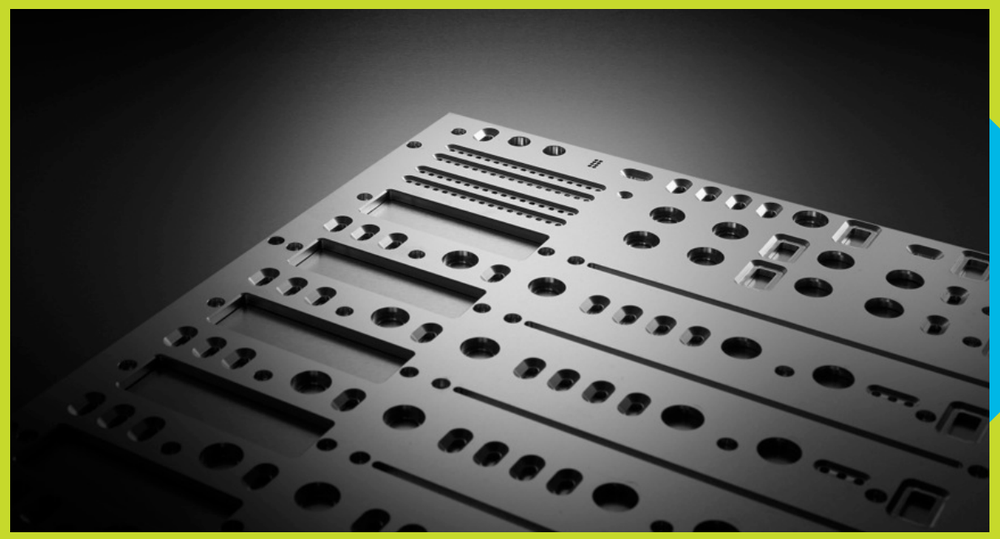
| | Alloy EN / AA | Temper | Yield strength $R_{p0,2}$ (MPa) | Tensile strength $R_m$ (MPa) | Thickness range (mm) | Maximum width (mm) | Maximum length (mm) |
|---|---|---|---|---|---|---|---|
| EN AW-1050A | 1050A | H111 | 40 | 75 | 4 - 150 | 3000 | 10000 |
| EN AW-2014A | 2014A | T651 | 430 | 475 | 4 - 140 | 2020 | 10000 |
| EN AW-2017A | 2017A | T451 | 270 | 415 | 4 - 200 | 3000 | 10000 |
| AA 2024 | 2024 | T351 | 300 | 440 | 25 - 152 | 3480 | 10160 |
| EN AW-2024 | 2024 | T351 | 300 | 440 | 4 - 152 | 3000 | 10000 |
| EN AW-2618A | 2618A | T851 | 400 | 440 | 4 - 140 | 2020 | 10000 |
| EN AW-5052 | 5052 | O/H111/H112 | 105 | 195 | 4 - 250 | 2500 | 10000 |
| AA 5083 | 5083 | O/H112 | 150 | 285 | 25 - 368 | 3302 | 10160 |
| EN AW-5083 | 5083 | O/H111/H112 | 150 | 285 | 4 - 250 | 3000 | 10000 |
| EN AW-5086 | 5086 | H111 | 135 | 280 | 4 - 250 | 3000 | 10000 |
| EN AW-5454 | 5454 | O/H111/H112 | 145 | 245 | 4 - 150 | 2200 | 10000 |
| EN AW-5754 | 5754 | H111/H112 | 105 | 205 | 4 - 250 | 2200 | 10000 |
| AA 6061 | 6061 | T6/T651 | 295 | 325 | 25 - 406 | 3683 | 10160 |
| EN AW-6061 | 6061 | T6/T651 | 295 | 325 | 4 - 406 | 3000 | 10000 |
| EN AW-6082 | 6082 | T651 | 305 | 350 | 4 - 254 | 3000 | 10000 |
| EN AW-7020 | 7020 | T651 | 330 | 385 | 4 - 250 | 3000 | 10000 |
| AA 7075 | 7075 | T651 | 510 | 575 | 25 - 229 | 3683 | 10160 |
| EN AW-7075 | 7075 | T651 | 510 | 575 | 4 - 254 | 3000 | 10000 |

**Not all combinations of thickness, width and length are available**

**Beyond this table, Constellium is always ready to accomodate customers' requests. Should your business need specific properties or sizes, we advice you to contact us and we will do our best to meet your demands.**

## Customer Application Engineers:

# your entry point to technical collaboration



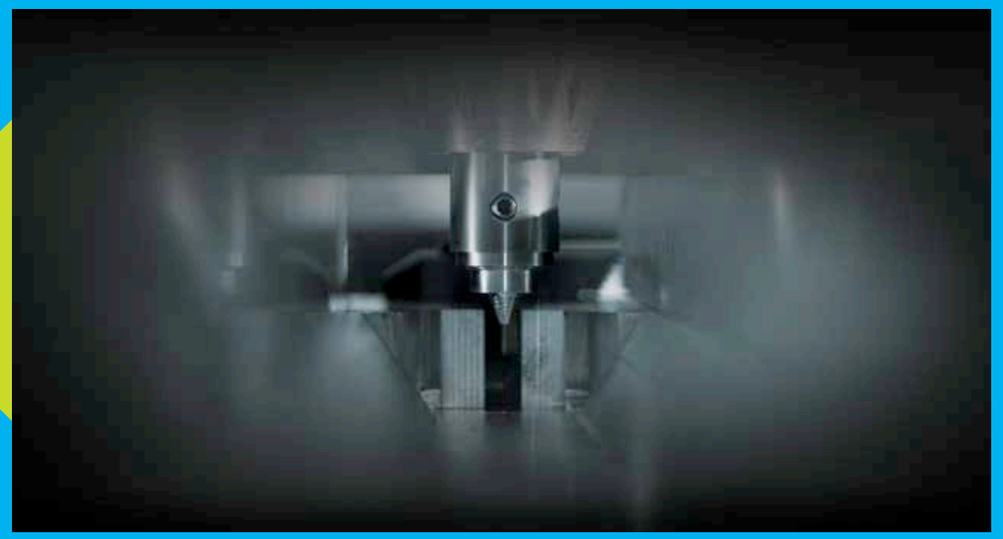
The Customer Application Engineer (CAE) organisation has been set up to link our customers' needs to our product offering, supporting choices for material and processing, and finding solutions together.

It is also a way for us to permanently receive feedback from customers and thus strive to improve our product performances and quality.

Constellium aims at bringing more value to its customers. This means innovating and collaborating with customers. This is the best way to make sure our future solutions match your future needs.

## Global Research & Development Center:

# extending the boundaries of aluminium applications



Our world-renowned leading R&D facility, dedicated to aluminium and its alloys, is a key contributor to numerous aluminium metallurgy innovations, including the design of new alloys, metallurgical tempers, products, functional applications, transformation and enabling processes.

Our research center aims to:

- leverage cutting-edge R&D practices to deliver a stream of sustainable, innovative, value-added solutions
- develop options for future business growth
- maintain technology networks in our key, shared products and processes (recycling, casting, fabrication) to ensure best-practice sharing and excellent knowledge and talent management

# More performance.
# More efficiency.
# Less impact.

At Constellium, we always strive to improve environmental sustainability.
**We will never rest on that matter**.

Constellium puts the people and the environment at the center of its development. Our endeavour is to help our customers grow and achieve that by protecting the environment.

This starts with our manufacturing processes. Constellium monitors the environmentally sensitive parameters of the production plants such as:

- Energy consumption
- Greenhouse Gas direct emissions
- Waste
- Water consumption
- Air emissions

Proposing innovative and customized solutions to our customers also allows them to not overuse our precious natural resources:

- Being able to manufacture things right from the first time means saving resources and time
- Using durable materials means an optimized product lifecycle
- Using lighter materials for mobile parts can transformed into higher efficiency and energy savings
- Being able to recycle gives you power for evolution with minimal impact on the environment