Keeping ahead of demand with no compromises!

Constellium’s range of products has improved properties across the board. From dent- and corrosion-resistance to hemming and deep drawing, our products demonstrate excellence, both in terms of in-service performance and processability.

---

No Compromise with Aesthetics!
SURFALEX®
High-tech outer alloys with exceptional surface quality

SURFALEX® HF
High formability for deep stamped parts

SURFALEX® HS
Higher strength for further downgauging

---

No Compromise with Design!
5754 / 5182 / 5182 SSF
Inner alloys for car body construction

6016X / 6016DRX
Inners alloys with bake hardening effect

FORMALEX® REMOTE
Monolithic alloy solution for remote laser welding

FORMALEX® PLUS
Ultra high formability for complex shapes

---

No Compromise with Safety!
SECURALEX®
Crashable alloy for structural parts

SECURALEX® HS
Crashable alloy with high strength

SECURALEX® UHS
Crashable alloy with ultra high strength

SECURALEX® P5/P6
Pedestrian safety alloy

---

No Compromise with Light-weighting!
CORALEX®
Structural alloy with excellent corrosion behavior

STRONGALEX®
Structural alloy with high strength

ULTRALEX®
Ultra high strength aluminium
Discover our aluminium applications in a real-time 3D model: www.automotive.products.constellium.com

**Discover our aluminium applications in a real-time 3D model:**

**Constellium’s Aluminium Automotive Body Sheet:** the perfect fit with current and future customers’ needs.

**SURFALEX®**

*for excellent surface aspects*

Surfalex® has a perfect surface and balanced properties (formability, hemming, strength in service) for outer skin applications as well as visible inners. Surfalex® allows the most sophisticated and audacious designs including sharp lines, while keeping a perfect surface aesthetics. We have developed a more formable version, Surfalex® HF, which is suited for deep drawn visible inners such as side panels. Surfalex® HS is a stronger version of Surfalex® for further downgauging of outers with the same forming and hemming performance.

**SECUALEX®**

*for crash alloys with energy absorption*

Constellium’s Securalex® product range is a family of high-tech crash alloys with controlled energy absorption for passenger protection in case of collision. We are currently working on extending the Securalex® range with higher strength versions. The product range comprises Securalex®, a crash-crushable alloy and Securalex® P5/P6, which is ductile with stable strength value for greater pedestrian safety. Securalex® HS and Securalex® UHS are a stronger version of Securalex® allowing for further downgauging of crash parts with the same crash performance.

**FORMALEX®**

*for optimized forming of complex inners*

Constellium’s Formalex® has been optimized in terms of composition and processing conditions to give the best possible press formability while maintaining good corrosion resistance. Thanks to its increased work hardening, it achieves significant improvements in stamping performance as well as in laboratory formability tests. Formalex® Plus is a breakthrough lightweighting solution for body-in-white compared to high formable mild steel. Formalex® Remote enables remote laser welding for joining complex part with a single alloy solution. It helps reducing production cycle times at the OEMs.

**STRONGALEX®**

*for high-strength of structural parts and reinforcements*

Constellium’s Coralex® is a structural alloy for chassis and inner structural parts. Offering an excellent corrosion resistance, including in case of thermal exposure, Strongalex® is a balanced property alloy which has good formability and a typical in-service yield strength of 270 MPa. Strongalex® allows for the downgauging of strength-limited parts in the body structure. Our innovation work focuses on drastically increasing the level of strength. Ultralex® enables further lightweighting in comparison with ultra high strength steel, with the same performance.

**Constellium’s capabilities**

Our range of finishing capabilities allows us to deliver even greater value in a variety of contexts: surface topography, shapes, lubrications, pre-treatments.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Cut to length</th>
<th>EDT or Mill Finish</th>
<th>Chemical conversion coatings / passivation</th>
<th>Stamping oils</th>
<th>Protection oils</th>
<th>Hot melt dry lubricants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum width</td>
<td>Thickness</td>
<td>Rectangular</td>
<td>Trapezoidal &amp; curve cuts optimized to minimize scrap</td>
<td>Chemetall Garbo-bond®</td>
<td>Chemetall Oxsilan</td>
<td>Others on request</td>
</tr>
<tr>
<td>Singen*</td>
<td>1580 mm</td>
<td>0.8 – 3.2 mm</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Other widths and thicknesses options upon request

Discover our aluminium applications in a real-time 3D model:

www.automotive.products.constellium.com

This publication is not a contractual document and in no way incurs the liability of Constellium for the information contained herein.
Co-creation with customers for tailor-made solutions
We work hand-in-hand with our customers throughout the critical design phases to optimize the use of aluminium, ensuring the right material is used in the right place. Together, we develop customized solutions that fit their specific needs. We also explore technologies for the future that will improve weldability, processability, recycling and more.

A world-class R&D center at the service of future needs
At our world-class R&D center in France and at our plants around the world, we are pushing aluminium to new frontiers with the development of advanced, lightweight products. The center has expert teams of researchers, metallurgists and automotive specialists who are on hand to provide modeling and simulation capabilities, qualification processes and analysis.

Innovation: the cornerstone of tomorrow’s Aluminium Automotive Body Sheet
Innovation is essential for the development of advanced aluminium automotive body sheet solutions. At Constellium, the needs of original equipment manufacturers are at the forefront of our R&D processes.

Prototyping & testing
**Alloy development**
- Laboratory casting at all scales
- Hot and cold rolling
- Heat treatment and quenching

**Surface treatment and lubrication**
- From beaker-scale to continuous pilot line

Design, forming & simulation
**Formability and mechanical testing**
- Full scale hydraulic stamping press
- State-of-the-art mechanical and formability laboratories

**Analysis and characterization**
- Full range of corrosion and durability tests
- State-of-the-art electron microscopy and surface characterization
- Strong chemical analysis capability

**Joining and welding**
- Adhesive bonding and durability testing
- Riveting, Resistance Spot Welding
- All relevant welding technologies
Alloys: a key area of development

Our solutions for OEM customers are helping make the transition to aluminium easier, more affordable and more eco-friendly.

Lightweighting is the key focus of our innovation. Through downgauging, aluminium creates gains in eco-efficiency, thus helping reduce the environmental footprint of cars over the usage phase.

With ultra high strength and formability, greater crash properties, higher stiffness and laser remote weldability, our products present a viable and much lighter substitute for steel in even the most demanding parts.

Pushing the limits of aluminium

- Ultra high strength
- Ultra high formability
- Perfect crashability
- Higher stiffness

Providing solutions

- For better integration with other materials
- For better manufacturing efficiency of OEMs

Customizing our offer

- From simulation studies in design phase to specific alloy & conversion developments

Metallurgy, corrosion and surface treatment expertise

Mechanical and thermal joining studies

Design, CAD, forming and crash simulation, prototyping, characterization

© G. Uféras
Aluminium’s inherent properties including recyclability positions it at the heart of the sustainability trends such as e-mobility and circular economy.

Holistic approach: 4 pillars
At Constellium, we take a holistic approach toward sustainability to minimize impacts and enhance benefits. It is based on commitments to improve our own operations, transparency in communicating our progress, and partnerships to address impacts throughout the entire value chain.

Eco-innovation for automotive
Aluminium’s favorable strength-to-weight ratio over steel allows automakers to lightweight vehicles, leading to increased fuel efficiency, reduced CO₂ emissions, and extended electric vehicle range. Compared to a traditional steel car hood, an aluminium one produced by Constellium brings 40%* mass saving and emits 37%* less Green House Gas. The efficient recycling of aluminium products also helps to recover a significant part of the initial investment. Aluminium has also greater energy absorption leading to improved safety performance, and its thermal conductivity is an advantage for battery enclosures.

*Source: 3rd party LCA assessment (https://www.constellium.com/sustainability/life-cycle-assessments)

Life cycle assessment of automotive body sheet
Greenhouse Gas Footprint
Tons Carbon Dioxide Equivalent (t CO₂e)

- Extraction and refining: 8.6 t CO₂e/ t of primary alu produced
- Smelting: 5 t CO₂e/ t
- Rolling: 0.4 t CO₂e/ t
- Product design and manufacturing: 0 – 4 t CO₂e/ t
- Car use: 21 t CO₂e/ t – 7 t CO₂e/ t
- Collecting and sorting: 2 t CO₂e/ t
- Recycling: 0.3 t CO₂e/ t

37% reduction in GHG emissions thanks to significant mass saving

Recycling metal has much lower GHG emissions than producing primary metal
Aluminium Recycling is the right thing to do
Recycling is the RIGHT THING to do and makes ECONOMIC SENSE. Constellium is committed to recycling the scrap produced during all production stages in all of our cast houses. We work closely with our clients and non-profit partners for a more efficient recycle closed loop, collecting and recycling aluminium scrap from both our customers’ operations and products end-of-life.

Sustainable supply chain
Constellium aims to work only with suppliers who comply with applicable laws and commit to sustainable practices. We do our utmost to integrate them into our Responsible Supply Chain Management Policy and Supplier Code of Conduct (CoC). We work to have our suppliers’ sign-off of our Supplier CoC and continue to evaluate our key suppliers’ sustainability performance. Meanwhile, we actively look for ASI certified aluminium supply.

Partnerships: sharing sustainability goals
Constellium is proud be a member and work with various industrial bodies especially of the aluminium sector such as Aluminium Association in the US. Our targets align with European Aluminium's Sustainability Roadmap towards 2025.

Aluminium Stewardship Initiative (ASI) is a global, multi-stakeholder, non-profit standards setting and certification organization. Constellium is a founding member of what is now an organization counting more than 50 members. The ASI Standard includes principles, criteria, indicators and verifiers addressing environmental, social and governance issues with a certification scheme. As a member, we are committed to obtain certification of at least one entity or site by the end of 2019.

Our commitment to transparency
Aluminium can be end-lessly melted down and recast while keeping its inherent properties
Recycling saves 95% energy compared to using primary metals

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Surfalex® family
Automotive Body Sheet

High-tech outer alloys, with exceptional surface quality, hemming and corrosion resistance

### Surfalex® family

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Yield in service (MPa)</th>
<th>Hemming</th>
<th>Surface quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfalex®</td>
<td>215</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Surfalex® HS</td>
<td>235</td>
<td>+++</td>
<td>+++</td>
</tr>
</tbody>
</table>

Paint bake condition = 2% +20min/185°C.

### Chemical composition (weight %)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Al</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfalex® 6016A</td>
<td>&lt;1.5</td>
<td>&lt;0.5</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.2 – 0.6</td>
<td>&lt;0.1</td>
<td>&lt;0.2</td>
<td>&lt;0.15</td>
<td></td>
</tr>
<tr>
<td>Surfalex® HS 6005A</td>
<td>0.5 – 0.9</td>
<td>&lt;0.35</td>
<td>&lt;0.3</td>
<td>&lt;0.5</td>
<td>0.4 – 0.7</td>
<td>&lt;0.03</td>
<td>&lt;0.2</td>
<td>&lt;0.1</td>
<td></td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium.

### Mechanical properties

**As delivered:** typical values in transverse direction after 1 week of natural aging.

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/Rm</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfalex®</td>
<td>95</td>
<td>205</td>
<td>0.45</td>
<td>23</td>
<td>26</td>
<td>0.32</td>
<td>0.64</td>
</tr>
<tr>
<td>Surfalex® HS</td>
<td>110</td>
<td>220</td>
<td>0.5</td>
<td>22</td>
<td>25</td>
<td>0.3</td>
<td>0.68</td>
</tr>
</tbody>
</table>

In service: properties on finished parts depend on paint bake time and temperature, as well as stamping strain.

Typical yield strength values are given below

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Paint bake condition</th>
<th>Rp0.2 (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfalex®</td>
<td>2% +20min/170°C</td>
<td>185</td>
</tr>
<tr>
<td>Surfalex®</td>
<td>2% +20min/185°C</td>
<td>215</td>
</tr>
<tr>
<td>Surfalex® HS</td>
<td>2% +20min/170°C</td>
<td>205</td>
</tr>
<tr>
<td>Surfalex® HS</td>
<td>2% +20min/185°C</td>
<td>235</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

### Delivery capabilities

**Width:** max. 2000 mm as standard, for larger widths please contact us

**Thickness:** 0.7 – 1.5 mm

**Surface:** EDT or Mill Finish

**Lubrication:** stamping oils, protection oils or hot-melt dry lubricants

**Cut to length:** rectangular, trapezoidal and curves cuts optimized to minimize scrap
High-tech outer alloy, proposing excellent surface quality as Surfalex®, combined with optimized formability for the most demanding outer parts

### Chemical composition (weight %)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfalex HF</td>
<td>6016</td>
<td>&lt;1.5</td>
<td>&lt;0.5</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.2 – 0.6</td>
<td>&lt;0.1</td>
<td>&lt;0.2</td>
<td>&lt;0.15</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

### Mechanical properties

**As delivered:** typical values after 1 week of natural ageing.

<table>
<thead>
<tr>
<th>Paint bake condition</th>
<th>$R_{p0.2}$ (MPa)</th>
<th>$R_m$ (MPa)</th>
<th>$R_{p0.2}$/$R_m$</th>
<th>$A_80$ (%)</th>
<th>$n_s$</th>
<th>$r_{10}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfalex® HF</td>
<td>96</td>
<td>211</td>
<td>0.46</td>
<td>25</td>
<td>28</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**In service:** properties on finished parts depend on paint bake time and temperature, as well as stamping strain.

Example yield strength values are given below:

<table>
<thead>
<tr>
<th>Paint bake condition</th>
<th>$R_{p0.2}$ (MPa)</th>
<th>$A_80$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2% +20min/185°C</td>
<td>201</td>
<td>22</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

### Alloy performance

Forming limit curve is improved, particularly in plane strain, enabling the forming of very complex and deeper parts, tighter radii and sharp character lines.

### Delivery capabilities

**Width:** max. 2000 mm as standard, for larger widths please contact us

**Thickness:** 0.7 – 1.5 mm

**Surface:** EDT or Mill Finish

**Lubrication:** stamping oils, protection oils or hot-melt dry lubricants

**Cut to length:** rectangular, trapezoidal and curves cuts optimized to minimize scrap
5xxx inner family
Automotive Body Sheet

Inner grades for car body construction

5xxx family

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5754</td>
<td>Reference</td>
</tr>
<tr>
<td>5182</td>
<td>Improved strength</td>
</tr>
<tr>
<td>5182SSF</td>
<td>Improved strength &amp; surface aspect</td>
</tr>
</tbody>
</table>

Chemical composition (weight %)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Al</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>5754</td>
<td>-</td>
<td>&lt;0.4</td>
<td>&lt;0.4</td>
<td>&lt;0.1</td>
<td>0.5</td>
<td>2.6–3.6</td>
<td>&lt;0.3</td>
<td>&lt;0.22</td>
<td>&lt;0.15</td>
</tr>
<tr>
<td>5182 &amp; 5182SSF</td>
<td>-</td>
<td>&lt;0.2</td>
<td>&lt;0.35</td>
<td>&lt;0.15</td>
<td>0.2–0.5</td>
<td>4–4.5</td>
<td>&lt;0.1</td>
<td>&lt;0.22</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

Mechanical properties

As-delivered: typical values in transverse direction after 1 week of natural ageing.

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/ Rm</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r10</th>
</tr>
</thead>
<tbody>
<tr>
<td>5754</td>
<td>100</td>
<td>210</td>
<td>0.48</td>
<td>21</td>
<td>23</td>
<td>0.32</td>
<td>0.9</td>
</tr>
<tr>
<td>5182</td>
<td>145</td>
<td>280</td>
<td>0.52</td>
<td>23</td>
<td>26</td>
<td>0.32</td>
<td>0.67</td>
</tr>
<tr>
<td>5182SSF</td>
<td>130</td>
<td>275</td>
<td>0.47</td>
<td>21</td>
<td>25</td>
<td>0.31</td>
<td>0.65</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

Delivery capabilities

Width: max. 1850 mm as standard, for larger widths please contact us
Thickness: 0.7 – 3.5 mm
Surface: EDT or Mill Finish
Lubrication: stamping oils, protection oils or hot-melt dry lubricants
Cut to length: rectangular, trapezoidal and curves cuts optimized to minimize scrap

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For further information, please contact us: technical.automotive-sheet@constellium.com
6xxx family
Automotive Body Sheet

Inner alloys with bake hardening effect

Chemical composition (weight %)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>6016X</td>
<td>6016A</td>
<td>&lt;1.5</td>
<td>&lt;0.5</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.2–0.6</td>
<td>&lt;0.1</td>
<td>&lt;0.2</td>
<td>&lt;0.15</td>
</tr>
<tr>
<td>6016DRX</td>
<td>6016A</td>
<td>1–1.5</td>
<td>&lt;0.5</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.2–0.6</td>
<td>&lt;0.1</td>
<td>&lt;0.2</td>
<td>&lt;0.15</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

Mechanical properties

As-delivered: typical values in transverse direction after 1 week of natural ageing.

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/Rm</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r10</th>
</tr>
</thead>
<tbody>
<tr>
<td>6016X</td>
<td>92</td>
<td>195</td>
<td>0.47</td>
<td>21</td>
<td>25</td>
<td>0.3</td>
<td>0.86</td>
</tr>
<tr>
<td>6016DRX</td>
<td>105</td>
<td>225</td>
<td>0.47</td>
<td>24</td>
<td>26</td>
<td>0.3</td>
<td>0.91</td>
</tr>
</tbody>
</table>

In service: properties on finished parts depend on paint bake time and temperature, as well as stamping strain. Typical values are given after 2% +20min/185°C:

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>r10</th>
</tr>
</thead>
<tbody>
<tr>
<td>6016X</td>
<td>215</td>
<td>275</td>
<td>16.5</td>
</tr>
<tr>
<td>6016DRX</td>
<td>240</td>
<td>300</td>
<td>18</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

Delivery capabilities

Width: max. 2000 mm as standard, for larger widths please contact us

Thickness: 0.7 – 3.2 mm

Surface: EDT or Mill Finish

Lubrication: stamping oils, protection oils or hot-melt dry lubricants

Cut to length: rectangular, trapezoidal and curves cuts optimized to minimize scrap

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Formalex® Plus
Automotive Body Sheet

Inner alloy for car body construction with breakthrough formability behavior

Chemical composition (weight %)

<table>
<thead>
<tr>
<th></th>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3003</td>
<td>&lt;0.6</td>
<td>&lt;0.7</td>
<td>&lt;0.2</td>
<td>1.0–1.5</td>
<td>≤0.05</td>
<td>≤0.05</td>
<td>&lt;0.1</td>
<td>≤0.05</td>
</tr>
</tbody>
</table>

Mechanical properties

As-delivered: values are given below (Transverse Direction):

<table>
<thead>
<tr>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/Rm</th>
<th>Ag (%</th>
<th>A80 (%)</th>
<th>ns</th>
<th>t10</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>105</td>
<td>0.48</td>
<td>26</td>
<td>37</td>
<td>0.23</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Example typical properties after 2% pre-straining are given below:

<table>
<thead>
<tr>
<th>Pre-straining</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2%</td>
<td>78</td>
<td>112</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

Delivery capabilities

Width: max. 1850 mm as standard, for larger widths please contact us
Thickness: 0.7 – 1.5 mm
Surface: EDT or Mill Finish
Lubrication: stamping oils, protection oils or hot-melt dry lubricants
Cut to length: rectangular, trapezoidal and curves cuts optimized to minimize scrap
Formalex® Remote
Automotive Body Sheet

Inner alloy providing an excellent weldability, in particular for Laser remote welding, and compatible with 6xxx recycling

### Chemical composition (weight %)

<table>
<thead>
<tr>
<th></th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.2 – 0.6</td>
<td>&lt;0.1</td>
<td>&lt;0.2</td>
<td>&lt;0.15</td>
<td></td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

### Mechanical properties

**As-delivered:** typical values in transverse direction after 1 week of natural ageing. Product performance is guaranteed up to 6 months after quench.

<table>
<thead>
<tr>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/Rm</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r0</th>
</tr>
</thead>
<tbody>
<tr>
<td>107</td>
<td>222</td>
<td>0.48</td>
<td>20</td>
<td>24</td>
<td>0.28</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**In service:** properties on finished parts depend on paint bake time and temperature, as well as stamping strain. Example yield strength values are given below:

<table>
<thead>
<tr>
<th>Paint bake condition</th>
<th>Rp0.2 (MPa)</th>
<th>A80 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2% +20min/185°C</td>
<td>210</td>
<td>17</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

### Welding performance

Formalex® Remote provides excellent weldability in Remote Laser Welding (high speed Laser welding without filler wire).

![Crack free overlap joint made out Formalex® Remote laser welded at high speed without filler wire.](image)

### Delivery capabilities

**Width:** max. 1850 mm as standard, for larger widths please contact us

**Thickness:** 0.7 – 3.2 mm

**Surface:** EDT or Mill Finish

**Lubrication:** stamping oils, protection oils or hot-melt dry lubricants

**Cut to length:** rectangular, trapezoidal and curves cuts optimized to minimize scrap
Securalex® family

**Automotive Body Sheet**

Structural alloys with in-service performances optimized to propose an adapted strength combined with an excellent crash performance

---

### Securalex® family

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securalex®</td>
<td>Medium strength crushable alloy</td>
</tr>
<tr>
<td>Securalex® HS</td>
<td>High strength crushable alloy</td>
</tr>
<tr>
<td>Securalex® UHS</td>
<td>Ultra high strength crushable alloy</td>
</tr>
</tbody>
</table>

### Chemical composition (weight %)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securalex®</td>
<td>6005A</td>
<td>0.4 – 0.65</td>
<td>&lt;0.35</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.45 – 0.8</td>
<td>&lt;0.1</td>
<td>&lt;0.2</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Securalex® HS</td>
<td>6005A</td>
<td>0.5 – 0.9</td>
<td>&lt;0.35</td>
<td>&lt;0.3</td>
<td>&lt;0.5</td>
<td>0.4 – 0.7</td>
<td>&lt;0.3</td>
<td>&lt;0.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Securalex® UHS</td>
<td>6111</td>
<td>0.6 – 0.8</td>
<td>&lt;0.35</td>
<td>0.6 – 0.8</td>
<td>&lt;0.3</td>
<td>0.5 – 0.7</td>
<td>&lt;0.03</td>
<td>&lt;0.1</td>
<td>&lt;0.15</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

### Mechanical properties

As-delivered: typical values in transverse direction at 1 week.

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/Rm</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securalex®</td>
<td>95</td>
<td>185</td>
<td>0.51</td>
<td>20</td>
<td>25</td>
<td>0.35</td>
<td>1.0</td>
</tr>
<tr>
<td>Securalex® HS</td>
<td>120</td>
<td>230</td>
<td>0.52</td>
<td>20</td>
<td>23</td>
<td>0.29</td>
<td>1.3</td>
</tr>
<tr>
<td>Securalex® UHS</td>
<td>140</td>
<td>280</td>
<td>0.5</td>
<td>21</td>
<td>26</td>
<td>0.28</td>
<td>1.2</td>
</tr>
</tbody>
</table>

In service: properties on finished parts depend on paint bake time and temperature, as well as stamping strain.

<table>
<thead>
<tr>
<th>Product</th>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>A80</th>
<th>$\delta_{\text{norm 2.0 mm}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securalex®</td>
<td>190</td>
<td>245</td>
<td>21</td>
<td>140</td>
</tr>
<tr>
<td>Securalex® HS</td>
<td>240</td>
<td>290</td>
<td>21</td>
<td>120</td>
</tr>
<tr>
<td>Securalex® UHS</td>
<td>270</td>
<td>330</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

*Normalized external bending angle according to VDA 238-100, after 10% pre-strain in transverse direction and 20 min 185°C

AutoForm and LS-DYNA® material cards available on request.

**Delivery capabilities**

- **Width:** max. 2000 mm as standard, for larger widths please contact us
- **Thickness:** 0.7 – 3.2 mm
- **Surface:** EDT or Mill Finish
- **Lubrication:** stamping oils, protection oils or hot-melt dry lubricants
- **Cut to length:** rectangular, trapezoidal and curves cuts optimized to minimize scrap

---

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Securalex® P5
Automotive Body Sheet

Inner alloy optimized for hood inners, especially for pedestrian safety requirements

Chemical composition (weight %)

<table>
<thead>
<tr>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>5251</td>
<td>&lt;0.3</td>
<td>&lt;0.3</td>
<td>&lt;0.1</td>
<td>&lt;0.5</td>
<td>&lt;2.5</td>
<td>&lt;0.1</td>
<td>&lt;0.15</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

Mechanical properties

As delivered: typical values

<table>
<thead>
<tr>
<th>R_{p0.2} (MPa)</th>
<th>R_{m} (MPa)</th>
<th>R_{p0.2}/R_{m} (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r_{10}</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>185</td>
<td>0.43</td>
<td>18</td>
<td>20</td>
<td>0.31</td>
</tr>
</tbody>
</table>

In service: properties on finished parts depend on paint bake time and temperature, as well as stamping strain.

Typical values are given after 5% +20min/185°C:

<table>
<thead>
<tr>
<th>R_{p0.2} (MPa)</th>
<th>R_{m} (MPa)</th>
<th>A80 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>190</td>
<td>17</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

Alloy performance

For hood inners, Securalex® P5 offers unique compromise between stiffness and controlled strength. This is particularly useful to manage pedestrian safety, in particular head impact.

Delivery capabilities

Width: max. 1850 mm as standard, for larger widths please contact us

Thickness: 0.7 – 3.2 mm

Surface: EDT or Mill Finish

Lubrication: stamping oils, protection oils or hot-melt dry lubricants

Cut to length: rectangular, trapezoidal and curves cuts optimized to minimize scrap
Securalex® P6
Automotive Body Sheet

Inner alloy optimized for hood inners, especially for pedestrian safety requirements

Chemical composition (weight %)

<table>
<thead>
<tr>
<th></th>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>6560</td>
<td>0.4 – 0.65</td>
<td>&lt;0.35</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
<td>0.2 – 0.35</td>
<td>&lt;0.05</td>
<td>&lt;0.15</td>
<td>&lt;0.1</td>
<td></td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

Mechanical properties

As-delivered: typical values in transverse direction after 1 week of natural ageing. Product performance is guaranteed up to 6 months after quench.

| Rp0.2 (MPa) | Rm (MPa) | Rp0.2/Rm | Ag (%) | A80 (%) | ns | t0 |
| 70 | 160 | 0.44 | 21 | 26 | 0.3 | 1.1 |

In service: properties on finished parts depend on paint bake time and temperature, as well as stamping strain.

Typical values are given after 2% +20min/185°C:

| Rp0.2 (MPa) | Rm (MPa) | A80 (%) |
| 130 | 190 | 18 |

AutoForm and LS-DYNA® material cards available on request.

Alloy performance

For hood inners, Securalex® P6 offers unique compromise between stiffness and controlled strength. This is particularly useful to manage pedestrian safety, in particular head impact.

Delivery capabilities

Width: max. 2000 mm as standard, for larger widths please contact us

Thickness: 0.7 – 3.2 mm

Surface: EDT or Mill Finish

Lubrication: stamping oils, protection oils or hot-melt dry lubricants

Cut to length: rectangular, trapezoidal and curves cuts optimized to minimize scrap
Coralex®
Automotive Body Sheet

Inner alloy for chassis and car body construction with excellent corrosion behavior

Chemical composition (weight %)

<table>
<thead>
<tr>
<th>AA</th>
<th>Si (weight %)</th>
<th>Fe (weight %)</th>
<th>Cu (weight %)</th>
<th>Mn (weight %)</th>
<th>Mg (weight %)</th>
<th>Cr (weight %)</th>
<th>Zn (weight %)</th>
<th>Ti (weight %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5018B</td>
<td>&lt;0.25</td>
<td>&lt;0.4</td>
<td>&lt;0.1</td>
<td>0.4 – 0.7</td>
<td>2.9 – 3.6</td>
<td>&lt;0.3</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

Mechanical properties

As-delivered: typical values in transverse direction for 1.5 mm.

<table>
<thead>
<tr>
<th>Rp0.2 (MPa)</th>
<th>Rm (MPa)</th>
<th>Rp0.2/ Rm</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>r10</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>245</td>
<td>0.53</td>
<td>19</td>
<td>22</td>
<td>0.32</td>
<td>0.65</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

Corrosion resistance

Intergranular corrosion results according to ASTM G 67.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mass Loss (mg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O/H111</td>
<td>&lt;1.5</td>
</tr>
<tr>
<td>17h 130°C</td>
<td>&lt;4</td>
</tr>
</tbody>
</table>

Delivery capabilities

Width: max. 1850 mm as standard, for larger widths please contact us

Thickness: 0.7 – 3.5 mm

Surface: EDT or Mill Finish

Lubrication: stamping oils, protection oils or hot-melt dry lubricants

Cut to length: rectangular, trapezoidal and curves cuts optimized to minimize scrap
**Strongalex®**

Automotive Body Sheet

---

**Structural alloy for car bodies with improved strength in service**

---

**Chemical composition (weight %)**

<table>
<thead>
<tr>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>6016</td>
<td>&lt;1.5</td>
<td>&lt;0.5</td>
<td>&lt;0.2</td>
<td>&lt;0.3</td>
<td>&lt;0.9</td>
<td>&lt;0.15</td>
<td>&lt;0.25</td>
<td>&lt;0.15</td>
</tr>
</tbody>
</table>

Other elements: <0.05 each, <0.15 in total, remainder aluminium

**Mechanical properties**

**As-delivered:** typical values in transverse direction after 1 week of natural ageing.

<table>
<thead>
<tr>
<th>R_p0.2 (MPa)</th>
<th>R_m (MPa)</th>
<th>R_p0.2 / R_m</th>
<th>A80 (%)</th>
<th>n</th>
<th>r_10</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>240</td>
<td>0.54</td>
<td>22</td>
<td>24</td>
<td>0.26</td>
</tr>
</tbody>
</table>

**In service:** properties on finished parts depend on paint bake time and temperature, as well as stamping strain.

Typical values are given after 2% +20min/185°C:

<table>
<thead>
<tr>
<th>R_p0.2 (MPa)</th>
<th>R_m (MPa)</th>
<th>A80 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>270</td>
<td>320</td>
<td>17</td>
</tr>
</tbody>
</table>

AutoForm and LS-DYNA® material cards available on request.

**Delivery capabilities**

**Width:** max. 2000 mm as standard, for larger widths please contact us

**Thickness:** 0.7 – 3.2 mm

**Surface:** EDT or Mill Finish

**Lubrication:** stamping oils, protection oils or hot-melt dry lubricants

**Cut to length:** rectangular, trapezoidal and curves cuts optimized to minimize scrap

---

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For further information, please contact us: technical.automotive-sheet@constellium.com
Structural alloy with ultra high strength, adapted for anti-intrusion applications

**Chemical composition (weight %)**

<table>
<thead>
<tr>
<th>AA</th>
<th>Si</th>
<th>Fe</th>
<th>Cu</th>
<th>Mn</th>
<th>Mg</th>
<th>Cr</th>
<th>Zn</th>
<th>Ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>7075</td>
<td>&lt;0.4</td>
<td>&lt;0.5</td>
<td>1.2 – 2.0</td>
<td>&lt;0.3</td>
<td>2.1 – 2.9</td>
<td>0.18 – 0.23</td>
<td>5.1 – 6.1</td>
<td>&lt;0.2</td>
</tr>
</tbody>
</table>

Other tempers (e.g. F, T61, ...) and other forming processes (e.g. hot forming, cold roll forming, ...) are possible.

**Mechanical properties**

As delivered: typical values in transverse direction

<table>
<thead>
<tr>
<th>R_p0.2 (MPa)</th>
<th>R_m (MPa)</th>
<th>R_p0.2/R_m</th>
<th>Ag (%)</th>
<th>A80 (%)</th>
<th>ns</th>
<th>t10</th>
</tr>
</thead>
<tbody>
<tr>
<td>520</td>
<td>595</td>
<td>0.87</td>
<td>11</td>
<td>13</td>
<td>0.08</td>
<td>0.95</td>
</tr>
</tbody>
</table>

Ultralex® T6 is delivered in aged temper compatible with warm forming process with limited loss of strength during the forming operation.

**In service**: Typical values after warm forming at T°C and paint-bake simulation (BH) of 20 min 185°C.

<table>
<thead>
<tr>
<th>In-service properties</th>
<th>R_p0.2 (MPa)</th>
<th>A80 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6 + T(175)°C + BH</td>
<td>500</td>
<td>12</td>
</tr>
<tr>
<td>T6 + T(225)°C + BH</td>
<td>515</td>
<td>12</td>
</tr>
</tbody>
</table>

LS-DYNA® material cards available on request.

**Delivery capabilities**

Dimensions upon request.