

HEAT EXCHANGER ALUMINUM
FLUX-FREE BRAZING MATERIAL

Aleris





A NEW DEVELOPMENT FLUX-FREE BRAZING MATERIAL

Aleris is pleased to be able to offer the latest development in brazing material for use in automotive and non-automotive brazed aluminium heat exchangers.

A fully non-fluxed brazing sheet that can be processed as a drop-in material in existing controlled atmosphere and vacuum brazing operations.

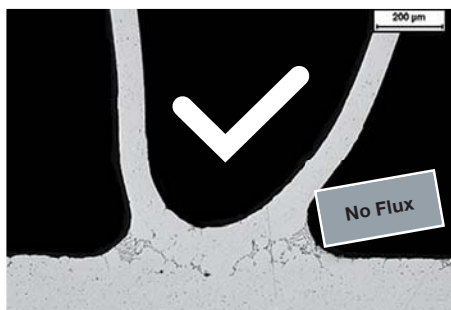
We are capable of supporting both prototype and full-scale production tests.

WHY FLUX-FREE?

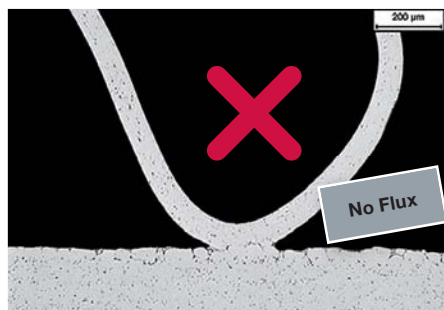
Removing the need for flux and the flux application process offers a number of significant benefits to the industrial user of brazing materials, e.g.:

- Process safety and efficiency, including the environmental impact of operations
- Product design complexity, core alloy selection and performance

- Plant energy usage, layout and costs in terms of (but not limited to) reduced spending on:
 - Capital investment in flux application equipment
 - Bill of material costs for flux usage and purchase administration etc.
 - Furnace and braze hardware maintenance
 - Logistics (incl. storage / waste streams)
 - Personal protective equipment, occupational health monitoring, etc.



Example of acceptable brazed fillets
Aleris flux-free clad 3xxx LL tube material
CAB brazed to 3003 fin
0 g/m² flux load
typical industrial profile



Example of poor brazed fillets
Aleris standard 4045 clad 3xxx LL tube material
CAB brazed to 3003 fin
0 g/m² flux load
typical industrial profile

ALERIS PROCESS CAPABILITIES AND COIL SIZES ARE AVAILABLE ON REQUEST.

RESEARCH, DEVELOPMENT AND PERFORMANCE

Aleris is able to offer this newly engineered material solution as the result of many years of extensive and customer focussed R&D – all of our R&D efforts are performed with the goal of offering tangible benefits to our customers.

Properties of flux-free products [ASTM B557, as delivered]

Product	Core alloy	Clad alloy	Temper	Possible application	Yield strength R _{p0.2} [MPa]	Tensile strength R _m [MPa]	A50 [%]
FF 3003	AA 3003	FF multi-clad	O / H1x	Fin	≥ 115	140 - 180	≥ 1
FF 3527	Hogal 3527	FF multi-clad	H1x / H2x	Tube	> 165	190 - 265	> 5
FF 3551	Hogal 3551	FF multi-clad	O / H1x / H2x	Stamping	> 35	120 - 160	> 18
FF 3534	Hogal 3534	FF multi-clad	O / H1x / H2x	Plate	> 145	165 - 235	> 3

Additional core alloys and tempers are available on request · Chemistries available on request

Properties of flux-free products [ASTM B557, post-braze typ., 600 °C / 3 min.]

Product	Temper	Possible application	Yield strength R _{p0.2} [MPa]	Tensile strength R _m [MPa]	ASTM G69 [mV]
FF 3003	H14	Fin	35 - 45	100 - 120	-710 to -740
FF 3527	H24	Tube	55 - 60	155 - 165	-680 to -710
FF 3551	O	Stamping	65 - 70 ¹⁾	175 - 185 ¹⁾	-710 to -740
FF 3534	H24	Plate	48 min.	130 - 140	-680 to -710

1) After 40 days natural aging / provisional test data for information purposes only

Available in both one-side & two-side, and single & multi-clad variants – please see the table above for standard options available for trial purposes.

Melt range

Clad alloy	Solidus °C	Liquidus °C
FF multi-clad	577	595

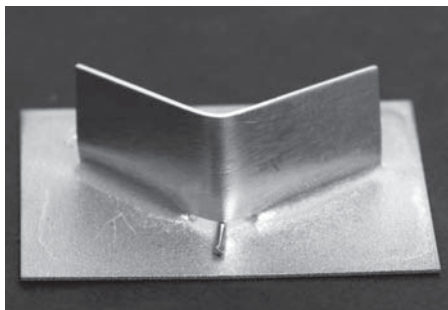
There are additional potential advantages to be gained by the customer due to improved internal cleanliness and the elimination of the possible interactions between residual flux and cooling media. Typical post-braze results are given above.

CUSTOMER SUPPORT

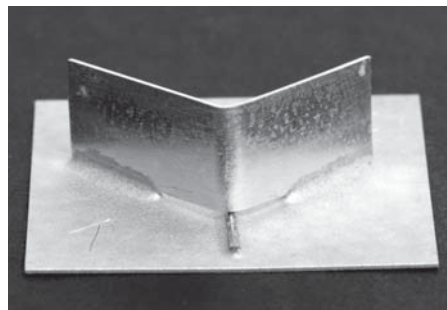
Aleris has extensive laboratory based brazing and testing equipment which we can offer to support your trial and validation of this new brazing material, for example:

- Glass tube furnaces (for simple material braze compatibility checks)

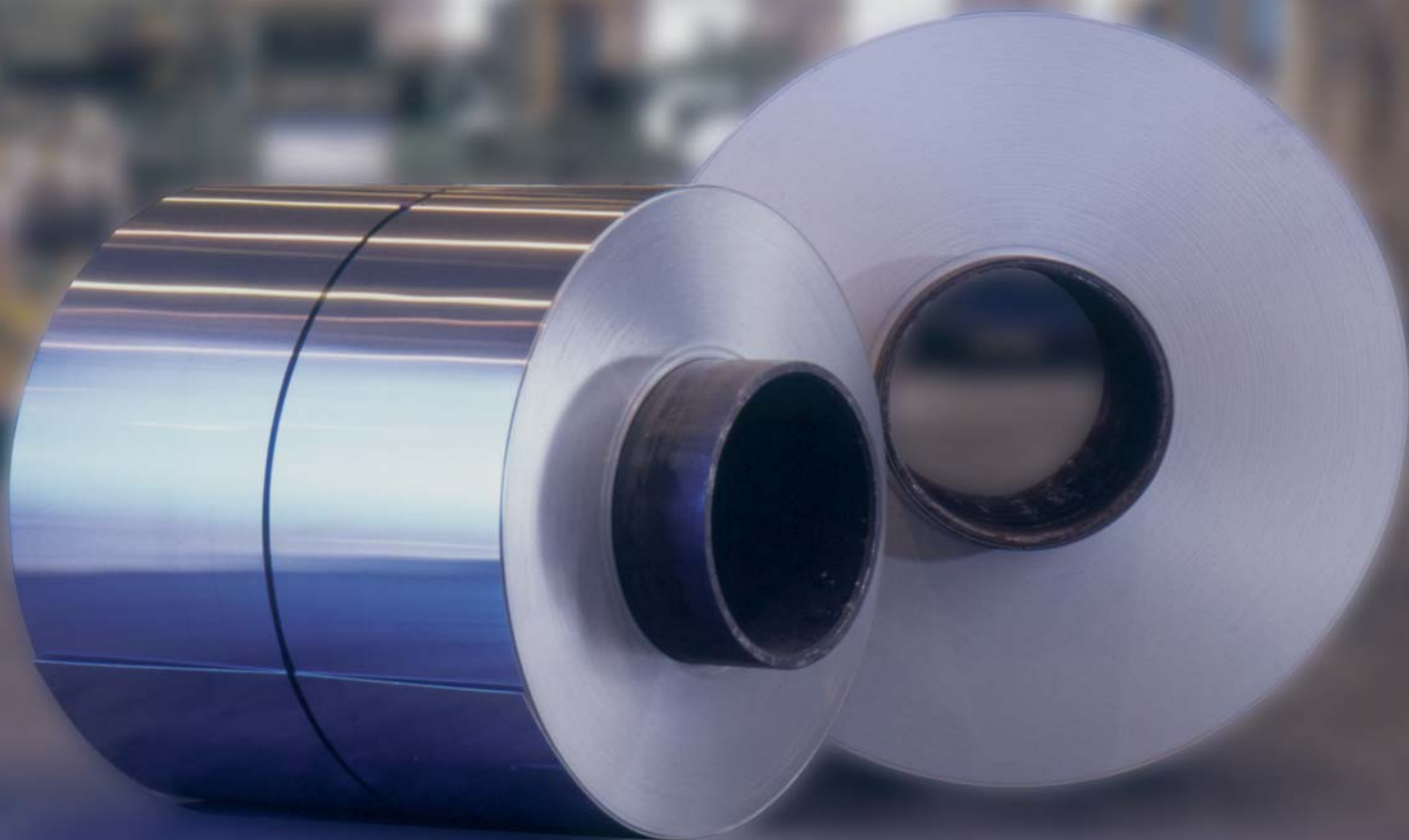
- CAB and vacuum batch furnaces (for larger-scale component tests, capable of replicating customer braze profiles)
- Corrosion cabinets / testing e.g. SWAAT
- Post-braze / post-testing metallographic assessments



Example of
Aleris flux-free material (FF 3527)
CAB brazed to typical industrial profile
No flux
0.8 mm wire gauge gap



Example of
Aleris standard 3xxx material
CAB brazed to typical industrial profile
5 g/m² fluxed
0.8 mm wire gauge gap

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