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## HUNTSMAN ADVANCED MATERIALS

### Adhesive Technical Support Europe

#### Comparison of ARALDITE® 2012 (ARALDITE® AW 2104 / Hardener HW 2934) & ARALDITE® 2012-1 (ARALDITE® AW 2104-1/ Hardener HW 2934)

### NEW PRODUCT DEVELOPMENT REPORT

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## INTRODUCTION

ARALDITE® 2012-1 is a new adhesive which has been developed to replace ARALDITE® 2012. This is due to a change in hazard classification of a raw material used in the resin component (ARALDITE® AW 2104). The composition, characteristics and properties of the ARALDITE® 2012-1 remain similar to the existing ARALDITE® 2012 product.

The ARALDITE® 2012-1 comprises a new resin component (ARALDITE® AW 2104-1) together with the existing hardener component (Hardener HW 2934).

The following comparative report shows data obtained from laboratory testing of the new ARALDITE® 2012-1 against the existing ARALDITE® 2012 system.

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## TEST RESULTS

Unless otherwise stated, the figures given below were determined by testing standard specimens made by lap-jointing 100 x 25 x 1.6 mm strips of sandblasted aluminium alloy. The bond area was 12.5 x 25 mm, with bonded specimens cured under light clamping pressure. Lap shear testing was carried out at 23°C at 10mm/min unless otherwise stated.

### Liquid properties

	ARALDITE® 2012 (ARALDITE® AW 2104/ Hardener HW 2934)	ARALDITE® 2012-1 (ARALDITE® AW 2104-1/ Hardener HW 2934)
Mix Ratio (resin : hardener)	100:100 by weight 100:100 by volume	100:100 by weight 100:100 by volume
Appearance (mix)	Pale viscous liquid	Pale viscous liquid
Viscosity (mix)	Ca. 25 – 65 Pa.s	Ca. 25 – 65 Pa.s
Working time (10g) 23°C	5 – 8 min	5 – 8 min

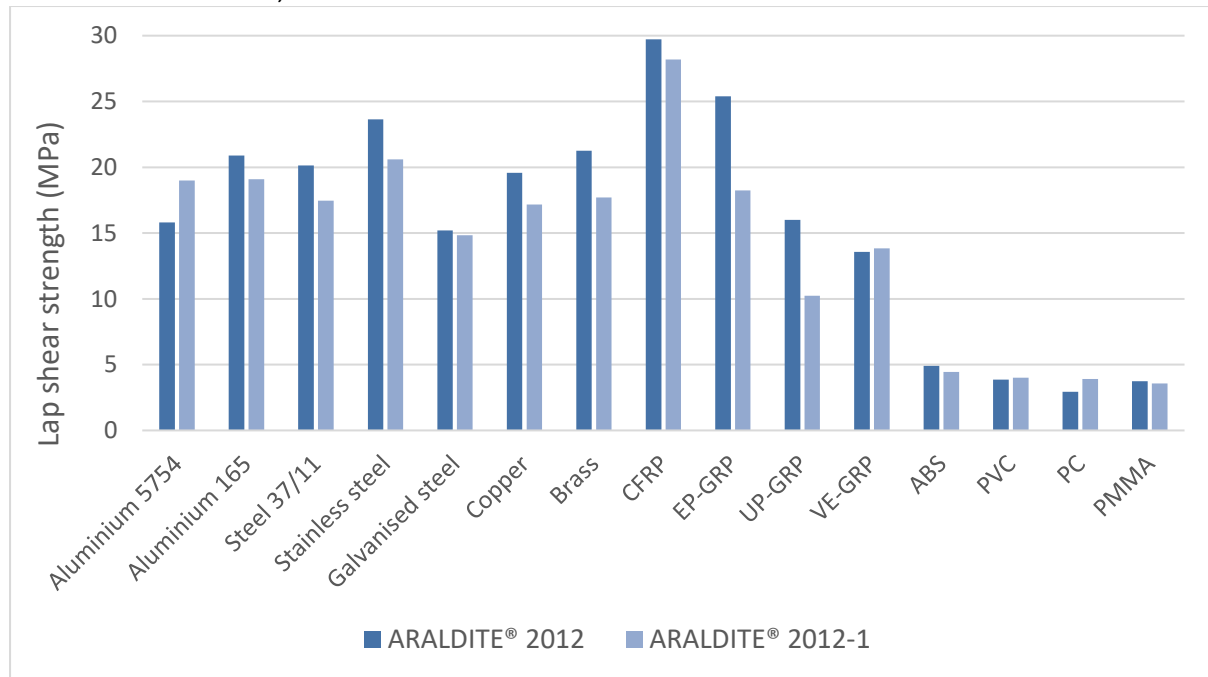
### Handling/working strength

Time to reach handling strength (1 MPa) and working strength (10 MPa) on bonded specimens cured at different temperatures.

Cure temperature	Time to reach lap shear strength	ARALDITE® 2012	ARALDITE® 2012-1
Curing at 15°C	Time to 1 MPa	20 minutes	25 minutes
	Time to 10 MPa	70 minutes	50 minutes
Curing at 23°C	Time to 1 MPa	20 minutes	15 minutes
	Time to 10 MPa	60 minutes	45 minutes
Curing at 40°C	Time to 1 MPa	10 minutes	10 minutes
	Time to 10 MPa	40 minutes	40 minutes

### Lap shear strength (LSS) on different materials (ISO 4587)

Cure: 16 hours at 40°C, tested at 23°C

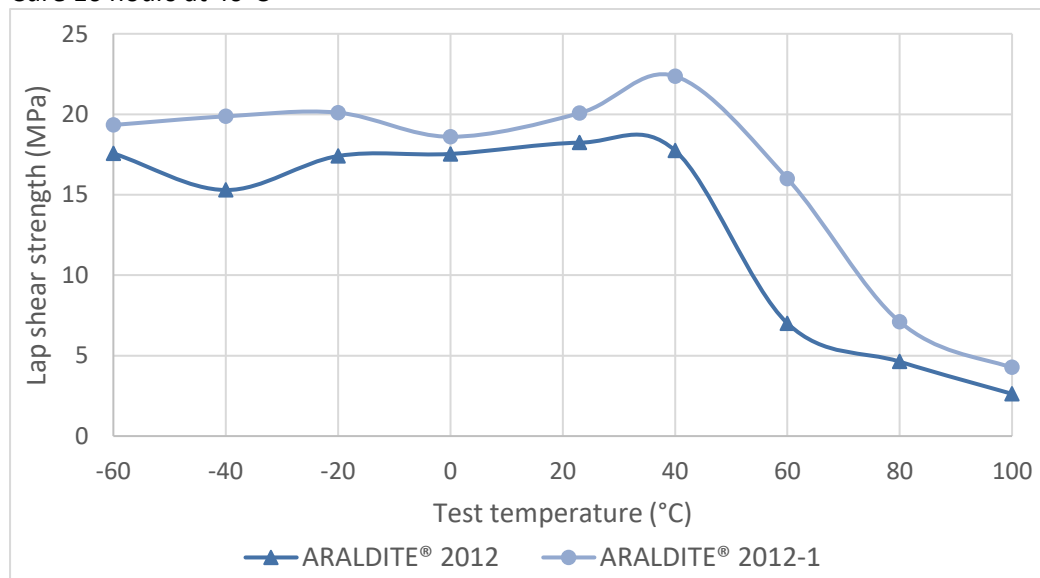


*Metal substrates: sandblasted & degreased with acetone*

*Plastic substrates: abraded & degreased with isopropanol*

### Lap shear strength versus temperature (ISO 4587)

Cure 16 hours at 40°C



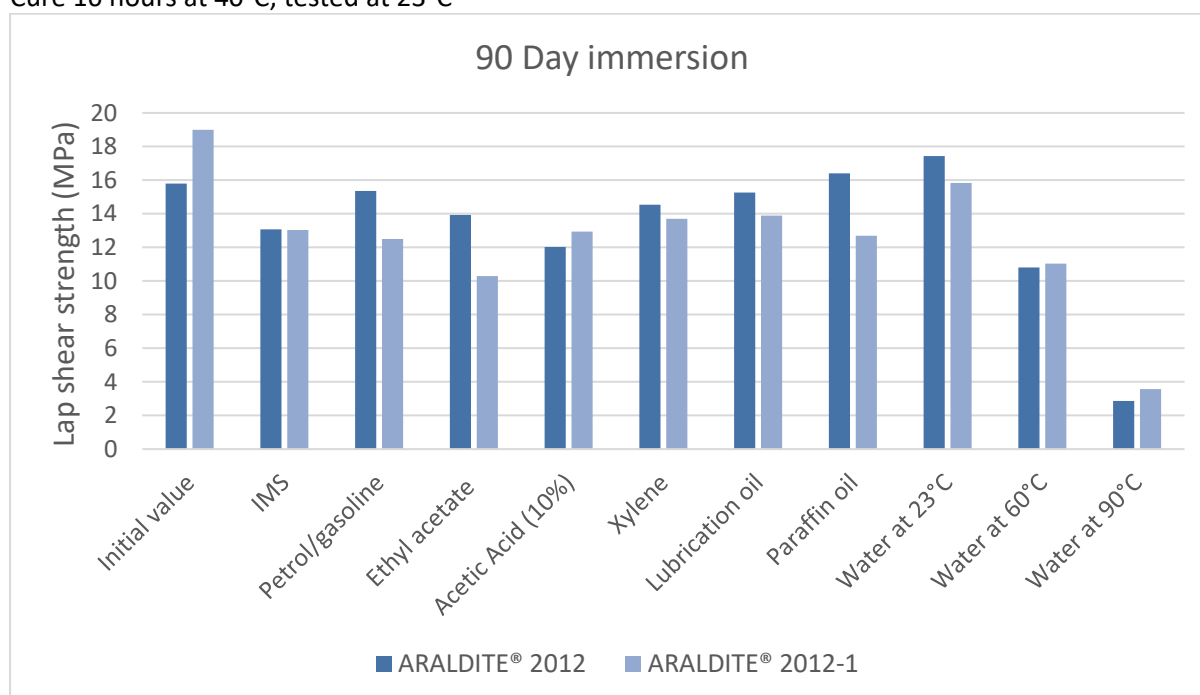
## DMA measurement (ISO 6721)

Cure 16 hours at 40°C

	ARALDITE® 2012	ARALDITE® 2012-1
Tg (Tanδ)	49°C	53°C
Shear modulus (23°C)	1070	1140

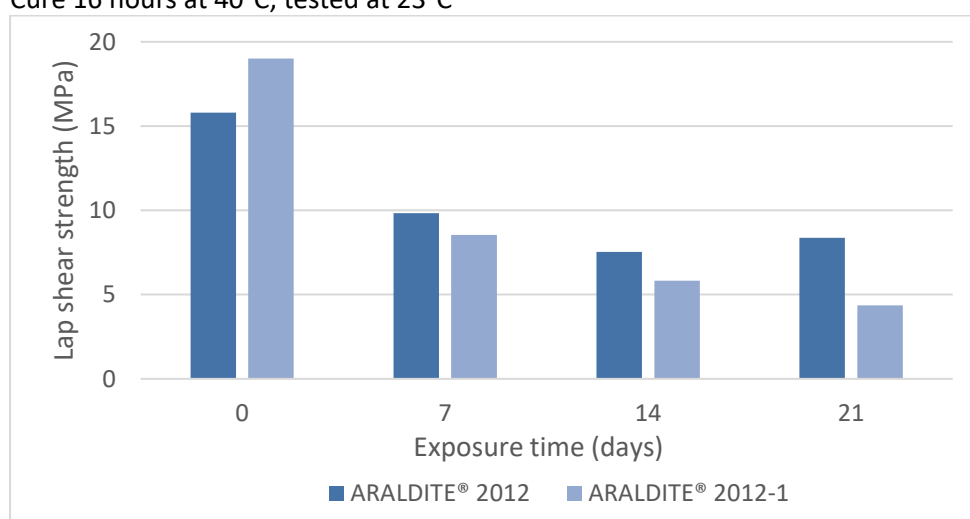
## Chemical aging - immersion in different media

Cure 16 hours at 40°C, tested at 23°C



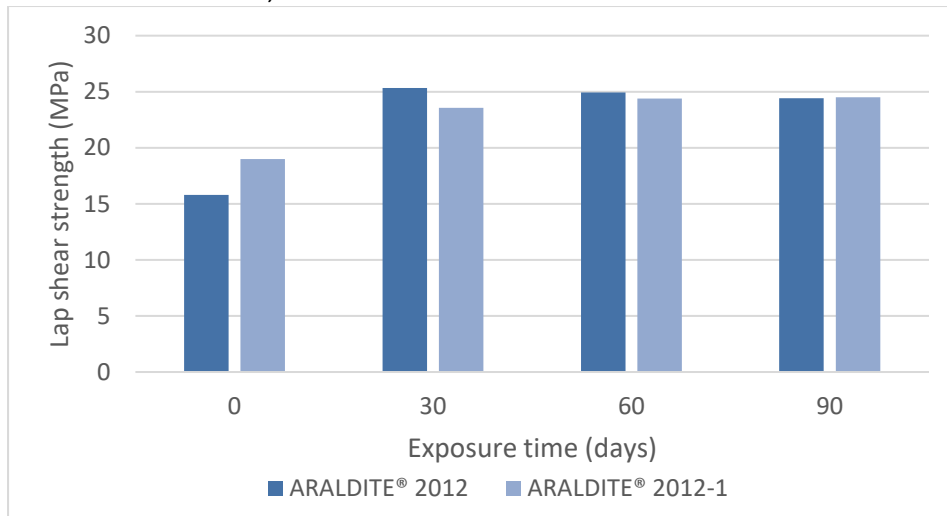
## Cataplasma aging (ISO 9142 E2)

Cure 16 hours at 40°C, tested at 23°C



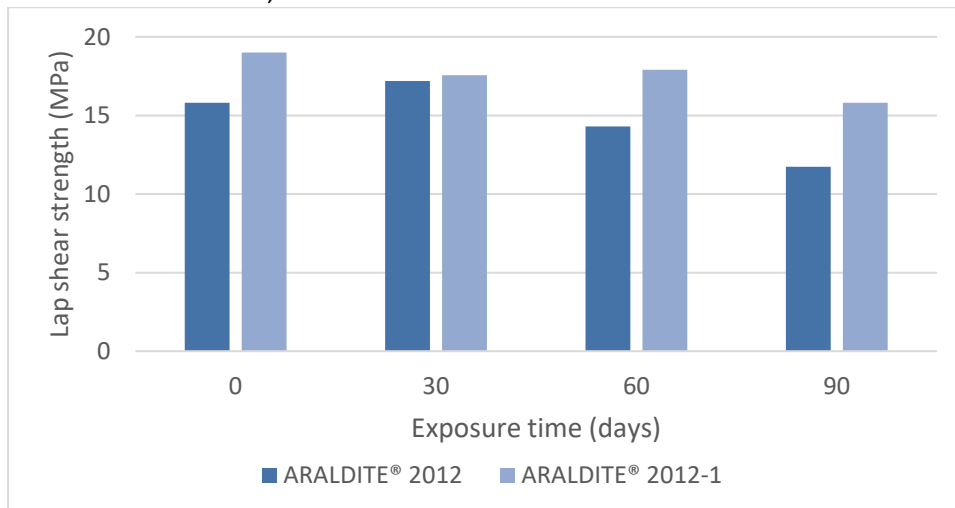
### Heat aging at 70°C

Cure 16 hours at 40°C, tested at 23°C



### Tropical weathering (40°C / 92% relative humidity)

Cure 16 hours at 40°C, tested at 23°C



### Tensile properties (ISO 527)

Cure 16 hours at 40°C, tested at 23°C

	Tensile modulus (MPa)	Tensile strength (MPa)	Elongation at break (%)
ARALDITE® 2012	2225	49.0	61.5
ARALDITE® 2012-1	1978	41.9	69.4

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## CONCLUSION

Testing indicates that the ARALDITE® 2012-1 offers similar handling and properties to the ARALDITE® 2012. For many applications, it may be possible to replace the ARALDITE® 2012 with ARALDITE® 2012-1 without a change of process conditions or part design. However, it is always recommended to check the suitability of the product for the intended application.

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