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HUNTSMAN ADVANCED MATERIALS

Adhesive Technical Support Europe

Comparison of ARALDITE® 2014-2 (ARALDITE® AW 139-1 / Hardener HW 5323-1) & ARALDITE® 2014-3 (ARALDITE® AW 139-2/ Hardener HW 5323-1)

NEW PRODUCT DEVELOPMENT REPORT

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INTRODUCTION

ARALDITE® 2014-3 is a new adhesive which has been developed to replace ARALDITE® 2014-2. This is due to a change in hazard classification of a raw material used in the resin component (ARALDITE® AW 139-1). The composition, characteristics and properties of the ARALDITE® 2014-3 remain similar to the existing ARALDITE® 2014-2 product.

The ARALDITE® 2014-3 comprises a new resin component (ARALDITE® AW 139-2) together with the existing hardener component (Hardener HW 5323-1).

The following comparative report shows data obtained from laboratory testing of the new ARALDITE® 2014-3 against the existing ARALDITE® 2014-2 system.

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® 2014-2 (ARALDITE® AW 139-1 / Hardener HW 5323-1)	ARALDITE® 2014-3 (ARALDITE® AW 139-2/ Hardener HW 5323-1)
Mix Ratio (resin : hardener)	100:50 by weight 100:50 by volume	100:50 by weight 100:50 by volume
Appearance (mix)	Dark grey paste	Dark grey paste
Viscosity (mix)	Thixotropic	Thixotropic
Working time (10g) 23°C	120 min.	120 min.

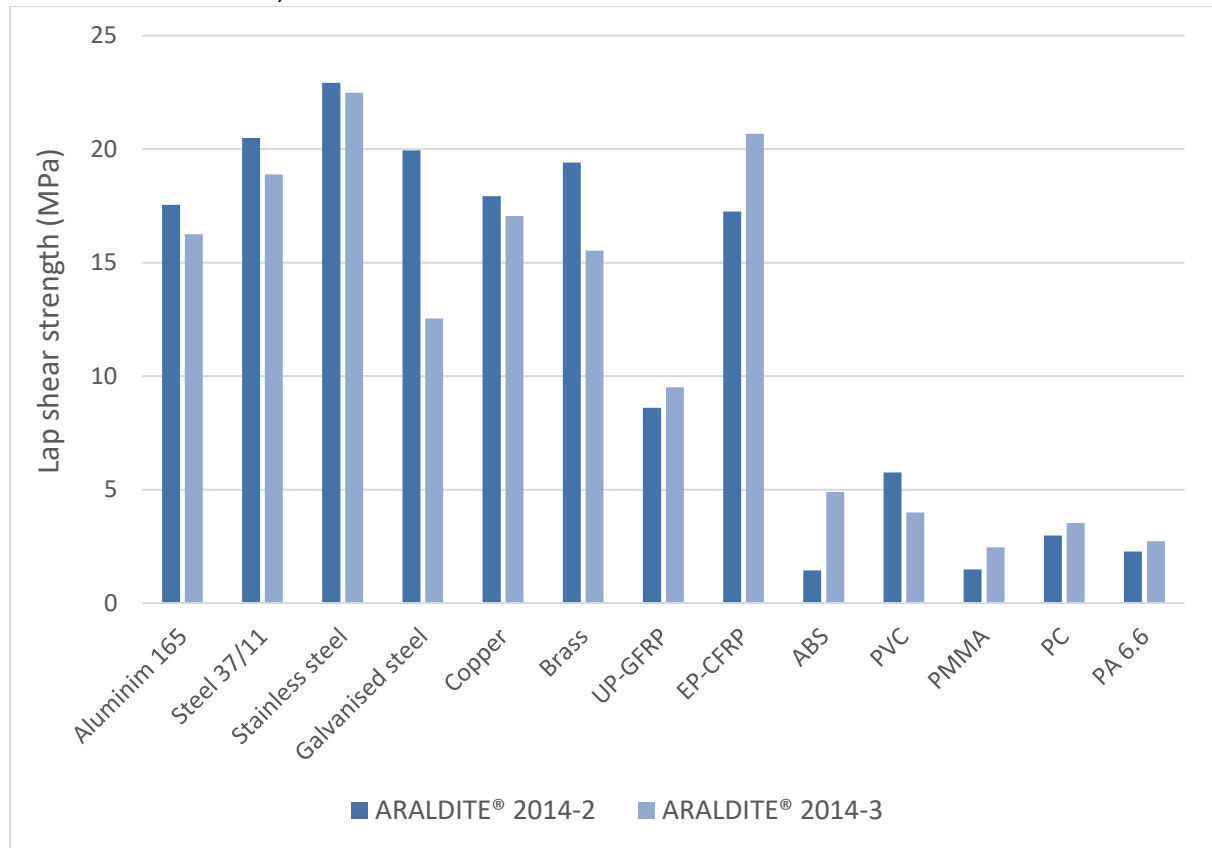
Handling/working strength

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® 2014-2	ARALDITE® 2014-3
Curing at 15°C	Time to 1 MPa	9 hours	9 hours
	Time to 10 MPa	12 hours	12 hours
Curing at 23°C	Time to 1 MPa	5 hours	4 hours
	Time to 10 MPa	7 hours	6 hours
Curing at 40°C	Time to 1 MPa	85 min.	70 min.
	Time to 10 MPa	110 min.	95 min.

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

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

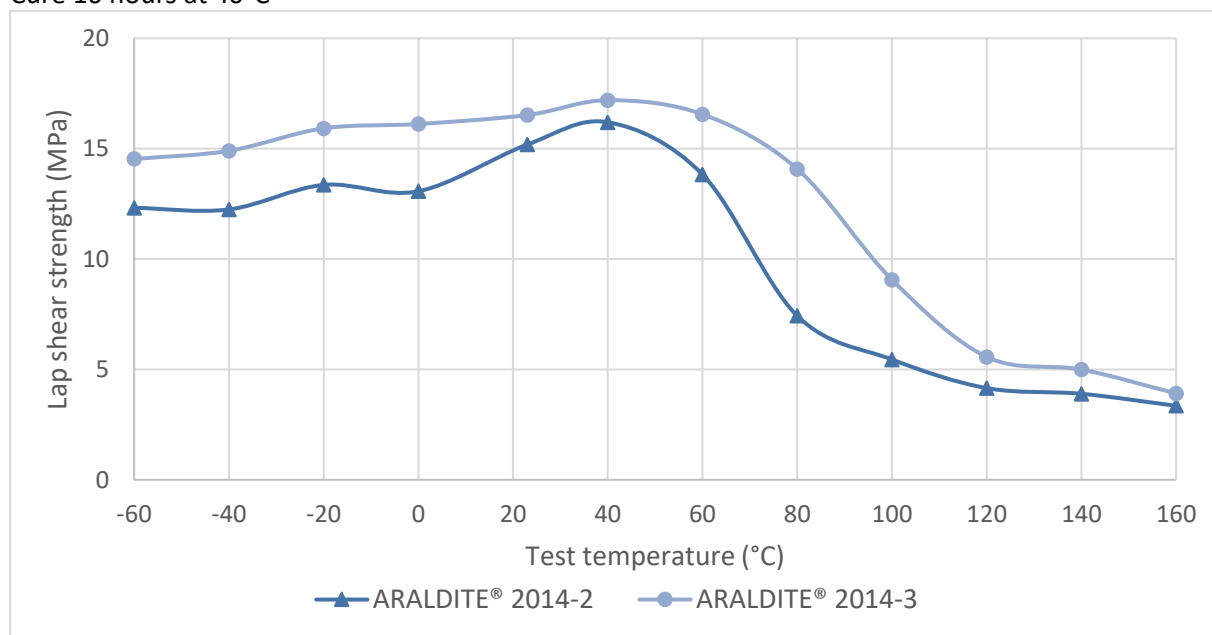


Metal substrates: sandblasted & degreased with acetone

Plastic substrates: abraded & degreased with isopropanol

Lap shear strength versus temperature (ISO 4587)

Cure 16 hours at 40°C



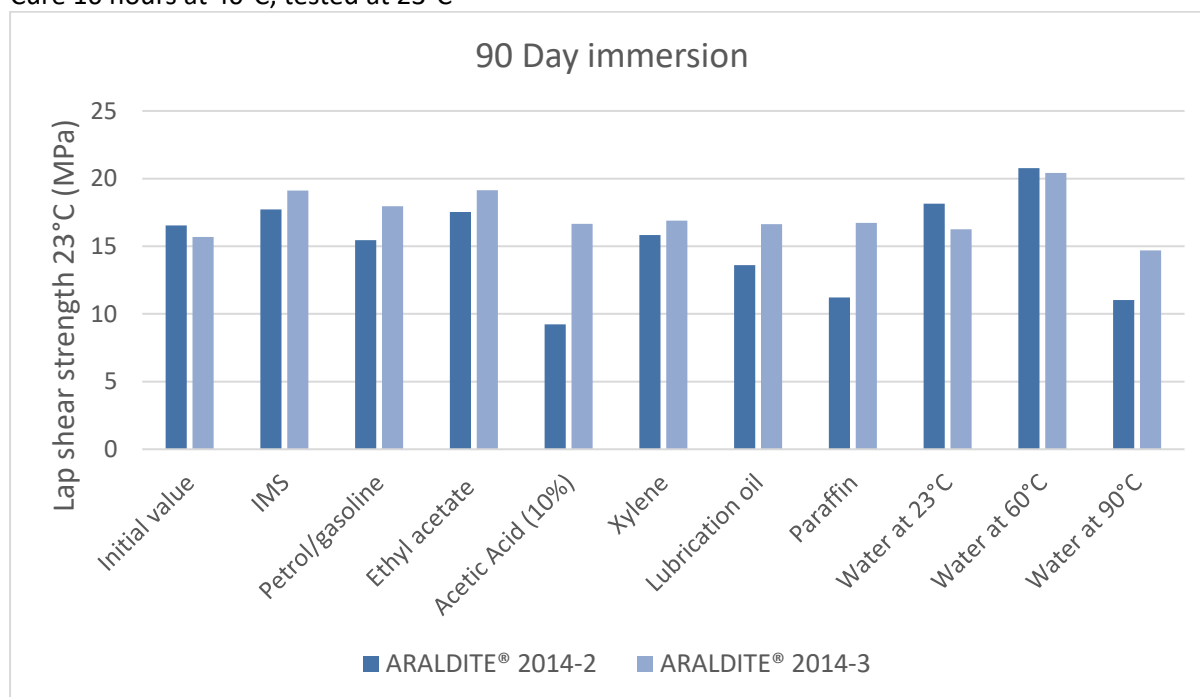
DMA measurement (ISO 6721)

Cure 16 hours at 40°C

	ARALDITE® 2014-2	ARALDITE® 2014-3
Tg (Tanδ)	69°C	69°C
Shear modulus (23°C)	1589	1667

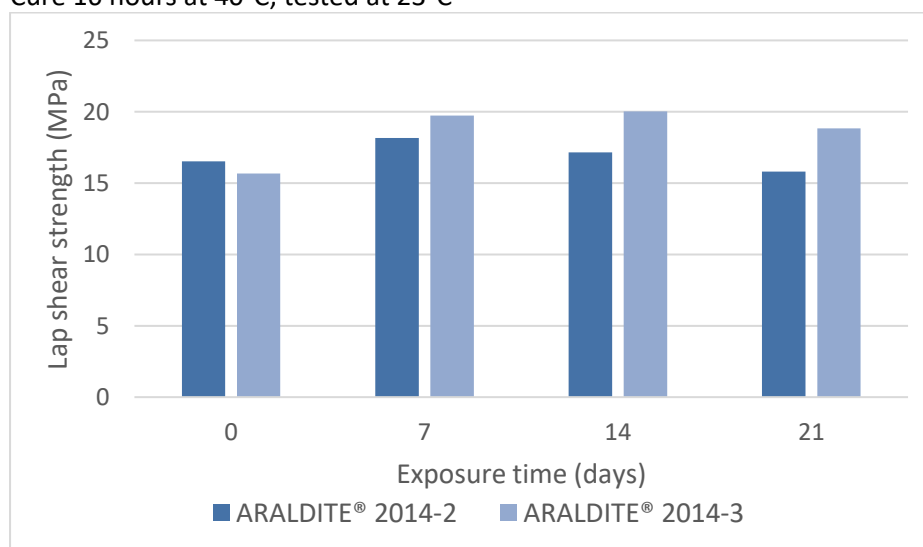
Chemical aging - immersion in different media

Cure 16 hours at 40°C, tested at 23°C



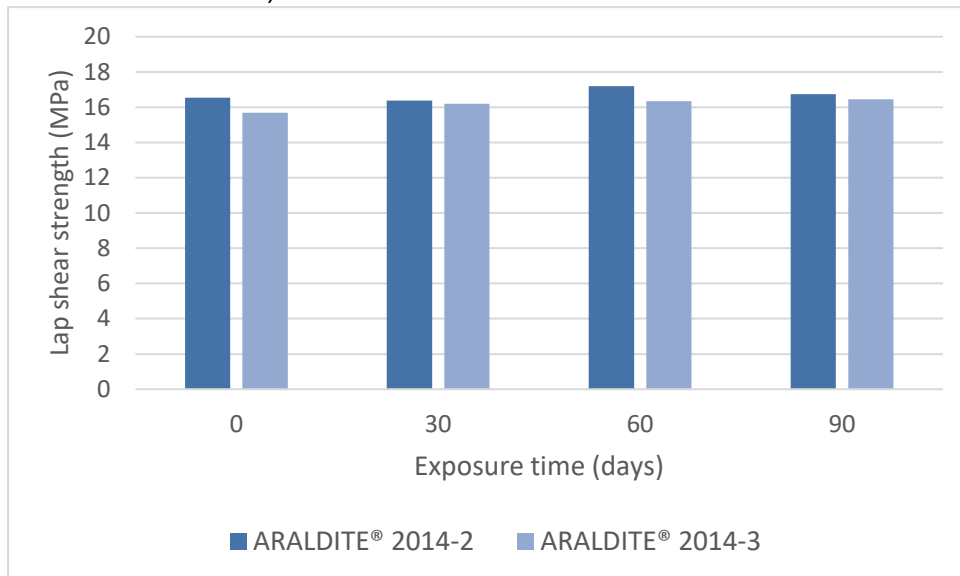
Cataplasma aging (ISO 9142 E2)

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



Tensile properties (ISO 527)

Cure 16 hours at 40°C, tested at 23°C

	Tensile modulus (MPa)	Tensile strength (MPa)	Elongation at break (%)
ARALDITE® 2014-2	3706	45	1.6
ARALDITE® 2014-3	3708	45	1.6

Flexural properties (ISO 178)

Cure 16 hours at 40°C, tested at 23°C

	Flexural modulus (MPa)	Flexural strength (MPa)
ARALDITE® 2014-2	3500	60
ARALDITE® 2014-3	3200	54

CONCLUSION

Testing indicates that the ARALDITE® 2014-3 offers similar handling and properties to the ARALDITE® 2014-2. For many applications, it may be possible to replace the ARALDITE® 2014-2 with ARALDITE® 2014-3 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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