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HUNTSMAN ADVANCED MATERIALS

Adhesive Technical Support Europe

Comparison of ARALDITE® AV 138 M-1 / HV 998-1 & ARALDITE® AV 138 M-2 / HV 998-1

NEW PRODUCT DEVELOPMENT REPORT

PREPARED BY

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INTRODUCTION

ARALDITE® AV 138 M-2 / HV 998-1 is a new adhesive which has been developed to replace ARALDITE® AV 138 M-1 / HV 998-1. This is due to a change in hazard classification of a raw material used in the resin component (AV 138 M-1). The characteristics and properties of the ARALDITE® AV 138 M-2 remain similar to the existing ARALDITE® AV 138 M-1.

The following comparative report shows data obtained from laboratory testing of the new ARALDITE® AV 138 M-2 / HV 998-1 adhesive system against the existing ARALDITE® AV 138 M-1 / HV 998-1 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 indicated otherwise.

Liquid properties

	ARALDITE® AV 138 M-1 / HV 998-1	ARALDITE® AV 138 M-2 / HV 998-1
Mix Ratio (resin : hardener)	100:40 by weight 100:40 by volume	100:40 by weight 100:40 by volume
Appearance (mix)	Dark grey paste	Dark grey paste
Viscosity (mix)	Thixotropic	Thixotropic
Working time (10g) 23°C	65 minutes	75 minutes

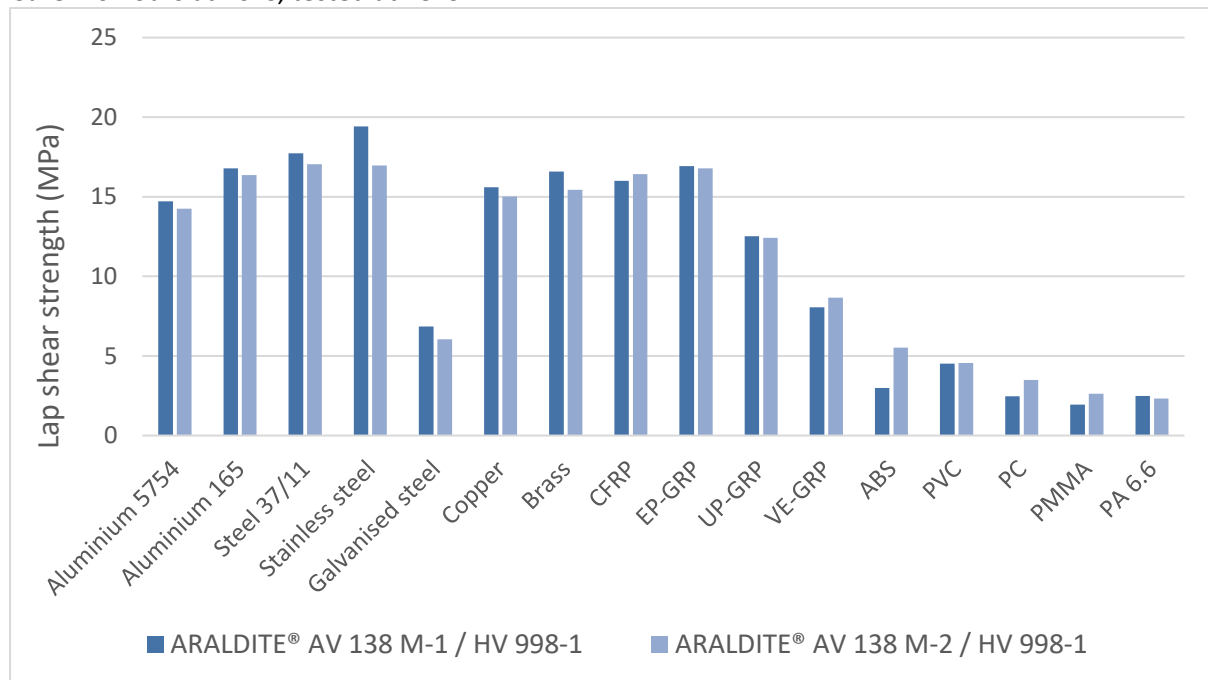
Handling/working strength

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® AV 138 M-1 / HV 998-1	ARALDITE® AV 138 M-2 / HV 998-1
Curing at 15°C	Time to 1 MPa	7 hours	8 hours
	Time to 10 MPa	14 hours	14 hours
Curing at 23°C	Time to 1 MPa	4 hours	5 hours
	Time to 10 MPa	6 hours	7 hours
Curing at 40°C	Time to 1 MPa	1 hour	1 hour
	Time to 10 MPa	1.5 hours	1.5 hours

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

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

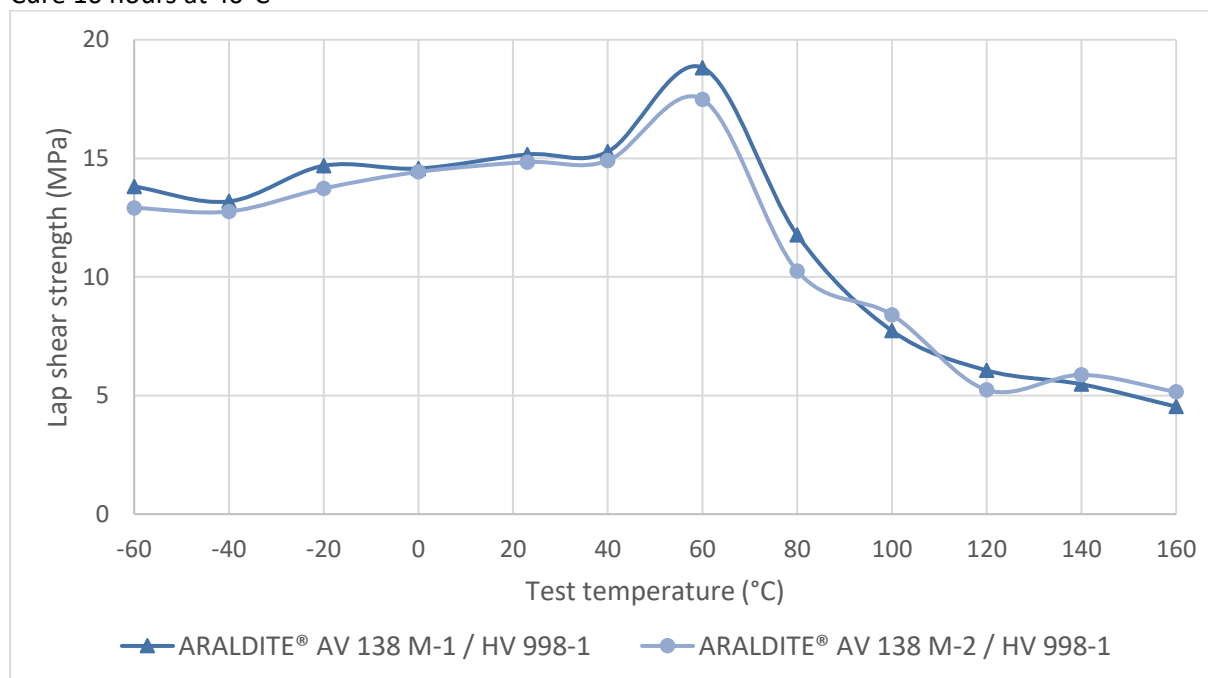


Metal substrates: sandblasted & degreased with acetone (galvanised steel – acetone degrease only)

Plastic substrates: abraded & degreased with isopropanol

Lap shear strength versus temperature (ISO 4587)

Cure 16 hours at 40°C



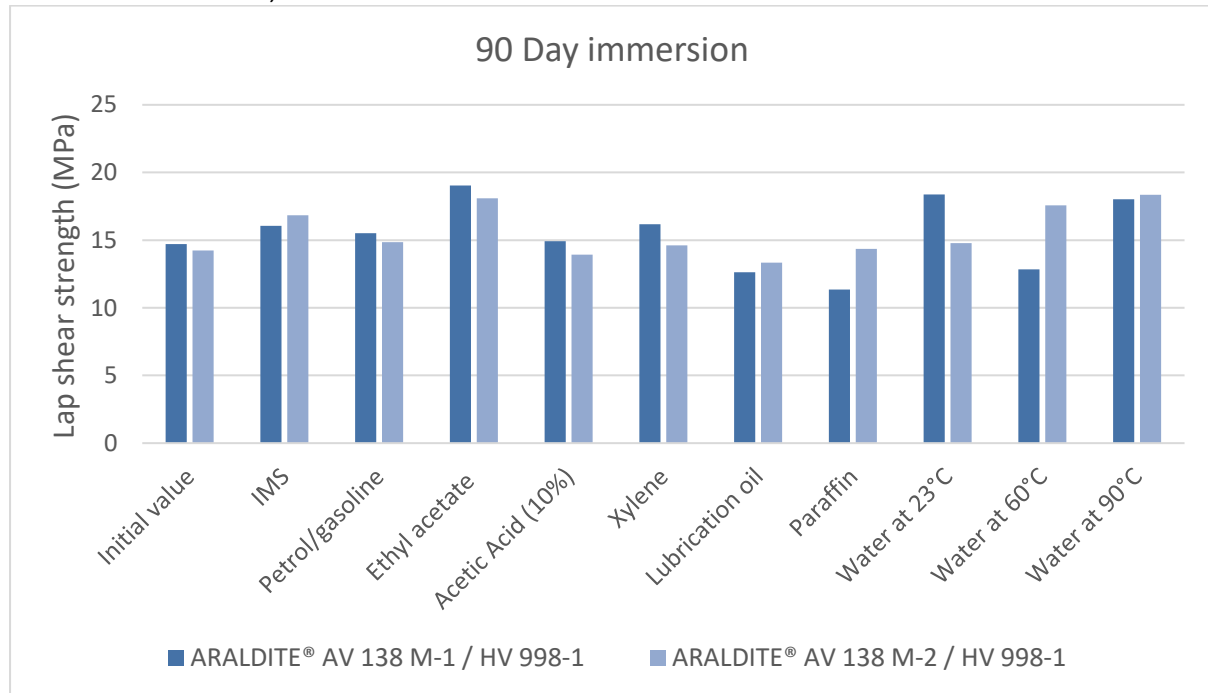
DMA measurement (ISO 6721)

Cure 16 hours at 40°C

	ARALDITE® AV 138 M-1 / HV 998-1	ARALDITE® AV 138 M-2 / HV 998-1
T _g (Tanδ)	70°C	69°C
Shear modulus (23°C)	1750 MPa	1910 MPa

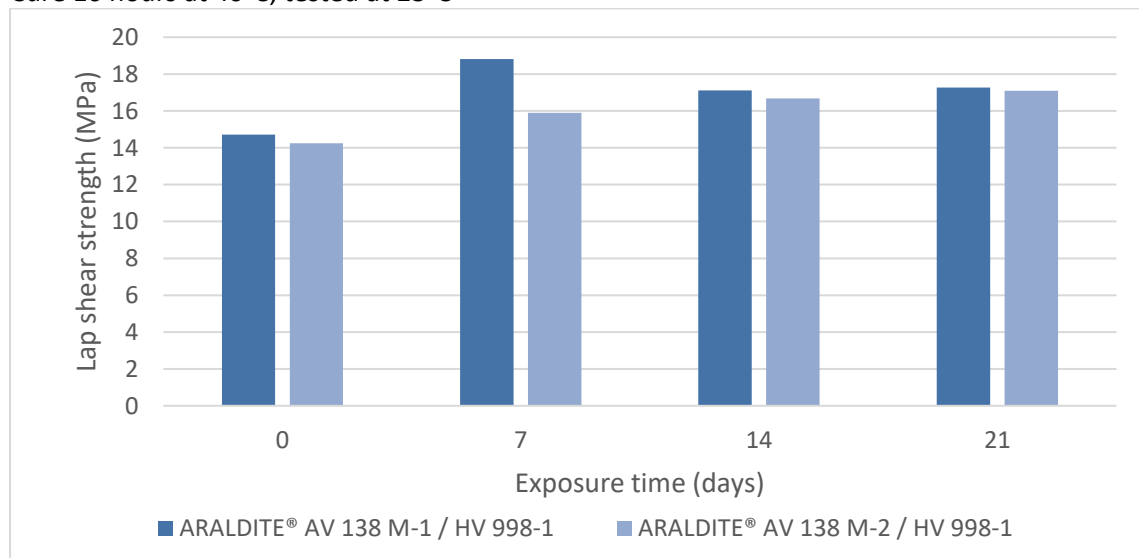
Chemical aging - immersion in different media

Cure 16 hours at 40°C, tested at 23°C



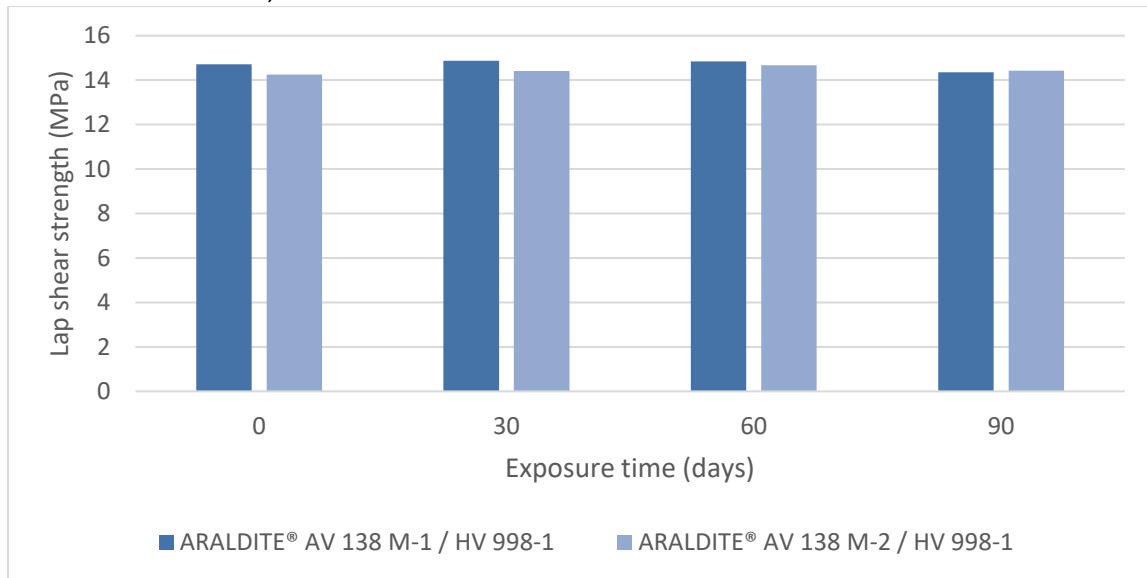
Cataplasma aging (ISO 9142 E2)

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® AV 138 M-1 / HV 998-1	4474	42	1.1
ARALDITE® AV 138 M-2 / HV 998-1	4828	43	1.1

CONCLUSION

Testing indicates that the ARALDITE® AV 138 M-2 / HV 998-1 offers similar handling and properties to the ARALDITE® AV 138 M-1 / HV 998-1. For many applications, it may be possible to replace ARALDITE® AV 138 M-1 / HV 998-1 with ARALDITE® AV 138 M-2 / HV 998-1 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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