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Comparison of ARALDITE® 2020
(XW 396 RESIN / XW 397 HARDENER)
&
ARALDITE® 2020-1
(XW 396-1 RESIN / XW 397-1 HARDENER)

NEW PRODUCT DEVELOPMENT REPORT

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INTRODUCTION

ARALDITE® 2020-1 is a new adhesive which has been developed to replace ARALDITE® 2020. This is due to a change in hazard classification of a raw material used in both the resin component (XW 396) and the hardener component (XW 397). The characteristics and properties of the ARALDITE® 2020-1 remain similar to the existing ARALDITE® 2020 product.
The ARALDITE® 2020-1 comprises a new resin component (XW 396-1 RESIN) together with a new hardener component (XW 397-1 HARDENER).
The following comparative report shows data obtained from laboratory testing of the new ARALDITE® 2020-1 against the existing ARALDITE® 2020 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® 2020 (XW 396 RESIN / XW 397 HARDENER)	ARALDITE® 2020-1 (XW 396-1 RESIN / XW 397-1 HARDENER)
Mix Ratio (resin : hardener)	100:30 by weight 100:35 by volume	100:28 by weight 100:33 by volume
Appearance (mix)	Pale, transparent liquid	Pale, transparent liquid
Gardner colour (mix)	≤1	≤1
Viscosity (mix)	Ca. 150 mPa.s	Ca. 300 mPa.s
Refractive index (mix)	1.51	1.50
Pot life 23°C (100g mix)	174 min	159 min

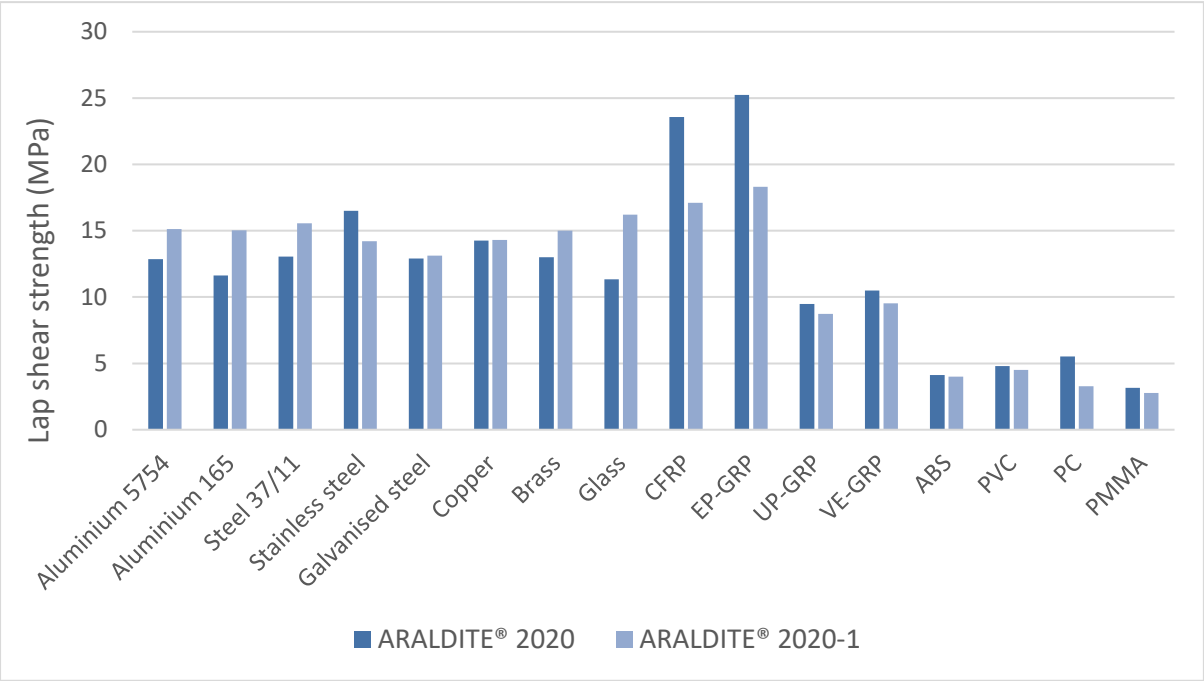
Handling/working strength

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® 2020	ARALDITE® 2020-1
Curing at 15°C	Time to 1 MPa	20 hours	25 hours
	Time to 10 MPa	48 hours	42 hours
Curing at 23°C	Time to 1 MPa	16 hours	16 hours
	Time to 10 MPa	25 hours	25 hours
Curing at 40°C	Time to 1 MPa	3 hours	4 hours
	Time to 10 MPa	7 hours	9 hours

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

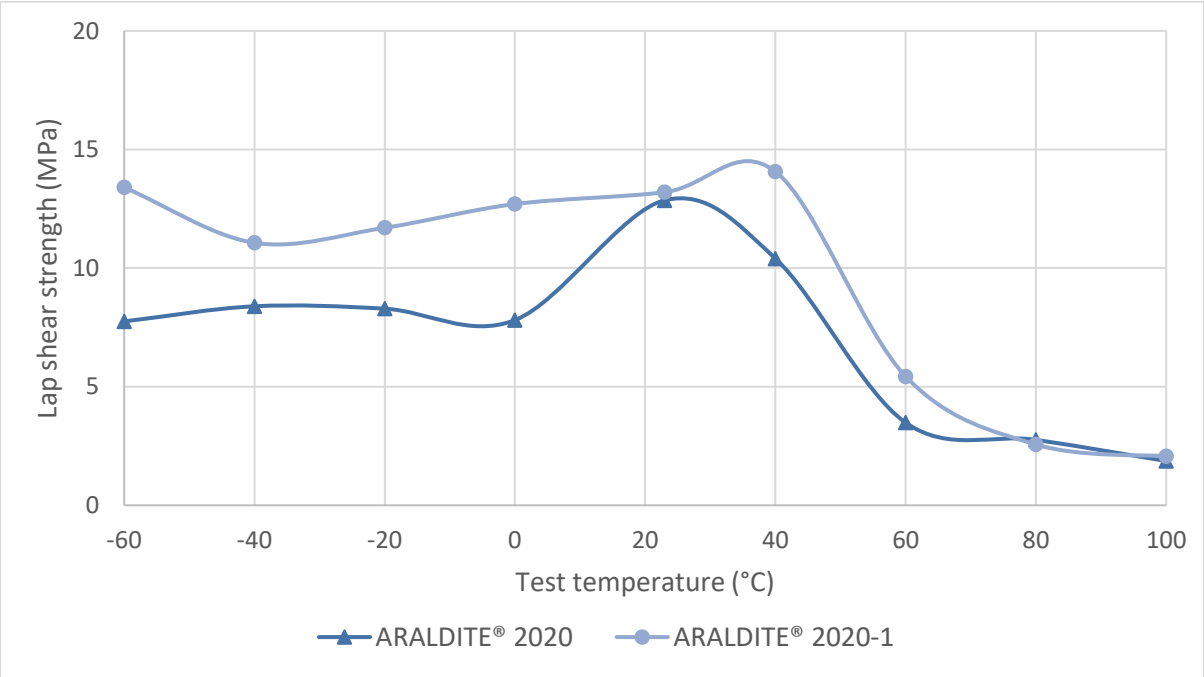
Cure: 16 hours at 40°C, tested at 23°C



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

Lap shear strength versus temperature (ISO 4587)

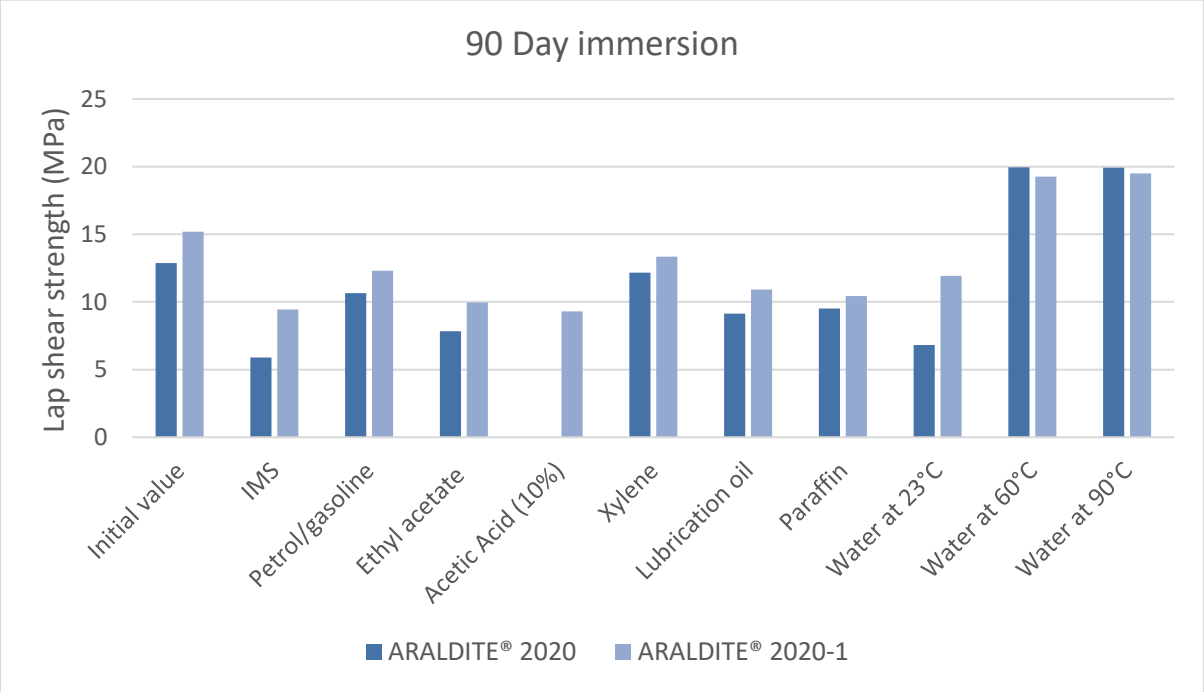
Cure 16 hours at 40°C



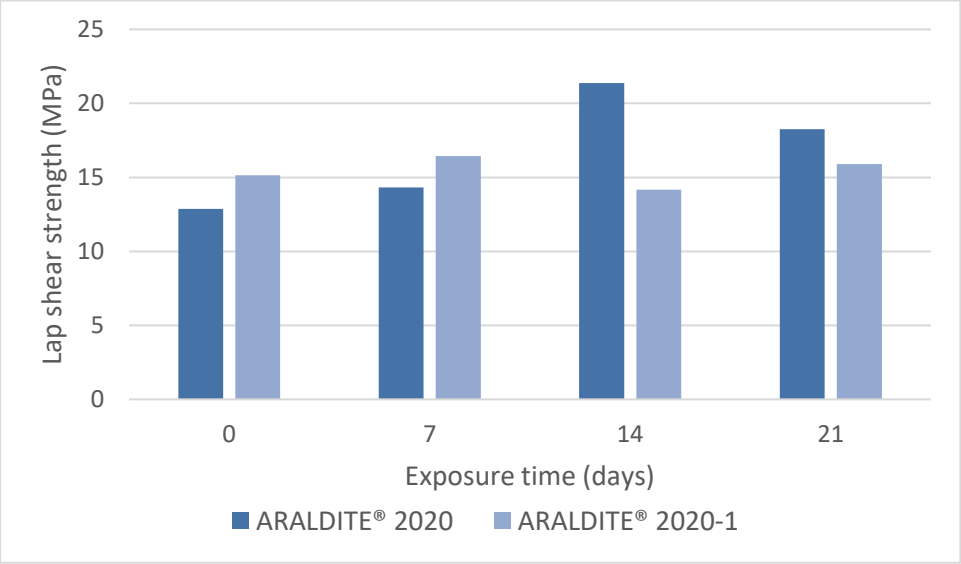
DMA measurement (ISO 6721)
Cure 16 hours at 40°C

	ARALDITE® 2020	ARALDITE® 2020-1
Tg (Tanδ)	53°C	53°C
Shear modulus (23°C)	1159 MPa	1140 MPa

Chemical aging - immersion in different media
Cure 16 hours at 40°C, tested at 23°C

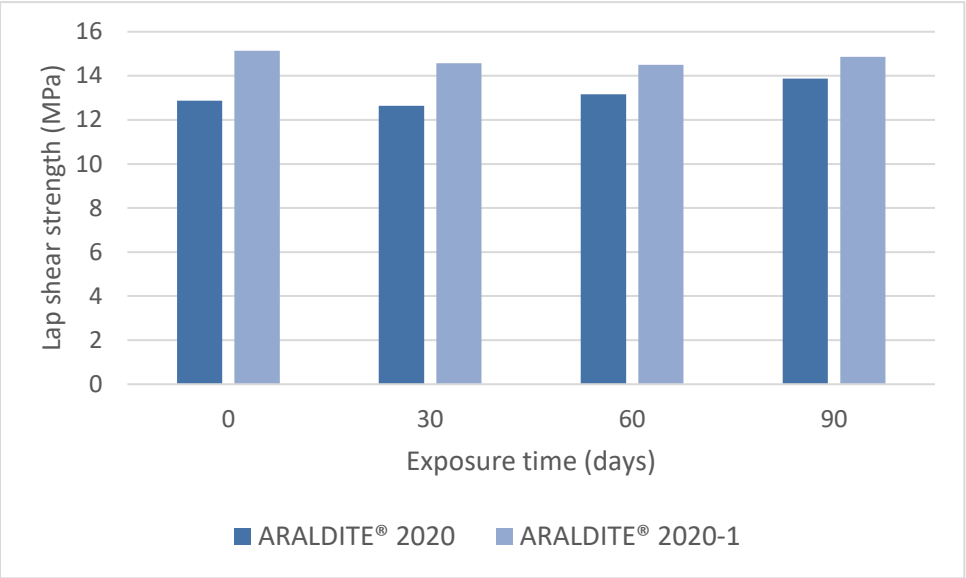


Cataplasma aging (ISO 9142 E2)
Cure 16 hours at 40°C, tested at 23°C



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® 2020	2413	56	8.6
ARALDITE® 2020-1	2166	55	11.9

Flexural properties (ISO 178)

Cure 16 hours at 40°C, tested at 23°C

	Flexural modulus (MPa)	Flexural strength (MPa)
ARALDITE® 2020	2494	78
ARALDITE® 2020-1	2321	70

CONCLUSION

Testing indicates that the ARALDITE® 2020-1 offers similar handling and properties to the ARALDITE® 2020. For many applications, it may be possible to replace ARALDITE® 2020 with ARALDITE® 2020-1 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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