

Araldite® AW 4859 / Hardener HW 4859

Product Description

Araldite® AW 4859 / Hardener HW 4859 is a two-component, epoxy adhesive paste of high strength and toughness. Performances can be enhanced by post-curing at elevated temperature. It has been designed to perfectly bond onto composites, especially CFRP but it is suitable for bonding a wide variety of metals, ceramics and many other substrates in common use.

Features

- Very high lap shear
- Bonds a wide variety of materials (metal, composite and thermoplastics)
- Temperature resistant up to 284°F (140°C)
- Extremely tough and resilient adhesive

Typical Properties*

Property	Araldite® AV 4738	Hardener HV 4739	Mixed System
Color	Black	Yellowish	Black
Density, g/cm ³	1.2	1.0	~1.1
Viscosity at 77°F (25°C), cP	80,000-100,000	10,000-15,000	Thixotropic
Pot life at 77°F (25°C), 100 g, min	--	--	100-120

* Specified data are on a regular basis analyzed. Data which is described in this document as 'typical' is not analyzed on a regular basis and is given for information purposes only. Data values are not guaranteed or warranted unless if specifically mentioned.

Processing

Pretreatment

The strength and durability of a bonded joint are dependent on proper treatment of the surfaces to be bonded. At the very least, joint surfaces should be cleaned with a good degreasing agent such as acetone, isopropanol (for plastics) or other proprietary degreasing agents in order to remove all traces of oil, grease and dirt. Low grade alcohol, gasoline (petrol) or paint thinners should never be used.

The strongest and most durable joints are obtained by either mechanically abrading or chemically etching (“pickling”) the degreased surfaces. Abrading should be followed by a second degreasing treatment

Mix Ratio

Product	Parts by weight	Parts by volume
Araldite® AW 4859	100	100
Hardener HW 4859	43	50

The resin and hardener should be blended until they form a homogeneous mix. Araldite® AW 4859 / Hardener HW 4859 is available in cartridges incorporating mixers and can be applied as ready to use adhesive with the aid of the tool recommended by Huntsman Advanced Materials

Application of adhesive

The resin/hardener mix is applied with a spatula, to the pretreated and dry joint surfaces.

A layer of adhesive 0.05 to 0.10 mm thick will normally impart the greatest lap shear strength to the joint. If possible, the adhesive should be applied on both substrates and the joint components must be assembled and clamped as soon as the adhesive has been applied.

For bond line thicknesses below 0.5 mm, the components must be assembled within 60 minutes after the application of the adhesive, for higher bond line thicknesses the components must be assembled within 30 minutes after application of the adhesive. An even contact pressure throughout the joint area will ensure optimum cure.

Mechanical Processing

Specialist firms have developed metering, mixing and spreading equipment that enables the bulk processing of adhesive. We will be pleased to advise customers on the choice of equipment for their particular needs.

Equipment Maintenance

All tools should be cleaned before adhesives residues have had time to cure. The removal of cured residues is a difficult and time-consuming operation. If solvents such as acetone are used for cleaning, operatives should take the appropriate precautions and, in addition, avoid skin and eye contact.

Cure times to reach minimum shear strength

Temperature, °F (°C)		59 (15)	77 (25)	104 (40)	140 (60)
Cure time to reach LSS* > 145 psi (1 MPa)	hours	4.5	-	-	-
	minutes	-	100	20	<5
Cure time to reach LSS > 1450 psi (10 MPa)	hours	6	2	-	-
	minutes	-	-	30	10

LSS = Lap shear strength

Curing requirements

To achieve optimum performance properties an elevated temperature cure or post cure is recommended. This adhesive will solidify to a handleable state but will not fully cure at temperatures below 140°F (60°C). Suggested cure schedules in order to improve the heat resistance of the adhesive are the following:

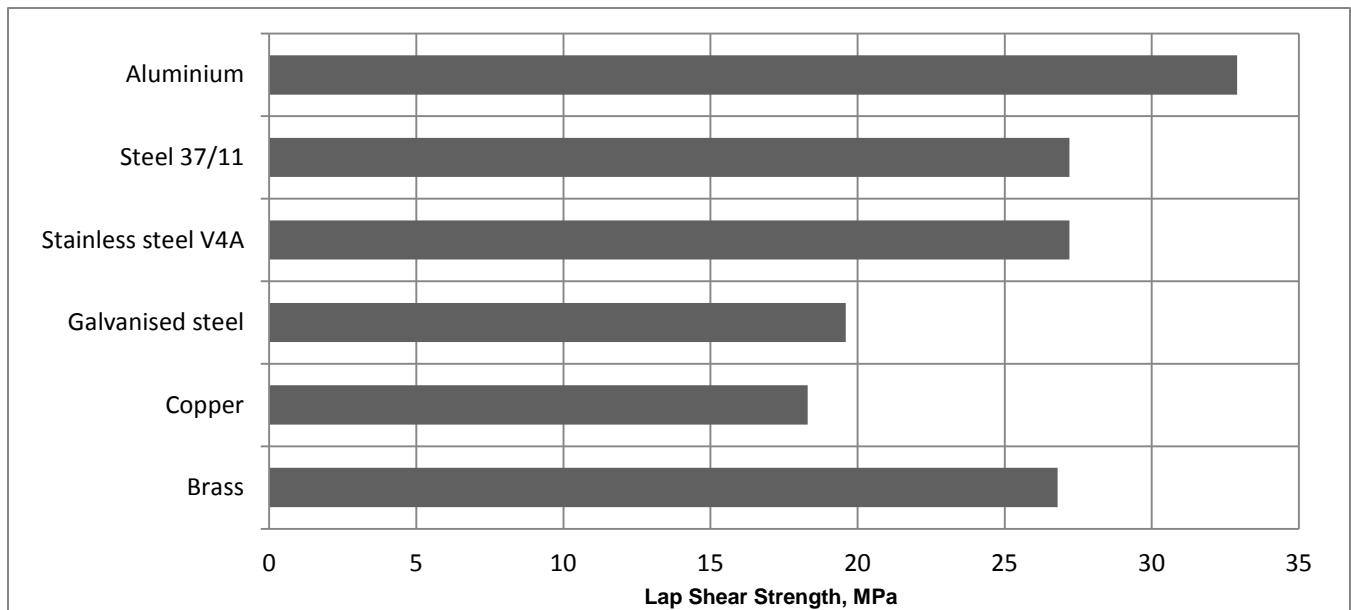
- 16 hour at 104°F (40°C) + 1 hour at 176°F (80°C)
- 3 hour at 176°F (80°C)
- 1 hour at 266°F (130°C)
- 30 min at 302°F (150°C)

Typical Physical Properties

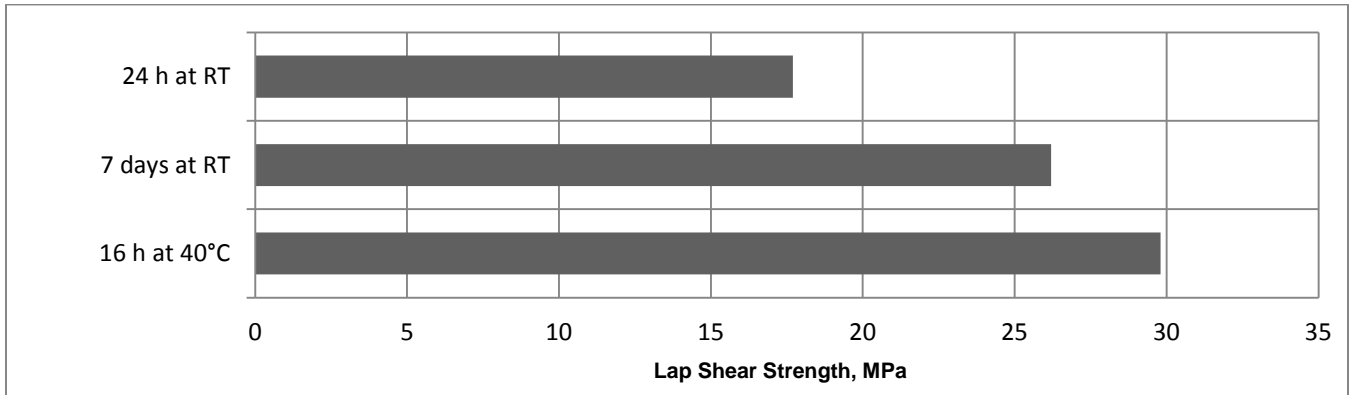
Unless otherwise stated, the figures given below were all determined by testing standard specimens made by lap-jointing 170 x 25 x 1.5 mm strips of aluminum alloy. The overlap was 12.5 x 25 mm in each case. The figures were determined with typical production batches using standard testing methods, and are provided solely as technical information and do not constitute a product specification.

Average lap shear strengths of typical metal-to-metal joints (ISO 4587) (typical average values)

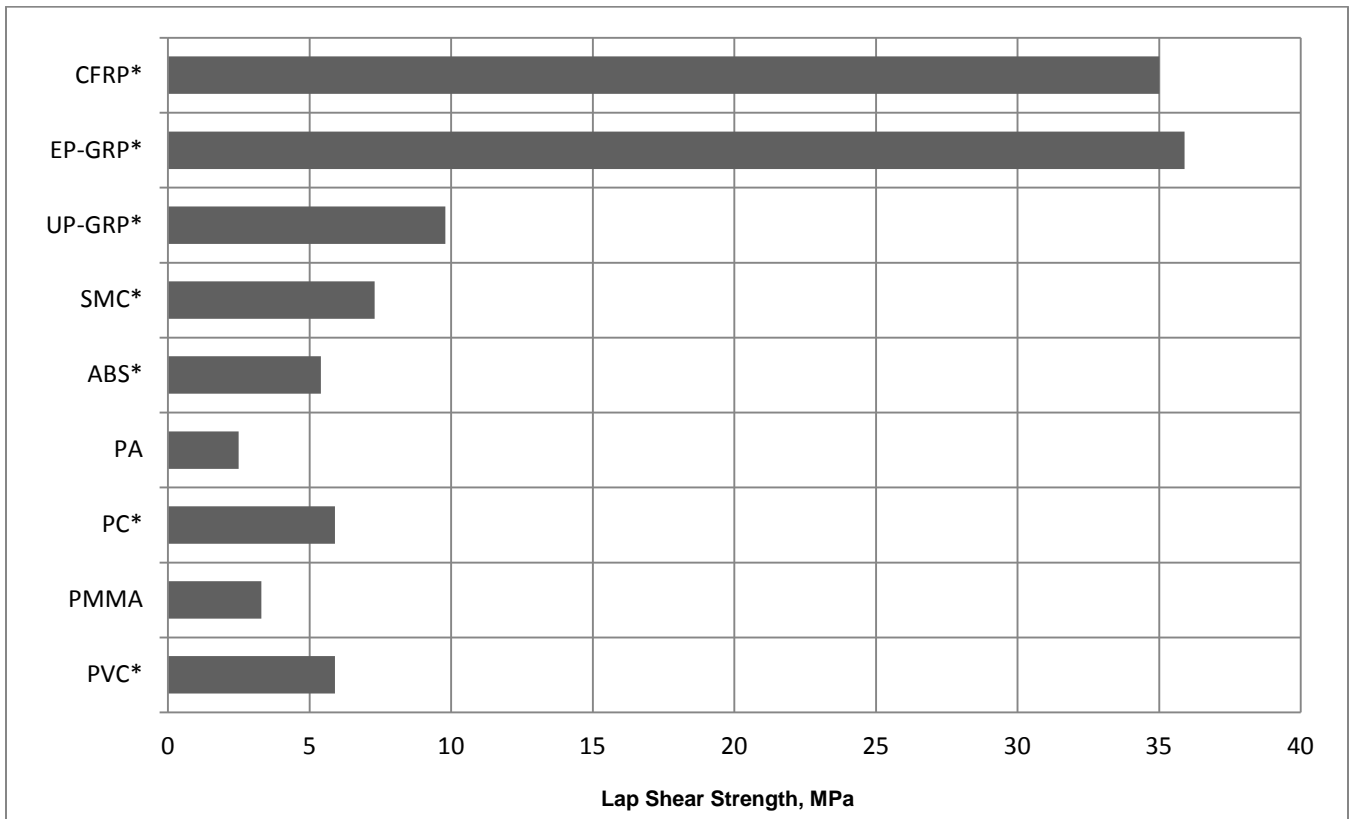
Cured for 16 hours at 104°F (40°C) + 1 hour at 176°F (80°C) and tested at 73°F (23°C). Pretreatment - Lightly abraded and alcohol degreased.



Other cure cycles, on aluminum and tested at 73°F (23°C). Pretreatment: sandblasted and degreased.

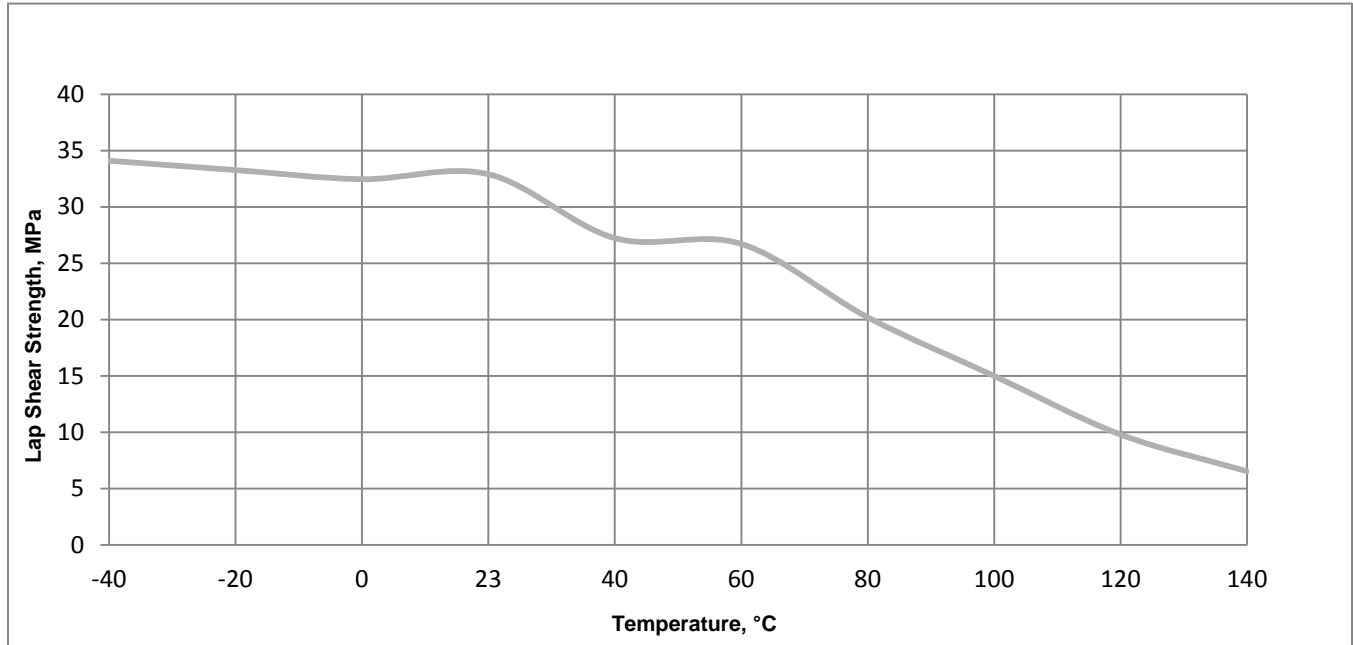


Average lap shear strengths of typical plastic-to-plastic joints (ISO 4587) (typical average values)
Cured for 16 hours at 104°F (40°C) + 1 hour at 176°F (80°C) and tested at 73°F (23°C). Pretreatment - Lightly abraded and alcohol degreased.

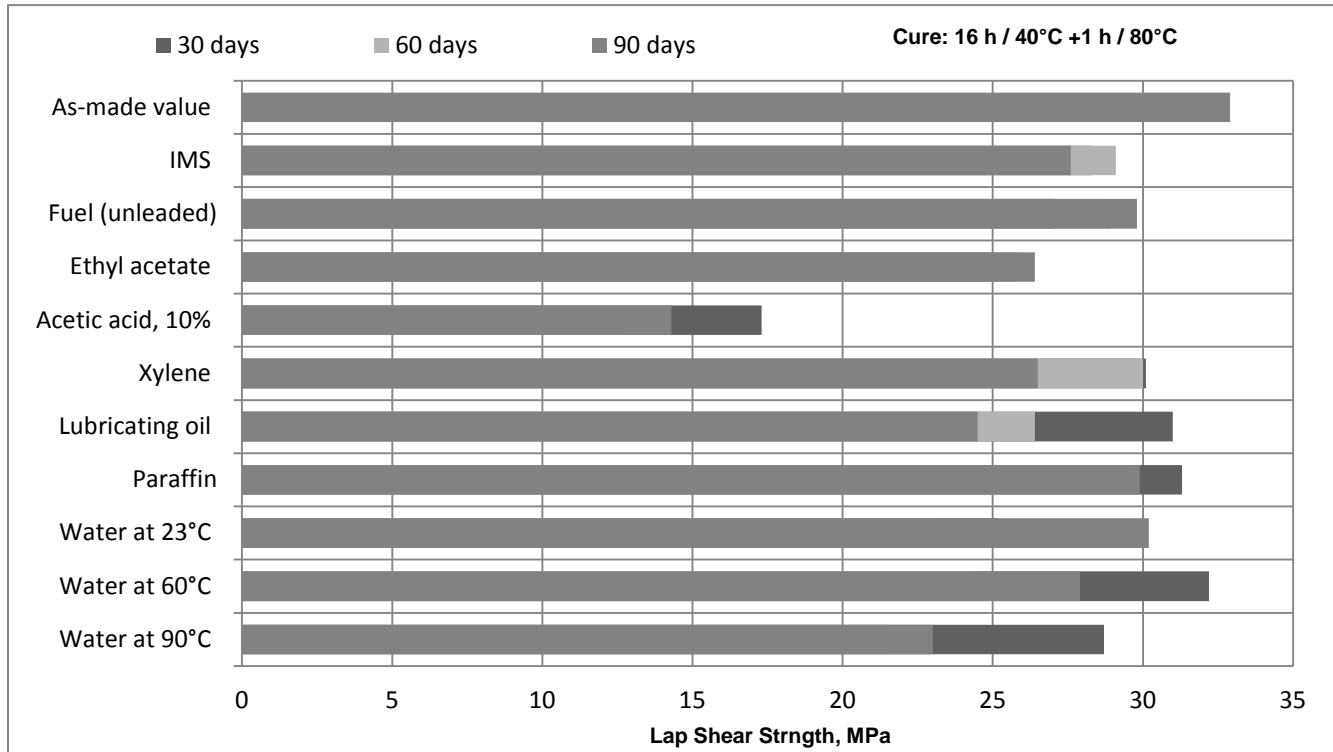


* substrate failure or substrate delamination

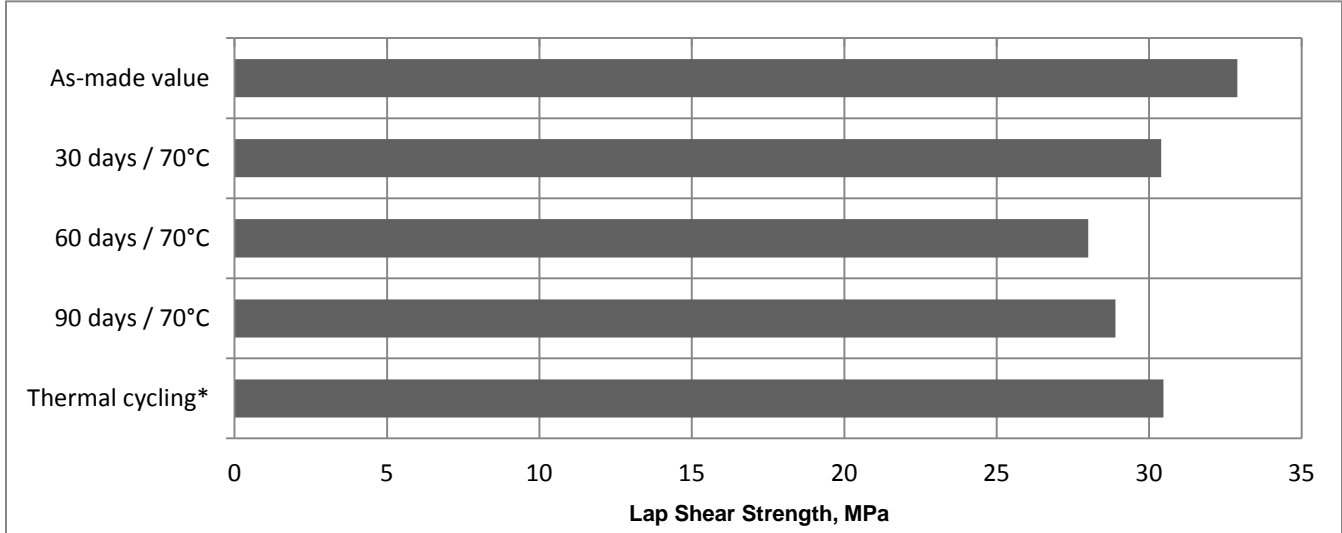
Lap shear strength versus temperature (ISO 4587) (typical average values) Cure: 16 hours at 104°F (40°C) + 1 hour at 176°F (80°C). Substrate: aluminum sandblasted and degreased.



Lap shear strength versus immersion in various media (typical average values) Unless otherwise stated, L.S.S. was determined after immersion for 30, 60 and 90 days at 73°F (23°C). Cure: 16 hours at 104°F (40°C) + 1 hour at 176°F (80°C). Substrate: aluminum, sandblasted and degreased.

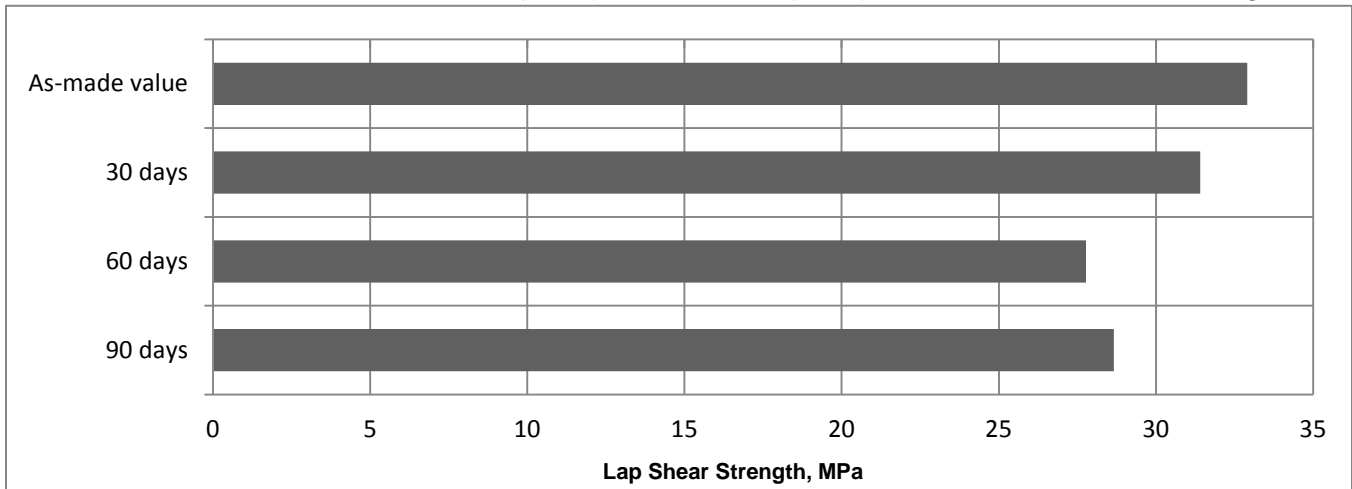


Lap shear strength versus heat ageing (ISO 4587) (typical average values). Cure: 16 hours at 104°F (40°C) + 1 hour at 176°F (80°C) and tested at 73°F (23°C). Substrate: aluminum sandblasted and degreased.



*25 cycles: -30°C to + 70°C

Lap shear strength versus tropical weathering (typical average values) (40°C / 92% RH), on aluminum, cured for 16 hours at 104°F (40°C) and tested at (23°C). Pretreatment - Sand blasting.



Property		Cure Schedule	Value
Tg (DSC), °F (°C)	ISO 11357-2	16 hours at 40°C	140 (60)
		16 hours at 40°C + 1 hour at 80°C	178 (81)
		3 hours at 80°C	194 (90)
		1 hour at 130°C	(216) 102
		0.5 hour / 150°C	210 (99)
		24 hours at RT + 2 hours at 150°C	252 (122)
Roller peel test (sandblasted aluminum), lbf-in (N/mm)	ISO 4578	16 hours at 40°C	34-46 (6-8)
		16 hours at 40°C + 4 hours at 80°C	5.7-17 (1-3)
Tensile strength at 23°C, ksi (MPa)	ISO 527	16 hours at 40°C + 1 hour at 80°C	5.8 (40)
E-modulus, ksi (MPa)		16 hours at 40°C + 1 hour at 80°C	232 (1,600)
Elongation at break, %		16 hours at 40°C + 1 hour at 80°C	4.3
Flexural strength at 23°C, ksi (MPa)	ISO 178	16 hours at 40°C + 1 hour at 80°C	9.4 (65)
Flexural modulus, ksi (MPa)		16 hours at 40°C + 1 hour at 80°C	218 (1,500)
Durometer Hardness (Shore D) at 23°C	ISO 868/03	16 hours at 40°C + 1 hour at 80°C	75
Bend notch test tested at 23°C/50%RH K _{1c} , MPa.m ^{1/2} G _{1c} , kJ.m ⁻²	ISO 13586	16 hours at 40°C + 1 hour at 80°C	1.7
			1.9
Shear modulus G', ksi (MPa), at	ISO 6721	--	-40°C
			0°C
			23°C
			60°C
			90°C
			140°C
			189 (1,300)
			133 (920)
			116 (800)
			71 (490)
			8.7 (60)
			0.17 (1.2)

Storage

Araldite® AW 4859 / Hardener HW 4859 should be stored in a dry place, in the original sealed containers, at temperatures between 2°C and 40°C (36°F and 104°F). Under these storage conditions, the product has a shelf life of **3 years** (from date of manufacture). The product should not be exposed to direct sunlight.

If stored below 60°F, the adhesive should be brought to 60°F - 77°F and conditioned at this temperature for some time prior to use.

Precautionary Statement

Huntsman Advanced Materials Americas LLC maintains up-to-date Safety Data Sheets (SDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material.

First Aid!

Refer to SDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

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