

Advanced Materials

Araldite® AY 103-1 / Hardener HY 991

Structural Adhesives

Araldite® AY 103-1 / Hardener HY 991

Low viscosity two component epoxy adhesive system

Key properties

- Low viscosity
- Heat resistant to ca 50oC
- Easy to apply over large areas
- Solvent free
- Bonds a wide variety of materials

Description

Araldite® AY 103-1 / Hardener HY 991 is a multipurpose, two component, room temperature curing, transparent liquid adhesive of high strength.

It is suitable for bonding wide variety of metals, ceramics, glass, rubbers, rigid plastics, and most other materials in common use. It is particularly easy to apply over large areas.

Product data

	Araldite® AY 103-1	Hardener HY 991	Mixed adhesive
Appearance (A112) (visual)*	clear liquid	clear, amber liquid	Pale yellow
Specific gravity	1.1 - 1.2	0.88 - 0.98	ca 1.0
Viscosity at 25 °C (A191) (Pa.s)*	1.8 – 2.4	15 - 35	-
Gel time at 25 °C (A8)*	-	-	200 – 400 min.
Lap shear at 25 °C (A501)* cure 30 min/100 °C	-	-	> 14 MPa

* Specified data are on a regular basis analysed. Data which is described in this document as 'typical' is not analysed 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 dependant on proper pretreatment of the surfaces to be bonded. At the very least, joint surfaces should be cleaned with a good degreasing agent such as acetone, iso-propanol (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	Parts by weight	Parts by volume
Araldite® AY 103-1	100	100
Hardener HY 991	40	50

Resin and hardener should be blended until they form a homogeneous mix.

Application of adhesive

The resin/hardener mix is applied directly or 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.

The joint components should be assembled and clamped as soon as the adhesive has been applied. 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 with hot water and soap 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.

Typical times to minimum shear strength

Temperature	°C	10	15	23	40	60	100
Cure time to reach	hours		16	12	2	-	-
LSS > 1N/mm ²	minutes	-	-	-	-	40	10
Cure time to reach	hours		48	22	6	-	-
LSS > 10N/mm ²	minutes	-	-	-	-	65	13

LSS = Lap shear strength.

Typical cured properties

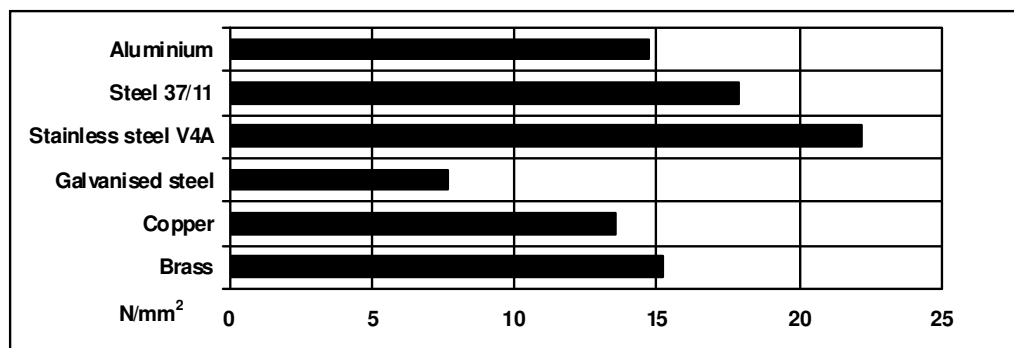
Unless otherwise stated, the figures given below were all determined by testing standard specimens made by lap-jointing 170 x 25 x 1.5 mm strips of aluminium alloy. The joint area was 12.5 x 25 mm in each case.

The figures were determined with typical production batches using standard testing methods. They 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 40°C and tested at 23°C

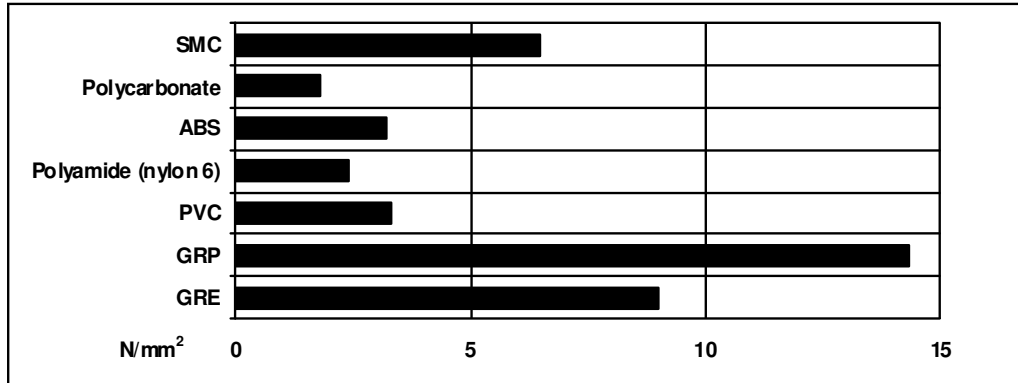
Pretreatment - Sand blasting



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

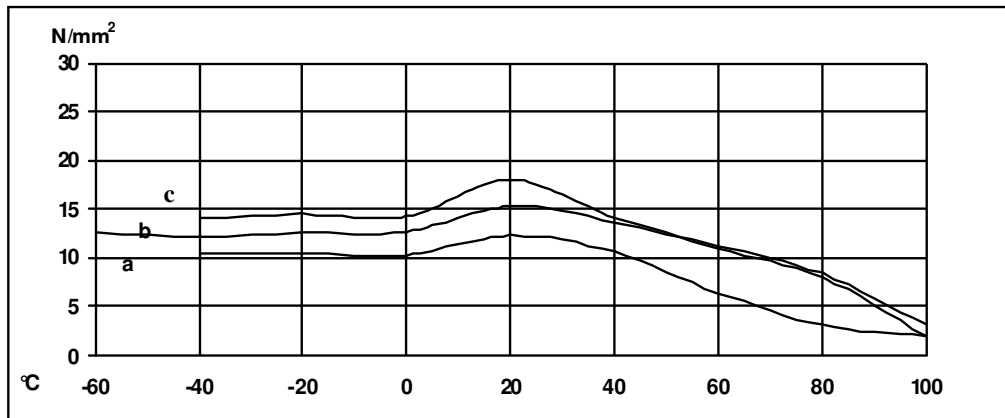
Cured for 16 hours at 40 °C and tested at 23°C

Pretreatment - Lightly abrade and alcohol degrease.



Lap shear strength versus temperature (DIN 53283) (typical average values)

Cure: (a) = 7 days /23°C; (b) = 16 hours at 40 °C (c) = 24 hours at 23°C plus 30 mins at 80°C



Roller peel test (ISO 4578) (typical average values)

Cured 16 hours/40°C

1 N/mm

Tensile strength (ISO 527) (typical average values)

38 MPa

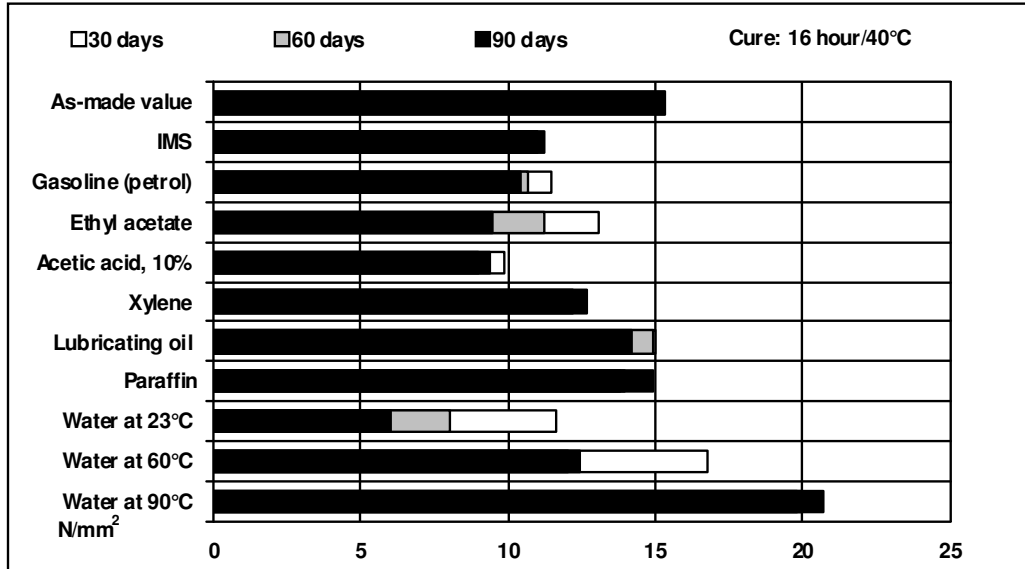
E Modulus

1.7 GPa

Glass transition temperature (°C) (typical average values) 55°C (cured 7 days at 23°C)

Lap shear strength versus immersion in various media (typical average values)

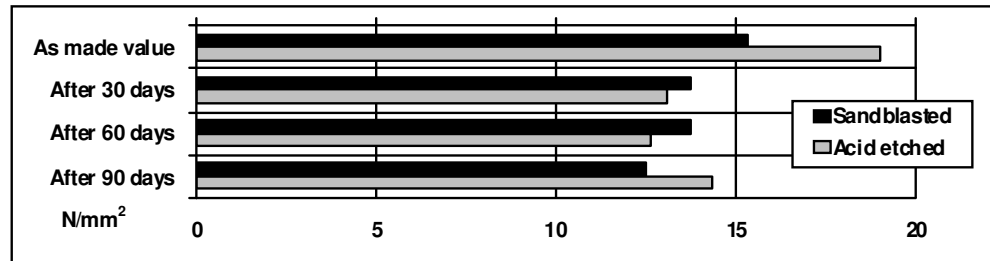
Unless otherwise stated, L.S.S. was determined after immersion for 90 days at 23°C



Lap shear strength versus tropical weathering (typical average values)

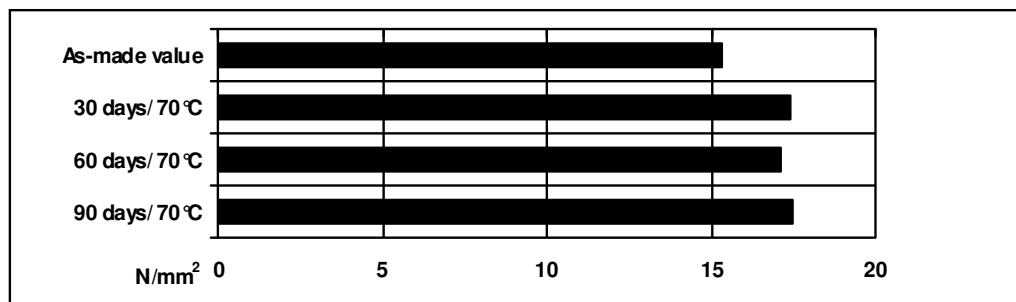
(40/92, DIN 50015; typical average values)

Cure: Sandblasted substrate - 16 hours/40°C, Acid etched substrate 7 days/23°C; Tested: at 23°C



Lap shear strength versus heat ageing (typical average values)

Cure: 16 hours/40°C



Thermal cycling (typical average values)

100 cycles of 6 hour duration from -30°C to 70°C:

11.7 N/mm²**Shore D hardness (typical average values)**

Cured 16 hours at 40°C

D 80 at 23°C

Shear modulus (G') (typical average values)

30°C

G' 0.4 GPa

G'' 40 MPa

50°C

G' 0.3 GPa

G'' 35 MPa

70°C

G' 0.13 GPa

G'' 28 MPa

90°C

G' 20 MPa

G'' 10 MPa

110°C

G' 5 MPa

G'' 1.5 MPa

Storage

Araldite® AY 103-1 and Hardener HY 991 must be stored at room temperature and the components must be stored in sealed containers. The expiry date is indicated on the label.

**Handling
Precautions****Caution**

Our products are generally quite harmless to handle provided that certain precautions normally taken when handling chemicals are observed. The uncured materials must not, for instance, be allowed to come into contact with foodstuffs or food utensils, and measures should be taken to prevent the uncured materials from coming in contact with the skin, since people with particularly sensitive skin may be affected. The wearing of impervious rubber or plastic gloves will normally be necessary; likewise the use of eye protection. The skin should be thoroughly cleansed at the end of each working period by washing with soap and warm water. The use of solvents is to be avoided. Disposable paper - not cloth towels - should be used to dry the skin. Adequate ventilation of the working area is recommended. These precautions are described in greater detail in the Material Safety Data sheets for the individual products and should be referred to for fuller information.



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