

Advanced Materials**Araldite® 2021-1****Structural Adhesives****TECHNICAL DATASHEET****Araldite® 2021-1****Two component toughened methacrylate adhesive system****Key properties**

- **Rapid curing**
- **Toughened**
- **Multi-purpose**
- **Excellent bond to a wide range of plastics, composites and metals**
- **Suitable for service at temperatures up to 100 °C**

Description

Araldite® 2021-1 is a two component, room temperature curing, methacrylate general purpose adhesive for rapid assembly operations on a wide range of substrates.

Product data

Properties	2021-1 A	2021-1 B	Mixed adhesive
Colour (visual)	off white	yellow / greenish	pale yellow
Specific gravity	1.02	0.95	ca. 1
Viscosity at 25 °C (A191)* (Pa.s)	15 - 50	10 - 50	thixotropic
Pot Life (100 gr. at 25°C)	-	-	ca. 3 minutes
Time to peak exotherm (20gr) (A159)*	-	-	7 - 15 minutes

* 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 dependent on proper pretreatment of the surfaces to be bonded, however the methacrylate adhesives can be used effectively with little surface preparation. Ideally 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.

Mix ratio	Parts by weight	Parts by volume
2021-1 A	100	100
2021-1 B	100	100

This system 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 may be applied manually or robotically to the pretreated and dry joint surfaces. Huntsman's technical support group can assist the user in the selection of a suitable application method as well as suggest a variety of reputable companies that manufacture and service adhesive dispensing equipments.

A layer of adhesive 0.25 to 0.5 mm thick will normally impart the greatest lap shear strength to the joint. For some metals like mild steel or stainless steel, a higher joint thickness may be necessary to reach satisfactory results. Huntsman stresses that proper adhesive joint design is also critical for a durable bond. The joint components should be assembled and secured in a fixed position as soon as the adhesive has been applied.

For more detailed explanations regarding surface preparation and pretreatment, adhesive joint design, and the dual cartridge dispensing system, visit www.aralditeadhesives.com.

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 MEK 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
Cure time to reach	hours	-	-	-	-
LSS > 1MPa	minutes	20	13	9	2
Cure time to reach	hours	-	-	-	-
LSS > 10MPa	minutes	30	19	13	6

LSS = Lap shear strength.

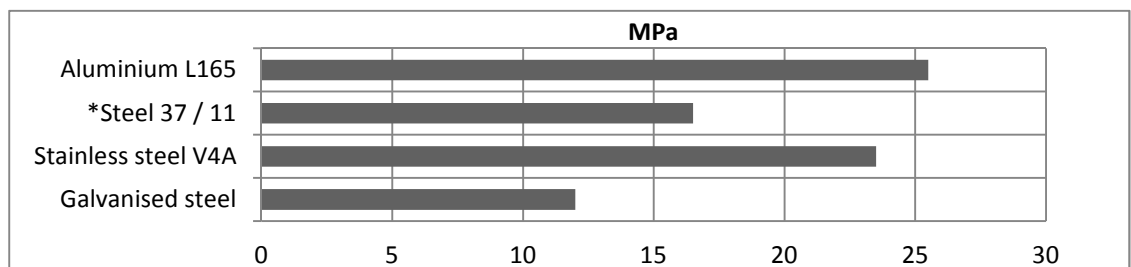
Typical cured properties

Unless otherwise stated, the figures given below were all determined by testing standard specimens made by lap-jointing 114 x 25 x 1.6 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 – sandblasting and degreasing

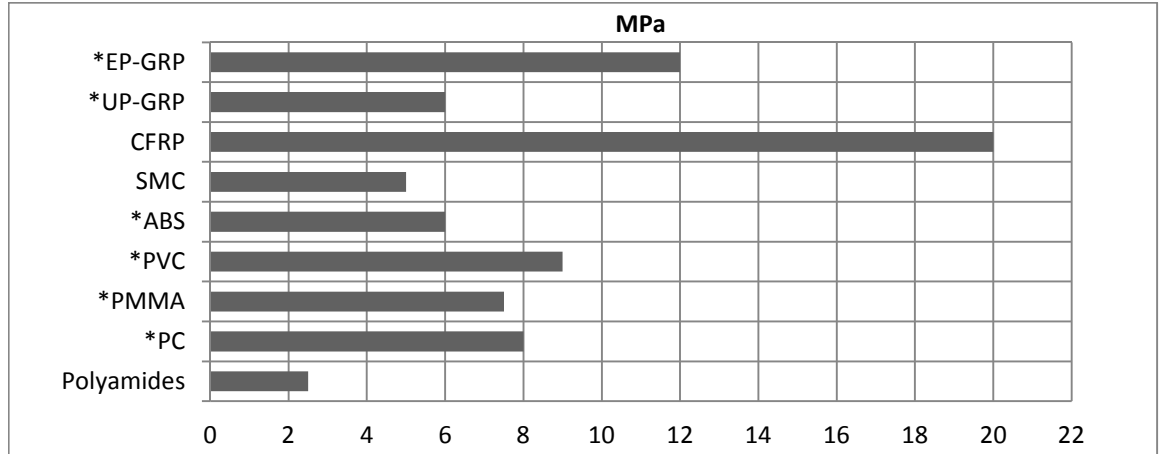


*Steel 37 / 11: tested with adhesive joint thickness of 1 mm, the performance may be lower for thinner adhesive joints.

Araldite® 2021-1 is not suitable to bond copper, brass or copper alloys. Araldite® 2022-1 or Araldite® 2047-1 may be used for these substrates.

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 isopropanol degrease.



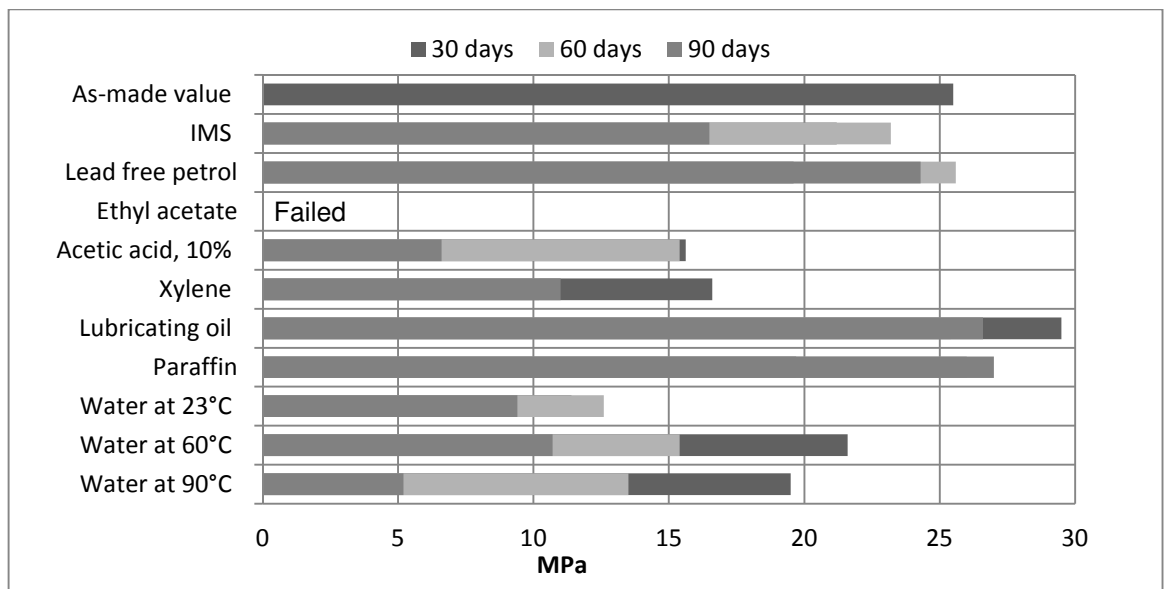
*: EP-GRP / UP-GRP / ABS / PVC / PMMA / PC: substrate failure observed

Tensile Properties (ISO 527) (typical average values) Cure 16 hours at 40°C test at 23°C

Tensile Strength	42 MPa
Tensile Modulus	1800 MPa
Elongation at break	> 10%

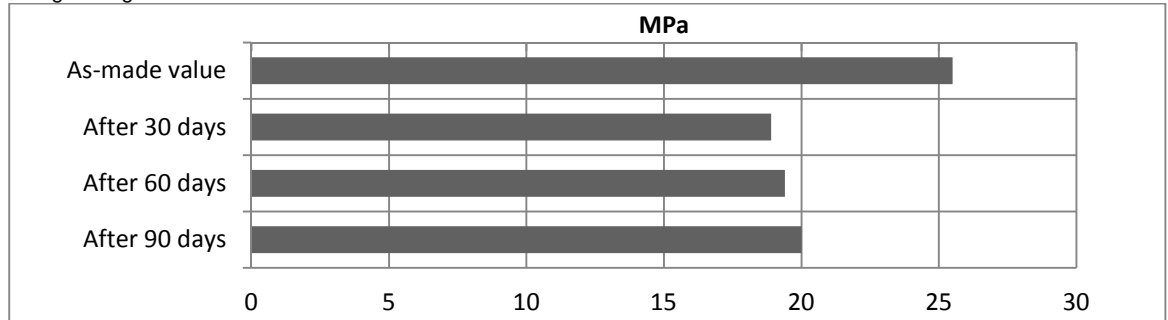
Lap shear strength versus immersion in various media (ISO 4587) (typical average values)

On aluminium, cured for 16 hours at 40°C and tested at 23°C. Pretreatment - sandblasting and degreasing
Unless otherwise stated, LSS was determined after immersion for 30, 60 and 90 days at 23°C



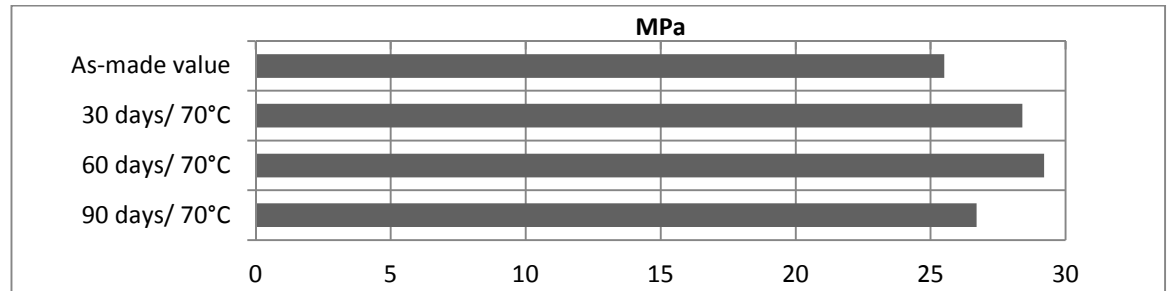
Lap shear strength versus tropical weathering (ISO 4587) (typical average values)

(40°C/ 92% RH), on aluminium, Cure: 16 hours at 40°C and tested at 23°C. Pretreatment - sandblasting and degreasing



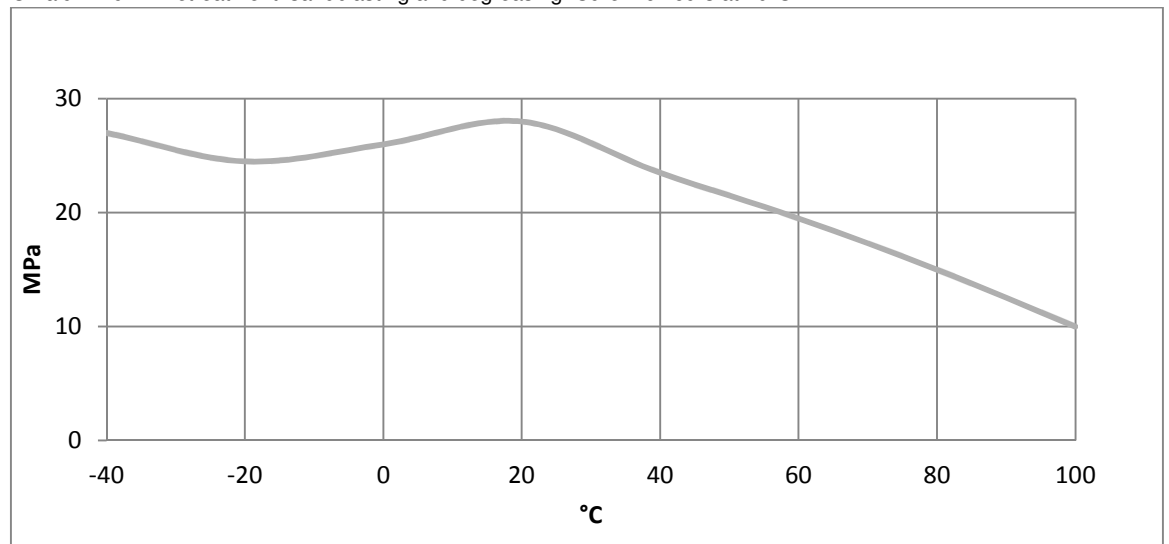
Lap shear strength versus heat ageing (ISO 4587) (typical average values)

On aluminium, cure: 16 hours at 40°C and tested at 23°C. Pretreatment - sandblasting and degreasing



Lap shear strength versus temperature (ISO 4587) (typical average values)

On aluminium. Pretreatment : sandblasting and degreasing. Cure: 16 hours at 40°C



Lap shear strength versus Thermal cycling (ISO 4587) (typical average values)

On aluminium. Pretreatment : sandblasting and degreasing. Cure: 16 hours at 40°C

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

(2h -30°C / 1 h up to 70°C / 2h 70°C / 1h down to -30°C)

27 MPa

Storage

Araldite[®] 2021-1 may be stored during 18 months at 2 – 8°C provided the components are stored in the original sealed containers. The expiry date is indicated on the packaging.
The product may be placed at room temperature before use, the total time at room temperature should not exceed 6 months. Long term exposure above 25°C will reduce the shelf life of the product.

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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