



## Advanced Materials

# Araldite® F 310 / Hardener Lacquer 2

### Araldite® Structural Adhesives

## Araldite® F 310 / Hardener Lacquer 2 “No-mix” Methacrylate adhesive system

### Key properties

- Hardener can be applied to substrate and stored for up to 30 days
- Rapid cure after joining, 20 minute handling strength
- High shear strength and peel strength
- Bonds well to a wide range of metals and plastic materials
- Good thermal stability

### Description

Araldite® F310 / Hardener Lacquer 2 is a “No-mix” room temperature curing, methacrylate adhesive suitable for bonding metals and plastics. Its high setting rate at room temperature allows handling of the bonded parts within a very short time. The adhesive has an assembly time of 10 minutes. As early as 20 minutes after joining (curing at room temperature), the parts can be handled. The final strength is attained within 2 hours.

Bonds produced with Araldite® F310 show good tensile shear and peel strengths as well as good thermal stability between -40°C and +130°C.

### Product data

Properties	Araldite® F310	Hardener Lacquer 2
Colour (visual) (A112)*	Yellow/pink	Pale yellow - reddish brown
Specific gravity	ca 1.0	-
Viscosity (Pas) (A191)*	18 - 26	Low
Lap shear strength at 23°C (A518)*		> 25 MPa
Gelation time (mins) at 23°C	ca. 10 minutes after parts are in contact	

\* 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, 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 or proprietary degreasing agent 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.

#### Application of adhesive

Depending on the type of application, the hardener lacquer can be applied by spraying, brushing, roll-coating or dipping one or both surfaces to be bonded.

The lacquer dries sufficiently in about 4 minutes to allow bonding, transporting or storage. Surfaces coated with Hardener Lacquer 2 can be stored for several weeks without losing the hardener’s reactivity.

Once the Hardener Lacquer 2 has dried, the adhesive is applied to one of the two surfaces. Then the parts are



joined immediately and fixed under contact pressure. Polymerisation starts as soon as the adhesive touches the Hardener Lacquer 2. The bond can be carefully handled after the time indicated overleaf to reach to lap shear strength of 1N/mm<sup>2</sup>.

A layer of adhesive 0.15 to 0.25 mm thick will normally impart the greatest lap shear strength to a joint, although joints of up to 0.8mm gap can be assembled. For joint gap widths up to 0.4 mm, application of hardener lacquer to just one surface is sufficient. To bridge wider joint gaps, hardener lacquer must be applied to both parts. Gaps wider than 0.8 mm should be avoided since the adhesive may not fully cure.

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.

If adhesive is applied to one surface and hardener lacquer to the other, this method of separate processing allows bonding operations practically independent of the pot life.

### Mechanical processing

Specialist firms have developed metering, spraying 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.

## Curing speed

### Typical times to minimum shear strength

Temperature	°C	0	10	15	23	40
Cure time to reach	hours	2				
LSS > 1N/mm <sup>2</sup>	minutes		35	25	18	9
Cure time to reach	hours	2½				
LSS > 10N/mm <sup>2</sup>	minutes		45	35	20	10

LSS = Lap shear strength.

## Typical cured properties

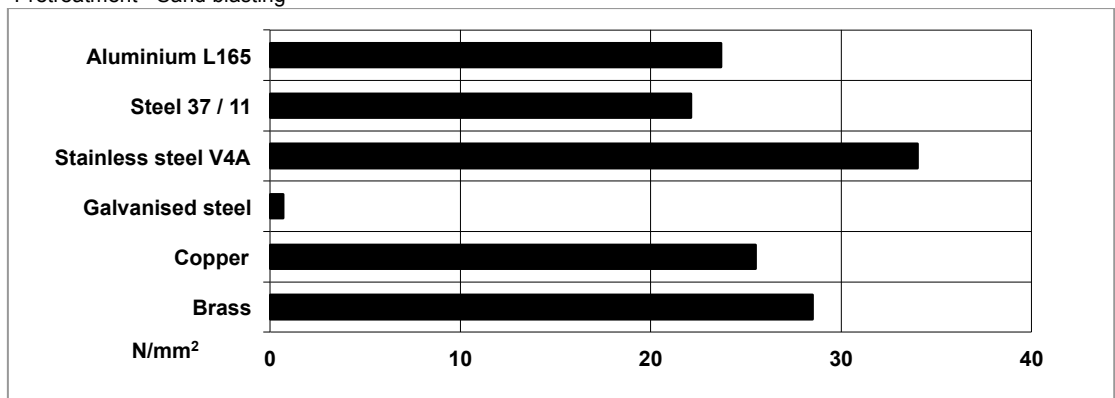
Unless otherwise stated, the figures given below were all determined by testing standard specimens made by lap-jointing 114 x 25 x 1.5 mm strips of aluminium alloy. The joint area was 12.5 x 25 mm in each case.

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 7 days at 23°C and tested at 23°C

Pretreatment - Sand blasting

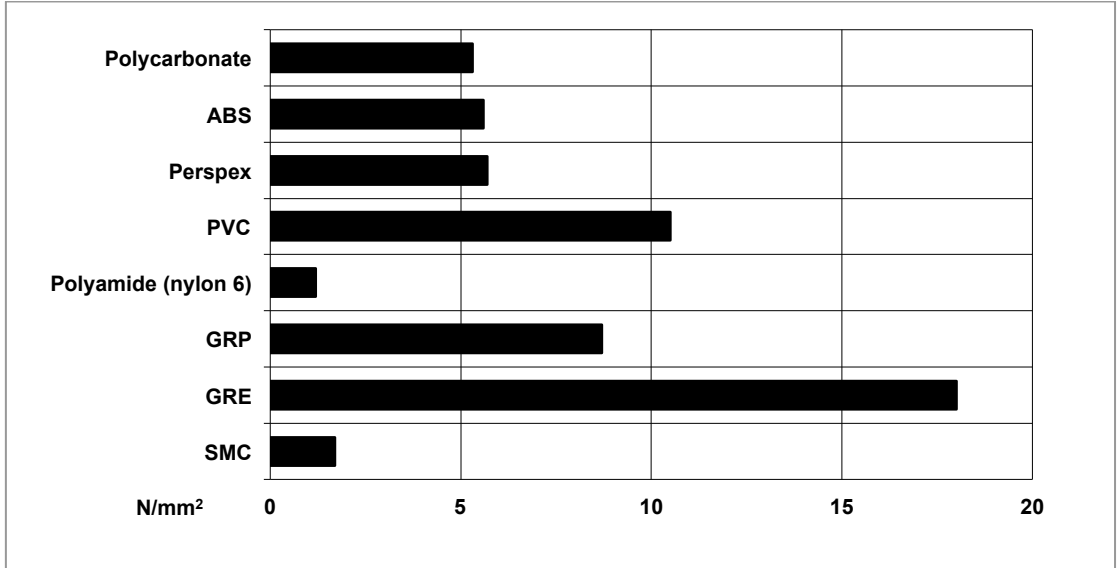




**Average lap shear strengths of typical plastic-to-plastic joints (ISO 4587) (typical average values)**

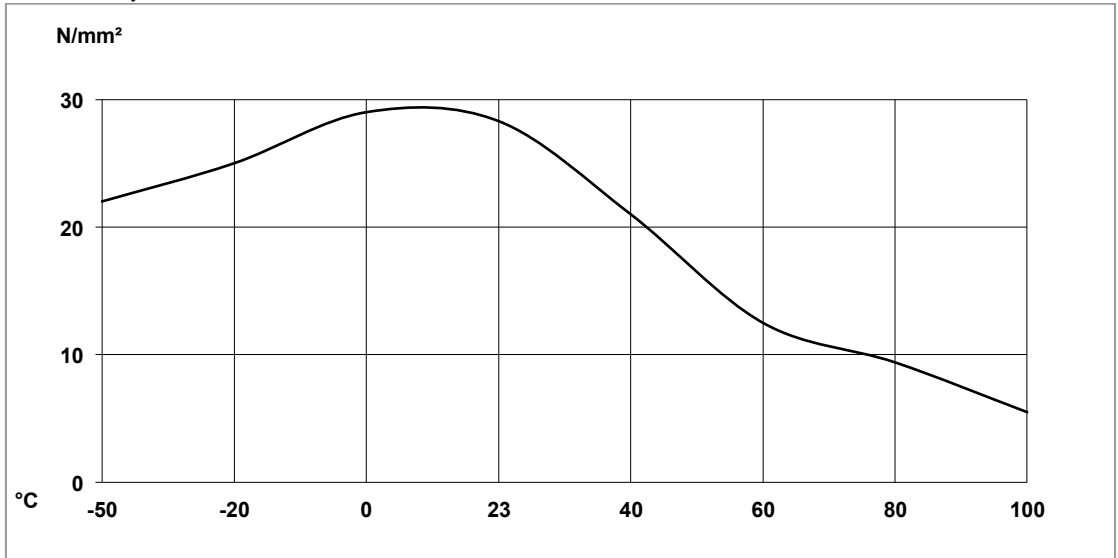
Cured for 7 days at 23°C and tested at 23°C

Pretreatment - Lightly abrade and isopropanol degrease. Note - failure modes are mainly substrate failure



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

Cure: = 7 days at 23°C



**Roller peel test (ISO 4578) at 23°C (typical average values)**

8 N/mm

**Glass Transition Temperature (Tg)**

55°C (Cured 7 days at 23°C)

**Tensile strength (ISO 527) (typical values)**

24 MPa

**Elongation at break:**

2.3 %

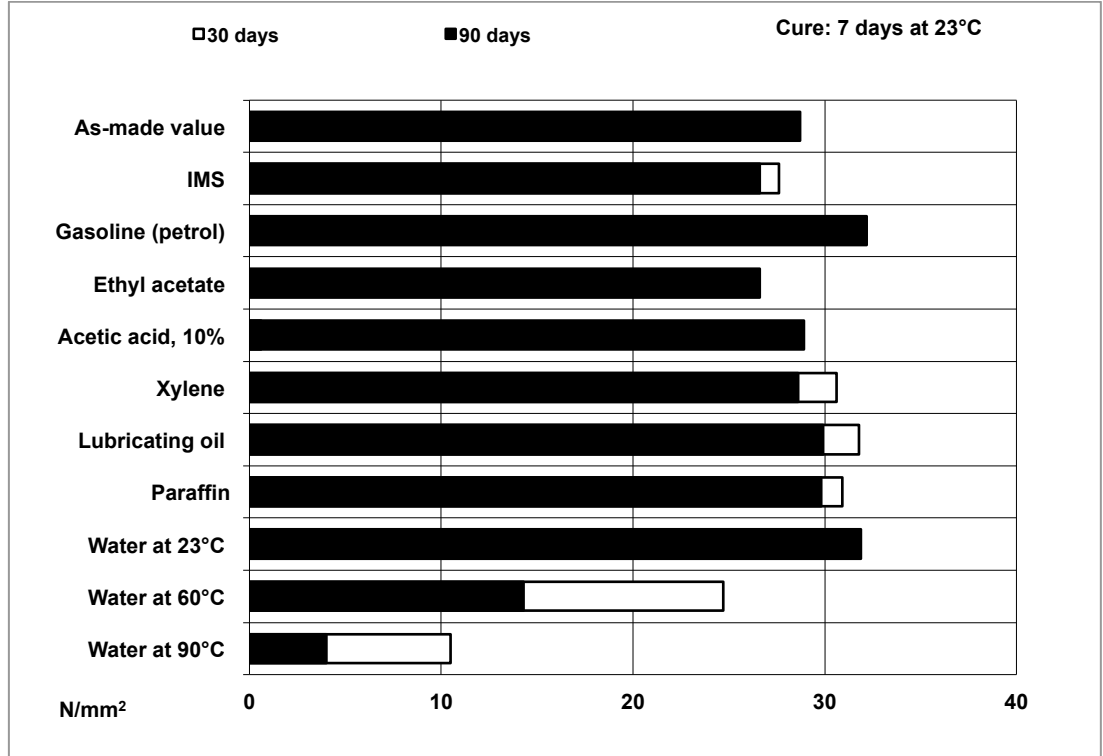
**Coefficient of thermal expansion (-30°C/+30°C)**

75 x 10<sup>-6</sup>/°K (Cured 7 days at 23°C)



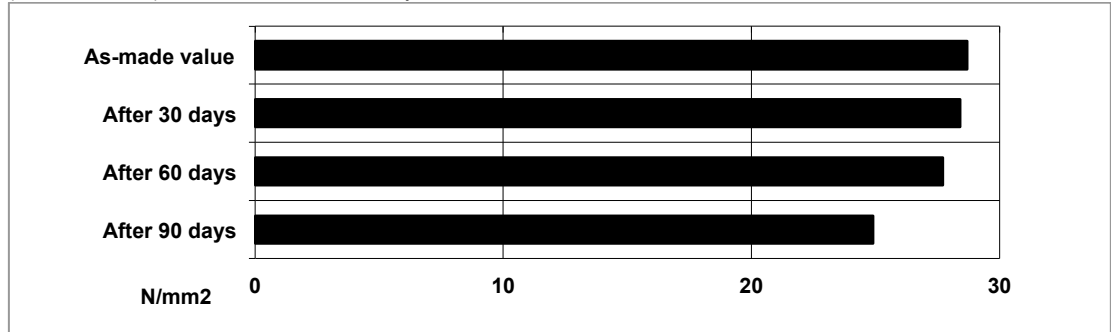
**Lap shear strength versus immersion in various media at 23°C (typical average values)**

Substrate – gritblasted aluminium



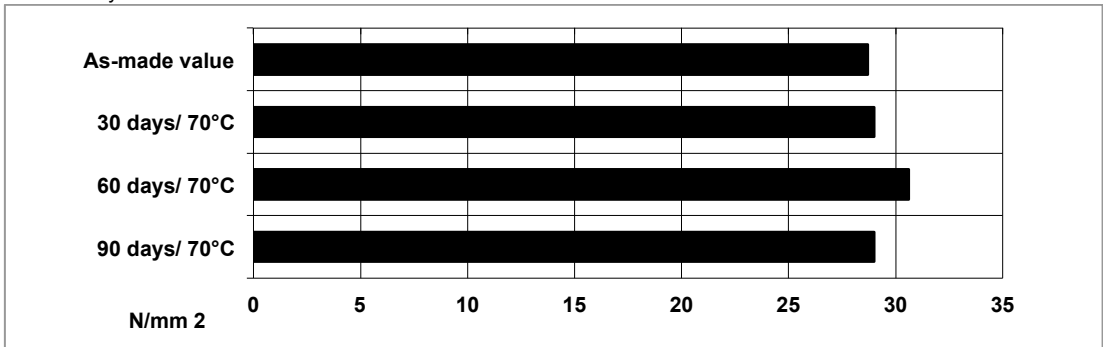
**Lap shear strength versus tropical weathering (ISO 4587) (typical average values)**

(40°C/ 92% RH), on aluminium, Cure 7 days at 23°C



**Lap strength versus heat ageing**

Cure: 7 days at 23°C





### Thermal cycling

100 cycles of 6 hour duration from -30°C to 70°C: 31.2 N/mm<sup>2</sup>

### Shear modulus (DIN 53345)

Cured 7 days at 23°C

Temperature	G' modulus	^ (Tan delta)
0°C	0.7 GPa	6.4 x 10 <sup>-2</sup>
20°C	0.7 GPa	6.8 x 10 <sup>-2</sup>
40°C	0.6 GPa	7.15 x 10 <sup>-2</sup>
60°C	0.45 GPa	9 x 10 <sup>-2</sup>
80°C	0.25 GPa	2 x 10 <sup>-1</sup>
100°C	60 MPa	4.5 x 10 <sup>-1</sup>

### Storage

Araldite® F310 and Hardener Lacquer 2 may be stored for up to 36 months at 2-8°C provided the components are stored in sealed containers. When stored at 23°C the life is a maximum of 6 months. The expiry date, assuming 2-8°C storage, is indicated on the packaging.

### 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 food-stuffs 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.



**Huntsman Advanced Materials**  
(Switzerland) GmbH  
Klybeckstrasse 200  
4057 Basel  
Switzerland

Tel: +41 (0)61 299 11 11  
Fax: +41 (0)61 299 11 12

www.huntsman.com/advanced\_materials  
Email: advanced\_materials@huntsman.com

Huntsman Advanced Materials warrants only that its products meet the specifications agreed with the user. Specified data are analysed on a regular basis. Data which is described in this document as 'typical' or 'guideline' 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.

The manufacture of materials is the subject of granted patents and patent applications; freedom to operate patented processes is not implied by this publication.

While all the information and recommendations in this publication are, to the best of Huntsman Advanced Material's knowledge, information and belief, accurate at the date of publication, **nothing herein is to be construed as a warranty, whether express or implied, including but without limitation, as to merchantability or fitness for a particular purpose. In all cases, it is the responsibility of the user to determine the applicability of such information and recommendations and the suitability of any product for its own particular purpose.**

The behaviour of the products referred to in this publication in manufacturing processes and their suitability in any given end-use environment are dependent upon various conditions such as chemical compatibility, temperature, and other variables, which are not known to Huntsman Advanced Materials. It is the responsibility of the user to evaluate the manufacturing circumstances and the final product under actual end-use requirements and to adequately advise and warn purchasers and users thereof.

Products may be toxic and require special precautions in handling. The user should obtain Safety Data Sheets from Huntsman Advanced Materials containing detailed information on toxicity, together with proper shipping, handling and storage procedures, and should comply with all applicable safety and environmental standards.

Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent on manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

Except where explicitly agreed otherwise, the sale of products referred to in this publication is subject to the general terms and conditions of sale of Huntsman Advanced Materials LLC or of its affiliated companies including without limitation, Huntsman Advanced Materials (Europe) BVBA, Huntsman Advanced Materials Americas Inc., Huntsman Advanced Materials (UAE) FZE, Huntsman Advanced Materials (Guangdong) Company Limited, and Huntsman Advanced Materials (Hong Kong) Ltd.

Huntsman Advanced Materials is an international business unit of Huntsman Corporation. Huntsman Advanced Materials trades through Huntsman affiliated companies in different countries including but not limited to Huntsman Advanced Materials LLC in the USA and Huntsman Advanced Materials (Europe) BVBA in Europe.

All trademarks mentioned are either property of or licensed to Huntsman Corporation or an affiliate thereof in one or more, but not all, countries.

Copyright © 2014 Huntsman Corporation or an affiliate thereof. All rights reserved