

Araldite® GY 191

Araldite® GY 191	100	pbw
Aradur® 943	20	pbw
Hardener HY 956	25	pbw
Aradur HY 177	50	pbw
Hardener LC 234	33	pbw

Low viscosity laminating and casting systems

Application

General purpose laminating such as foundry patterns, core boxes, repairs to fibreglass laminates e.g. boats, small electrical castings, cable terminations.

Processing methods

Castin / Impregnating.
Manually or with automatic mixing and dosing equipment.

Key Properties

Solvent Free
Room temperature Cure
Low shrinkage on curing
Good static and dynamic mechanical properties
Excellent electrical properties
Good chemical resistance
Can be used with a variety of different Hardeners

Product Data(Guideline Values)

Araldite® GY 191

Modified epoxy resin, containing mineral filler

Viscosity At 25°C	ISO 2555	mPa.s	600 - 900
Specific Gravity At 25°C	ISO 1675		1.10 – 1.15
Flash Point	Method: DIN 51758(Pensky – Martens Closed Cup)	°C	> 155
As Supplied Form	Light Yellow Clear Liquid		

Araldur® 943

Hardener

Viscosity At 25°C	ISO 2555	mPa.s	3400 - 5000
Specific Gravity At 25°C	ISO 1675		1.06 – 1.10
Flash Point	ISO 1523	°C	> 110
As Supplied Form	Pale Yellow Liquid		

Hardener HY 956

Hardener

Viscosity At 25°C	ISO 2555	mPa.s	400 - 500
Specific Gravity At 25°C	ISO 1675		1.01 – 1.04
Flash Point	ISO 1523	°C	> 175
As Supplied Form	Pale Yellow Liquid		

Aradur® HY 117

Hardener

Viscosity At 25°C	ISO 2555	mPa.s	600 - 1100
Specific Gravity At 25°C	ISO 1675		0.95 – 1.0
Flash Point	ISO 1523	°C	> 160
As Supplied Form	Amber Liquid		

Hardener LC 234

Hardener

Viscosity At 25°C	ISO 2555	mPa.s	700 - 1200
Specific Gravity At 25°C	ISO 1675		1.0 – 1.05
Flash Point	ISO 1523	°C	> 100
As Supplied Form	Amber Liquid		

Processing Data(Guideline Values)

	Araldite® GY 191 Aradur 943	Araldite® GY 191 Hardener HY 956	Araldite® GY 191 Aradur HY 177	Araldite® GY 191 Hardener LC 234
	Fast Cure	Medium Cure	Slow Cure	Cures at room temperature but
Special Features	Tough and Resilient when cured	Tough and Resilient when cured	Tough and Resilient when cured	Requires post curing at elevated temperatures for optimum properties e.g. 12 hours at 50° C
Application	General purpose laminating and fibreglass repairs	Laminating in hot conditions clear casting	Small electrical castings and cable terminations	Gives best high temperature performance for room temperature gel systems
Mix Ratio (pbw)	100 : 20	100 : 25	100 : 50	100 : 33
Density g/cm ³	1.10-1.15	1.10-1.15	1.05.1.10	1.10-1.15
Usable Life (mins) @ 25°C				
100 gram mix	15-20	40-50	60-80	50-60
500 gram mix	10-15	25-35	50-70	40-50
Minimum Cure Time (hrs)				
@ 15°C	24	48	-	-
@ 25°C	12-14	24	48	36
@ 50°C	4	6	10	12
@ 70°C	1	2	4	6

Processing and Storage (Guideline Values)

CASTING

Moulds

A variety of mould materials are suitable for use with araldite® casting and encapsulating systems e.g.

Vacuum formed pve or polystyrene

Elastomeric moulding compounds

Araldite tooling resins

Metals, e.g. Mild steel or aluminium

Release agents

It is recommended that araldite® release agent qz 5111 be used to prepare the mould surface prior to casting. For curing above 50°C in mould use release agent qz 13

Filling of Moulds

This should always be done slowly and preferably through the lowest point of the mould, so that the air will be carried out of the mould as it is filled.

With open top moulds for encapsulation, the following procedure is recommended:

- Slowly pour resin mixture into one corner of the mould.

- Fill until the unit being encapsulated is covered with a thin layer of epoxy 1-2mm thick.
- Wait until the mixture in the mould has begun to thicken and before it completely solidifies, top up with a fresh mixture.

LAMINATING

- Precut glass cloth to shape of mould or tank, this facilitates handling of the cloth during laminating.
- Any irregularities, holes or sharp internal corners should be filled or filleted with either an ARALDITE® epoxy putty such as LC 230 or with laminating mix filled with milled glass fibres QT 50.
- **NOTE:** Into a small quantity of the laminating mix above, milled glass fibres QT 50 are stirred until a thick smooth paste is obtained, this paste is then knifed into the irregularities.
- Coat surface with mixture of resin and hardener using a brush or paint roller.
- Place precut glass cloth on to the surface, and stipple with brush or use a paint roller or specially designed fibre-glassing roller, to force the laminating mix up through the glass to wet it out.
- Unimpregnated areas remain white in appearance, while fully impregnated cloth is transparent to translucent. More laminating mix should then be added to these white areas for immediate re-impregnation.
- This process is repeated until the required thickness is obtained. In the interest of increased strength, ridges can be built into the laminate by means of foam strips or pieces of timber. Where joints occur, an overlap of 3-5cm is essential.
- After the laminate has cured, the surface is given a light sand to remove small projections of glass and the surface given a final coat of the same system.
- This ensures a smooth, even surface and prevents "wicking" of the glass fibres.

NOTE:

No air pockets or bubbles should appear in the laminate - the use of rollers helps to prevent this.

If for any reason the laminate is allowed to cure before completion, the area should be abraded and degreased with EPOSOLVE 70 and laminating carried on as before.

To determine whether crosslinking has been carried to completion and the final properties are optimal, it is necessary to carry out relevant measurements on the actual object or to measure the glass transition temperature. Different gel and cure cycles in the customer's manufacturing process could lead to a different degree of crosslinking and thus a different glass transition temperature.

Mixing

It is essential that the correct mixing ratio be used and that the resin and hardener are thoroughly mixed together before use. Inaccuracies will result in a lowering of the physical properties of the cured system and, if the error is sufficiently great, the system may not cure satisfactorily.

If ARALDITE® GY 191 is stored for prolonged periods at low temperatures crystallisation may occur. To rectify, heat to approximately 60°C, till clear and allow to cool before use.

Curing

To determine whether crosslinking has been carried to completion and the final properties are optimal, it is necessary to carry out relevant measurements on the actual object or to measure the glass transition temperature. Different gel and cure cycles in the customer's manufacturing process could lead to a different degree of crosslinking and thus a different glass transition temperature.

Clean Up

Any spillages should be cleaned up as they occur. Use dry sand or sawdust to soak up bulk of large spillages, and deposit into waste drums. Clean up small spillages before they set with Eposolve 70 (Huntsman Advanced Materials) or warm water and detergent.

Caution: Eposolve 70 contains Toluene and should only be used in well ventilated areas. Avoid direct skin contact. For further information, refer to the specific instruction sheet.

Storage Conditions

Store the components in a dry place at RT, in tightly sealed original containers. Under these conditions, the shelf life will correspond to the expiry date stated on the label. After this date, the product may be processed only after reanalysis. Partly emptied containers should be tightly closed immediately after use.

For information on waste disposal and hazardous products of decomposition in the event of a fire, refer to the Material Safety Data Sheets (MSDS) for these particular products.

Mechanical and Physical Properties (Guideline Values)

Determined on standard test specimen at 23°C. Cured for 24h/RT + 6h/80°C

Properties	Araldite® GY 191 Aradur 943	Araldite® GY 191 Hardener HY 956	Araldite® GY 191 Aradur HY 177	Araldite® GY 191 Hardener LC 234
Tensile Shear Strength (Al/Al)MPa	15 - 20	12 - 17	10 - 15	10 - 15
Tensile Strength MPa	50 - 60	40 - 50	35 - 45	50 - 60
Compressive Strength MPa	120 - 130	90 - 100	30 - 40	90 - 100
Flexural Strength MPa	110 - 130	100 - 110	40 - 60	90 - 110
Martens Heat Distortion Temperature, °C	50 - 55	50	25 - 30	75 - 80
Coefficient Expansion $\times 10^{-6} / ^\circ\text{C}$	70 - 80	70 - 80	70 - 80	70 - 80
Moisture Absorption 20°C, 10 Days, %	0.4 - 0.5	0.6 - 0.7	0.9 - 1.1	0.6 - 0.7
Minimum Dielectric Strength KV/mm 50Hz 25°C	18 - 20	18 - 20	18 - 20	20 - 22
Dielectric Constant 50Hz, 25°C	3 - 3.3	4	3.8 - 4	3.9 - 4.1
Power Factor Tan δ 50Hz 25°C°	0.010	0.008	0.03	0.012
Volume Resistivity Ohms/cm 25°C	4×10^{15}	5×10^{15}	3×10^{15}	4×10^{15}

Araldite GY191/Aradur 943

Determined on standard test specimen at 23°C. Cured for 24h/RT + 6h/80°C

	Coating System (50-55)	Laminating System (60-65% Glass)
Maximum operating temperature ° C		75-85
Tensile strength MPa	50-60	300-400
Flexural Strength MPa	110-130	400-500
Modulus of Elasticity, MPa	$4.6 \times 10^3 - 4.7 \times 10^3$	$2.0 \times 10^4 - 2.2 \times 10^4$
Coefficient of linear expansion $10^{-6} / ^\circ\text{C}$	70-80	10
Water Absorption, wt%	0.4-0.5	0.4-0.5
Minimum dielectric strength 50Hz at 25°C (KV/cm)	180-200	180-200

Industrial hygiene

Mandatory and recommended industrial hygiene procedures should be followed whenever our products are being handled and processed. For additional information please consult the corresponding Safety Data Sheets and the brochure "Hygienic precautions for handling plastics products".

Handling Precautions

Safety precautions at workplace:

protective clothing
gloves
arm protectors
goggles/safety glasses
respirator/dust mask

Yes.
Essential.
Recommended when skin contact likely.
Yes.
Recommended.

Skin protection:
before starting work
after washing

Apply barrier cream to exposed skin.
Apply barrier or nourishing cream.

Cleaning of contaminated skin

Dab off with absorbent paper, wash with warm water and alkali-free soap, then dry with disposable towels. Do not use solvents.

Clean shop requirements

Cover workbenches, etc. with light coloured paper. Use disposable beakers, etc.

Disposal of spillage

Soak up with sawdust or cotton waste and deposit in plastic-lined bin.

Ventilation:
of workshop
of workplace

Renew air 3 to 5 times an hour.
Exhaust fans. Operatives should avoid inhaling vapors.

First Aid

Contamination of the **eyes** by resin, hardener or casting mix should be treated immediately by flushing with clean, running water for 10 to 15 minutes. A doctor should then be consulted.

Material smeared or splashed on the **skin** should be dabbed off, and the contaminated area then washed and treated with a cleansing cream (see above). A doctor should be consulted in the event of severe irritation or burns. Contaminated clothing should be changed immediately.

For more detailed information please read Huntsman Advanced Material safety data sheets for the individual products.

Note

Araldite® is a registered trademark of Huntsman Corporation or an affiliate thereof in one or more countries, but not all countries.

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HUNTSMAN ADVANCED MATERIALS

Huntsman Advanced Materials(Australia) Pty Limited
ABN 93 091 627 879

Gate 3 Ballarat Road, Deer Park, VIC
Tel: + 61 3 9361 6060
Fax: +61 3 9361 6066
<http://www.huntsman.com>