HUNTSMAN

®Araldite Casting and Laminating Resin System

	A	B	C	D
Araldite® MY 750	**100 pbw**	**100 pbw**	**---**	**---**
Araldite® MY 753	**---**	**---**	**100 pbw**	**100 pbw**
Aradur® HY 956 EN	**22-25 pbw**	**---**	**17-20 pbw**	**---**
Aradur® HY 951	**---**	**10-12 pbw**	**---**	**9.5-12 pbw**

Medium to low viscosity liquid casting resin systems for processing at room temperature or slightly elevated temperatures. High filler additions possible.

Applications

Casting and encapsulation of small low to medium voltage electrical and electronic components.

Processing methods

Casting

Properties

Good mechanical strength
Excellent Electrical Properties
Resistant to chemical attack

Araldite MY 750 has better properties at elevated temperatures.

Araldite MY 753 has lower viscosity and longer usable life. This simplifies processing, reduces risk of air entrapment and allows a higher filler loading.

Edition: May 2004
Replaces Edition: Decembre 2003

Product data

(Guideline values)

Unmodified liquid epoxy resin				**Araldite MY 750**
Viscosity	at 25°C	ISO 12058	mPa s	12'000 - 16'000
Epoxy content		ISO 3001	equiv/kg	5.20 - 5.40
Density	at 25°C	ISO 1675	g/cm³	1.15 - 1.20
Flash point		ISO 1523	°C	> 200
Vapour pressure	at 20°C	(Knudsen)	Pa	$< 10^{-2}$
	at 50°C	(Knudsen)	Pa	5.10^{-3}

Plasticised liquid epoxy resin				**Araldite MY 753**
Viscosity	at 25°C	ISO 12058	mPa s	1800 - 2800
Epoxy content		ISO 3001	equiv/kg	4.25 - 4.55
Density	at 25°C	ISO 1675	g/cm³	approx. 1.15
Flash point		ISO 1523	°C	192
Vapour pressure	at 20°C	(Knudsen)	Pa	< 0.01

Formulated, low viscosity polyamine hardener				**Aradur HY 956 EN**
Viscosity	at 25°C	ISO 12058	mPa s	370 - 470
Specific gravity	at 25°C		g/cm³	1.0 - 1.05
Flash point		DIN 51758	°C	152
Vapour pressure	at 20°C	(Knudsen)	Pa	0.1

Low viscosity, aliphatic amine hardener				**Aradur HY 951**
Viscosity	at 25°C	ISO 12058	mPa s	10 - 20
Specific gravity	at 20°C		g/cm³	0.95 - 1.05
Flash point		DIN 51758	°C	110
Vapour pressure	at 20°C	(Knudsen)	Pa	0.3

Storage

The resins and hardeners should be stored separately in cool dry place. Under these conditions the shelf life will correspondent to the expiry date stated on the label. The hardeners are hygroscopic and will deteriorate if allowed to absorb moisture; the containers should therefore be kept firmly closed when not in use.
For information on waste disposal and hazardous products of decomposition in the event of fire, refer to the Material Safety Data Sheets (MSDS) for these particular products

Processing properties

Mixing

Mix resin and hardener together at room temperature, stirring thoroughly. Low ambient temperatures cause Araldite MY 750 to be viscous and difficult to mix. This is overcome by warming Araldite MY 750 prior to mixing to about 30°C.

Note: Although warming Araldite MY 750 facilitates measuring and mixing, it is also shortens usable life – see Usable Life below.

Casting mixtures

Mixing and pouring under vacuum minimizes any tendency to the formation of voids. Mineral fillers may be incorporated in order to minimize shrinkage, to decrease the coefficient of expansion, to increase thermal conductivity, to decrease the exothermic temperature rise on curing.

Quantity production

Production line processing of Araldite MY 750 and MY 753 with Hardener Aradur HY 956 EN or Aradur HY 951 is best carried out by means of proportioning-mixing-dispensing machine. Automatic processing by these machines offers high production rates with good process control. This close control makes possible the processing of large quantities of Araldite systems with short usable life – such as Araldite MY 750 and MY 753 with Hardener Aradur HY 956 EN or Aradur HY 951.

Usable Life

A 500 g quantity of resin-hardener mixture has usable life:

	Temperature of mixtures	**Araldite MY 750 Aradur HY 956 EN or Aradur HY 951**	**Araldite MY 753 Aradur HY 956 EN or Aradur HY 951**
	25°C	15-20 minutes	35-50 minutes
or	40°C	10-15 minutes	15-25 minutes
or	60°C	5-10 minutes	10-15 minutes

However, owing to the heat generated by the exothermic reaction between resin and hardener, the usable life will be noticeably shortened if more than 500 g of mixture is allowed to stand in one compact mass – e.g. in a mixing beaker or similar “bulk container”. To minimize exothermic temperature rise, which is the cause of this shortening of usable life, the heat generated must be rapidly conducted away. The following procedure is suggested when mixing large quantities:

Divide the mixture into several small containers or pour into a shallow container so that the mixture spreads out to a thin layer (5-10 mm). A shallow polythene basin is recommended since this allows hardened resin residues to be removed simply by flexing. Where there is risk of exposure to damp air, containers must be covered – see Moisture Pick-up.

Dividing or spreading out the mixture increases its surface-to volume ratio so assisting dissipation of heat generated by the resin-hardener reaction.

Since usable life is limited, it is good practice to prepare only the quantity of mixture needed for immediate use – or to use automatic mixing-dispensing equipment.

Curing

The fast rate of reaction between Araldite MY 750 and MY 753 with Hardener Aradur HY 956 EN or Aradur HY 951 may cause a built-up of excessive exothermal heat – unless precautions are taken. For example:

Only small* casting and thin* laminates may be hot-cured immediately after pouring.

Medium-sized * castings and laminates must be allowed to gel for a preliminary period of at least 8 hours at room temperature before curing at any higher temperature.

Araldite MY 750 and MY 753 with Hardener Aradur HY 956 EN or Aradur HY 951 are suited to the production of small castings and laminates short curing schedules at moderate temperatures. These systems are not recommended for large castings or thick laminates.

* **Important** – for all sizes Short high-temperature curing schedules (without initial gelling at room temperature) should not be used unless preliminary trials with castings or laminates manufactured to the specified design, and in the specified moulds, produce no harmful exothermic effects.

Processing properties (continued….)

Curing (continued)

Minimum curing schedules

Cure for at least:	24 hours	at	25°C *
or	2-3 hours	at	60°C **
or	10-20 min.	at	100°C **

* Thin-section castings and laminates of Araldite MY 750 and MY 753 with Hardener Aradur HY 956 EN or HY 951 will require considerably longer than 24 hours to cure at 25°C.
To achieve full curing in reasonable time they must be cured at a temperature above 40°C.

** Extra time must be allowed for the moulds and castings or laminates to reach the required temperature.

Moisture pickup

Hardener Aradur HY 956 EN and Aradur HY 951 are hygroscopic – they absorb moisture when exposed to damp air. The hardeners and uncured resin-hardener mixtures are in consequence adversely affected by high atmospheric humidity, which, when the mixture is applied as a thin layer, may even prevent curing. Low ambient temperatures, which prolong curing, aggravate this effect. The mixtures should not be prepared or applied in work-areas exposed to high atmospheric humidity combined with low ambient temperature.

To make the effect of moist air less severe, the mixture should be allowed to stand * in the mixing container – *covered with lid* – so that the resin-hardener reaction is well under way when the mixture is used.

· * **Standing time for mixture at room temperature:**

Araldite MY 750 + Aradur HY 956 EN or Aradur HY 951	5-10 minutes
Araldite MY 753 + Aradur HY 956 EN or Aradur HY 951	15-20 minutes

Mechanical and Physical properties

Resin-hardener mixture		Araldite MY 750 Aradur HY 956 EN	Araldite MY 750 Aradur HY 951	Araldite MY 753 Aradur HY 956 EN	Araldite MY 753 Aradur HY 951
Initial viscosity at 25°C	Pa s	2.0 - 3.5	1.5 - 3.0	0.8 - 1.5	0.5 - 1.0
at 40°C	Pa s	0.8 - 1.8	0.4 - 0-8	0.2 - 0.5	0.15 - 0.35
at 60°C	Pa s	ca 0.2	ca 0.1	ca 0.1	ca 0.05
Cured resin **Curing schedule: 3 hours at 60°C**					
Specific gravity	--	1.17	1.19	1.17	1.18
Tensile strength *ISO 527*	MPa	75 - 85	75 - 90	55 - 65	55 - 60
Elongation at break *ISO 527*	%	3.5 - 4.5	3 - 4	3 - 4	2.5 - 3.5
Modulus of elasticity *(tension) ISO 527*	GPa	2.9 - 3.3	3.5 - 4.0	2.5 - 2.8	2.4 - 2.75
Flexural strength *ISO 178*	MPa	105 - 120	120 - 135	85 - 100	90 - 110
Modulus of elasticity *(flexure) ISO 178*	GPa	3.3 - 3.7	3.8 - 4.2	3.0 - 3.3	2.7 - 3.0
Compressive strength *(yield) ISO 604*	MPa	100 - 110	115 - 125	80 - 90	90 - 110
Deflection temperature *ISO 75*	°C	85 - 90*	85 - 90*	55 - 60†	55 - 60†

* Prolonged curing above 60°C will give a deflection approaching 100°C (with Aradur HY 956 EN) or above 100°C (with Aradur HY 951). For example:

System	Curing schedule	Deflection temperature
MY 750 + HY 956 EN	16h at 25°C + 1/2h at 120°C	95 - 100°C
	16h at 25°C + 1/2h at 120°C	95 - 100°C
	3h at 60°C + 2h at 120°C	95 - 100°C
MY 750 + HY 951	16h at 25°C + 1/2h at 120°C	95 - 100°C
	16h at 25°C + 1/2h at 120°C	105 - 110°C
	3h at 60°C + 2h at 120°C	105 - 110°C

Physical and mechanical properties (continued)

Resin-hardener mixture		Araldite MY 750 Aradur HY 956 EN	Araldite MY 750 Aradur HY 951	Araldite MY 753 Aradur HY 956 EN	Araldite MY 753 Aradur HY 951
Coefficient of expansion *ASTM D 696-70*	Linear/°C	65 - 70 $x10^{-6}$	65 - 70 x 10^{-6}	95 - 100 x 10^{-6}	90 - 95 x 10^{-6}
Thermal conductivity *BS 874 section 4.2.3*	W/m °C	0.21 - 0.23	0.20 - 0.22	0.19 - 0.21	0.19 - 0.21
Limiting oxygen index *ASTM D 2863-76*	--	22	21	23	22
Water absorption *BS 2782* 24 h at 23°C *method 502F* ½ h at 100°C *method 503B*	 mg mg	 10 - 25 50 - 70	 10 - 25 40 - 55	 10 - 25 75 - 95	 10 - 25 65 - 80

Electrical properties

Resin-hardener mixture		Araldite MY 750 Aradur HY 956 EN	Araldite MY 750 Aradur HY 951	Araldite MY 753 Aradur HY 956 EN	Araldite MY 753 Aradur HY 951
Electric strength *IEC 60243-1* *Step-by-step, 3 mm, 20°C*	kV/mm	12 - 13	11.5 - 12-5	11.5 - 12.5	11.5 - 12.5
Permittivity (ε) IEC 60250					
50 Hz at 20°C *Schering bridge*	---	4.5 - 4-7	3.85 - 4.05	4.1 - 4.3	3.9 - 4.1
1 kHz at 20°C *Transformer bridge*	---	4.3 - 4.6	3.8 - 4.0	4.0 - 4.2	3.8 - 4.0
1 MHz at 20°C *Q-meter*	---	3.7 - 4.0	3.65 - 3.85	3.7 - 3.9	3.6 - 3.8
Loss tangent (tan δ) IEC 60250	%				
50 Hz at 20°C *Schering bridge*	---	0.6 - 0.8	0.5 - 1.0	1.0 - 1.5	1.0 - 2.0
1 kHz at 20°C *Transformer bridge*	---	1.5 - 1.7	1.0 - 1.5	1.5 - 2.0	1.0 - 2.0
1 MHz at 20°C *Q-meter*	---	2.5 - 3.5	2.5 - 3.0	2.0 - 2.5	2.0 - 3.0
Volume resistivity IEC 60093 *Voltmeter-ammeter, 1 min, 20°C*	ohm m	$> 10^{13}$	$> 10^{13}$	$> 10^{13}$	$> 10^{13}$

Glasscloth laminates impregnated with Araldite MY 753 + Aradur HY 951

Wet lay-up 12-ply glasscloth * laminate. Pressed to 3.2 mm stops for 2 days at room temperature and cured for a further 5 days at room temperature. Resin-to-glass weight ration = 36: 64.

Flexural strength *BS 2782 method 304 B*

at room temperature	475 - 500 MPa
at room temperature after 2 hour immersion in boiling water	420 - 450 MPa

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	yes
gloves	essential
arm protectors	recommended when skin contact likely
goggles/safety glasses	yes
respirator/dust mask	recommended
Skin protection	
before starting work	Apply barrier cream to exposed skin
after washing	Apply barrier or nourishing cream
Cleansing 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 breakers, etc.
Disposal of spillage	Soak up with sawdust or cotton waste and deposit in plastic-lined bin
Ventilation:	
of workshop	Renew air 3 to 5 times an hour
of workplace	Exhaust fans. Operatives should avoid inhaling vapours.

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.
Anyone taken ill after **inhaling** vapours should be moved out of doors immediately. In all cases of doubt call for medical assistance.

Note