

Advanced Materials**Aradur[®] 9664-1*****SOLID AROMATIC AMINE HARDENER**

| | | |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| GENERAL | Aradur [®] 9664-1 is a micropulverized version of the Aradur [®] 976-1, which is also referred to as Eporal 'DDS' or 'DAPS'. It is a high performance hardener used with Araldite [®] epoxy resins. | |
| CHEMICAL DESCRIPTION | 4,4'-Diaminodiphenyl sulfone | |
| APPLICATIONS | <ul style="list-style-type: none">• Adhesives• Castings• Printed circuit board laminates• High temperature laminates• Prepregs• Composites/Advanced composites• Coatings/high performance | |
| ADVANTAGES | <ul style="list-style-type: none">• Excellent thermal stability• Outstanding chemical resistance• Excellent high temperature properties | |
| TYPICAL PROPERTIES | Visual appearance | white to off- white |
| | Melting point | 176 - 185 °C |
| | Amine content | 99 - 100 % |
| | Water content | 0.0 - 0.15 % |
| | Particle size, less than 50 µm | 99 - 100 % |
| PACKAGING & STORAGE | Aradur [®] 9664-1 is supplied in 15 kg drums. This product has a minimum shelf life of one year when stored away from excessive heat and humidity. | |

FORMULATIONS**Casting Application 1**

When using a liquid resin and Hardener HT 9664-1, the following procedure is suggested:

| Product | Parts by weight |
|-------------------|------------------------|
| Araldite® GY 6005 | 100 |
| Aradur® 9664-1 | 36 |

Procedure

Heat the resin to 135 °C (275 °F) and then add the Aradur® 9664-1 while stirring. Continue stirring until a homogeneous mixture is obtained. Cool the solution to 120 °C (248 °F), then pour into the mold.

When using Hardener HT 9664-1/liquid resin/accelerator, the following procedure is suggested:

| Product | Parts by weight |
|---------------------|------------------------|
| Araldite® GY 6005 | 100 |
| Aradur® 9664-1 | 36 |
| BF ₃ MEA | 0.5-1.0 |

Procedure

Heat the resin to 135 °C (275 °F) and add the Hardener

Aradur® 9664-1 while stirring until a homogeneous mixture is obtained. Cool the resin/hardener mixture to 100 °C (212 °F), then add the accelerator and stir until the mixture is again uniform.

Gel Time (30 gram mass) at Various Temperatures

| | pbw | 100 °C | 120 °C | 140 °C |
|---------------------|------------|---------------|---------------|---------------|
| Araldite® GY 6005 | 100 | | | |
| Aradur® 9664-1 | 36 | 180 min | 130 min | 75 min |
| Araldite® GY 6005 | 100 | | | |
| Aradur® 9664-1 | 36 | | | |
| BF ₃ MEA | 0.5 | 180 min | 116 min | 50 min |
| Araldite® GY 6005 | 100 | | | |
| Aradur® 9664-1 | 36 | | | |
| BF ₃ MEA | 1 | 30 min | 21 min | 11 min |

Cured Properties

System: Araldite® GY 6005/Aradur® 9664-1(100/36)

Cure: 24 hrs @ 120°C (248 °F) + 4 hrs @ 175°C (350 °F)

Physical Properties @ 25°C (77°F)

| | |
|--------------------------------|-----------------------|
| Tensile strength, psi | 8550 |
| Tensile modulus, psi | 3.4 x 10 ⁵ |
| Elongation at break, % | 3.3 |
| Water absorption, 2 hr boil, % | 0.6 |

Electrical Properties

Volume resistivity (ohm-cm)

| | |
|------------------|------------------------|
| @ 25°C (77 °F) | 7.1 x 10 ¹⁶ |
| @ 150°C (302 °F) | 1.6 x 10 ¹³ |

Dielectric constant, 60 Hz

| | |
|-----------------|-----|
| @ 20°C (68°F) | 4.4 |
| @ 100°C (212°F) | 4.5 |
| @ 130°C (265°F) | 4.5 |
| @ 150°C (302°F) | 4.6 |

**FORMULATION
(CONTINUED)**

| | |
|--------------------------|-------|
| Dielectric factor, 60 Hz | |
| @ 20°C (68 °F) | 0.008 |
| @ 100°C (212 °F) | 0.004 |
| Dielectric factor, 60 Hz | |
| @ 20°C (68 °F) | 0.008 |
| @ 100°C (212 °F) | 0.004 |
| @ 130°C (265 °F) | 0.007 |
| @ 150°C (302 °F) | 0.015 |

Casting Application 2

When using Araldite[®] MY 720 and Aradur[®] 9664-1 to produce an unfilled casting, the following procedure is suggested:

Parts by weight

| | |
|------------------------------|-----|
| Araldite [®] MY 720 | 100 |
| Aradur [®] 9664-1 | 44 |

Procedure

Carefully heat the Araldite[®] MY 720 to 135 °C (275 °F) and slowly stir in the Aradur[®] 9664-1 until a clear mixture is obtained. (The total mass is 500 g.) Maintain a temperature of 135 °C and degas the mixture for 20 minutes at 30 inches of mercury. Then pour the material into molds and cure at the cure schedule below.

For larger quantities up to 5 kg, the temperature should not be allowed to go above 125 °C (256 °F) because a violent exotherm may result.

Unfilled batches scaled-up to >5 kg should be carefully investigated by the user for possible exotherms. In all cases, hot spots should be avoided when heating.

Accelerators are not recommended in the formulation where no solvents or fillers are used. If accelerators are evaluated, extreme caution should be exercised.

Cured Properties

| | Tested @ | |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------|
| | 25°C | 150°C |
| Tensile strength, psi | 8540 | 6460 |
| Tensile modulus, psi | 5.4 x 10 ⁵ | 3.8 x 10 ⁵ |
| Tensile elongation, % | 1.8 | 1.9 |
| Flexural strength, psi | 13.000 | 12.300 |
| Flexural modulus, psi | 5.0 x 10 ⁵ | 3.9 x 10 ⁵ |
| Ultimate compressive strength, psi | 34.000 | |
| Compressive yield strength, psi | 29.000 | |
| Compressive modulus, psi | 2.8 x 10 ⁵ | |
| Charpy impact, unnotched, ft-lb | 5.7 | |
| Heat deflection temperature, °C (°F) | 238 (460) | |
| Tg, °C (°F) | 177 (350) | |
| Cure | 2 hrs @ 80 °C (176 °F) + 1 hr @ 100 °C (212 °F) + 4 hrs @ 150 °C (302 °F) + 7 hrs @ 200 °C (392 °F) | |

**HANDLING
PRECAUTIONS****Personal hygiene***Safety precautions at workplace*

| | |
|------------------------|--------------------------------------|
| protective clothing | yes |
| gloves | essential |
| arm protectors | recommended when skin contact likely |
| goggles/safety glasses | yes |

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

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 workplaces | Exhaust fans. Operatives should avoid inhaling vapours |

FIRST AID

Contamination of the *eyes* by resin, hardener or 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.

IMPORTANT LEGAL NOTICE

Huntsman Advanced Materials warrants only that its products meet the specifications agreed with the user. Typical properties, where stated, are to be considered as representative of current production and should not be treated as specifications.

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., 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.

Aradur and Araldite are registered trademarks of Huntsman Corporation or an affiliate thereof.

Copyright © 2007 Huntsman Corporation or an affiliate thereof. All rights reserved.

Main Office :
Huntsman Advanced Materials (Switzerland) GmbH
Klybeckstrasse 200
4057 BASEL
Switzerland
+41 61 966 3333