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## Advanced Materials

# Araldite® LY 1564 SP / Aradur® 3485

WARM CURING EPOXY RESIN SYSTEM

Araldite® LY 1564 SP is an epoxy-based resin
Aradur® 3485 is a formulated amine hardener

| | |
|---|---|
| **APPLICATIONS** | Industrial composites (Windmill Blades) |
| **PROPERTIES** | Laminating system with low viscosity and high flexibility. The long pot life of Aradur® 3485 facilitates the production of very large industrial parts. |
| **PROCESSING** | Resin Transfer Moulding (RTM, Infusion)<br>Filament Winding<br>Wet Lay-up |

**KEY DATA**

**Araldite® LY 1564 SP**

| | | |
|---|---|---|
| Aspect (visual) | clear liquid | |
| Color (Gardner, ISO 4630) | 1-2 | |
| Viscosity at 77°F [25°C] (ISO 9371B) | 1200 - 1400 | [cps] |
| Density at 77°F [25°C] (ISO 1675) | 1.1 - 1.2 | [g/cm$^3$] |
| Flash point (ISO 2719) | 365 [185] | °F [°C] |

**Aradur® 3485**

| | | |
|---|---|---|
| Aspect (visual) | Clear, colorless (to slightly yellow), liquid | |
| Viscosity at 25 °C (ISO 9371B) | 10 - 30 | [cps] |
| Density at 25 °C (ISO 1675) | 0,94 – 0,97 | [g/cm$^3$] |
| Flash point (ISO 2719) | > 251 [122] | °F [°C] |

## PROCESSING DATA

**MIX RATIO**

| *Components* | *Parts by weight* | *Parts by volume* |
|---|---|---|
| Araldite® LY 1564 SP | 100 | 100 |
| Aradur® 3485 | 37 | 44 |

We recommend that the components are weighed with an accurate balance to prevent mixing inaccuracies which can affect the properties of the matrix system. The components should be mixed thoroughly to ensure homogeneity. It is important that the side and the bottom of the vessel are incorporated into the mixing process.

When processing large quantities of mixture the pot life will decrease due to exothermic reaction. It is advisable to divide large mixes into several smaller containers.

**INITIAL MIX VISCOSITY** (HOEPPLER, ISO 9371B)

| | *°F [°C]* | *[cps]* |
|---|---|---|
| Araldite® LY 1564 SP /Aradur® 3485 | at 77 [25] | 200 - 320 |

**POT LIFE** (TECAM, 23°C, 65 % RH)

| | *[ g ]* | *[min]* |
|---|---|---|
| Araldite® LY 1564 SP/ Aradur®3485 | 100 | 970 -1050 |
| | 1000 | 190 - 260 |

**GEL TIME** (HOT PLATE)

| | *°F [°C]* | *[min]* |
|---|---|---|
| Araldite® LY 1564 SP/ Aradur® 3485 | at 140 [60] | 110 - 140 |
| | at 176 [80] | 40 - 55 |
| | at 212 [100] | 15 - 20 |
| | at 248 [120] | 6 - 10 |

The values shown are for small amounts of pure resin/hardener mix. In composite structures the gel time can differ significantly from the given values depending on the fibre content and the laminate thickness.

## PROPERTIES OF THE CURED, NEAT FORMULATION

**GLASS TRANSITION TEMPERATURE** (IEC 1006, DSC, 10 K/MIN)

| *Cure:* | $T_G$ |
|---|---|
| 2 days 73°F [23°C] | [°C] 36 - 43 |
| 8 days 73°F [23°C] | [°C] 48 - 55 |
| 20 h 104°F [40°C] | [°C] 53 - 60 |
| 15 h 122°F [50°C] | [°C] 60 - 72 |
| 24 h 122°F [50°C] | [°C] 64 - 72 |
| 10 h 140°F [60°C] | [°C] 65 - 73 |
| 16 h 140°F [60°C] | [°C] 74 - 80 |
| 4 h 176°F [80°C] | [°C] 76 - 83 |
| 8 h 176°F [80°C] | [°C] 80 - 88 |
| 2 h 212°F [100°C] | [°C] 80 - 87 |
| 5 h 212°F [100°C] | [°C] 83 - 90 |

| | | | | |
|---|---|---|---|---|
| **TENSILE TEST** (ISO 527) | | | *Cure: 15 h 50 °C* | *Cure: 8 h 80 °C* |
| | Tensile strength | [Kpsi] | 10.1 – 11.3 | 9.4 – 10.7 |
| | Elongation at tensile strength | [%] | 3.5 – 4.0 | 4.5 - 5.3 |
| | Ultimate strength | [Kpsi] | 8.5 – 9.6 | 7.8 – 9.1 |
| | Ultimate elongation | [%] | 5.0 – 6.0 | 9.0 - 10.0 |
| | Tensile modulus | [Kpsi] | 435 - 478 | 406 - 449 |

| | | | | | |
|---|---|---|---|---|---|
| **FLEXURAL TEST** (ISO 178) | | | *Cure: 7 days 23°C* | *Cure: 15 h 50°C* | *Cure: 8 h 80°C* |
| | Flexural strength | [Kpsi] | 13.0 – 15.2 | 17.4 – 19.6 | 15.9 – 18.1 |
| | Elongation at flexural strength | [%] | 2.5 – 3.5 | 4.5 - 5.5 | 5.5 - 6.5 |
| | Ultimate strength | [Kpsi] | 13.8 – 15.2 | 10.4 – 11.6 | 13.0 – 15.9 |
| | Ultimate elongation | [%] | 2.5 - 3.5 | 8.5 - 10.0 | 9.0 - 10.5 |
| | Flexural modulus | [Kpsi] | 471 - 507 | 449 - 478 | 406 – 435 |

| | | | | |
|---|---|---|---|---|
| **FRACTURE PROPERTIES** | | | *Cure: 15 h 50°C* | *Cure: 8 h 80°C* |
| **BEND NOTCH TEST** (PM 258-0/90) | Fracture toughness $K_{1C}$ | [psi√inch] | 989 – 1077 | 1263 –1429 |
| | Fracture energy $G_{1C}$ | [inch-lb./inch$^2$] | 1.14 – 1.48 | 2.28 – 2.74 |

## PROPERTIES OF THE CURED, REINFORCED FORMULATION

**INTERLAMINAR SHEAR TEST** (ASTM D 2344)

Short beam: Laminate comprising 12 layers unidirectional E-glass fabric (425 g/m$^2$)
Laminate thickness t = 118 mils – 125 mils [3.0 mm - 3.2 mm]
Fibre volume content: 63 - 65 %

| | | *Cure: 1.5 h 176°F [80°C] + 5 h 212°F [100°C]* |
|---|---|---|
| Shear strength | [psi] | 7540 - 8410 |

**STORAGE**

Araldite® LY 1564 SP should be stored in a dry place, in the sealed original container, away from heat and humidity, at temperatures between +2°C and +40°C (+35.6°F and +104°F). Under these storage conditions, the shelf life is 5 years. The product should not be exposed to direct sunlight.

Like many liquid epoxy resins, Araldite® LY 1564 SP may crystallize when stored below room temperature. Heating the resin to 60-70°C (140-160°F), preferably in a water bath, for several hours, will re-liquify it and restore its original properties.

Aradur® 3485 should be stored in a dry place, in the sealed original container, away from heat and humidity, at temperatures between +2°C and +40°C (+35.6°F and +104°F). Under these storage conditions, the shelf life is 3 years. The product should not be exposed to direct sunlight.

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**First Aid!**
Refer to MSDS as mentioned above.

**KEEP OUT OF REACH OF CHILDREN**

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