

Araldite® EP Structural Epoxy Adhesives

HUNTSMAN

Enriching lives through innovation

The transportation industry's demand for structural adhesives is at an all-time high due to the lightweighting of part assemblies. In addition to incorporating high strength-to-weight honeycomb composites and aluminum substrates in today's automobiles, buses, rail cars and shipping containers, engineers are bonding rather than riveting or mechanically assembling flat panels. With easy-to-handle, fast-curing epoxy adhesives, manufacturers are optimizing production efficiencies and improving product quality. Furthermore, advanced epoxy adhesives maintain their integrity when exposed to temperature extremes, long-term stresses, vibrations, and corrosive environments.

About Huntsman

Huntsman Advanced Materials is uniquely qualified to serve transportation design and manufacturing engineers because of our long-term role as a pioneer and technology leader in epoxy chemistries. The Araldite® brand has been synonymous with bonding excellence for more than 60 years.

Throughout the world, Huntsman high-performance adhesives have long been preferred materials for the toughest applications – including the fabrication and assembly of aircraft exterior components, as well as interior parts.

Huntsman is a global supplier of adhesives used in the assembly of:

- automotive and mass transit vehicles
- recreation and marine equipment
- large composite wind blades
- flame-retardant electronic parts
- power industry transformers and components

Next-Generation Epoxy Adhesives

Structural epoxy adhesives from Huntsman produce durable, high-strength bonds on substrates; including metals, thermosetting plastics and composites. The systems are formulated with a wide range of viscosities and working times to meet the processing and mechanical requirements of most parts. Araldite® epoxy adhesives offer excellent chemical and corrosion resistance, and maintain their dimensional integrity even when exposed to impact, vibration and temperature extremes. Bonded components exhibit high lap shear and compressive strength under service conditions.

Three new easy-to-handle, ambient-cure epoxy adhesives have been developed. While heat will accelerate their cure cycles, the use of an autoclave is not required. All three adhesives can produce strong bonds and seals on aluminum, honeycomb and composite structures. Each adhesive offers its own unique features:

- **Araldite® EP 200 Epoxy Adhesive** is an extrudable room-temperature curable adhesive for use at service temperatures of up to 200°F (93°C). It produces bonds and seals with high shear and peel strength. It is suitable for bonding metals, composites and some engineering thermoplastics. Araldite® EP 200 Epoxy Adhesive can also be used as an edge seal for metal honeycomb sandwich panels. The specific rheology of this new epoxy adhesive makes the application to vertical and overhead surfaces possible without running or sagging.

Araldite® EP 200 epoxy is a gap-filling paste with a working time of more than 60 minutes. It offers a user friendly 1:1 volume mix ratio and color mix indicator to ensure thorough blending. The mixed adhesive develops handling strength in six to eight hours at room temperature. Once cured, the durable adhesive maintains its toughness and flexibility at temperatures ranging from -67°F (-55°C) to 200°F (93°C).

- **Araldite® EP 300 Epoxy Adhesive** is ideal for bonding and reinforcing composites, aluminum and some engineering thermoplastic substrates. It is also well suited for use as a liquid shim between two uneven surfaces. This high-performance adhesive may be used at service temperatures of up to 400°F (204°C) after curing at room temperature. It features high lap shear and compressive strengths, which are retained after environmental aging.

Araldite® EP 300 epoxy is a gap-filling paste that dispenses easily for fast application over irregular surfaces. It offers a 2:1 mix ratio and can develop its handling strength within two to three hours at room temperature; full properties are reached after 15 hours at 77°F (25°C).

- **Araldite® EP 1000 Epoxy Adhesive** is a two-part, nano-toughened epoxy system that can be used at temperatures up to 300°F (150°C). It maintains high shear strength and good peel strength on bonded substrates including metals, composites and dissimilar materials. The cured adhesive can withstand exposure to aviation fuels and hydraulic fluids.

Araldite® EP 1000 adhesive is a thixotropic paste with a 40-minute open time and is supplied in dual cartridges (2:1 volume mix ratio). This adhesive can be cured at room temperature or with a room-temperature gel followed by an oven cure for either three hours at 160°F (71°C) or one hour at 212°F (100°C).

Araldite® Epoxy Adhesives Properties Comparison Chart

Property	EP 200	EP 300	EP 1000
Viscosity, cP	Thixotropic Paste	Paste	Thixotropic Paste
Working Time at 75°F	60-70 min. per 100 g mix	30-35 min. per 125 g mix	40 min. per 20 g mix
Handling Strength, at 77°F, hrs	6-8	4-5	4
Lap Shear Strength, psi AL (Anodized, Primed)			
at -67°F (-55°C)	3,160	--	--
at -94°F (-70°C)	--	2,550	--
at 73°F (23°C)	3,200	4,200	5,200**
at 180°F (82°C)	--	--	4,600
at 250°F (121°C)	--	3,100	--
at 300°F (149°C)	760	--	500
at 350°F (177°C)	--	2,200	--
at 400°F (204°C)*	--	1,100	--
CFRP	--	2,800	--
Modified Polycarbonate	1,100	--	--
Roller Peel Strength, pli	27	--	26
T-Peel Strength, pli	--	15	17
Compressive Strength, at 75°F, psi	--	11,000	--
Hardness, Shore D	75	82	--

* Etched, Primed AL ** At 77°F (25°C)

Conclusion

The high performance and durability of epoxy adhesives have established a long and successful track record. Years of experience in the development of aerospace adhesives has led to the introduction of a new generation of structural adhesives. Part manufacturers can now realize significant productivity improvement while at the same time improving component performance and durability.

The new adhesives cure fast and at lower temperatures. Moreover, the next-generation epoxy systems develop rapid green strength to accommodate handling within hours rather than days. In addition, these epoxy systems are also easier to process, with user friendly 1:1 and 2:1 resin/hardener volume mix ratios – saving time and reducing the possibility of bond failure due to off-ratio mixing.

For more information about Huntsman's new Araldite® EP 200, EP 300, and EP 1000 epoxy adhesives, visit www.aralditeadhesives.com