

Leepoxy Plastics, Inc.

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TECHNICAL BULLETIN LEECURE B-1550

Description

LEECURE B-1550 is a proprietary Leepoxy Lewis acid epoxy catalyst based on boron trifluoride. It has been used since 1965 in producing **latent one-component** heat-cured epoxy systems. It can be used with all commercially available epoxy resins: bisphenol A, bisphenol F, cycloaliphatic, novolac, and flexibilized epoxy resins. Besides excellent room temperature stability (4 months), LEECURE B-1550 cured systems feature attractively short cure times and low cure temperatures. Cured systems offer exceptional water, chemical, and heat resistance, tensile strength, and electrical properties.

The excellent physical properties of LEECURE B-1550 cured systems can be enhanced through the judicious choice of appropriate dry non-alkaline fillers. In unfilled systems, fracture, impact, and thermal shock resistance can be significantly improved through the incorporation of flexibilized resins or toughening agents. Leepoxy's proprietary 23-135 CTBN adduct is one such toughening agent

LEECURE B-1550 has found application in electrical potting and winding compounds. It is used most widely, however, in casting, filament winding, pre-preg, and gunk molding applications for the aerospace and automotive industry and in the manufacture

of corrosion-resistant pipe, pipe fittings, and high pressure vessels. Manufacturers in these markets have recognized distinct advantages in handling and processing properties and general similarity in final cured properties versus crystallized forms of Lewis acid such as BF_3 -MEA.

These advantages are:

1. Liquid form. Easy handling and can be mixed into liquid resins without heating.
2. Lower cure temperatures and/or shorter cure times.
3. Complete compatibility with epoxy resins.
4. Long shelf life and good storage characteristics. It is much less hygroscopic than crystalline BF_3 , though it can be adversely affected by prolonged exposure to moisture.
5. Low odor.
6. No volatiles or gas given off during cure at high temperatures.

TYPICAL PROPERTIES	
Appearance	Amber semi-solid
Viscosity @ 25°C, cps.	10,000 – 25,000
Density, lbs./gal.	9.9
Shelf Life, months	12

Handling and Mixing

Keep LEECURE B-1550 containers tightly sealed at all times. Use of dry nitrogen is recommended to protect partial containers from moisture/humidity contamination. The epoxy resin, fillers, and any other ingredients to be mixed should be moisture-free as well. Avoid alkaline fillers such as calcium carbonate. Fillers such as silica, barytes, glass, graphite, clays, and others that have a pH of 7 or lower are recommended. Mix very thoroughly in a dry mix vessel. No special equipment is necessary, but entrapment of excessive air bubbles should be avoided. Exposure to humidity in the air should be minimized from the time of mix until the product is ultimately heat cured because prolonged exposure to humidity may harm the reactivity, physical properties, and surface appearance of the LEECURE B-1550 cured system.

LEECURE B-1550 tends to increase in viscosity and can even partially crystallize in storage temperatures below 60°F. Simply heating LEECURE B-1550 to 150 – 180°F and then stirring it at that temperature can easily reverse this phenomenon.

TYPICAL HANDLING PROPERTIES		
Mix Ratio ¹ , by weight, phr	5	
Pot Life @ 25°C, months	4	
Gel Time, 10 g, minutes	B-1550	BF₃MEA
@ 110°C	77	80
@ 120°C	31	56
@ 124°C	22	
@ 130°C	12	27
@ 140°C	7	12
@ 150°C	5	7
Cure Time @ 150°C, thin film, minutes	60	

1 Mix ratio with Bisphenol A Resin (EEW=189)

Curing Conditions

Epoxy compounds containing LEECURE B-1550 should be cured so as to control the effects of the exothermic reaction. The optimum time and temperature will depend on the particular formulation and the mass of compound. Longer cure schedules may be needed when curing thin sections or where the epoxy is adjacent to a mass of material that will act as a heat sink. The recommended minimum bondline cure temperature is 125°C. Generally, the higher the cure temperature, the better the heat resistance and physical properties of the cured systems.

Also additives, modifiers, and diluents used in formulating epoxy compounds incorporating LEECURE B-1550 may have a marked effect not only on the cure rate but also the final properties of the cured system. Diluents, fillers, and flexibilizers will generally increase pot life, gel time, and cure time.

TYPICAL PERFORMANCE	
Glass Transition Temperature, °C	135
Tensile Strength, psi	9,250
Modulus, psi	3.5 x 10 ⁵
Tensile Elongation, %	3.4
Flexural Strength, psi	15,500
Hardness, Shore D	90
Izod Impact, ft lb/ in notch	0.33
Dielectric Constant, 1 MHz @ 25 °C	3.9
Dissipation Factor, 1 MHz @ 25 °C	0.024
Volume Resistivity, ohm-cm 25 °C	5 x 10 ¹⁵
	90 °C 1 x 10 ¹⁵
	150 °C 3.4 x 10 ⁹
Dielectric Strength, v/mil	790
Weight Loss, 10 days @ 150 °C, %	< 1.0

[100 parts Bisphenol A epoxy resin (EEW=189) and 6 parts LEECURE B-1550 cured one hour @ 135 °C