

Epalloy™ 7200 Compared to Polymercaptan Cure

Epoxy formulators use a variety of methods to accelerate cure of standard Liquid Epoxy Resin (LER) to provide products for low temperature and/or fast cure applications. One such example would be the use of polymercaptans for fast cure adhesives. However, polymercaptans have some undesirable side effects, including odor, poor water resistance, and high cost.

A simple formula was tested to compare the speed of cure, hardness development, and water absorption of a mercaptan-cured system against Epalloy 7200 resin cured with an accelerated amine. Formulations are shown in Table 1 and test results are shown in Table 2.

TABLE 1– Epalloy 7200 vs. Mercaptan Cure

<u>Formulation</u>	A	B
DER 331	100	0
Epalloy 7200	0	85
Erisys GE-20	0	15
Capcure 3-800	90	0
Versamine EH-50	10	0
Versamine F-11	0	49

Formulation A is a standard five-minute epoxy formula. Formulation B is our Epalloy 7200 test formula. The Epalloy7200 was diluted with Erisys GE-20 to provide a resin viscosity similar to LER resin with an EEW = 185-190. With the use of Versamine F-11 the mixed viscosity of Formulation B will be lower than Formulation A.

While mercaptan-cured adhesives are well known for fast cure, they are also known for disagreeable odor and high cost. The Epalloy 7200 provides advantages over the mercaptan formula in both regards. There is no disagreeable odor associated with the Epalloy 7200 formula, and it is estimated that the cost of Formula B will be approximately 20 to 25% less than the mercaptan formula.

Formulation B also provides curing and physical property advantages as seen in Table 2 below.

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TABLE 2– Epalloy 7200 vs. Mercaptan Cure

<u>Test Results</u>	A	B
Gel Time (20 grams)	3'10"	4'20"
D Hardness @ 15 min	55/42	79
D Hardness @ 30 min	73	82
D Hardness @ 40 min	74	84
D Hardness @ 16 hrs	78	82
Water Absorption (24 hour boil)	10.00%	7.97%

While formulation B does not gel as fast as the mercaptan in a 20-gram mass, it develops physical strength faster than the mercaptan formula. So we see a longer working or open time with faster property build.

Mercaptans are also known for relatively poor resistance to water. The Epalloy 7200 formulation shows improved water resistance as compared to the mercaptan formulation.

These data indicate several advantages in the use of Epalloy 7200 over the use of polymercaptan cured epoxy resin in fast cure formulations;

- No odor
- Lower cost
- Longer working time
- Faster property build
- Improved water resistance