



Chemir / Polytech

Laboratories, Inc.

Materials Analysis Specialists

- ▲ Materials Identification
- ▲ Polymer Testing
- ▲ Deformulations

4 December 2000

Mr. Danny R. Warren
Warren Environmental Inc.
P.O. Box 1206
Carver, MA 02330

Re: Shrinkage and Thermal Compatibility Testing
P.O. #: Verbal
Chemir/Polytech Job #: 32611

Dear Mr. Warren:

Per your request, we have completed the analysis of your sample "S 301 Epoxy" determining shrinkage in accordance with ASTM C 883-80 *Standard Test Method for Effective Shrinkage of Epoxy-Resin Systems Used With Concrete* and thermal compatibility in accordance with ASTM C 884-92 *Standard Test Method for Thermal Compatibility Between Concrete and an Epoxy Resin Overlay*. The results are summarized below.

SAMPLE LOG-IN

The sample was logged as follows:

SAMPLE DESCRIPTION	CHEMIR/POLYTECH SAMPLE NUMBER
S 301 Epoxy	502764

ANALYSIS CONCLUSIONS

The sample "S 301 Epoxy" (Chemir/Polytech #502764) passed both ASTM C 883-80 *Standard Test Method for Effective Shrinkage of Epoxy-Resin Systems Used With Concrete* and ASTM C 884-92 *Standard Test Method for Thermal Compatibility Between Concrete and an Epoxy Resin Overlay*. No failures were observed.

ANALYSIS DISCUSSION

Effective Shrinkage per ASTM C 883-80

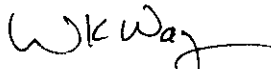
This test method covers the determination of the effective shrinkage occurring during the curing of epoxy resin systems. A laminate is constructed of the epoxy resin applied to a glass plate. As the epoxy cures, any shrinkage will cause a bowing of the glass plate. Failure in the test consists of shrinkage sufficient enough to fracture the glass. A 350 gram mixture of the "S 301 Epoxy" (Chemir/Polytech #502764) was poured into a mold measuring 3.5 inches x 9.0 inches leaving a slight excess. The glass panel was positioned over the mold and placed on top of the epoxy mixture. A 225-gram weight was placed on top of the glass panel and the epoxy was allowed to cure for a period of 24 hours. After 24 hours, the epoxy-glass laminate was allowed to age glass side down for 144 hours at 73.4°F and 40% relative humidity. After the aging period, the laminate was subjected to ten uninterrupted cycles lasting 30 minutes each with temperatures of 124°F and 73.4°F. No cracks in the glass and no de-laminations were observed.

Thermal Compatibility ASTM C 884-92

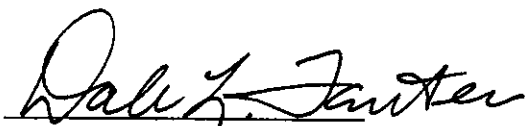
This test method covers the determination of which epoxy-resin systems are subject to debonding when used as overlays for concrete when the combination of the two is subjected to temperature changes that may be met in the field. A layer of epoxy-sand mortar was applied to a slab of cured and dried concrete. After the epoxy was cured, the sample was subjected to five cycles of temperature change between 77°F and -6°F. No cracks between the concrete and the epoxy mortar were observed. No de-lamination was observed.

An invoice is being sent to your accounts payable department. Samples are disposed of on the first Monday every month after being retained a maximum of 30 days unless you direct us otherwise in writing. Please review the Terms & Conditions on the inside back cover of this report that governs analysis work. Thank you for consulting Chemir/Polytech Laboratories, Inc. If you have any questions regarding this work, or if we can be of any further assistance, please call us at (314) 291-6620.

Sincerely,
Chemir / Polytech Laboratories, Inc.



Wayne K. Way, Ph.D.
Vice President - Technology



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Director - Polymer Science

Project Chemist:


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Lab Technician

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Enclosures