

## Scope

1. This method of test is intended to determine the amount of water absorption of cured epoxy resin systems.

## Apparatus

2. (a) *Balance* - A Type I or II, Class A balance conforming to AASHTO M 231.

(b) *Beaker* - A 250 ml (minimum) graduated disposable plastic beaker.

(c) *Mixing Tools* - Stainless steel spatulas or wooden tongue depressors.

(d) *Thermometer* - A thermometer conforming generally to the requirements for ASTM 1C or 1F thermometers.

(e) *Mold* - Mold suitable for making a 12 by 3 by 1/8 in. homogeneous sheet of hardened epoxy.

(f) *Saw* - A band saw suitable for cutting epoxy water absorption specimens.

(g) *Oven* - A forced air oven capable of maintaining a uniform temperature of  $122 \pm 5.4$  °F.

(h) *Desiccator* - A desiccator of sufficient size to accommodate the specimens.

(i) *Sandpaper* - No. 0 or finer sandpaper.

(j) *Timer* - Clock or watch.

(k) *Brush* - A 1 in. paint brush.

(l) *Straightedge* - A 12 in. wooden or metal straightedge.

(m) *Wax* - Paraffin wax.

## Safety Precautions

3. The following precautions should be observed when handling epoxy components and cleaning fluids:

(a) Persons handling these materials should use appropriate protective clothing, including rubber or plastic gloves, and appropriate eye protection such as safety glasses.

(b) If any epoxy or cleaning material should contact the skin, the material should be removed immediately with a dry cloth or paper towel, and the affected area should be washed thoroughly with soap and water.

(c) If any material should come in contact with the eyes, flush immediately with water and contact a physician.

(d) Adequate ventilation is necessary to prevent excessive inhalation of vapors.

(e) Observe all precautions specified by the manufacturer before handling each material.

## Sample Preparation

4. (a) Thoroughly stir the individual components, for at least one minute, immediately before testing.

(b) Combine and mix sufficient quantities of components A and B, in accordance with the manufacturer's recommendations, such that a minimum sample quantity of 200 ml is obtained. If the manufacturer does not recommend a mixing time, mix the sample for at least 3 minutes. Use separate mixing tools when obtaining and mixing the desired quantities of each component to avoid contamination.

(c) Brush a light coat of melted wax on the inner and outer surfaces of the mold, paying special attention to seam areas.

(d) Fill the mold with mixed adhesive and strike off excess with a straightedge.

(e) Allow the adhesive to cure in air for seven days at  $77 \pm 2$  °F.

(f) Carefully remove the hardened epoxy from the mold and cut three 1 by 3 in. rectangular specimens, using the band saw.

(g) Prepare the specimens by lightly roughening or sanding all surfaces with No. 0 or finer sandpaper.

## Procedure

5. (a) Condition the specimens by heating them in an oven at  $122 \pm 5.4$  °F for a period of  $24 \pm 1/2$  hours.

(b) Allow the specimens to cool sufficiently in a desiccator and then weigh each specimen to the nearest 0.0001 g. Record this as conditioned weight (CW) on the worksheet.

(c) Place each specimen on its edge and immerse completely in a container of distilled or deionized water maintained at a temperature of  $77 \pm 2$  °F.

(d) At the end of  $24 \pm 1/2$  hours, remove the specimens from the water one at a time, blot off all surface water with a dry cloth, and immediately weigh to the nearest 0.0001 g. Record this as wet weight (WW).

(e) Recondition and weigh the specimens using the same procedure as given in paragraph 5, (a) and (b). Record this as reconditioned weight (RW).

(f) If the reconditioned weight is lower than the conditioned weight, the difference shall be considered as water soluble matter lost during the immersion pro-

cedure and the percent soluble matter lost shall be calculated as shown in paragraph 6 (b).

**NOTE:** *When the weight of the reconditioned specimen, after immersion in water, exceeds the conditioned weight prior to immersion, the soluble matter lost shall be recorded as "0".*

#### Calculations

6. (a) Calculate the percent increase in weight of each specimen to the nearest 0.01 percent according to the following formula:

$$W = \frac{WW - CW}{CW} \times 100$$

where:

W = increase in weight, %  
 WW = wet weight, g  
 CW = conditioned weight, g

(b) Calculate the percent of soluble matter lost by each specimen to the nearest 0.01 percent according to the following formula:

$$SM = \frac{CW - RW}{CW} \times 100$$

where:

SM = soluble matter lost, %  
 CW = conditioned weight, g  
 RW = reconditioned weight, g

(c) Calculate the average percent water absorbed according to the following formula:

$$AW = W + SM$$

where:

AW = average absorbed water, %  
 W = increase in weight, %  
 SM = soluble matter lost, %

#### Report

7. Report the average percent of absorbed water as water absorption to the nearest 0.1 percent.

Normal testing time is 12 days.