NOTES

TENSIOMETER CONSTRUCTION WITH PLASTIC MATERIALS

Plastic materials now available lend themselves readily to tensiometer construction by simple techniques. If necessary, plastic tensiometers can be made entirely with hand tools.

Some plastics are excessively permeable to air and are worthless for tensiometers. However, either high or normal impact type of polyvinyl chloride (PVC) pipe has proven satisfactory, and is easily obtained from larger hardware or rubber-goods supply stores. Porous ceramic cups which fit 1/2-inch nominal size Schedule 80 PVC pipe (0.84-inch OD, 0.346 ID) are commercially available. Construction consists of cutting and fitting plastic parts and assembling with cemented joints. Tensiometers of the type described here have been tested in the laboratory and have performed satisfactorily in the field for two seasons.

In simplest form, the tensiometer consists of porous cup, PVC pipe, medium-weight 1/2-inch PVC slip-type coupler, a 2-inch length of 9/16-inch OD clear acrylic (e.g. Lucite) tubing, a No. 0 neoprene stopper, and gauge or manometer. The coupler adds wall thickness where the gauge is threaded in and can be omitted if a manometer is used.

To assemble the tensiometer as indicated in figure 1, the PVC pipe is cut so that the end to which the cup is to be attached is perpendicular to the pipe axis. Scrape some of the bevel from the inside of the coupler, coat the inside of coupler and end of pipe opposite the cup with PVC cement (the type used to solvent-weld PVC pipe). Immediately force the coupler over the end of the pipe so that ends of pipe and coupler are flush. After the cement dries, the coupler end of the pipe is reamed with tapered reamer or with 41/64-inch drill to a depth of 1/2-inch. The clear acrylic sight-glass is cemented in with PVC cement. If a vacuum gauge is to be used, flatten a portion of the coupler surface by filing or grinding, drill a hole through the flattened portion and thread the hole to receive the gauge. The tapered tap used to thread the hole must be inserted only far enough to permit gauge threads to be started readily.

Since the inside diameter of the pipe and outside diameter of the cup neck vary, some fitting or matching is required. The fit should be snug but not tight, and a relatively loose fit is usually acceptable. To cement the cup to the PVC pipe, coat generously the cup neck and shoulder, as well as the inside and cut end of the pipe, with contact bond cement. Ignore air bubbles, allow the first coat to dry 10 to 15 minutes, apply a second coat, and insert the cup neck with a slight twisting motion. Allow to dry at least 24 hours in vertical position with the weight of pipe resting on the joint. The gauge is installed using Permatex No. 2 (a nonhardening automobile gasket cement), nonhardening automobile rubber cement, or liquid neoprene as thread dope.

Figure 1—Relationship of parts and assembled tensiometer.

$1.10 for a 2-foot length plus about 40 cents for a 10-foot length may be stocked for convenience; lengths may be stocked for convenience; lengths may be stocked for convenience; lengths may be stocked for convenience;

Fewer cups would probably be used in mass production in a well-equipped shop. Distributors, e.g., Cadillac Plastic and Chemical Co., 15111 Second Avenue, Detroit 3, Michigan, with branches in several Midwestern, Southwestern, and Western cities.

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