FLORIDA DEPARTMENT OF TRANSPORTATION
State Materials Office
5007 NE 39th Avenue
Gainesville, Florida 32609
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Florida Method of Test
For
RECYCLED PLASTIC FENCE POSTS

Designation: FM 5-557

1. SCOPE

This method describes four test protocols for properties considered crucial for the successful performance and durability of the material. The tests include:

Warpage resistance
Water absorption
Insect resistance
Burn susceptibility

NOTE: The values stated in SI are to be regarded as standard. The values given in parenthesis are for information only.

2. EQUIPMENT

2.1 Balance capable of accuracy to 0.01 g.

2.2 Vacuum drying oven.

2.3 Large drying oven (inside height greater than 813 mm (32 in.), capable of achieving 150 °C (300 °F).

2.4 Oven post holder (Figure 1).

2.5 Warpage measurement fixture (Figure 2).

2.6 Inside-to-inside calipers and digital or other micrometer to measure accurately caliper distances.

2.7 Brass wire and engravable labels to identify individual discs.

2.8 4-L container and hot plate for boiling water.

3. PROCEDURE

3.1 Warpage Resistance: Cut two 813-mm (32-in.) long sections from two selected posts such that the ends are perpendicular to the linear axis of the

post. Mark the post at 51 mm (2 in.) intervals end to end. Drive one nail into each end of the post as close to the center as possible. This will provide the post support during warpage measurements. Place the post in the oven in the special holders (see Figure 1). The holder is a 102-mm (4-in.) square wood box attached to a 305-mm (12-in.) board. Wooden wedges are used to tightly hold the post vertically in place in the box during heating.

Heat to 130 °C (266 °F) for up to 8 hours or until warping occurs. Place the posts on the warpage test fixture via the v-notches (Figure 2). This device consists of a board 864 mm (34 in.) long to which are attached two vertical sides 203 x 140 mm (8.0 x 5.5 in.) each containing a 25-mm (1-in.) v-shaped notch. After supporting the heated posts in the notches via the nails, take measurements every 51-mm (2-in.) along the post. Use an inside-to-inside caliper placed vertically to measure the distance between board and post. Measure the caliper distance via digital micrometer or other approved device. Convert measurements to percent warpage by the following:

$$\% \text{ Warpage} = \frac{\text{Initial Value - Final Value}}{\text{Initial Value}} (100)$$

3.2 Water Absorption: Cut six post discs with a thickness between 3 and 6 mm (1/8 to 1/4 in.). Clean the disc edges of cuttings. Attach brass engraved labels to identify discs. Connect via wire. Dry samples at 105 °C (221 °F) to constant mass. Weigh all samples to 0.01 g. Insert the samples in the boiling water and continue boiling for 600 min. Remove the samples and absorb excess surface moisture by patting on a towel. Reweigh samples.

Calculate water absorption:

$$\% \text{ absorption} = \frac{\text{mass boiling - mass dry}}{\text{mass dry}} (100)$$

3.3 Insect Exposure: Cut six, 6 mm (0.24 in.) thick discs of each post. Clean disc edges of cuttings. Attach brass engraved labels to identify each disc. Dry samples 24 hours in a vacuum oven at 105 °C (221 °F) to constant mass. Weigh every sample to 0.01 g.

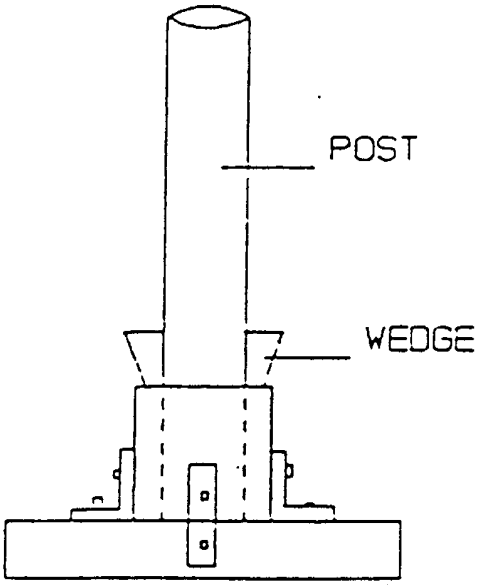
In initial tests, the vacuum-dried post discs were tested at the University of Florida Institute of Food and Agriculture Sciences (IFAS) Research and Education Center in Ft. Lauderdale, Florida. However, any recognized insect laboratory will be permitted (eg, USDA labs, Gulfport, MS, Gainesville, FL). The materials are then exposed for two (2) weeks to two species of termites,

Eastern subterranean (Retuculiterures flaviper) and Formosan subterranean (Captotezures formosanius). Vacuum dry the exposed samples to constant mass and calculate the percent mass loss.

$$\% \text{ Mass Loss} = \frac{\text{Initial Mass - Final Mass}}{\text{Initial Mass}} (100)$$

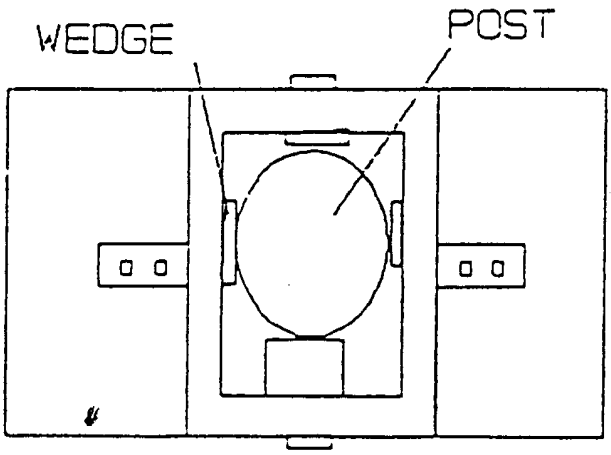
For fire ants, also use a two week exposure and follow the same protocol.

3.4 Flammability: Three line fence posts 102 mm (4 in.) diameter x 2440 mm (8 ft) length shall be embedded in soil in a row 2.4 m (8 ft) but not more than 3.0 m (10 ft) apart . If no dry grass is present around the posts, then 102 mm (4 in.) dry hay shall be placed around the posts and ignited. If grass is present, the grass shall be at least 102 mm (4 in.) high and shall burn when ignited. Manufacturers shall provide proof of the posts' reduced susceptibility to burning.



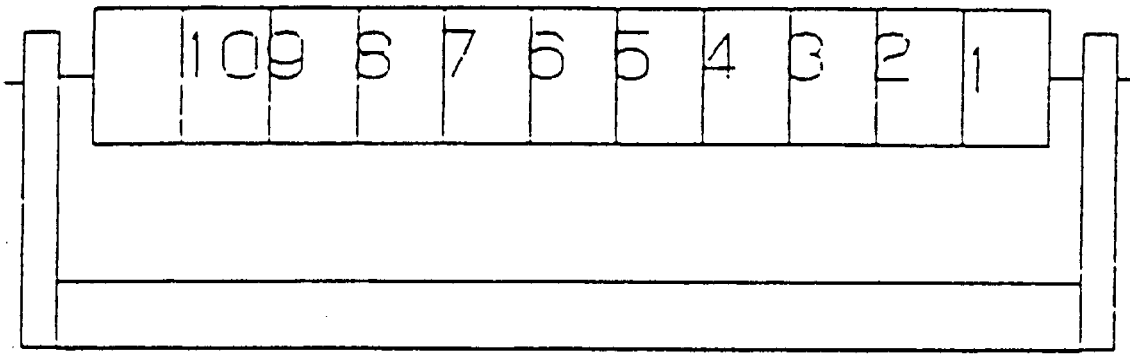
A

TOP VIEW



B

Figure 1: Diagram of stand used to ensure the vertical position of the posts during heat treatment



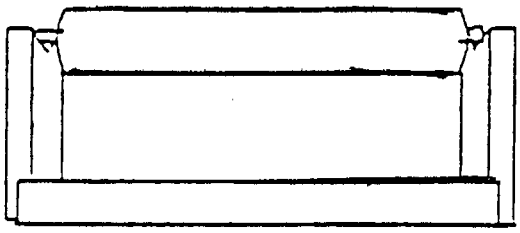


Figure 2 : Diagram of apparatus used to measure warpage with post in place.