Designation: E 907 – 96

An American National Standard

Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems[1]

This standard is issued under the fixed designation E 907; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of the resistance of adhered membrane roofing systems to uplift pressure. It applies to roof systems with or without rigid board insulation or base ply, which are either adhered or mechanically fastened, and fully adhered membranes.

1.2 This test method is intended to be used as a measure of the uplift resistance of the roofing system. Systems containing cold adhesive shall be in place for the cure time specified by the adhesive manufacturer to obtain optimum adhesion before conducting the test. Hot-applied systems shall be permitted to cool to normal prevailing surface temperatures before conducting the test.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 575 Practice for Reporting Data from Structural Tests of Building Constructions, Elements, Connections, and Assemblies[2]

3. Summary of Test Method

3.1 A controlled negative pressure is created on top of the roof surface by means of a chamber fitted with a pressure measuring device and vacuum equipment.

3.2 For roofs containing surfacing such as gravel, slag, or granules, the loose surfacing shall be removed by sweeping a 300 mm (12 in.) wide path around the perimeter of the test area. Care shall be taken not to damage the test area. A heavy pouring of hot asphalt is applied over the swept area and allowed to cool. This provides a smooth surface and allows the edges of the chamber to be in complete contact with the roof surface so that a negative pressure is developed inside the chamber. Other methods are not to be used to prepare the test area unless the method used will produce a tight seal and is compatible so as not to damage the roof membrane. Examples are the use of wet sand, duct tape, water, or polythene film.

4. Significance and Use

4.1 This field test method is suitable for determining the uplift resistance of the roofing system as stated in applicable specifications, bid documents, or when required by other authorities having jurisdiction. This field test method is also intended to supplement measurement of the uplift resistance performance of roofing systems as determined under laboratory conditions.

5. Apparatus

5.1 *Square Chamber*, 1500 ± 15 mm (60 ± ½ in.) in size, sufficiently strong to withstand the necessary negative pressure without collapsing.

NOTE 1—A manufactured dome shaped chamber of rigid clear polycarbonate shown in Fig. 1 has been successfully used. The dome consists of four equal segments for ease of transporting the unit to and from the job site. Rubber gaskets are used to seal the joints along the flanges. One segment of the dome has a hole to accommodate vacuum equipment and another segment has a hole for a flexible hose leading to a manometer (Fig. 2). The bottom flanges of the chamber are equipped with a flexible poly(vinyl chloride) foam strip to seal the chamber to the roof surface.

5.2 *Pressure-Sensing Device*, for measuring the negative pressure inside the chamber. The manometer shall be calibrated to indicate negative pressures in increments of 360 ± 20 Pa (7.5 ± 0.5 lbf/ft^2).

5.3 *Vacuum Equipment*, with sufficient capacity to create the negative pressures required in the test chamber (see 8.8). The chamber vacuum equipment shall also be equipped with controls to maintain the constant negative pressure at each test pressure increment as required in 8.8.

5.4 *Dial Indicator*, with a reset face graduated in at least 0.05 mm (0.002 in.) units and having at least a 50 mm (2 in.) range, mounted at the center of a 50 by 50 by 1500 mm (2 by 2 by 59 in.) long aluminum bar or member of equivalent

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[2] *1983 Annual Book of ASTM Standards*, Vol 04.11.

FIG. 1 View of Chamber over Roof Test Area During Test

stiffness. Feet on each end of the bar provide support and give a clear distance of 50 mm (2 in.) above the roof surface. This allows measurement of roof surface deflections in the test area (see Fig. 3).

5.4.1 All persons not involved in the test shall be kept far enough away from the test area to ensure that the dial gage indicator is not affected by movement and influence the readings.

6. Hazards

6.1 The manometer shall be designed to serve as a safety device to prevent negative pressures that will cause the plastic dome to shatter. The design of the manometer or safety features of other pressure sensing devices shall not be changed to increase negative pressures above the design or allowable values of the chamber.

6.2 Safety goggles or face shield shall be worn by persons operating the equipment or observing its operation as a precaution against injury caused by a sudden failure of the test chamber or roofing system.

7. Sampling

7.1 Perform testing in selected locations representative of the perimeter and interior areas of the roof.

7.2 Select the number of tests in accordance with Table 1.

8. Procedure

8.1 Measure and record air temperature with a thermometer, and roof surface temperature with a surface thermometer.

8.2 Conduct tests when the temperature of the roof surface is in the range from 4 to 38°C (40 to 100°F). Temperatures outside this range will produce questionable results. For safety considerations, tests shall not be conducted when the wind speed at the roof level is over 6.5 m/s (15 mph). When necessary to measure and record wind speed, a portable anemometer shall be used.

8.3 Place the bar with attached dial indicator so that the tip of the dial indicator is in contact with the roof membrane near the center of the test area.

8.4 Place the assembled chamber over the roof test area so that the deflection bar with attached dial indicator is centered within the chamber and is perpendicular to two sides of the chamber. The edges of the chamber shall be sealed to the roof surface. Orient the chamber on the roof so that the edges are parallel with the direction of the structural framing of the building.

8.5 Install the pressure measuring device. If a manometer is used, fill it with water to zero calibration level.

8.6 Connect the vacuum equipment to the hole provided for it in the chamber. Make sure that the bypass valve on the vacuum equipment is open before starting the equipment, or if a rheostat is used, that it is in the OFF position.

8.7 Continuously observe the deflection and pressure measuring device throughout the period that vacuum is created for sudden or variable rates of movement.

8.8 Regulate the negative pressure in the chamber to the specified level. Unless otherwise specified, conduct the test by raising the negative pressure in the chamber to 720 ± 20 Pa (15 lbf/ft^2) and holding this pressure for 1 min. Thereafter, raise the pressure in increments not greater than 360 ± 20 Pa (7.5 lbf/ft^2) until the agreed upon pressure is reached. Hold the pressure at each increment for 1 min. Terminate the test when