

Waterproof Membrane Quality Assurance Testing – (High Voltage) for Non-Conductive Deck or Conventional Roof Assembly with a Vapor Retarder No Overburden – No Surface Wiring

Part One - General

1.1 Description

- A. Work to include: Attach direct current electronic testing system that creates a voltage potential difference between the roof membrane surface and the conductive structural deck (i.e. – concrete, metal). Complete testing by sweeping the testing equipment over all membrane surfaces to locate breaches.
- B. Related Sections: Work contained elsewhere that applies to testing.
 - 1. Scope of Work
 - 2. Roofing or Waterproofing Membrane Section (Div. 7)
 - 3. Vegetated Roof Section

1.2 References

- A. ASTM D 7877-14 – Standard Guide for Electronic Methods of Detecting and Locating Leaks in Waterproofing Membranes.

1.3 Submittals

- A. Test procedure description.
- B. Product Data Sheets for materials permanently installed to provide specified leak detection system.
 - 1. Surface perimeter wire
 - 2. Conductive media wire grid
- C. Proposed perimeter and isolation wiring layout.

1. Proposed segmentation of roofing/waterproofing area into individual test grids.
2. Locate perimeter wire lead location for each grid within test area
3. As built grid plan as needed

D. Final report shall be provided, including

1. Digital roof plan
2. Breach photographs
3. Plotted breaches when repairs are not completed same day of testing
4. Verification of breach repairs
5. Location of any permanent components installed on roof such as surface wiring and conductive media surface penetrations.

1.4 Quality Assurance

- A. Testing agency shall have a minimum of 10 years experience of testing
- B. Testing agency shall examine all surfaces to be tested. Testing agency shall notify roofing/waterproofing contractor of any and all conditions in which in his opinion, will affect satisfactory execution of the testing.
- C. Tested area should be protected from construction traffic as soon as possible after test is completed.
- D. Testing company shall complete and submit a final report. (see submittal 1.3.D)
- E. Pre-construction conference – site or phone conference
 1. Coordinate meeting with general contractor, roofer/waterproofer, testing agency, landscaper, architect,

owner's representative and other trades whose work interfaces with the roof/waterproofing application.

2. Verify project requirements
3. Discuss test procedures, needs to complete testing and coordination
4. Discuss site conditions
5. Discuss post testing protection of membrane

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Part Two - Products

2.0 Membrane Quality Assurance Testing Agency

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2.1 Provide products that are accepted by the membrane manufacturer and are fully compatible with the indicated substrate and other components.

2.2 System Description

A. Work to include: Attach direct current electronic testing system that creates a voltage potential difference between the roof membrane surface and the conductive structural deck (ie. – concrete, metal). Complete testing by sweeping the testing equipment over all membrane surfaces to locate breaches.

B. Conductive Media: Conductive media shall be installed within the membrane assembly to provide a conductive field beneath the membrane.

2.3 Materials

A. Conductive Media: Conductive media shall be installed within the membrane assembly.

1. Conductive media shall have two charging locations per roof area on small areas and/or one charging area per 15,000 SF.
2. Conductive media shall be 0.016 in. in diameter, 3.04 stainless steel wire mesh with $\frac{3}{4}$ " cells.
3. Charging connection shall be insulated copper wire secured to conductive mesh. Copper wire shall be accessed to roof through $\frac{1}{2}$ " PVC conduit with a Lock-tight waterproof box or behind base flashings. (See 2 details)

B. Conductive wire used to deliver electronic charge around perimeter of all areas being tested and to isolate grounds (i.e. drains, railings).

1. Composite poly-wire has 9 strands of 0.07-inch stainless steel wire interwoven into braided polyethylene strands.
2. Tapes and sealants used to secure conductive wire to membrane assembly surface shall be compatible with membrane manufacturer's membrane.

C. Conductive Media: Stainless steel mesh located within the roof assembly.

1. This mesh acts to create a conductive substrate.
2. Conductive media shall be 0.016 inches in diameter, 304 stainless steel wire mesh with $\frac{3}{4}$ " cells.

D. Conductive media activation wire: #14 Copper Strand Wire.

1. This wire acts as a lead from the testing equipment to the conductive media.

E. 2 ½" Cold Weather Foil Tape

1. Used to secure activation wire to the conductive media.
2. Used to temporarily hold adjacent conductive media rolls in place until insulation or cover-board are installed.

F. Watertight access box: Liquid-tight PVC box and cover plate.

1. Provides a watertight seal for the activation wire.

Part Three - Execution

3.1 Testing

A. Verify membrane assembly and visually examine area to be tested.

1. Materials, debris and equipment must have been removed the prior afternoon from area to be tested.
2. Grounds must be located for creating an electronic charge in the structural deck.

B. Conductive mesh installation

1. Mesh can be located at a number of places within the assembly.
 - a. Directly over non-conductive deck, beneath insulation.
 - b. Between vapor barrier and insulation.
 - c. Between insulation layers.
 - d. Between insulation and cover-board.
 - e. Application directly beneath membrane requires membrane manufacturer's approval.
2. Roll-out conductive mesh
 - a. Provide 2" side and end laps
 - b. Keep conductive mesh 4" from metal/conductive penetrations (i.e. conduit, vent pipes, pre-fab curbs)
 - c. Keep conductive mesh 6" from drain bodies.
 - d. Keep conductive mesh within 4" of perimeter.
 - e. Temporarily hold conductive mesh in place with duct tape, foil tape or staples.

- f. Secure adjacent rolls of conductive mesh with 3-4" strips of aluminum tape spaced 10-12' O.C. or duct tape applied to length of the side laps to prevent displacement.
1. Provide access points to put electrical charge in conductive media
 - a. Attach #14 insulated copper wire to conductive media by stripping 1" of insulation from copper wire and wrapping and taping it to the media cells, using aluminum tape.
 - b. Run insulated wire to access point above the membrane surface. (see two detail options attached)
- C. Turn on equipment and verify ground lead is activating structural deck.
- D. Testing
1. Area tested must be dry.
 2. Identify membrane breaches, mark number and plot location. Photograph breaches for documentation.
 3. After breaches have been repaired, complete confirmation testing to assure repair is watertight.
- E. Prepare and submit report.
- F. Post Test Membrane Protection
1. Protect membrane from storage of materials and construction activities after testing is completed.
 2. Re-test membrane if it has not been protected in a satisfactory manner.
- G. We recommend you contact the membrane manufacturer for recommendations to protect the membrane. Methods to consider;
1. On a daily basis general contractor has a laborer sweep roof surfaces not limited to debris, fasteners and/or concrete

chips.

2. Thoroughly sweep all debris, fasteners and/or concrete chips from the roof surface and lay down 4' x 8' sheets of plywood.
3. Thoroughly sweep all debris, fasteners and/or concrete chips from roof surfaces, lay down ½", .75 lb density, expanded polystyrene insulation and cover with 4' x 8' sheets of plywood.

Memo: The specification is the way to have something enforceable. It is not enough to simply state that the membrane be protected. It is not happening.

Memo: If a vegetated roof is to be installed you may want to install surface wiring around the perimeter and at grounds (drains) before the overburden is installed. This wiring can reduce the discovery area in the event of a future leak.

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