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Standard Guide for Use of Drainage System Media with Waterproofing Systems[1]

This standard is issued under the fixed designation D7492/D7492M; 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 guide makes recommendations for the selection and application of prefabricated drainage media used in conjunction with waterproofing systems on horizontal and vertical surfaces. Drainage media considered include rigid and semi-rigid insulation boards and rigid materials including plastics. This guide considers drainage media as it relates to the performance of the waterproofing system, so its primary focus is draining water away from the membrane. This guide does not cover in detail other aspects or functions of drainage system performance such as efficiency of soil dewatering. The scope of this guide does not cover other drainage media including gravel and filter fabric systems that can be constructed. The scope of this guide does not cover drainage materials or drainage system designs used for vegetative roof systems. Vegetative roof systems require specialized designs.

1.2 The committee with jurisdiction over this standard is not aware of any other comparable standards published by other organizations.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.4 This standard may involve hazardous materials, operations and equipment. *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C165 Test Method for Measuring Compressive Properties of Thermal Insulations

C898/C898M Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Separate Wearing Course

C981 Guide for Design of Built-Up Bituminous Membrane Waterproofing Systems for Building Decks

C1471/C1471M Guide for the Use of High Solids Content Cold Liquid-Applied Elastomeric Waterproofing Membrane on Vertical Surfaces

D896 Practice for Resistance of Adhesive Bonds to Chemical Reagents

D1079 Terminology Relating to Roofing and Waterproofing

D2434 Test Methods for Measurement of Hydraulic Conductivity of Coarse-Grained Soils

D3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

D3385 Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer

D4511 Test Method for Hydraulic Conductivity of Essentially Saturated Peat

D4630 Test Method for Determining Transmissivity and Storage Coefficient of Low-Permeability Rocks by In Situ Measurements Using the Constant Head Injection Test

D4716/D4716M Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head

D5898/D5898M Guide for Standard Details for Adhered Sheet Waterproofing

D6622/D6622M Guide for Application of Fully Adhered Hot-Applied Reinforced Waterproofing Systems

E154/E154M Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

[1] This guide is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.22 on Waterproofing and Dampproofing Systems.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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3. Terminology

3.1 Refer to Terminology D1079 for definitions of terms used in this guide.

4. Summary of Practice

4.1 This guide describes a method to estimate the amount of water a drainage system may need to carry. The guide also offers descriptions of the various drainage systems in existence today along with suggestions on how different building situations will require different performance characteristics from the drainage medium chosen. Items to be aware of during the installation of drainage systems are also covered along with illustrations of typical drainage systems.

5. Significance and Use

5.1 This guide provides information and guidelines for the selection and installation of drainage systems media that are in conjunction with waterproofing systems. This guide is intended to be used in conjunction with Guides C898/C898M, C981, C1471/C1471M, D5898/D5898M, and D6622/D6622M and to provide guidelines for the total waterproofing and drainage system.

6. General

6.1 In selecting a drainage medium for use with waterproofing, consideration should be given to the design of the waterproofing system. In particular orientation of the system, attachment recommendations, connections to interior and exterior drainage systems, and external loads applied to the system. Additional considerations include the materials and construction over the drainage medium, installation recommendations, durability, and penetrations and joints. (See Figs. 1-3.) In all designs, the potential slip planes should be considered.

6.2 *Compatibility*—It is essential that all components and contiguous elements of the waterproofing system are compatible and that the design of the system's waterproofing and drainage is coordinated to form an integrated waterproofing system.

6.3 *Basic Components*—The various types of drainage media available are outlined in Section 12 of this guide and all consist of one or more of the following basic components. The basic components of typical drainage medium are a mounting surface that is placed against the waterproofing membrane to prevent embedment of the media, a porous core that provides a drainage path, and a filter surface, often a fabric bonded over the porous core to prevent clogging of the drainage paths. Fibrous and foam drainage media are homogeneous materials that are sufficiently dense that they can be placed directly against the waterproofing membrane. However, fibrous and foam media may not function properly in horizontal or nearly horizontal (<30°) orientations. Other foam boards merely provide periodic grooves creating paths to drain water away from the waterproofed surface. Where appropriate, a protection board should be installed between the waterproofing and drainage media to reduce embedment of drainage media into the waterproofing.

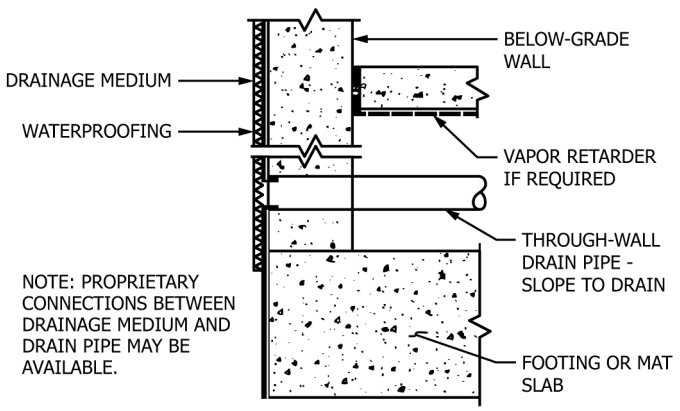

FIG. 1 Drainage at Lot Line Below-Grade Wall

6.4 The drainage media selection should include a consideration of the forces that will be placed on it, such as backfill pressure, gravity loads, and shear loads both initially and over the expected useful life of the assembly.

6.5 The construction of drainage media should be considered relative to the strength and protection of the waterproofing membrane. The bearing surface of drainage media should place no sharp edges against the waterproofing membrane, which could puncture, abrade the membrane, or imprint itself in the membrane. The filter fabric and its bond to the drainage medium core should resist impact, compressive, and shear loads imposed by backfilling and compaction, and temporary and permanent construction loads.

6.6 The drainage media should always be placed next to the waterproofing. This location minimizes the hydrostatic head on top of the waterproofing. If insulation is required the insulation shall be specified to handle the environment that is present outside the drainage media and waterproofing membrane. If the insulation is porous, the drainage media must allow the porous insulation to drain any water accumulated during construction or during its service on the wall into either the drainage media or the footing drain tile system. A non-porous insulation is any insulation with closed cells that prevent water from flowing in or out, for example extruded polystyrene foam or polystyrene foam bead boards. A porous insulation is any insulation that has open channels that easily allow water to enter and leave the insulation such as rigid fiberglass boards with a perm rating of 4.6 Darcy (k, mm/s) or more (see X1.1.3).

7. Drainage Capacity

7.1 *General*—The drainage capacity is the volume of water that passes through drainage media in a specified direction under a known hydraulic gradient. The two major drainage capacities of interest are the in-plane and through-the-face drainage capacities. The orientation of the media and any slope of the substrate will have a major effect on the drainage capacity.

7.1.1 *Through-the-Face Drainage*—Through-the-face drainage is the flow or seepage of water perpendicular to the longitudinal axis of the drainage media. When media are installed in a horizontal orientation, through-the-face drainage