

DEPARTMENT OF COMMERCE

BUREAU OF STANDARDS

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UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR  
INTEGRAL WATERPROOFING MATERIAL, WATER-REPEL-  
LENT TYPE (FOR USE WITH PORTLAND CEMENT MOR-  
TAR OR CONCRETE)

FEDERAL SPECIFICATIONS BOARD SPECIFICATION No. 444

This specification was officially promulgated by the Federal Specifications Board October 28, 1926, for the use of the departments and independent establishments of the Government in the purchase of integral waterproofing material, water-repellent type (for use with Portland cement mortar or concrete).

[The latest date on which the technical requirements of this specification shall become mandatory for all departments and independent establishments of the Government is January 28, 1927. They may be put into effect, however, at any earlier date, after promulgation]

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I. GENERAL SPECIFICATIONS

There are no general specifications applicable to this specification.

II. TYPES

The materials covered by this specification are intended to be mixed with Portland cement mortar or concrete for the purpose of rendering them more completely impermeable and water repellent.

### III. MATERIALS AND WORKMANSHIP

The materials shall be stable compounds not subject to disintegration either before or after incorporation with the mortar or concrete with which they are intended to be used.

### IV. GENERAL REQUIREMENTS

1. The material shall either mix readily with water or with dry Portland cement, and shall become an insoluble integral part of the mortar or concrete.

2. The material when mixed with Portland-cement mortar or concrete shall render such mortar or concrete more completely impervious to water and shall not impair their durability or reduce the compressive strength more than 10 per cent.

### V. DETAIL REQUIREMENTS

The waterproofing properties shall be such that when combined in the manner, and in the proportions of waterproofing material to cement, specified by the manufacturers for use with Portland-cement mortar and concrete, and tested as herein specified, the treated test pieces shall show an absorption of not more than 3 per cent and shall reduce the permeability (when tested under a pressure of 100 pounds) at least 95 per cent of test pieces made without the admixture of waterproofing materials, but in all other respects of identical materials, composition, and age.

### VI. INSPECTION, SAMPLING, AND TESTS

1. Test samples may be taken before shipment or after delivery at the discretion of the inspector. Representative samples shall be taken for at least every 500 pounds or 100 gallons of material. The samples when practicable shall be placed in a single container and sent to the laboratory as a composite sample representative of the lot under consideration.

2. The appearance and chemical composition of the composite sample shall be recorded for comparison with those of samples from other shipments of materials of the same brand and make.

3. The following tests shall be made for absorption, permeability, and compression.

4. Mortar for tests of waterproofing materials shall be made from Portland cement, and sand passing a No. 20 sieve and held on a No. 50 sieve, in the proportion of 1 volume of cement to 4 volumes of sand, with only sufficient water thoroughly worked to form a mixture which has a flow of 90 as measured by a cement laboratory flow table.

All materials shall be mixed at and the test pieces be stored in a temperature of approximately 70° F.

5. The waterproofing materials shall be incorporated in accordance with the methods, and in the proportions to the amount of cement, as specified by the manufacturers in their standard directions for the use of their materials.

6. Test pieces shall be made at the same time and under the same conditions, of both treated and untreated mortar. The permeability test pieces shall be made in the form of 1-inch thick disks in metal molds. The absorption test pieces shall be made in the form of 2-inch cubes in metal molds. The molds shall be removed after 24 hours.

7. The exposed surfaces of test pieces at the time of molding shall be struck off with a trowel, and 24 hours after molding all surfaces of the cubes and both faces of the disks shall be brushed with a wire brush to remove any neat cement brought to the surface in molding.

8. The test pieces shall be kept in a moist closet for 24 hours after molding, then be stored in a damp atmosphere for six days, after which period in the air of the laboratory.

9. The tests shall be made when test pieces have aged 28 and 90 days. In each test each of the treated and untreated pieces shall be tested under identical conditions.

10. Pieces for the absorption tests shall be dried at 212 to 230° F. until no further loss in weight is shown. They shall then be allowed to cool in the air to room temperature. The pieces shall be completely immersed in water for 24 hours, then be removed, the surfaces dried with a cloth, and weighed immediately. This process shall be repeated daily until the pieces show less than one-tenth of 1 per cent daily increase in weight. The increased weight of the treated and the untreated pieces shall then be compared.

11. The impermeability tests shall be made by subjecting one side of the test pieces to a water pressure of 100 pounds per square inch, using water free from any visible discoloration or matter in suspension. The test shall be continued 24 hours unless a measurable degree of permeability is shown in less time.

12. The degree of permeability shall be calculated in cubic centimeters of water passing through the piece per square centimeter of surface exposed to water pressure. The impermeability of the treated and the untreated piece shall be then compared.

13. Compression tests shall be made of cubes that have been subjected to absorption tests. The cubes shall be tested to complete failure. The resistance to compression of the treated and the untreated pieces shall then be compared.

### VII. PACKING AND MARKING

Materials for integral waterproofing shall be packed in suitable containers that will preserve the materials in good condition. Each package shall be marked with the net weight or net liquid measure of the contents, and with the brand or trade name of the contents and the name of the manufacturer. Each order of the material shall be accompanied by printed directions for its use.

### VIII. NOTES

1. The integral waterproofing materials should be mixed with the mortar or concrete with which it is to be used in accordance with the printed directions of the manufacturer.

2. Treated mortar and concrete should be made with not more than 2 volumes of fine, nor more than 4 volumes of coarse aggregate to each volume of cement. The aggregate should be so graded in size as to produce a mixture of maximum density. Only such a quantity of water should be used as necessary to make the completely mixed product sufficiently plastic for properly placing and finishing.

3. In addition to various makes of integral waterproofing of the water-repellent type there are in the market brands of Portland cement with which a waterproofing material has been combined in its manufacture.

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