
Standard Specification for Blended Hydraulic Cement

AASHTO Designation: M 240M/M 240-21¹

Technically Revised: 2021

Editorially Revised: 2021

Technical Subcommittee: 3a, Hydraulic Cement and Lime

ASTM Designation: C595/C595M-21



**American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, DC 20004**

[This is a preview. Click here to purchase the full publication.](#)

Standard Specification for

Blended Hydraulic Cement

AASHTO Designation: M 240M/M 240-21¹

AASHTO

Technically Revised: 2021

Editorially Revised: 2021

Technical Subcommittee: 3a, Hydraulic Cement and Lime

ASTM Designation: C595/C595M-21

1. SCOPE

1.1. This specification pertains to blended hydraulic cements for both general and special applications using slag, pozzolan, limestone, or some combination thereof, with portland cement or portland cement clinker, or slag with lime (see Note 1).

Note 1—This specification prescribes ingredients and proportions with some performance requirements, whereas ASTM C1157/C1157M is a hydraulic cement specification in which performance criteria alone govern the products and their acceptance.

1.2. 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. Values in SI units [or inch-pound units] shall be obtained by measurement in SI units [or inch-pound units] or by appropriate conversion, using the Rules for Conversion and Rounding given in IEEE/ASTM SI 10, of measurements made in other units [or SI units]. Values are stated in only SI units when inch-pound units are not used in practice.

1.3. The text of this standard refers to notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) are not requirements of the standard.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards:*

- M 85, Portland Cement
- M 201, Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- M 327, Processing Additions for Use in the Manufacture of Hydraulic Cements
- R 71, Sampling and Amount of Testing of Hydraulic Cement
- R 80, Determining the Reactivity of Concrete Aggregates and Selecting Appropriate Measures for Preventing Deleterious Expansion in New Concrete Construction
- T 105, Chemical Analysis of Hydraulic Cement
- T 106M/T 106, Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)
- T 107M/T 107, Autoclave Expansion of Hydraulic Cement
- T 129, Amount of Water Required for Normal Consistency of Hydraulic Cement Paste
- T 131, Time of Setting of Hydraulic Cement by Vicat Needle
- T 133, Density of Hydraulic Cement

- T 137, Air Content of Hydraulic Cement Mortar
- T 153, Fineness of Hydraulic Cement by Air Permeability Apparatus
- T 192, Fineness of Hydraulic Cement by the 45- μ m (No. 325) Sieve

2.2. *ASTM Standards:*

- C51, Standard Terminology Relating to Lime and Limestone (as used by the Industry)
- C219, Standard Terminology Relating to Hydraulic and Other Inorganic Cements
- C226, Standard Specification for Air-Entraining Additions for Use in the Manufacture of Air-Entraining Hydraulic Cement
- C311/C311M, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
- C563, Standard Guide for Approximation of Optimum SO₃ in Hydraulic Cement
- C688, Standard Specification for Functional Additions for Use in Hydraulic Cements
- C821, Standard Specification for Lime for Use with Pozzolans
- C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution
- C1038/C1038M, Standard Test Method for Expansion of Hydraulic Cement Mortar Bars Stored in Water
- C1157/C1157M, Standard Performance Specification for Hydraulic Cement
- C1702, Standard Test Method for Measurement of Heat of Hydration of Hydraulic Cementitious Materials Using Isothermal Conduction Calorimetry
- C1891, Standard Test Method for Fineness of Hydraulic Cement by Air Jet Sieving at 45- μ m (No. 325)
- *Manual of Cement Testing, Annual Book of ASTM Standards, Volume 04.01*

2.3. *IEEE/ASTM Standard:*

- SI10, American National Standard for Metric Practice

3. TERMINOLOGY

3.1. *Definitions*—The terms used in this specification are defined in ASTM C219 (see Note 2), except for the following terms:

- 3.1.1. *binary blended cement*—a blended hydraulic cement consisting of portland cement with either a slag, a pozzolan, or a limestone.
- 3.1.2. *slag, n*—the term “slag” is used within this standard to denote either slag cement or granulated blast-furnace slag.
- 3.1.3. *ternary blended cement*—a blended hydraulic cement consisting of portland cement with either a combination of two different pozzolans, slag and a pozzolan, a pozzolan and a limestone, or a slag and a limestone.

Note 2—Relevant terms in ASTM C219 applicable to this standard include portland cement, portland cement clinker, hydraulic cement, slag cement, granulated blast-furnace slag, pozzolan, and calcium sulfate. Limestone is defined in ASTM C51.

4. CLASSIFICATION

4.1. This specification applies to the following types of blended cement that generally are intended for use as directed.

- 4.1.1. *Blended hydraulic cements for general concrete construction.*
- 4.1.1.1. *Type IS*—Portland blast-furnace slag cement.
- 4.1.1.2. *Type IP*—Portland-pozzolan cement.
- 4.1.1.3. *Type IL*—Portland-limestone cement.
- 4.1.1.4. *Type IT*—Ternary blended cement.
- 4.2. *Reporting:*
- 4.2.1. The naming practice for blended cements shall be made by adding the suffix (X) to the type designation under Section 4.1.1, where (X) equals the targeted percentage of slag, pozzolan, or limestone in the product expressed as a whole number by mass of the final blended product, within the allowable variation as stated in Section 15.3.
- 4.2.2. The naming practice for ternary blended cements shall be made by adding the suffixes (AX) and (BY) to the Type IT designation under Section 4.1.1, where:
- 4.2.2.1. A is “S” for slag, “P” for pozzolan, or “L” for limestone, whichever is present in a larger amount by mass;
- 4.2.2.2. X is the targeted percentage by mass of constituent A;
- 4.2.2.3. B is “S” for slag, “P” for pozzolan, or “L” for limestone; and
- 4.2.2.4. Y is the targeted percentage by mass of constituent B.
- 4.2.2.5. Both X and Y values are expressed as a whole number by mass of the final blended product, within the allowable variation as stated in Section 15.3. If X and Y are the same, list the two constituents in alphabetical order by constituent type (limestone, pozzolan, or slag).
- Note 3**—Examples of the naming practice per Sections 4.2.1 and 4.3 are shown below (all percentages by mass):
- Binary blended cement with 80 percent portland cement and 20 percent slag = Type IS(20);
 - Binary blended cement with 85 percent portland cement and 15 percent pozzolan = Type IP(15);
 - Binary blended cement with 90 percent portland cement and 10 percent limestone = Type IL(10).
 - Ternary blended cement with 70 percent portland cement, 20 percent slag, and 10 percent pozzolan = Type IT(S20)(P10);
 - Ternary blended cement with 65 percent portland cement, 25 percent of one pozzolan, and 10 percent of another pozzolan = Type IT(P25)(P10);
 - Ternary blended cement with 60 percent portland cement, 20 percent slag, and 20 percent pozzolan = Type IT(P20)(S20);
 - Ternary blended cement with 80 percent portland cement, 10 percent limestone, and 10 percent pozzolan = Type IT(L10)(P10); and
 - Ternary blended cement with 75 percent portland cement, 15 percent slag, and 10 percent limestone = Type IT(S15)(L10).
- 4.2.3. A simplified naming practice is used in this standard for practicality and clarity when referring to specific requirements for binary and ternary blended cements that are applicable to a range of