October 2022 ERRATA for *Standard Specifications for Transportation Materials and Methods of Sampling and Testing and Provisional Standards,* 42nd Edition (HM-42)

October 2022

Dear Customer:

AASHTO has issued an erratum, which includes technical changes, for the *Standard Specifications for Transportation Materials and Methods of Sampling and Testing and AASHTO Provisional Standards,* 42nd Edition (HM-42). Attached please find the full errata listing of changes and a set of replacement pages.

The current and previous corrections are detailed in a table just after this letter and are displayed on the affected pages as follows:

Gray Box in Page Header	Corrected Text Format
October 2022 Errata	*Italicized*
August 2022b Errata	Underlined
August 2022 Errata	**Bold**

Please feel free to download additional copies of this erratum from the AASHTO online Store at:

https://downloads.transportation.org/HM-42-Errata.pdf

AASHTO staff sincerely apologizes for any inconvenience.

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List of Errata for *Standard Specifications for Transportation Materials and Methods of Sampling and Testing and Provisional Standards*, 42nd Edition (HM-42)

Original Page	Section	Existing Text	Corrected Text
October 2022			
M 103M/ M 103	ASTM Designation	A27/A27M-17	A27/A27M-20
M 181	Section 15.1.1	*Adhesion Test*—Class A, extruded and bonded, must conform to the requirements of Section 15.2.1. Class B, bonded, must conform to the requirements of Section 15.2.2. Class A, extruded, is not subject to adhesion test.	*Adhesion Test*—Class A, extruded and bonded, must conform to the requirements of Section 15.1.1.1. Class B, bonded, must conform to the requirements of Section 15.1.1.2. Class A, extruded, is not subject to adhesion test.
	Section 15.1.2.1	The wire fails to withstand the mandrel bend test described in Section 15.4.	The wire fails to withstand the mandrel bend test described in Section 15.1.3.
R 51	Section 5.3.1	Filter sock netting materials are also available in biodegradable plastics for areas where removal and disposal are not planned.	Filter sock netting materials are also available in natural biodegradable materials (e.g., cotton, wood fiber) for areas where removal and disposal are not planned.
August 2022b			
All Parts, xv	List of Technical Changes, M 85	Revised to remove T 107 reference.	Revised to remove T 107 reference for harmonization with ASTM C150/C150M-22.
All Parts, xvii	List of Technical Changes, M 302	Revised as follows: [bulleted list]	Revised as follows for harmonization with ASTM C989/C989M-22: [bulleted list]
All Parts, xviii	List of Technical Changes, M 327	Revised to remove flexural strength requirement.	Revised to remove flexural strength requirement for harmonization with ASTM C465-22.
Part 1, cxlii	Table of Contents, Numerical	M 190-04 (2022)	M 190-22
		M 243-96 (2021)	M 243-22
Part 1, cxliii	Table of Contents, Numerical	M 246-15 (2019)	M 246-22
		M 278-15 (2019)	M 278-22
Part 1, cxliv	Table of Contents, Numerical	M 323-17 (2021)	M 323-22

List of Errata for *Standard Specifications for Transportation Materials and Methods of Sampling and Testing and Provisional Standards*, 42nd Edition (HM-42)

Original Page	Section	Existing Text	Corrected Text
Part 1, cxlvi	Table of Contents, Numerical	R 78-16 (2020)	R 78-22
Part 1, cxlviii	Table of Contents, Subject	M 323-17 (2021)	M 323-22
Part 1, cxlix	Table of Contents, Subject	R 78-16 (2020)	R 78-22
Part 1, cl	Table of Contents, Subject	M 190-04 (2022)	M 190-22
		M 243-96 (2021)	M 243-22
		M 246-15 (2019)	M 246-22
		M 278-15 (2019)	M 278-22
Part 2, cxlv	Table of Contents, Numerical	T 341-10 (2019)	T 341-22
Part 2, cl	Table of Contents, Subject	T 341-10 (2019)	T 341-22
Part 3, cxli and cxlv	Table of Contents	MP 42-20	MP 42-22
M 85-1 and M 85-15	ASTM Designation	ASTM C150/C150M-20	ASTM C150/C150M-22
M 86M/ M 86-1	Header	Change bar missing from AASHTO Designation and line after	Change bar added.
M 240M/ M 240-1	ASTM Designation	ASTM C595/C595M-20	ASTM C595/C595M-21[1]
M 302-1	ASTM Designation	ASTM C989/C989M-18	ASTM C989/C989M-22
M 327-1	ASTM Designation	ASTM C465-19	ASTM C465-22
T 397-46	T 397, Appendix X6	Figure X6.4 did not render correctly.	Figure X6.4 has been replaced.

List of Errata for *Standard Specifications for Transportation Materials and Methods of Sampling and Testing and Provisional Standards*, 42nd Edition (HM-42)

Original Page	Section	Existing Text	Corrected Text
August 2022			
xxxix	List of Technical Changes	The Balloted Revisions column describes PP 114 as a "New provisional recommended practice."	The Balloted Revisions column describes PP 114 as a "New provisional **standard** practice."

[1] In addition, please note that the **41st Edition (HM-41)** List of Technical Changes listed the revisions but not harmonization information for M 240M/M 240. The bulleted list in that edition should be preceded by the following:

> Revised as follows for harmonization with ASTM C595/C595M-21

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LIST OF TECHNICAL CHANGES—PART 1

The balloted technical changes listed below are also indicated in the specifications by a change bar in the left margin. Unballoted editorial changes do not receive the change bar; however, the subheader line below the designation number will indicate if the standard has been editorially revised.

Release: July 2022

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
M 6-13 (2022)	Fine Aggregate for Hydraulic Cement Concrete	1c	Reconfirmed for 2022 publication.
M 31M/M 31-22	Deformed and Plain Carbon and Low-Alloy Steel Bars for Concrete Reinforcement	4f	Revised as follows: • Updated for equivalency with ASTM A625/A615M-20. • Corrected editorial error in Table 1.
M 33M/M 33-22	Preformed Expansion Joint Filler for Concrete (Bituminous Type)	4e	Revised to update temperature-measuring devices.
M 43-05 (2022)	Sizes of Aggregate for Road and Bridge Construction	1c	Reconfirmed for 2022 publication.
M 54M/M 54-22	Welded Deformed Steel Bar Mats for Concrete Reinforcement	4f	Revised for equivalency with ASTM A184/A184M-19.
M 85-22	Portland Cement	3a	Revised to remove T 107 reference for harmonization with ASTM C150/C150M-22.
M 86M/M 86-22	Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe	4a	Revised to update temperature-measuring devices.
M 102M/M 102-22	Steel Forgings, Carbon and Alloy, for General Industrial Use	4f	Revised for equivalency with ASTM A668/A668M-20a.
M 103M/M 103-19	Steel Castings, Carbon, for General Application	4f	Editorial revisions to Tables 1 and 2.
M 105-09 (2022)	Gray Iron Castings	4f	Reconfirmed for 2022 publication.
M 143-14 (2022)	Sodium Chloride	4c	Reconfirmed for 2022 publication.
M 144-14 (2022)	Calcium Chloride	4c	Reconfirmed for 2022 publication.
M 152M/M 152-22	Flow Table for Use in Tests of Hydraulic Cement	3a	Revised for equivalency with ASTM C230/C230M-21.
M 163M/M 163-22	Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application	4f	Revised for equivalency with ASTM A743/A743M-21.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
M 170-22	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe	4a	Revised to update temperature-measuring devices.
M 170M-22	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe [Metric]	4a	Revised to update temperature-measuring devices.
M 190-22	Asphalt-Coated Corrugated Metal Culvert Pipe and Pipe-Arches	4b	Revised to update temperature-measuring devices.
M 195-22	Lightweight Aggregates for Structural Concrete	1c	Revised to update temperature-measuring devices.
M 199M/M 199-22	Precast Reinforced Concrete Manhole Sections	4a	Revised as follows: • Updated for equivalency with ASTM C478M-19a and C478-20a. • Updated temperature-measuring devices.
M 206M/M 206-22	Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe	4a	Revised to update temperature-measuring devices.
M 207M/M 207-22	Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe	4a	Revised to update temperature-measuring devices.
M 208-18 (2022)	Cationic Emulsified Asphalt	2a	Reconfirmed for 2022 publication.
M 213-22	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)	4e	Revised to update temperature-measuring devices.
M 216-22	Quicklime and Hydrated Lime for Soil Stabilization	3a	Revised to update temperature-measuring devices.
M 224-22	Use of Protective Sealers for Portland Cement Concrete	4c	Revised to update temperature-measuring devices.
M 235M/M 235-22	Epoxy Resin Adhesives	4c	Revised for equivalency with ASTM C881/C881M-20a.
M 243-22	Field-Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches	4b	Revised to update temperature-measuring devices.
M 246-22	Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe	4b	Revised to update temperature-measuring devices.
M 247-13 (2022)	Glass Beads Used in Pavement Markings	4c	Reconfirmed for 2022 publication.
M 251M/M 251-22	Plain and Laminated Elastomeric Bridge Bearings	4e	Revised as follows: • Revised to harmonize with relevant provisions in the AASHTO LRFD Bridge Design Specifications. • Updated temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
M 259-22	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD	4a	Revised as follows: • Title change. • Incorporated LRFD changes from 2019. • Updated temperature-measuring devices.
M 261-22	Rib-Tread Standard Tire for Special-Purpose Pavement Frictional-Property Tests	5a	Revised to update temperature-measuring devices.
M 268-22	Retroreflective Sheeting for Flat and Vertical Traffic Control Applications	4d	Revised to update temperature-measuring devices.
M 269-96 (2022)	Turnbuckles and Shackles	4d	Reconfirmed for 2022 publication.
M 273-22	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 ft of Cover Subjected to Highway Loadings	4a	Revised to update temperature-measuring devices.
M 278-22	Class PS46 Poly(Vinyl Chloride) (PVC) Pipe	4b	Revised to update temperature-measuring devices.
M 279-14 (2022)	Metallic-Coated, Steel Woven Wire Fence Fabric		Reconfirmed for 2022 publication.
M 280-22	Metallic-Coated (Carbon) Steel Barbed Wire	4d	Revised for equivalency with ASTM A121-19.
M 281-22	Steel Fence Posts and Assemblies, Hot-Wrought	4d	Revised for equivalency with ASTM A702-13(2018).
M 285M/M 285-22	Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service	4f	Revised for equivalency with ASTM A744/A744M-21.
M 286-22	Smooth-Tread Standard Tire for Special-Purpose Pavement Frictional-Property Tests	5a	Revised to update temperature-measuring devices.
M 288-22	Geosynthetic Specification for Highway Applications	4g	Revised to update temperature-measuring devices.
M 292M/M 292-22	Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both	4f	Revised for equivalency with ASTM A194/A194M-20a.
M 300-22	Inorganic Zinc-Rich Primer	4c	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
M 302-22	Slag Cement for Use in Concrete and Mortars	3a	Revised as follows for harmonization with ASTM C989/ C989M-22: • Updated for equivalency with ASTM C989/C989M-18a. • Changed "slag" to "slag cement" in several places. • Rewrote Appendix X2.
M 307-22	Silica Fume Used in Cementitious Mixtures	3a	Revised as follows: • Updated for equivalency with ASTM C1240-20. • Updated temperature-measuring devices.
M 314-90 (2022)	Steel Anchor Bolts	4f	Reconfirmed for 2022 publication.
M 316-18 (2022)	Polymer-Modified Emulsified Asphalt	2a	Reconfirmed for 2022 publication.
M 320-22	Performance-Graded Asphalt Binder	2b	Revised as follows: • Minor language updates throughout. • Updated Tables 1 and 2. • New Note 4.
M 322M/M 322-22	Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement	4f	Revised for equivalency with ASTM A996/A996-16.
M 323-22	Superpave Volumetric Mix Design	2d	Revised extensively across multiple Sections.
M 326-18 (2022)	Polyethylene (PE) Liner Pipe, 300- to 1600-mm Diameter, Based on Controlled Outside Diameter	4b	Reconfirmed for 2022 publication.
M 327-22	Processing Additions for Use in the Manufacture of Hydraulic Cements	3a	Revised to remove flexural strength requirement for harmonization with ASTM C465-22.
M 328-14 (2022)	Inertial Profiler	5a	Reconfirmed for 2022 publication.
M 332-22	Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test	2b	Revised as follows: • Minor language updates regarding LTPPBind throughout. • Updated Tables 1 and 2. • New Section 4.2.5.
M 339M/M 339-22	Thermometers Used in the Testing of Construction Materials	5c	New standard specification.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
M 340-22	Materials for Emulsified Asphalt Chip Seals	5b	Adopted standard practice, formerly MP 27.
M 341-22	Materials for Microsurfacing	5b	Adopted standard practice, formerly MP 28.
M 342-22	Materials for Slurry Seal	5b	Adopted standard practice, formerly MP 32.
M 343-22	Materials for Emulsified Asphalt Fog Seal	5b	Adopted standard practice, formerly MP 33.
M 344-22	Materials for Sand Seals	5b	Adopted standard practice, formerly MP 34.
M 345-22	Materials for Emulsified Asphalt Scrub Seal	5b	Adopted standard practice, formerly MP 43. Revised as follows: • Updated temperature-measuring devices.
M 346-22	Materials for Ultrathin Bonded Wearing Course	5b	Adopted standard practice, formerly MP 44.
M 347-22	Materials for Full-Depth Reclamation Mixtures with Emulsified Asphalt	5b	Adopted standard practice, formerly MP 45.
M 348-22	Waterborne White and Yellow Traffic Paints	5b	Adopted standard practice, formerly MP 24. Revised as follows: • Updated temperature-measuring devices.
M 349-22	Materials for Asphalt Tack Coat	2a	Adopted standard practice, formerly MP 36.
M 350-22	Reclaimed Asphalt Shingles for Use in Asphalt Mixtures	2d	Adopted standard practice, formerly MP 23.
R 9-05 (2022)	Acceptance Sampling Plans for Highway Construction	5c	Reconfirmed for 2022 publication.
R 10-22	Definition of Terms Related to Quality and Statistics as Used in Highway Construction	5c	Revised extensively throughout Section 4.
R 13-22	Conducting Geotechnical Subsurface Investigations	1b	Revised for equivalency with ASTM D420-18.
R 15-18 (2022)	Asphalt Additives and Modifiers	2b	Reconfirmed for 2022 publication.
R 18-18 (2022)	Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories	5c	Reconfirmed for 2022 publication.
R 23-99 (2022)	Chemical, Biological, and Physical Analysis of Water	5c	Reconfirmed for 2022 publication.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
R 24-99 (2022)	Collection and Preservation of Water Samples	5c	Reconfirmed for 2022 publication.
R 25-22	Technician Training and Certification Programs	5c	Revised as follows: • Updated language in Section 7.2. • Added references for Appendixes.
R 26-01 (2022)	Certifying Suppliers of Performance-Graded Asphalt Binders	2b	Reconfirmed for 2022 publication.
R 28-22	Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)	2b	Revised to update temperature-measuring devices.
R 30-22	Mixture Conditioning of Hot Mix Asphalt (HMA)	2c	Revised as follows: • Updated procedure and information regarding short-term aging. • Updated temperature-measuring devices.
R 34-03 (2022)	Evaluating Deicing Chemicals	5c	Reconfirmed for 2022 publication.
R 35-22	Superpave Volumetric Design for Asphalt Mixtures	2d	Revised extensively across multiple Sections.
R 37-04 (2022)	Application of Ground Penetrating Radar (GPR) to Highways	5a	Reconfirmed for 2022 publication.
R 38-10 (2022)	Quality Assurance of Standard Manufactured Materials	5c	Reconfirmed for 2022 publication.
R 40-10 (2022)	Measuring Pavement Profile Using a Rod and Level	5a	Reconfirmed for 2022 publication.
R 44-07 (2022)	Independent Assurance (IA) Programs	5c	Reconfirmed for 2022 publication.
R 46-22	Designing Stone Matrix Asphalt (SMA)	2d	Revised to update temperature-measuring devices.
R 47-22	Reducing Samples of Asphalt Mixtures to Testing Size	2c	Revised to update temperature-measuring devices.
R 49-09 (2022)	Determination of Low-Temperature Performance Grade (PG) of Asphalt Binders	2b	Reconfirmed for 2022 publication.
R 50-09 (2022)	Geosynthetic Reinforcement of the Aggregate Base Course of Flexible Pavement Structures	4g	Reconfirmed for 2022 publication.
R 51-22	Compost for Erosion/Sediment Control (Filter Berms and Filter Socks)	4g	Revised as follows: • Updated Table 1. • Updated test methods.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
R 52-22	Compost for Erosion/Sediment Control (Compost Blankets)	4g	Revised as follows: • Updated Table 1. • Updated test methods.
R 54-14 (2022)	Accepting Pavement Ride Quality When Measured Using Inertial Profiling Systems	5a	Reconfirmed for 2022 publication.
R 56-14 (2022)	Certification of Inertial Profiling Systems	5a	Reconfirmed for 2022 publication.
R 57-14 (2022)	Operating Inertial Profiling Systems	5a	Reconfirmed for 2022 publication.
R 58-22	Dry Preparation of Disturbed Soil and Soil–Aggregate Samples for Test	1a	Revised to update temperature-measuring devices.
R 59-22	Recovery of Asphalt Binder from Solution by Abson Method	2c	Revised to update temperature-measuring devices.
R 64-22	Sampling and Fabrication of 50-mm (2-in.) Cube Specimens Using Grout (Non-Shrink) or Mortar	3b	Revised to update temperature-measuring devices.
R 65-14 (2022)	Evaluating the Engineering and Environmental Suitability of Recycled Materials	5c	Reconfirmed for 2022 publication.
R 68-22	Preparation of Asphalt Mixtures by Means of the Marshall Apparatus	2d	Revised to update temperature-measuring devices.
R 70M/R 70-22	Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete	3a	Revised to update temperature-measuring devices.
R 71-22	Sampling and Amount of Testing of Hydraulic Cement	3a	Revised for equivalency with ASTM C183/C183M-16.
R 72-22	Match Curing of Concrete Test Specimens	3c	Revised to update temperature-measuring devices.
R 74-22	Wet Preparation of Disturbed Soil Samples for Test	1a	Revised to update temperature-measuring devices.
R 78-22	Recovering Residue from Emulsified Asphalt Using Low-Temperature Evaporative Techniques	2a	Revised to update temperature-measuring devices.
R 79-22	Vacuum Drying Compacted Asphalt Specimens	2c	Revised to update temperature-measuring devices.
R 83-22	Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)	2d	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
R 85-18 (2022)	Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)	5a	Reconfirmed for 2022 publication.
R 86-18 (2022)	Collecting Images of Pavement Surfaces for Distress Detection	5a	Reconfirmed for 2022 publication.
R 87-18 (2022)	Determining Pavement Deformation Parameters and Cross Slope from Collected Transverse Profiles	5a	Reconfirmed for 2022 publication.
R 88-18 (2022)	Collecting the Transverse Pavement Profile	5a	Reconfirmed for 2022 publication.
R 89-18 (2022)	Accreditation Bodies Operating in the Fields of Construction Materials Testing and Inspection	5c	Reconfirmed for 2022 publication.
R 90-18 (2022)	Sampling Aggregate Products	1c	Reconfirmed for 2022 publication.
R 91-18 (2022)	Determining Aggregate Source Shape Values from Digital Image Analysis Shape Properties	1c	Reconfirmed for 2022 publication.
R 92-18 (2022)	Evaluating the Elastic Behavior of Asphalt Binders Using the Multiple Stress Creep Recovery (MSCR) Test	2b	Reconfirmed for 2022 publication.
R 95-22	Accelerated Aging of Hot-Poured Asphalt Crack Sealant Using a Vacuum Oven	4e	Revised to update temperature-measuring devices.
R 100-22	Making and Curing Concrete Test Specimens in the Field	3b	Revised to update temperature-measuring devices.
R 101-22	Developing Performance Engineered Concrete Pavement Mixtures	3c	Adopted standard practice, formerly PP 84.
R 102-22	Emulsified Asphalt Chip Seal Design	5b	Adopted standard practice, formerly PP 82.
R 103-22	Microsurfacing Design	5b	Adopted standard practice, formerly PP 83.
R 104-22	Slurry Seal Design	5b	Adopted standard practice, formerly PP 87.
R 105-22	Emulsified Asphalt Fog Seal Design	5b	Adopted standard practice, formerly PP 88.
R 106-22	Sand Seal Design	5b	Adopted standard practice, formerly PP 90.
R 107-22	Emulsified Asphalt Scrub Seal Design	5b	Adopted standard practice, formerly PP 91.
R 108-22	Ultrathin Bonded Wearing Course Design	5b	Adopted standard practice, formerly PP 100.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
R 109-22	Emulsified Asphalt Content of Full-Depth Reclamation Mixture Design	5b	Adopted standard practice, formerly PP 101. Revised as follows: • Updated temperature-measuring devices.
R 110-22	Continuous Thermal Profile of Asphalt Mixture Construction	5c	Adopted standard practice, formerly PP 80. Revised as follows: • Extensively revised to reorganize standard.
R 111-22	Intelligent Compaction Technology for Embankment and Asphalt Pavement Applications	5c	Adopted standard practice, formerly PP 81. Revised as follows: • Extensively revised to reorganize standard.
R 112-22	Asphalt Tack Coat Design	2a	Adopted standard practice, formerly PP 93.
R 113-22	Materials Selection and Mixture Design of Permeable Friction Courses (PFCs)	2d	Adopted standard practice, formerly PP 77. Revised as follows: • Updated temperature-measuring devices.
R 114-22	Design Considerations When Using Reclaimed Asphalt Shingles (RAS) in Asphalt Mixtures	2d	Adopted standard practice, formerly PP 78.

LIST OF TECHNICAL CHANGES—PART 2

The balloted technical changes listed below are also indicated in the specifications by a change bar in the left. Unballoted editorial changes do not receive the change bar; however, the subheader line below the designation number will indicate if the standard has been editorially revised.

Release: July 2022

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 11-22	Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing	1c	Revised to update temperature-measuring devices.
T 19M/T 19-22	Bulk Density ("Unit Weight") and Voids in Aggregate	1c	Revised to update temperature-measuring devices.
T 22M/T 22-22	Compressive Strength of Cylindrical Concrete Specimens	3c	Revised as follows: • Updated temperature-measuring devices. • Sections 6.1.1.1, 8.1, 8.3.1, 9.1.1, 12.1. • New terminology Section.
T 24M/T 24-22	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	3c	Revised as follows: • Updated temperature-measuring devices. • Additional information on measurements of cores.
T 27-22	Sieve Analysis of Fine and Coarse Aggregates	1c	Revised to update temperature-measuring devices.
T 44-22	Solubility of Bituminous Materials	2b	Revised to update temperature-measuring devices.
T 48-22	Flash Point of Asphalt Binder by Cleveland Open Cup	2b	Revised to update temperature-measuring devices.
T 49-22	Penetration of Bituminous Materials	2b	Revised to update temperature-measuring devices.
T 50-22	Float Test for Bituminous Materials	2a	Revised to update temperature-measuring devices.
T 51-22	Ductility of Asphalt Materials	2b	Revised to update temperature-measuring devices.
T 53-22	Softening Point of Bitumen (Ring-and-Ball Apparatus)	2b	Revised to update temperature-measuring devices.
T 59-22	Emulsified Asphalts	2a	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 71-22	Effect of Organic Impurities in Fine Aggregate on Strength of Mortar	1c	Revised to update temperature-measuring devices.
T 72-22	Saybolt Viscosity	2a	Revised as follows: • Updated temperature-measuring devices. • Updated apparatus. • Updated procedure, precision, and bias for emulsified asphalt.
T 78-22	Distillation of Cutback Asphalt Products	2a	Revised to update temperature-measuring devices.
T 79-22	Flash Point with Tag Open-Cup Apparatus for Use with Material Having a Flash Point Less Than 93ºC (200ºF)	2a	Revised to update temperature-measuring devices.
T 84-22	Specific Gravity and Absorption of Fine Aggregate	1c	Revised to update temperature-measuring devices.
T 85-22	Specific Gravity and Absorption of Coarse Aggregate	1c	Revised to update temperature-measuring devices.
T 88-22	Particle Size Analysis of Soils	1a	Revised as follows: • Updated temperature-measuring devices. • Added isopropyl alcohol to apparatus. • Added clarifications for hydrometer test.
T 89-22	Determining the Liquid Limit of Soils	1a	Revised to update temperature-measuring devices.
T 90-22	Determining the Plastic Limit and Plasticity Index of Soils	1a	Revised to update temperature-measuring devices.
T 96-22	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	1c	Revised to update temperature-measuring devices.
T 97-22	Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)	3c	Revised as follows: • Additional information on verifying the accuracy of testing machines. • New terminology Section.
T 99-22	Moisture–Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop	1b	Revised to update temperature-measuring devices.
T 100-22	Specific Gravity of Soils	1a	Revised to update temperature-measuring devices.
T 102-22	Spot Test of Asphaltic Materials	2b	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 103-22	Soundness of Aggregates by Freezing and Thawing	1c	Revised to update temperature-measuring devices.
T 104-22	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate	1c	Revised to update temperature-measuring devices.
T 105-22	Chemical Analysis of Hydraulic Cement	3a	Revised as follows: • Added and revised information on porcelain crucibles. • Updated temperature-measuring devices.
T 106M/T 106-22	Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)	3a	Revised to update temperature-measuring devices.
T 107M/T 107-22	Autoclave Expansion of Hydraulic Cement	3a	Revised as follows: • Updated temperature-measuring devices. • Updated for equivalency with ASTM C151/C151M-18.
T 111-22	Mineral Matter or Ash in Asphalt Materials	2b	Revised to update temperature-measuring devices.
T 112-22	Clay Lumps and Friable Particles in Aggregate	1c	Revised to update temperature-measuring devices.
T 113-22	Lightweight Particles in Aggregate	1c	Revised to update temperature-measuring devices.
T 119M/T 119-18 (2022)	Slump of Hydraulic Cement Concrete	3b	Reconfirmed for 2022 publication.
T 129-22	Amount of Water Required for Normal Consistency of Hydraulic Cement Paste	3a	Revised specifications for the Vicat apparatus.
T 131-22	Time of Setting of Hydraulic Cement by Vicat Needle	3a	Revised for equivalency with ASTM C191-19.
T 132-22	Tensile Strength of Hydraulic Cement Mortars	3a	Revised to update temperature-measuring devices.
T 133-22	Density of Hydraulic Cement	3a	Revised to update temperature-measuring devices.
T 134-22	Moisture–Density Relations of Soil–Cement Mixtures	1b	Revised as follows: • Added Appendix X1 and relevant references and notes. • Revised Table 1 and Section 6.4 regarding oversize particles.
T 135-22	Wetting-and-Drying Test of Compacted Soil–Cement Mixtures	1b	Revised to update temperature-measuring devices.
T 136-22	Freezing-and-Thawing Tests of Compacted Soil–Cement Mixtures	1b	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 137-22	Air Content of Hydraulic Cement Mortar	3a	Revised as follows: • Updated temperature-measuring devices. • Updated measure standardization instructions.
T 148-22	Measuring Length of Drilled Concrete Cores	3c	Revised as follows: • Added precision information. • Updated core specifications. • New terminology Section.
T 153-22	Fineness of Hydraulic Cement by Air Permeability Apparatus	3a	Revised as follows: • Updated temperature-measuring devices. • Updated for equivalency with ASTM C204-18.
T 154-22	Time of Setting of Hydraulic Cement Paste by Gillmore Needles	3a	Revised for equivalency with ASTM C266-20.
T 155-22	Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete	3b	Revised to update temperature-measuring devices.
T 157-22	Air-Entraining Admixtures for Concrete	3b	Revised to update temperature-measuring devices.
T 158-22	Bleeding of Concrete	3b	Revised to update temperature-measuring devices.
T 160-22	Length Change of Hardened Hydraulic Cement Mortar and Concrete	3c	Revised as follows: • Updated temperature-measuring devices. • Updated instructions for molding and curing of specimens.
T 161-22	Resistance of Concrete to Rapid Freezing and Thawing	3c	Revised to update temperature-measuring devices.
T 162-22	Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency	3a	Revised for equivalency with ASTM C305-20.
T 164-22	Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)	2c	Revised as follows: • Updated temperature-measuring devices. • Added requirement to report asphalt binder content to the nearest 0.01 percent.
T 166-22	Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens	2c	Revised to update temperature-measuring devices.
T 167-22	Compressive Strength of Hot Mix Asphalt	2d	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 176-22	Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test	1a	Revised as follows: • Increased sample size for adequate testing and address discrepancies. • Updated temperature-measuring devices.
T 178-22	Portland Cement Content of Hardened Hydraulic-Cement Concrete	3c	Revised to update temperature-measuring devices.
T 179-22	Effect of Heat and Air on Asphalt Materials (Thin-Film Oven Test)	2b	Revised to update temperature-measuring devices.
T 180-22	Moisture–Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop	1b	Revised to update temperature-measuring devices.
T 185-22	Early Stiffening of Hydraulic Cement (Mortar Method)	3a	Revised as follows: • Updated temperature-measuring devices. • Updated for equivalency with ASTM C359-20.
T 186-22	Early Stiffening of Hydraulic Cement (Paste Method)	3a	Revised for equivalency with ASTM C451-19.
T 190-22	Resistance R-Value and Expansion Pressure of Compacted Soils	1a	Revised for equivalency with ASTM D2844/D2844M-18.
T 191-14 (2022)	Density of Soil In-Place by the Sand-Cone Method	1b	Reconfirmed for 2022 publication.
T 193-22	The California Bearing Ratio	1a	Revised to update temperature-measuring devices.
T 194-22	Determination of Organic Matter in Soils by Wet Combustion	1a	Revised to update temperature-measuring devices.
T 195-22	Determining Degree of Particle Coating of Asphalt Mixtures	2c	Revised to update temperature-measuring devices.
T 196M/T 196-22	Air Content of Freshly Mixed Concrete by the Volumetric Method	3b	Revised to update temperature-measuring devices.
T 197M/T 197-22	Time of Setting of Concrete Mixtures by Penetration Resistance	3b	Revised to update temperature-measuring devices.
T 198-22	Splitting Tensile Strength of Cylindrical Concrete Specimens	3c	Revised to add terminology references.
T 201-22	Kinematic Viscosity of Asphalts (Bitumens)	2b	Revised to update temperature-measuring devices.
T 202-22	Viscosity of Asphalts by Vacuum Capillary Viscometer	2b	Revised to update temperature-measuring devices.
T 206-22	Penetration Test and Split-Barrel Sampling of Soils	1b	Revised for equivalency with ASTM D1568-18.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 207-22	Thin-Walled Tube Sampling of Soils	1b	Revised for equivalency with ASTM D1587/D1587M-15.
T 209-22	Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures	2c	Revised as follows: • Updated temperature-measuring devices. • Improved precision estimates. • Changes to plant-produced sample drying in Section 7.2.1. • Minor edits for precision in Sections 5.4.5, 5.5., 9.1, and 10.1. • Updated Annex 1.
T 210-22	Aggregate Durability Index	1c	Revised to update temperature-measuring devices.
T 215-22	Permeability of Granular Soils (Constant Head)	1a	Revised as follows: • Updated temperature-measuring devices. • Updated significance and use. • Clarifications to apparatus. • Language updates to Method A and Method B.
T 216-22	One-Dimensional Consolidation Properties of Soils	1a	Revised to update temperature-measuring devices.
T 217-14 (2022)	Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Moisture Tester	1a	Reconfirmed for 2022 publication.
T 218-86 (2022)	Sampling Hydrated Lime	3a	Reconfirmed for 2022 publication.
T 219-22	Testing Lime for Chemical Constituents and Particle Sizes	3a	Revised to update temperature-measuring devices.
T 220-22	Determination of the Strength of Soil–Lime Mixtures	1a	Revised to update temperature-measuring devices.
T 226-22	Triaxial Compressive Strength of Undrained Rock Core Specimens without Pore Pressure Measurements	1a	Revised as follows: • Removed ASTM equivalency. • Extensive revisions across most Sections.
T 228-22	Specific Gravity of Semi-Solid Asphalt Materials	2b	Revised as follows: • Title change. • Updated for equivalency with ASTM D70/D70M-21. • Updated temperature-measuring devices.
T 232-90 (2022)	Determination of Lime Content in Lime-Treated Soils by Titration	3a	Reconfirmed for 2022 publication.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 233-22	Density of Soil In-Place by Block, Chunk, or Core Sampling	1a	Revised to update temperature-measuring devices.
T 236-22	Direct Shear Test of Soils under Consolidated Drained Conditions	1a	Revised to update temperature-measuring devices.
T 237-22	Testing Epoxy Resin Adhesive	4c	Revised to update temperature-measuring devices.
T 240-22	Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)	2b	Revised to update temperature-measuring devices.
T 242-18 (2022)	Frictional Properties of Paved Surfaces Using a Full-Scale Tire	5a	Reconfirmed for 2022 publication.
T 244-22	Mechanical Testing of Steel Products	4f	Revised for equivalency with ASTM A370-20.
T 245-22	Resistance to Plastic Flow of Asphalt Mixtures Using Marshall Apparatus	2d	Revised to update temperature-measuring devices.
T 246-22	Resistance to Deformation and Cohesion of Hot Mix Asphalt (HMA) by Means of Hveem Apparatus	2d	Revised to update temperature-measuring devices.
T 247-22	Preparation of Test Specimens of Hot Mix Asphalt (HMA) by Means of California Kneading Compactor	2d	Revised to update temperature-measuring devices.
T 250-22	Thermoplastic Traffic Line Material	4c	Revised to update temperature-measuring devices.
T 255-22	Total Evaporable Moisture Content of Aggregate by Drying	1c	Revised to update temperature-measuring devices.
T 258-81 (2022)	Determining Expansive Soils	1a	Reconfirmed for 2022 publication.
T 265-22	Laboratory Determination of Moisture Content of Soils	1a	Revised to update temperature-measuring devices.
T 267-22	Determination of Organic Content in Soils by Loss on Ignition	1a	Revised to update temperature-measuring devices.
T 269-14 (2022)	Percent Air Voids in Compacted Dense and Open Asphalt Mixtures	2c	Reconfirmed for 2022 publication.
T 272-18 (2022)	One-Point Method for Determining Maximum Dry Density and Optimum Moisture	1b	Reconfirmed for 2022 publication.
T 273-86 (2022)	Soil Suction	1a	Reconfirmed for 2022 publication.
T 275-22	Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Paraffin-Coated Specimens	2c	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 276-22	Measuring Early-Age Compression Strength and Projecting Later-Age Strength	3c	Revised as follows: • Updated terminology. • Updated precision measurements. • Included additional references to curing methods. • Updated temperature-measuring devices.
T 277-22	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration	3c	Revised as follows: • Updated vacuum pump specifications. • Updated language regarding precision. • Updated temperature-measuring devices.
T 279-18 (2022)	Accelerated Polishing of Aggregates Using the British Wheel	5a	Reconfirmed for 2022 publication.
T 280-22	Concrete Pipe, Manhole Sections, or Tile	4a	Revised to update temperature-measuring devices.
T 281-22	Vitrified Clay Pipe	4a	Revised as follows: • Updated for equivalency with ASTM C301-18. • Updated temperature-measuring devices.
T 283-22	Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage	2d	Revised to update temperature-measuring devices.
T 287-22	Asphalt Binder Content of Asphalt Mixtures by the Nuclear Method	2c	Revised as follows: • Updated temperature-measuring devices. • Added requirement to report asphalt binder content to the nearest 0.01 percent.
T 289-22	Determining pH of Soil for Use in Corrosion Testing	1a	Revised to update temperature-measuring devices.
T 291-22	Determining Water-Soluble Chloride Ion Content in Soil	1a	Revised to update temperature-measuring devices.
T 295-22	Specific Gravity or API Gravity of Liquid Asphalts by Hydrometer Method	2a	Revised to update temperature-measuring devices.
T 296-22	Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression	1a	Revised to update temperature-measuring devices.
T 300-22	Force Ductility Test of Asphalt Materials	2a	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 301-22	Elastic Recovery Test of Asphalt Materials by Means of a Ductilometer	2b	Revised to update temperature-measuring devices.
T 302-22	Polymer Content of Polymer-Modified Emulsified Asphalt Residue and Asphalt Binders	2a	Revised to update temperature-measuring devices.
T 303-22	Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali–Silica Reaction	1c	Revised to update temperature-measuring devices.
T 304-22	Uncompacted Void Content of Fine Aggregate	1c	Revised to update temperature-measuring devices.
T 305-22	Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures	2c	Revised to update temperature-measuring devices.
T 308-22	Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method	2c	Revised to update temperature-measuring devices.
T 309-22	Temperature of Freshly Mixed Portland Cement Concrete	3b	Revised to update temperature-measuring devices.
T 310-22	In-Place Density and Moisture Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth)	1b	Revised as follows: • Replaced all instances of "probe" with "source rod". • Updated language throughout to consistent active voice.
T 312-22	Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor	2d	Revised to update temperature-measuring devices.
T 313-22	Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)	2b	Revised to update temperature-measuring devices.
T 314-22	Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)	2b	Revised to update temperature-measuring devices.
T 315-22	Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)	2b	Revised to update temperature-measuring devices.
T 316-22	Viscosity Determination of Asphalt Binder Using Rotational Viscometer	2b	Revised to update temperature-measuring devices.
T 317-04 (2022)	Prediction of Asphalt-Bound Pavement Layer Temperatures	5a	Reconfirmed for 2022 publication.
T 319-22	Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures	2c	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 320-22	Determining the Permanent Shear Strain and Stiffness of Asphalt Mixtures Using the Superpave Shear Tester (SST)	2d	Revised to update temperature-measuring devices.
T 321-22	Determining the Fatigue Life of Compacted Asphalt Mixtures Subjected to Repeated Flexural Bending	2d	Revised to update temperature-measuring devices.
T 324-22	Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures	2d	Revised to update temperature-measuring devices.
T 325-22	Estimating the Strength of Concrete in Transportation Construction by Maturity Tests	3b	Revised to update temperature-measuring devices.
T 326-22	Uncompacted Void Content of Coarse Aggregate (As Influenced by Particle Shape, Surface Texture, and Grading)	1c	Revised to update temperature-measuring devices.
T 327-22	Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus	1c	Revised to update temperature-measuring devices.
T 329-22	Moisture Content of Asphalt Mixtures by Oven Method	2c	Revised to update temperature-measuring devices.
T 330-22	The Qualitative Detection of Harmful Clays of the Smectite Group in Aggregates Using Methylene Blue	1c	Revised to update temperature-measuring devices.
T 331-22	Bulk Specific Gravity (G_{mb}) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method	2c	Revised to update temperature-measuring devices.
T 332-22	Determining Chloride Ions in Concrete and Concrete Materials by Specific Ion Probe	3c	Revised to update temperature-measuring devices.
T 333-22	Linear Coefficient of Shrinkage on Cure of Adhesive Systems	4c	Revised to update temperature-measuring devices.
T 336-22	Coefficient of Thermal Expansion of Hydraulic Cement Concrete	3c	Revised to update temperature-measuring devices.
T 339-22	Analysis of Structural Steel Coatings for Isocyanate Content	4c	Revised to update temperature-measuring devices.
T 341-22	Determination of Compression Capacity for Profile Wall Plastic Pipe by Stub Compression Loading	4b	Revised to update temperature-measuring devices.
T 342-22	Determining Dynamic Modulus of Hot Mix Asphalt (HMA)	2d	Revised to update temperature-measuring devices.
T 344-22	Evaluation of Superpave Gyratory Compactor (SGC) Internal Angle of Gyration Using Simulated Loading	2d	Revised to update temperature-measuring devices.
T 346-22	Glass Beads Used in Pavement Markings	4c	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 348-22	Air-Void Characteristics of Freshly Mixed Concrete by Buoyancy Change	3b	Revised to update temperature-measuring devices.
T 351-14 (2022)	Visual Stability Index (VSI) of Self-Consolidating Concrete (SCC)	3b	Reconfirmed for 2022 publication.
T 352-14 (2022)	Determining Formwork Pressure of Fresh Self-Consolidating Concrete (SCC) Using Pressure Transducers	3b	Reconfirmed for 2022 publication.
T 353-14 (2022)	Particle Size Analysis of Hydraulic Cement and Related Materials by Light Scattering	3a	Reconfirmed for 2022 publication.
T 354-22	Specific Gravity and Absorption of Aggregate by Volumetric Immersion Method	1c	Revised to update temperature-measuring devices.
T 355-22	In-Place Density of Asphalt Mixtures by Nuclear Methods	2c	Revised as follows: • Replaced all instances of "probe" with "source rod". • Updated language throughout to consistent active voice.
T 356-22	Determining Air Content of Hardened Portland Cement Concrete by High-Pressure Air Meter	3c	Revised to update temperature-measuring devices.
T 357-22	Predicting Chloride Penetration of Hydraulic Cement Concrete by the Rapid Migration Procedure	3c	Revised to update temperature-measuring devices.
T 358-22	Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration	3c	Revised as follows: • Updated temperature-measuring devices. • Extensive revisions across most Sections.
T 359M/T 359-18 (2022)	Pavement Thickness by Magnetic Pulse Induction	3c	Reconfirmed for 2022 publication.
T 361-22	Determining Asphalt Binder Bond Strength by Means of the Binder Bond Strength (BBS) Test	2a	Revised to update temperature-measuring devices.
T 363-22	Evaluating Stress Development and Cracking Potential due to Restrained Volume Change Using a Dual Ring Test	3c	Revised to update temperature-measuring devices.
T 364-22	Determination of Composite Activation Energy of Aggregates due to Alkali–Silica Reaction (Chemical Method)	3c	Revised to update temperature-measuring devices.
T 366-22	Apparent Viscosity of Hot-Poured Asphalt Crack Sealant Using Rotational Viscometer	4e	Revised to update temperature-measuring devices.
T 368-22	Measuring Low-Temperature Flexural Creep Stiffness of Hot-Poured Asphalt Crack Sealant by Bending Beam Rheometer (BBR)	4e	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 369-22	Evaluation of the Low-Temperature Tensile Property of Hot-Poured Asphalt Crack Sealant by Direct Tension Test	4e	Revised to update temperature-measuring devices.
T 370-22	Measuring Adhesion of Hot-Poured Asphalt Crack Sealant Using Direct Adhesion Tester	4e	Revised to update temperature-measuring devices.
T 371-22	Measuring Interfacial Fracture Energy of Hot-Poured Asphalt Crack Sealant Using a Blister Test	4e	Revised to update temperature-measuring devices.
T 377-22	Detecting the Presence of Phosphorous in Asphalt Binder	2b	Revised to update temperature-measuring devices.
T 378-22	Determining the Dynamic Modulus and Flow Number for Asphalt Mixtures Using the Asphalt Mixture Performance Tester (AMPT)	2d	Revised to update temperature-measuring devices.
T 379-18 (2022)	Nonlinear Impact Resonance Acoustic Spectroscopy (NIRAS) for Concrete Specimens with Damage from Alkali-Silica Reaction (ASR)	3c	Reconfirmed for 2022 publication.
T 380-22	Potential Alkali Reactivity of Aggregates and Effectiveness of ASR Mitigation Measures (Miniature Concrete Prism Test, MCPT)	3c	Revised to update temperature-measuring devices.
T 381-22	Determining Aggregate Shape Properties by Means of Digital Image Analysis	1c	Revised to update temperature-measuring devices.
T 382-22	Determining the Viscosity of Emulsified Asphalt by a Rotational Paddle Viscometer	2a	Revised to update temperature-measuring devices.
T 383-22	Evaluation of Asphalt Release Agents (ARAs)	2b	Revised as follows: • Updated temperature-measuring devices. • Updated procedure. • Updated product formulation parameters. • Added Appendix.
T 384-22	Protective Sealers for Portland Cement Concrete	4c	Revised to update temperature-measuring devices.
T 388-22	Detectable Warning Systems	4d	Revised to update temperature-measuring devices.
T 389-22	Determining the Influence of Road Surfaces on Vehicle Noise Using the Statistical Isolated Pass-By (SIP) Method	5a	Revised to update temperature-measuring devices.
T 390-22	Determining the Influence of Road Surfaces on Traffic Noise Using the Continuous-Flow Traffic Time-Integrated Method (CTIM)	5a	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
T 393-22	Determining the Fracture Potential of Asphalt Mixtures Using the Illinois Flexibility Index Test (I-FIT)	2d	Revised to update temperature-measuring devices.
T 394-22	Determining the Fracture Energy of Asphalt Mixtures Using the Semicircular Bend Geometry (SCB)	2d	Revised to update temperature-measuring devices.
T 395-22	Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method	3b	Adopted standard method of test, previously TP 118.
T 396-22	Box Test in Slip Form Paving of Fresh Portland Cement Concrete	3b	Adopted standard method of test, previously TP 137.
T 397-22	Uniaxial Response of Ultra-High Performance Concrete	3c	New standard method of test.
T 398-22	Measuring Retroreflectivity of Pavement Marking Materials Using a Mobile Retroreflectivity Unit	4c	Adopted standard method of test, previously TP 111.
T 399-22	Determining In-Place Density and Moisture Content of Soil and Soil–Aggregate Using Complex Impedance Methodology	1b	Adopted standard method of test, previously TP 112.
T 400-22	Determining the Damage Characteristic Curve and Failure Criterion Using the Asphalt Mixture Performance Tester (AMPT) Cyclic Fatigue Test	2d	Adopted standard method of test, previously TP 107. Revised as follows: • Significant rewrite of standard. • Revised to update temperature-measuring devices.
T 401-22	Cantabro Abrasion Loss of Asphalt Mixture Specimens	2d	Adopted standard method of test, previously TP 108. Revised as follows: • Title change. • Added more exact measurements to rounding and margins of error. • Updated significance and use. • New Appendix A. • Revised to update temperature-measuring devices.

LIST OF TECHNICAL CHANGES—PART 3

The balloted technical changes listed below are also indicated in the specifications by a change bar in the left. Unballoted editorial changes do not receive the change bar; however, the subheader line below the designation number will indicate if the standard has been editorially revised.

Release: July 2022

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
MP 23-15 (2021)	Reclaimed Asphalt Shingles for Use in Asphalt Mixtures	2d	Adopted as M 350.
MP 24-15 (2021)	Waterborne White and Yellow Traffic Paints	4c	Adopted with revisions as M 348.
MP 26-15 (2022)	Cotton Duck Fabric Bridge Bearings	4e	Extended one year for 2022 publication; Year 7 of 8 in Provisional life cycle.
MP 27-16 (2020)	Materials for Emulsified Asphalt Chip Seals	5b	Adopted as M 340.
MP 28-17 (2020)	Materials for Microsurfacing	5b	Adopted as M 341.
MP 31-22	Materials Used in Cold Recycled Mixtures with Emulsified Asphalt	2a	Title change.
MP 32-17 (2021)	Materials for Slurry Seal	5b	Adopted as M 342.
MP 33-17 (2021)	Materials for Emulsified Asphalt Fog Seal	5b	Adopted as M 343.
MP 34-18 (2020)	Materials for Sand Seals	5b	Adopted as M 344.
MP 35-22	Thin Overlay Treatments Using a Binder Resin System and Aggregate for Concrete Surfaces	4c	Revised as follows: • Extensive revisions across most Sections. • Updated temperature-measuring devices.
MP 36-18 (2020)	Materials for Asphalt Tack Coat	2a	Adopted as M 349.
MP 37-18 (2022)	Performance-Graded Asphalt Binder for Surface Treatments	2b	Extended two years for 2022 publication; Year 4 of 8 in Provisional life cycle.
MP 38-22	Materials Used in Cold Recycled Mixture with Foamed Asphalt	2d	Title change.
MP 39-22	File Format of Intelligent Compaction Data	5c	Revised to add data requirements for Density Profiling System.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
MP 41-22	High Friction Surface Treatment for Asphalt and Concrete Pavements Using Calcined Bauxite	4c	Revised extensively across most Sections.
MP 42-22	Steel-Reinforced Polyethylene (SRPE) Corrugated Pipe	4b	Revised to update temperature-measuring devices.
MP 43-20	Materials for Emulsified Asphalt Scrub Seal	5b	Adopted with revisions as M 345.
MP 44-20	Materials for Ultrathin Bonded Wearing Course	5b	Adopted as M 346.
MP 45-20	Materials for Full-Depth Reclamation Mixtures with Emulsified Asphalt	5b	Adopted as M 347.
MP 46-22	Balanced Mix Design	2d	Revisions updating State Practices to Sections 5, 6, 7, and all tables in Appendix X1.
MP 47-22	File Format of Two-Dimensional and Three-Dimensional (2D/3D) Pavement Image Data	5a	Revised as follows: • Updated definition for registration. • Minor language updates for more precise instructions. • Updated Figure 1. • Updated Table 1.
PP 77-14 (2021)	Materials Selection and Mixture Design of Permeable Friction Courses	2d	Adopted with revisions as R 113.
PP 78-17 (2021)	Design Considerations When Using Reclaimed Asphalt Shingles (RAS) in Asphalt Mixtures	2d	Adopted as R 114.
PP 80-20 (2021)	Continuous Thermal Profile of Asphalt Mixture Construction	5c	Adopted with revisions as R 110.
PP 81-18 (2020)	Intelligent Compaction Technology for Embankment and Asphalt Pavement Applications	5c	Adopted with revisions as R 111.
PP 82-16 (2020)	Emulsified Asphalt Chip Seal Design	5b	Adopted as R 102.
PP 83-16 (2020)	Microsurfacing Design	5b	Adopted as R 103.
PP 84-20 (2021)	Developing Performance Engineered Concrete Pavement Mixtures	3c	Adopted as R 101.
PP 87-20 (2021)	Slurry Seal Design	5b	Adopted as R 104.
PP 88-17 (2021)	Emulsified Asphalt Fog Seal Design	5b	Adopted as R 105.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
PP 89-19 (2022)	Grinding the Ends of Cylindrical Concrete Specimens	3c	Extended two years for 2022 publication; Year 4 of 8 in Provisional life cycle.
PP 90-18 (2020)	Sand Seal Design	5b	Adopted as R 106.
PP 91-21	Emulsified Asphalt Scrub Seal Design	5b	Adopted as R 107.
PP 92-19 (2022)	Preparation of Test Specimens Using the Plastic Mold Compaction Device	1b	Extended two years for 2022 publication; Year 4 of 8 in Provisional life cycle.
PP 93-18 (2020)	Asphalt Tack Coat Design	2a	Adopted as R 112.
PP 94-22	Determination of Optimum Asphalt Content of Cold Recycled Mixture with Foamed Asphalt	2d	Revised to update temperature-measuring devices.
PP 95-22	Preparation of Indirect Tension Performance Test Specimens	2d	Revised to update temperature-measuring devices.
PP 96-18 (2022)	Developing Dynamic Modulus Master Curves for Asphalt Mixtures Using the Indirect Tension Testing Method	2d	Extended two years for 2022 publication; Year 4 of 8 in Provisional life cycle.
PP 100-20	Ultrathin Bonded Wearing Course Design	5b	Adopted as R 108.
PP 101-20	Emulsified Asphalt Content of Full-Depth Reclamation Mixture Design	5b	Adopted with revisions as R 109.
PP 102-20 (2022)	Digital Interchange of Geotechnical Data	1b	Extended two years for 2022 publication; Year 2 of 8 in Provisional life cycle.
PP 103-21 (2022)	Sample Preparation and Polishing of Unbound Aggregates for Dynamic Friction Testing	1c	Extended two years for 2022 publication; Year 2 of 8 in Provisional life cycle.
PP 104-21 (2022)	Sample Preparation and Polishing of Asphalt Mixture Specimens for Dynamic Friction Testing	1c	Extended two years for 2022 publication; Year 2 of 8 in Provisional life cycle.
PP 105-20 (2022)	Balanced Design of Asphalt Mixtures	2d	Extended two years for 2022 publication; Year 2 of 8 in Provisional life cycle.
PP 114-22	Data Lot Names for Intelligent Construction Technologies	5c	New provisional **standard** practice.
TP 107-18 (2021)	Determining the Damage Characteristic Curve of Asphalt Mixtures from Direct Tension Cyclic Fatigue Tests	2d	Adopted with revisions as T 400.
TP 108-14 (2021)	Abrasion Loss of Asphalt Mixture Specimens	2d	Adopted with revisions as T 401.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
TP 111-14 (2021)	Measuring Retroreflectivity of Pavement Marking Materials Using a Mobile Retroreflectivity Unit	4c	Adopted as T 398.
TP 112-21	Determining In-Place Density and Moisture Content of Soil and Soil–Aggregate Using Complex Impedance Methodology	1b	Adopted as T 399.
TP 113-22	Determination of Asphalt Binder Resistance to Ductile Failure Using Double-Edge-Notched Tension (DENT) Test	2b	Revised to update temperature-measuring devices.
TP 114-18 (2022)	Determining the Interlayer Shear Strength (ISS) of Asphalt Pavement Layers	2c	Extended one year for 2022 publication; Year 7 of 8 in Provisional life cycle.
TP 115-16 (2022)	Determining the Quality of Tack Coat Adhesion to the Surface of an Asphalt Pavement in the Field or Laboratory	2c	Extended one year for 2022 publication; Year 7 of 8 in Provisional life cycle.
TP 116-22	Rutting and Fatigue Resistance of Asphalt Mixtures Using Incremental Repeated Load Permanent Deformation (iRLPD)	2d	Revised to update temperature-measuring devices.
TP 117-22	Determination of the Voids of Dry Compacted Filler	2c	Revised to update temperature-measuring devices.
TP 118-17 (2021)	Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method	3b	Adopted with editorial revisions as T 395.
TP 119-22	Electrical Resistivity of a Concrete Cylinder Tested in a Uniaxial Resistance Test	3c	Revised extensively across all Sections.
TP 120-22	Pore Index for Carbonate Coarse Aggregate	1c	Revised to update temperature-measuring devices.
TP 122-22	Determination of Performance Grade of Physically Aged Asphalt Binder Using Extended Bending Beam Rheometer (BBR) Method	2b	Revised to update temperature-measuring devices.
TP 123-16 (2022)	Measuring Asphalt Binder Yield Energy and Elastic Recovery Using the Dynamic Shear Rheometer	2b	Extended one year for 2022 publication; Year 7 of 8 in Provisional life cycle.
TP 125-22	Determining the Flexural Creep Stiffness of Asphalt Mixtures Using the Bending Beam Rheometer (BBR)	2d	Revised to update temperature-measuring devices.
TP 126-22	Evaluation of the Tracking Resistance of Hot-Poured Asphalt Crack Sealant by Dynamic Shear Rheometer (DSR)	4e	Revised to update temperature-measuring devices.
TP 127-22	Determining the Fracture Energy Density of Asphalt Binder Using the Binder Fracture Energy (BFE) Test	2b	Revised to update temperature-measuring devices.

Designation Number	Title	Technical Subcommittee Number	Balloted Revisions
TP 128-22	Evaluation of Oxidation Level of Asphalt Mixtures by a Portable Infrared Spectrometer	2c	Revised as follows: • Updates to terminology. • Updates to specimen sampling and sampling equipment.
TP 129-21 (2022)	Vibrating Kelly Ball (VKelly) Penetration in Fresh Portland Cement Concrete	3c	Editorially revised to remove specific brands.
TP 130-18 (2022)	Producing Draw Down Panels and Measuring the Coefficient of Retroreflected Luminance (RL) of Pavement Markings in a Laboratory Panel	4c	Extended two years for 2022 publication; Year 4 of 8 in Provisional life cycle.
TP 131-18 (2022)	Determining the Dynamic Modulus of Asphalt Mixtures Using the Indirect Tension Test	2d	Extended two years for 2022 publication; Year 4 of 8 in Provisional life cycle.
TP 133-22	Determining the Damage Characteristic Curve and Failure Criterion Using Small Specimens in the Asphalt Mixture Performance Tester (AMPT) Cyclic Fatigue Test	2d	Minor revisions to language in Sections 13.3 and 13.6.9 and Note 5.
TP 134-22	Stress Sweep Rutting (SSR) Test Using Asphalt Mixture Performance Tester (AMPT)	2d	Revised to add language and procedure for determining Rutting Strain Index (RSI).
TP 135-22	Total Pore Volume in Hardened Concrete Using Vacuum Saturation	3c	Revised to update temperature-measuring devices.
TP 136-22	Degree of Saturation of Hydraulic-Cement Concrete	3c	Revised to update temperature-measuring devices.
TP 137-20	Box Test in Slip Form Paving of Fresh Portland Cement Concrete	3b	Adopted as T 396.
TP 138-20 (2022)	Weight and Diameter for Carbon-Steel for Steel Wire and Welded Wire Reinforcement for Concrete	4f	Extended two years for 2022 publication; Year 2 of 8 in Provisional life cycle.
TP 139-22	Determining the Relative Density (Specific Gravity) and Absorption of Lightweight Aggregate for Internally Cured Concrete Mixtures	1c	Revised to update temperature-measuring devices.
TP 140-22	Moisture Sensitivity Using Hydrostatic Pore Pressure to Determine Cohesion and Adhesion Strength of Compacted Asphalt Mixture Specimens	2d	Revised to update temperature-measuring devices.
TP 141-22	Determining the Indirect Tensile Nflex Factor to Assess the Cracking Resistance of Asphalt Mixtures	2d	Revised to update temperature-measuring devices.

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PART 1—STANDARD SPECIFICATIONS AND STANDARD PRACTICES

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STD. NO.	TITLE
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M 170-22	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
M 170M-22	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe [Metric]
M 175M/M 175-05 (2020)	Perforated Concrete Pipe
M 176M/M 176-20	Porous Concrete Pipe
M 178M/M 178-20	Concrete Drain Tile
M 180-12 (2021)	Corrugated Sheet Steel Beams for Highway Guardrail
M 181-10 (2019)	Chain-Link Fence
M 182-05 (2021)	Burlap Cloth Made from Jute or Kenaf and Cotton Mats
M 190-22	Asphalt-Coated Corrugated Metal Culvert Pipe and Pipe-Arches
M 194M/M 194-13 (2021)	Chemical Admixtures for Concrete
M 195-22	Lightweight Aggregates for Structural Concrete
M 196-16	Corrugated Aluminum Pipe for Sewers and Drains
M 197-20	Aluminum Alloy Sheet for Corrugated Aluminum Pipe
M 199M/M 199-22	Precast Reinforced Concrete Manhole Sections
M 201-21	Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
M 202M/M 202-19	Steel Sheet Piling
M 203M/M 203-20	Steel Strand, Low-Relaxation Uncoated Seven-Wire for Concrete Reinforcement
M 204M/M 204-19	Uncoated Stress-Relieved Steel Wire for Prestressed Concrete
M 205M/M 205-11 (2019)	Molds for Forming Concrete Test Cylinders Vertically
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M 213-22	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
M 216-22	Quicklime and Hydrated Lime for Soil Stabilization
M 218-03 (2020)	Steel Sheet, Zinc-Coated (Galvanized), for Corrugated Steel Pipe
M 219-92 (2021)	Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
M 224-22	Use of Protective Sealers for Portland Cement Concrete
M 226-80 (2021)	Viscosity-Graded Asphalt Binder
M 227M/M 227-19	Steel Bars, Carbon, Merchant Quality, Mechanical Properties
M 230-07 (2020)	Expanded and Extruded Foam Board (Polystyrene)
M 231-95 (2019)	Weighing Devices Used in the Testing of Materials
M 232M/M 232-19	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
M 233-86 (2019)	Boiled Linseed Oil Mixture for Treatment of Portland Cement Concrete
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M 237-96 (2019)	Epoxy Resin Adhesives for Bonding Traffic Markers to Hardened Portland Cement and Asphalt Concrete
M 240M/M 240-21	Blended Hydraulic Cement
M 241M/M 241-13 (2021)	Concrete Made by Volumetric Batching and Continuous Mixing
M 242M/M 242-20	Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
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M 246-22	Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe
M 247-13 (2022)	Glass Beads Used in Pavement Markings
M 249-12 (2020)	White and Yellow Reflective Thermoplastic Striping Material (Solid Form)
M 251M/M 251-22	Plain and Laminated Elastomeric Bridge Bearings
M 252-21	Corrugated Polyethylene Drainage Pipe
M 254-06 (2019)	Corrosion-Resistant Coated Dowel Bars
M 255M/M 255-19	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
M 259-22	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
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M 306-10 (2019)	Drainage, Sewer, Utility, and Related Castings
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M 346-22	*Adopted*—Materials for Ultrathin Bonded Wearing Course
M 347-22	*Adopted*—Materials for Full-Depth Reclamation Mixtures with Emulsified Asphalt
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Standard Specification for

Portland Cement

AASHTO Designation: M 85-22[1]

Technically Revised: 2022

Technical Subcommittee: 3a, Cement, Lime, and Concrete Materials

ASTM Designation: C150/C150M-22

1. SCOPE

1.1. *This specification covers ten types of portland cement as follows (see Note 1)*:

1.1.1. *Type I*—For general use, when the special properties specified for any other type are not required;

1.1.2. *Type IA*—Air-entraining cement for the same uses as Type I, where air entrainment is desired;

1.1.3. *Type II*—For general use, more especially when moderate sulfate resistance is desired;

1.1.4. *Type IIA*—Air-entraining cement for the same uses as Type II, where air entrainment is desired;

1.1.5. *Type II(MH)*—For general use, more especially when moderate heat of hydration and moderate sulfate resistance are desired.

1.1.6. *Type II(MH)A*—Air-entraining cement for the same uses as Type II(MH), where air entrainment is desired.

1.1.7. *Type III*—For use when high early strength is desired;

1.1.8. *Type IIIA*—Air-entraining cement for the same use as Type III, where air entrainment is desired;

1.1.9. *Type IV*—For use when low heat of hydration is desired; and

1.1.10. *Type V*—For use when high sulfate resistance is desired.

Note 1—Some cements are designated with a combined type classification, such as Type I/II, indicating that the cement meets the requirements of the indicated types and is being offered as suitable for use when either type is desired.

1.2. When both SI and inch-pound units are present, the SI units are the standard. The inch-pound units are approximations listed for information only.

1.3. The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- 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 131, Time of Setting of Hydraulic Cement by Vicat Needle
- T 137, Air Content of Hydraulic Cement Mortar
- T 153, Fineness of Hydraulic Cement by Air Permeability Apparatus
- T 154, Time of Setting of Hydraulic Cement Paste by Gillmore Needles
- T 186, Early Stiffening of Hydraulic Cement (Paste Method)

2.2. *ASTM Standards*:

- C33/C33M, Standard Specification for Concrete Aggregates
- C51, Standard Terminology Relating to Lime and Limestone (as used by the Industry)
- C226, Standard Specification for Air-Entraining Additions for Use in the Manufacture of Air-Entraining Hydraulic Cement
- C452, Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate
- C563, Standard Test Method for Approximation of Optimum SO_3 in Hydraulic Cement
- C1038/C1038M, Standard Test Method for Expansion of Hydraulic Cement Mortar Bars Stored in Water
- C1702, Standard Test Method for Measurement of Heat of Hydration of Hydraulic Cementitious Materials Using Isothermal Conduction Calorimetry
- E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

3. TERMINOLOGY

3.1. *Definitions*:

3.1.1. *portland cement*—a hydraulic cement produced by pulverizing clinker, consisting essentially of hydraulic calcium silicates, and usually containing one or more of the following:

- water,
- calcium sulfate,
- up to 5 percent limestone, and
- processing additions.

3.1.2. *air-entraining portland cement*—a portland cement containing an interground air-entraining addition.

3.1.3. *hydraulic cement*—a cement that sets and hardens by chemical interaction with water and is capable of doing so under water.

4. ORDERING INFORMATION

4.1. *Orders for material under this specification shall include the following*:

ABC Portland Cement Company
Qualitytown, NJ

Plant: Example Cement Type: II(MH) Date: March 9, 20xx
Production Period: March 2, 20xx–March 8, 20xx

Additional Data

	Limestone	Inorganic Processing Addition Data
Type	—	Ground, Granulated Blast-Furnace Slag
Amount (%)	3.5	3.0
SiO_2 (%)	12.9	33.1
Al_2O_3 (%)	3.0	10.9
Fe_2O_3 (%)	1.0	1.1
CaO (%)	43.5	44.4
SO_3 (%)	0.6	0.2

	Base Cement Phase Composition
C_3S (%)	63
C_2S (%)	11
C_3A (%)	5
C_4AF (%)	11

We certify that the above-described data represents the materials used in the cement manufactured during the production period indicated.

Signature: _____ Title: _____

Figure X1.2—Example Additional Data Report

[1] In essential equivalence with ASTM C150/C150M-22.
[2] Taylor, P. *Specifications and Protocols for Acceptance Tests on Processing Additions in Cement Manufacturing*, NCHRP Report 607, Transportation Research Board, Washington, DC, 2008, 96 pp. Available at www.trb.org.

Standard Specification for

Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe

AASHTO

AASHTO Designation: M 86M/M 86-22

Technically Revised: 2022

Technical Subcommittee: 4a, Concrete Drainage Structures

ASTM Designation: C14M-15a and C14-15a

1. SCOPE

1.1. This specification covers nonreinforced concrete pipe intended to be used for the conveyance of sewage, industrial wastes, storm water, and for the construction of culverts.

1.2. This specification is applicable for orders in either SI units (M 86M) or in inch-pound units (M 86). SI units and inch-pound units are not necessarily equivalent. Inch-pound units are shown in brackets in the text for clarity, but they are the applicable values when the material is ordered to M 86.

Note 1—This specification is a manufacturing and purchasing specification only and does not include requirements for bedding, backfill, or the relationship between field load conditions and the strength classification of pipe. However, experience has shown that the successful performance of this product depends on the proper selection of the class of pipe, type of bedding and backfill, and care that the installation conforms to the construction specifications. Owners are cautioned that they must correlate the field requirements with the class of pipe specified and provide for or require inspection at the construction site.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 6, Fine Aggregate for Hydraulic Cement Concrete
- M 80, Coarse Aggregate for Hydraulic Cement Concrete
- M 85, Portland Cement
- M 157, Ready-Mixed Concrete
- M 194M/M 194, Chemical Admixtures for Concrete
- M 240M/M 240, Blended Hydraulic Cement
- M 262, Concrete Pipe and Related Products
- M 295, Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- M 302, Slag Cement for Use in Concrete and Mortars
- M 339M/M 339, Thermometers Used in the Testing of Construction Materials
- T 280, Concrete Pipe, Manhole Sections, or Tile

Standard Specification for

Steel Castings, Carbon, for General Application

AASHTO Designation: M 103M/M 103-19

Technically Revised: 2019 **Editorially Revised: 2022**

Technical Subcommittee: 4f, Metals

ASTM Designation: *A27/A27M-20*

1. SCOPE

1.1. This specification covers carbon steel castings for general applications that require up to 485 MPa [70 ksi] minimum tensile strength.

Note 1—The grades covered by this specification represent materials that are suitable for assembly with other steel castings or wrought steel parts by fusion welding. It is not intended to imply that all these grades possess the same degree of weldability or that the same welding techniques can be used on all castings. It is the responsibility of the purchaser to establish for himself a suitable welding technique.

1.2. Several grades and two classes of steel castings are covered, as indicated below. The grade and class desired shall be specified by the purchaser.

1.2.1. *Grade N-1*—Chemical analysis only.

1.2.2. *Grade N-2*—Heat treated but not mechanically tested.

1.2.3. *Grade U-415-205 [60-30]*—Mechanically tested but not heat treated.

1.2.4. *Grades 415-205 [60-30], 450-240 [65-35], 485-250 [70-36], and 485-275 [70-40]*—Heat treated and mechanically tested.

1.2.5. Class 1 and Class 2 steel castings shall be specified in accordance with Section 9.2.

1.3. This specification is applicable to orders in either SI units (as M 103M) or inch-pound units (as M 103). 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. Inch-pound units are shown in brackets in the text for clarity, but they are the applicable values when the material is ordered to M 103.

1.4. 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 or regulatory limitations prior to use.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standard*:

- T 244, Mechanical Testing of Steel Products

2.2. *ASTM Standards*:

- A781/A781M, Standard Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use
- A957/A957M, Standard Specification for Investment Castings, Steel and Alloy, Common Requirements, for General Industrial Use

3. GENERAL CONDITIONS FOR DELIVERY

3.1. Except for steel investment castings, material furnished to this specification shall conform to the requirements of ASTM A781/A781M, including any supplementary requirements that are indicated on the purchase order. Failure to comply with the general requirements of ASTM A781/A781M constitutes nonconformance with the specification. In case of a conflict between this specification and ASTM A781/A781M, this specification shall prevail.

3.2. Steel investment castings furnished to this specification shall conform to the requirements of ASTM A957/A957M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the common requirements of ASTM A957/A957M constitutes nonconformance with the specification. In case of a conflict between the requirements of this specification and ASTM A957/A957M, ASTM A957/A957M shall prevail.

4. ORDERING INFORMATION

4.1. *Orders for material under this specification should include the following information in proper sequence*:

4.1.1. Quantity;

4.1.2. Specification, grade (Section 1.2), and class (Section 9.2);

4.1.3. Description of the casting by pattern number or drawing;

4.1.4. Options in the specification; and

4.1.5. Supplementary requirements desired, including standards of acceptance.

5. HEAT TREATMENT

5.1. All castings of Grades N-2, 415-205 [60-30], 450-240 [65-35], 485-250 [70-36], and 485-275 [70-40] shall be heat treated by annealing, normalizing, normalizing and tempering, or quenching and tempering. Unless otherwise specified in the inquiry, contract, or order, the castings may be heat treated by any one or combination of these heat treatments at the option of the manufacturer.

5.1.1. Heat treatment shall be performed after castings have been allowed to cool from the pouring temperature to below the transformation range.

5.2. Furnace temperatures for heat treating shall be regulated by the use of pyrometers.

15.1.1. *Adhesion Test*—Class A, extruded and bonded, must conform to the requirements of Section *15.1.1.1*. Class B, bonded, must conform to the requirements of Section *15.1.1.2*. Class A, extruded, is not subject to adhesion test.

15.1.1.1. Three specimens from each lot shall be tested. Measure a distance of 19 mm ($^3/_4$ in.) from the end of the specimen. With a regular hand grip wire stripper, exert maximum hand pull parallel to the axis of the wire. Attempt to remove the measured portion of the vinyl sleeve from the core wire. The lot shall be acceptable if the vinyl sleeve is not capable of being removed from the core wire on all three specimens.

15.1.1.2. Three specimens from each lot shall be tested. Make two cuts parallel to the axis of the wire through the coating, approximately 2 mm ($^1/_{16}$ in.) apart and at least 13 mm ($^1/_2$ in.) long. With a knife, peel back a section of the coating between 3 mm ($^1/_8$ in.) and 6 mm ($^1/_4$ in.) long to produce a tab. Attempt to remove the 2-mm ($^1/_{16}$-in.) strip of coating by pulling the tab. The lot shall be acceptable if the coating breaks rather than separates from the core wire on all three specimens.

15.1.2. *Accelerated Aging*—Polymer-coated wire from which the fabric is woven shall withstand exposure for 1000 h when tested in accordance with ASTM G152 Table X1.1 Cycle 1 or ASTM G155 Table X3.1 Cycle 1. The product shall be construed to have failed the test if:

15.1.2.1. The wire fails to withstand the mandrel bend test described in Section *15.1.3*.

15.1.2.2. Shrinkage of the polymer coating is greater than 5.2 mm/m ($^1/_{16}$ in./ft) of wire.

15.1.2.3. There is a significant change in color or gloss of the polymer surface as determined by visual inspection.

15.1.3. *Mandrel Bend*—The mandrel bend test shall be performed on an individual picket removed from the fabric. The specimen may be any length of wire over 305 mm (12 in.) and shall include both bends and straight sections, but shall not include either twists or knuckles. The polymer-coated wire when subjected to a single bend at –28.9°C (–20°F) around a mandrel no larger than 10 times the diameter of the wire shall not exhibit breaks or cracks in the polymer coating.

15.1.4. *Color*—Unless otherwise stipulated by the purchaser, the color of the polymer in both Class A and Class B fabric shall be in accordance with the standard colors contained in Table 11.

Table 11—Standard Polymer Colors

	Munsell Units (ASTM D1535 and ASTM D1729)		
	Medium Green	Dark Green	Black
Hue	7.5G to 2.5G	0.1G to 7.5G	See chroma tolerance
Value	3.5 to 4.5	2.3 to 3.3	1.3 to 2.1
Chroma	Greater than 6	1 to 4	Max = 0.5 (any hue)

15.1.4.1. Compliance with this requirement shall be determined by comparison of specimens of the polymer-coated wire to standard flat specimens of fused film of approximately the thickness specified for the polymer coating to be applied to the wire, and measuring at least 38 by 38 mm ($1^1/_2$ by $1^1/_2$ in.).

15.1.4.2. Standard flat specimens for the evaluation of color of Class A polymer coating shall be prepared by milling, calendering, or compression molding polymer pellets using temperatures approximating those to be used in the extrusion process.

15.1.4.3. Standard flat specimens for the evaluation of Class B polymer coatings shall be prepared by thermally fusing polymer powder onto a suitable base using temperatures approximating those to be used in the powder-coating process.

15.1.4.4. The color of the standard flat specimens shall be determined in accordance with ASTM D1535 and ASTM D1729.

16. WORKMANSHIP (FABRIC)

16.1. Chain-link fabric shall be produced by methods recognized as good commercial practices. Excessive roughness, blisters, sal-ammoniac spots, bruises, flaking, frozen knuckles, or other defects, if present to any considerable extent, shall provide a basis for rejection. Polymer coatings shall be without voids and without tears or cuts that reveal the substrate.

17. STANDARD LENGTH OF ROLLS (FABRIC)

17.1. The standard length of roll shall be 15.2 m (50 ft) ±1 percent except as otherwise agreed on at the time of purchase.

17.2. The length of roll shall be determined by unrolling a roll of fabric on a flat surface and exerting tension by appropriate means to remove all slack. The tension applied shall not reduce the actual height of the fabric by more than 5.2 mm/m ($^1/_{16}$ in./ft) of height or by more than 12.7 mm ($^1/_2$ in.), whichever is less.

18. SAMPLING AND NUMBER OF TESTS (FABRIC)

18.1. A lot shall be 50 rolls or fraction thereof of chain-link fabric of the same size and type offered for inspection at one time. One roll from every lot shall be taken at random as a sample for test purposes. However, in no case shall fewer than two rolls from the entire quantity offered for inspection be sampled and tested, except when the entire quantity offered for inspection is fewer than ten rolls; then only one roll shall be selected for the sample.

18.2. Sample rolls selected shall be inspected for weave (Section 8), size of mesh (Section 9), diamond count (Section 8.2), wire size (Section 11), height of fabric (Section 12), selvage (Section 13), and length of roll (Section 17).

18.3. Test specimens shall be taken from the outside end of the sample rolls and tested for breaking strength (Section 10) and, if applicable, mass or thickness of coating (Section 14).

18.4. If material tested fails to meet any of the requirements of this specification, the roll sampled shall be rejected, and two additional rolls shall be tested from the same lot, both of which shall meet the requirements in every respect or the lot represented by the samples will be rejected.

18.5. The manufacturer may elect to test for breaking strength and mass or thickness of coating before weaving the wire into fabric; however, the purchaser reserves the right to sample and test wire from the complete fabric for compliance.

19. INSPECTION (FABRIC)

19.1. The engineer, or his representative, shall have free entry, at all times, to all parts of the manufacturer's or fabricator's works that concern the manufacture or fabrication of materials furnished under this specification. Each product or article furnished under this specification shall

A4. CALCULATION

A4.1. Calculate the activity index with portland cement as follows:

Activity index with portland cement = $(A/B) \times 100$

where:

A = average compressive strength of test mix cubes, MPa; and

B = average compressive strength of control mix cubes, MPa.

A5. PRECISION AND BIAS

A5.1. *Precision*—Single operator precision on blended cements using fly ash is essentially the same as on fly ash/cement blends in ASTM Research Report C09-1001,[3] and it was found to have 3.8 percent coefficient of variation (1s percent). This indicates that results of two properly conducted tests by the same operator should not differ by more than 10.7 percent (d2s) of the average of two results. Because the test is performed solely for the purpose of manufacturer certification of raw material quality, no multilaboratory precision is applicable.

A5.2. *Bias*—Because there are no standard reference materials, bias cannot be determined.

APPENDIX

(Nonmandatory Information)

X1. MANUFACTURER'S CERTIFICATION (MILL TEST REPORT)

X1.1. To provide uniformity for reporting the results of tests performed on blended cements under this specification, as required by Section 15 of M 240, Manufacturer's Certification, an example Mill Test Report is shown in Figure X1.1.

X1.2. The identity information given should unambiguously identify the cement production represented by the Mill Test Report and may vary, depending on the manufacturer's designation and purchaser's requirements.

X1.3. The Manufacturer's Certification statement may vary, depending on the manufacturer's procurement order or legal requirements, but should certify that the blended cement shipped is represented by the certificate and that the blended cement conforms to applicable requirements of the specification at the time it was tested (or retested) or shipped.

X1.4. The sample Mill Test Report has been developed to reflect the chemical and physical requirements of this specification and recommends reporting all analyses and tests normally performed on blended cements meeting M 85. Purchaser reporting requirements should govern if different from normal reporting by the manufacturer or from those recommended here.

X1.5. Blended cements may be shipped prior to later-age test data being available. In such cases, the test value may be left blank. Alternatively, the manufacturer can generally provide estimates based on historical production data. The report should indicate if such estimates are provided.

X1.6. In reporting limits from the tables in M 240 on the Mill Test Report, only those limits specifically applicable should be listed. In some cases, M 240 table limits are superseded by other provisions.

ABC Portland Cement Company
Qualitytown, N.J.

Plant Example | Blended Cement Type: IL(13) | Date April 15, 20xx

Production Period March 1, 20xx – March 31, 20xx

AASHTO M 240

REQUIREMENTS

Chemical		
Item	Spec. Limit	Test Result
Sulfate as SO_3 (%)	3.0 max[a]	3.2
Loss on ignition (%)	10.0 max	5.4
Equivalent alkali content of portland cement (Na_2Oeq %)	[b]	0.65

Physical		
Item	Spec. Limit	Test Result
Blaine fineness (m2/kg)	[b]	479
Fineness, No. 325 sieve (% retained)	[b]	2.6
Density (g/cm3)	[b]	3.06
Air content of mortar (volume %)	12 max	6.0
Autoclave test		
Expansion (%)	0.80 max	0.04
Contraction (%)	0.20 max	
Time of initial setting (Vicat)		
Not less than (minutes)	45	120
Not more than (hours)	7	
Compressive strength (MPa)	min:	
3 days	13.0 min	28.9
7 days	20.0 min	34.8
28 days	25.0 min	42.9[c]
Mortar bar expansion, ASTM C1038, (%)	0.020 max[a]	0.005

X1.4. The sample Mill Test Report has been developed to reflect the chemical and physical requirements of this specification and recommends reporting all analyses and tests normally performed on blended cements meeting M 85.

[a] Default table maximum may be exceeded if C1038 limit is met. Required only if percent SO3 exceeds the limit in Table 1.

[b] Not applicable.

[c] Test result for this production period not available. Most recent test result provided.

We certify that the above described blended cement, at the time of shipment, meets the chemical and physical requirements of AASHTO M 240 or (other) _____ specification.

Signature: _____ Title: _____

Figure X1.1—Example Mill Test Report for an M 240 Type IL Blended Cement

[1] In essential equivalence with ASTM C595/C595M-21.

[2] Section on Safety, *Manual of Cement Testing*, *Annual Book of ASTM Standards*, Volume 04.01.

[3] Poole, T., "Interlaboratory Test Data for Specification for Raw or Calcined Natural Pozzolan for Use in Portland Cement Concrete," ASTM Research Report C09-1001, American Society for Testing and Materials, Philadelphia, PA, February 10, 1989, 16 pages.

Standard Specification for

Slag Cement for Use in Concrete and Mortars

AASHTO Designation: M 302-22

Technically Revised: 2022 **Editorially Revised: 2022**

Technical Subcommittee: 3a, Cement, Lime, and Concrete Materials

ASTM Designation: C989/C989M-22

1. SCOPE

1.1. This specification covers slag cement for use as a cementitious material in concrete and mortar.

1.2. The values stated in SI units are to be regarded as standard. The values given in parentheses are given for information only.

1.3. *The following safety hazards caveat pertains only to the test methods described in this specification. 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.*

1.4. The text of this standard references notes that provide explanatory information. These notes and footnotes (excluding those in tables) shall not be considered as requirements of this standard.

Note 1—The material described in this specification may be used for blending with portland cement to produce a cement meeting the requirements of M 240M/M 240 or as a separate ingredient in concrete or mortar mixtures. The material may also be useful in a variety of special grouts and mortars and, when used with an appropriate activator, as the principal cementitious material in some applications.

Note 2—Information on technical aspects of the use of the material described in this specification is contained in Appendix X1, Appendix X2, and Appendix X3. More detailed information on that subject is contained in ACI 233R.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 85, Portland Cement
- M 240M/M 240, Blended 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 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-µm (No. 325) Sieve

2.2. *ASTM Standards:*

- C125, Standard Terminology Relating to Concrete and Concrete Aggregates
- C465, Standard Specification for Processing Additions for Use in the Manufacture of Hydraulic Cements
- 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
- D3665, Standard Practice for Random Sampling of Construction Materials

2.3. *American Concrete Institute Report*:

- 233R, Guide to the Use of Slag Cement in Concrete and Mortar[1]

3. TERMINOLOGY

3.1. *Definitions*:

3.1.1. *blast-furnace slag*—the nonmetallic product, consisting essentially of silicates and aluminosilicates of calcium and other bases that is developed in a molten condition simultaneously with iron in a blast furnace. (See ASTM C125.)

3.2. *Descriptions of Terms Specific to This Standard*:

3.2.1. *granulated blast-furnace slag*—the glassy granular material formed when molten blast-furnace slag is rapidly chilled as by immersion in water. (See ASTM C125.) Compositional adjustments may be made while the blast-furnace slag is molten.

3.2.2. *slag cement*—granulated blast-furnace slag, as defined and described in Sections 3.1.1 and 3.2.1 and ground to cement fineness with or without additions meeting the requirements of the section on additions.

4. CLASSIFICATION

4.1. Slag is classified by performance in the slag activity test in three grades: Grade 80, Grade 100, and Grade 120. (See Table 1.)

5. ORDERING INFORMATION

5.1. The purchaser shall specify the grade slag desired and the optional chemical or physical data to be reported.

6. ADDITIONS

6.1. *The slag cement covered by this specification shall contain no additions except as follows*:

6.1.1. It is permissible to add calcium sulfate to slag cement provided it has been demonstrated by ASTM C1038/C1038M that a test mixture will not develop expansion in water exceeding 0.020 percent at 14 days. In the test mixture, 50 percent of the mass of portland cement shall be replaced

Standard Specification for

Processing Additions for Use in the Manufacture of Hydraulic Cements

AASHTO

AASHTO Designation: M 327-22

Technically Revised: 2022

Technical Subcommittee: 3a, Cement, Lime, and Concrete Materials

ASTM Designation: C465-22

1. SCOPE

1.1. This specification pertains to the criteria and tests to be used for determining whether an organic or inorganic processing addition, when used in the recommended amount at the option of the cement producer in the manufacture of hydraulic cements, meets the requirements as prescribed by definition in M 85 and M 240M/M 240 as well as ASTM C1157/C1157M and C845/C845M. The materials listed in the following former AASHTO and ASTM specifications shall be considered as meeting the organic processing additions requirements of this specification:

- M 85-57, Portland Cement
- ASTM C205-58, Standard Specification for Portland Blast-Furnace Slag Cement
- ASTM C340-58, Standard Specification for Portland-Pozzolan Cement
- ASTM C358-58, Standard Specification for Slag Cement

1.2. *The following safety hazards caveat pertains only to the test methods described in this specification. 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. *AASHTO Standards:*

- M 6, Fine Aggregate for Hydraulic Cement Concrete
- M 80, Coarse Aggregate for Hydraulic Cement Concrete
- M 85, Portland Cement
- M 85-57, Portland Cement
- M 240M/M 240, Blended Hydraulic Cement
- R 39, Making and Curing Concrete Test Specimens in the Laboratory
- T 22, Compressive Strength of Cylindrical Concrete Specimens
- 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 119M/T 119, Slump of Hydraulic Cement Concrete

- T 121M/T 121, Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- 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 137, Air Content of Hydraulic Cement Mortar
- T 152, Air Content of Freshly Mixed Concrete by the Pressure Method
- T 153, Fineness of Hydraulic Cement by Air Permeability Apparatus
- T 196M/T 196, Air Content of Freshly Mixed Concrete by the Volumetric Method
- T 231, Capping Cylindrical Concrete Specimens

2.2. *ASTM Standards:*

- C205-58, Standard Specification for Portland Blast-Furnace Slag Cement (withdrawn 1967; replaced by C595)
- C226, Standard Specification for Air-Entraining Additions for Use in the Manufacture of Air-Entraining Hydraulic Cement
- C340-58, Standard Specification for Portland-Pozzolan Cement (withdrawn 1967)
- C358-58, Standard Specification for Slag Cement (withdrawn 1967)
- C596, Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement
- C845/C845M, Standard Specification for Expansive Hydraulic Cement
- C1157/C1157M, Standard Performance Specification for Hydraulic Cement
- D891, Standard Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals
- E203, Standard Test Method for Water Using Volumetric Karl Fischer Titration

3. MATERIALS

3.1. *Cements:*

3.1.1. In cases where it is desired that the proposed organic processing addition be accepted for general use in portland cement, tests shall be made on cements prepared from at least five different clinkers. As a minimum, these clinkers shall represent two Type I cements containing not less than 9.0 percent C_3A, one Type II cement, and two Type III cements, all conforming to M 85.

3.1.2. In cases where it is also desired that the proposed organic processing addition be used in blended cements, the test and test procedures shall be as specified with a control and an addition for cement conforming to the appropriate specification, M 240M/M 240 or ASTM C1157/C1157M.

3.1.3. Organic processing additions that have been shown to meet the requirements of this specification may also be used in cements conforming to ASTM C845/C845M. Testing of the addition with these special cements, where desired, shall be done using the tests and test procedures as specified with a control cement and a cement containing the addition, both conforming to ASTM C845/C845M.

3.1.4. In cases where it is desired that the proposed organic processing addition be limited in use to specific types of cement less in number than required in Section 3.1.1, the tests and test procedures shall be as specified, and at least two pairs of cements shall be prepared from two clinkers from different plants for each type under specific consideration.

3.1.5. For inorganic processing additions, or in cases where it is desired that the proposed organic processing addition be limited in use to a single plant, the tests and test procedures shall be as specified, and at least two pairs of cements shall be prepared from clinkers representing each type under specific consideration.

5.2.7. Compost shall be uniformly applied using an approved spreader unit, such as a pneumatic blower, specialized berm machine, etc. When applied, the compost should be directed at the soil surface, compacting (settling) and shaping the berm to some degree. The filter berm may also be applied by hand when approved by the project engineer or landscape designer.

5.2.8. On highly unstable soils, use compost filter berms in conjunction with appropriate structural measures. If used in conjunction with a silt fence, the silt fence fabric shall be laid on the soil surface with the lip facing the slope. The compost filter berm shall be constructed at the uphill base of the silt fence and over the entire fence fabric lip.

5.2.9. Seeding the berm may be done, if desired, in conjunction with pneumatic blowing, or following berm construction with a hydraulic seeding unit, or by hand.

5.3. *Filter Socks*:

5.3.1. Filter socks shall either be made on site or delivered to the job site. The filter sock shall be produced from a 5-mil-thick continuous high-density polyethylene (HDPE) filament, woven into a tubular mesh netting material with openings in the knitted mesh of $^{1}/_{16}$-in. (1.5-mm) to $^{3}/_{8}$-in. (10-mm) or a multifilament polypropylene tubular mesh netting material with $^{1}/_{8}$-in. (3-mm) openings. This shall then be filled with compost meeting the specifications outlined in Table 1 to the diameter of the sock. Filter sock netting materials are also available in *natural biodegradable materials (e.g., cotton, wood fiber)* for areas where removal and disposal are not planned. Filter socks contain the compost, allowing filtration to occur even during peak storm events and concentrated flows.

5.3.2. Filter socks will be placed at locations indicated on plans as directed by the engineer. Filter socks should be installed parallel to the base of the slope or other affected area, perpendicular to sheet flow. In extreme conditions (i.e., 2:1 slopes), or when sheet flow flows to the area from a parcel above the work zone, a second sock shall be constructed at the top of the slope in order to dissipate flows.

5.3.3. At locations where greater than a 200-ft-long section of ground is to be treated with a filter sock, the sock lengths should be sleeved. After one sock section (200-ft) is filled and tied off (knotted) or zip tied, the second sock section shall be pulled over the first (1–2-ft) and "sleeved," creating an overlap. Once overlapped, the second section is filled with compost starting at the sleeved area to create a seamless appearance. The socks may be staked at the overlapped area (where the sleeve is) to keep the sections together. Sleeving at the joints is necessary because it reduces the opportunity for water to penetrate the joint when installed in the field.

5.3.4. In general, a 12-in.-diameter filter sock will replace a normal (24-in.) silt fence, and an 18-in. diameter filter sock will replace a "super silt" (36-in.) silt fence reinforced with steel posts.

5.3.5. If the filter sock is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The engineer shall specify seed requirements.

5.3.6. Filter socks may be used in direct flow situations perpendicular to runoff channels not exceeding 3-ft (90-cm) in depth. Normally, 8-in. filter socks should be used. Be sure to stake the filter sock perpendicular to water flow, at a minimum interval of 10 linear feet, using 2-in. (5-cm) wooden stakes. The stakes should be projected through the center of the filter sock and into the soil 1-ft (30-cm) deep and leaving 3–4 in. (7.5–10-cm) protruding above the filter sock.

6. TEST METHODS

6.1. The chemical, physical, and biological analysis of the compost shall be determined in accordance with the *Test Methods for the Examination of Composting and Compost* (TMECC), jointly published by the U.S. Department of Agriculture and the U.S. Composting Council (2002, publishing as a part of the USDA National Resource Conservation Technical Bulletin Series) (see Appendix X1).

6.2. TMECC 02.12-B or ASTM D2977 shall be used to determine gradation of the compost.

7. SAMPLING, TESTING, PACKING, AND MARKING

7.1. The sampling, testing, packing, and marking of compost samples shall be done in accordance with TMECC 02.01-B (Selection of Sampling Locations for Windrows and Piles).

8. KEYWORDS

8.1. Compost; compost logs; compost socks; compost tubes; compost wattles; erosion control; filter berm; filter logs; filter socks; filter tubes; sediment control; sheet flow.

APPENDIXES

(Nonmandatory Information)

X1. METHODS FOR THE SAMPLING AND CHARACTERIZATION OF COMPOST

X1.1. Sampling procedures to be used for purposes of this specification (and the Seal of Testing Assurance Program) are as provided in 02.01, Field Sampling of Compost Materials, and 02.01-B, Selection of Sampling Locations for Windrows and Piles of the Test Methods for the Examination of Composting and Compost (TMECC), Chapter 2, Section One, Sample Collection and Laboratory Preparation, jointly published by the USDA and USCC (2002, publishing as a part of the USDA National Resource Conservation Technical Bulletin Series). The sample collection section is available online at http://compostingcouncil.org.

X1.2. Test Methods to be used for purposes of this specification are as provided in the Test Methods for the Examination of Composting and Compost (TMECC), jointly published by the USDA and USCC (2002, publishing as a part of the USDA National Resource Conservation Technical Bulletin Series). A list of such methods is provided in the table below and online at http://compostingcouncil.org.

X6.2. *Methods to Reduce Likelihood of Misalignment Effects*—Although perfect alignment is not possible, the effects of misalignments can be minimized.

X6.2.1. *Grip Type*—The use of flat grips may reduce the likelihood of encountering alignment-based effects during testing.

X6.2.2. *Cast Specimens*—If the test specimen is to be cast, it is critical that the molds have flat, parallel sides. Ensure that the molds are sturdy, well assembled, and not deformed. Over time, molds can become deformed due to less-than-careful demolding and reassembly.

X6.2.3. *Cut Specimens*—If the test specimen is to be cut from a larger sample, it is critical that the cut faces be flat and parallel. Ridges on cut faces created by the specimen extraction method can cause alignment problems.

X6.2.4. *Transfer Plates*—If transfer plates are installed on the test specimen, the plates should be of uniform cross-section. The method for affixing the plates to the test specimen, generally with a structural adhesive, should also be controlled such that the thickness of the adhesive remains uniform.

X6.2.5. *Alignment of Testing Machine Heads*—The centers of the opposing grips should be aligned translationally and concentrically. ASTM E1012 offers a specific methodology for aligning a testing machine. The testing machine with wedge grips that was commonly used during the development of this test method was aligned to within ASTM E1012 Class 5 in order to minimize alignment issues.

X6.3. *Indications of Misalignment in Captured Experimental Data*:

X6.3.1. The alignment or misalignment of a test specimen can be observed and recorded when the specimen is gripped in the testing machine. Generally, misalignment induces bending within the gage length of a specimen that will occur during the gripping process, and thus can happen very quickly and outside of the load application portion of a test. As such, collection and recording of data from the electronic displacement measurement sensors should be initiated prior to the initiation of the gripping process.
In order to detect the magnitude of any imparted bending within the gage length, the individual displacement measurements for opposite faces of a test specimen will need to be examined. Generally, the individual measurements on parallel faces of the test specimen during gripping will be approximately equal and opposite, demonstrating that the specimen has been subjected to bending stresses. This bending induced deformation will be one sign on one face (i.e., compression) and of the opposite sign (i.e., tension) on the opposing face. The axial component of the deformation for two opposing faces is the average of the response from both faces (i.e., the bending portions on opposing faces cancel each other out because it is a rectangular cross section subjected to elastic flexural stresses). Likewise, the axial component for the test specimen as a whole, is the average of the response from all four faces; and since the axial load during gripping is maintained near zero, the observed average axial component will also be nearly zero.

X6.3.2. Figures X6.3, X6.4, and X6.5 demonstrate informative data that can be captured during the execution of the test method. The average load as measured by the load cell in the testing machine is plotted versus the average specimen displacement along the gauge length in Figure X6.3. The measured displacements from the four transducers, each located 49.15 mm [1.935 in. from a face of a 50.8 mm by 50.8 mm [2 in. by 2 in.] prismatic cross-section specimen, are averaged to generate the displayed displacement values. The results from this test specimen are similar to a Type H-2 response, however, first cracking appears to have occurred at a significantly lower load level than subsequent cracking.

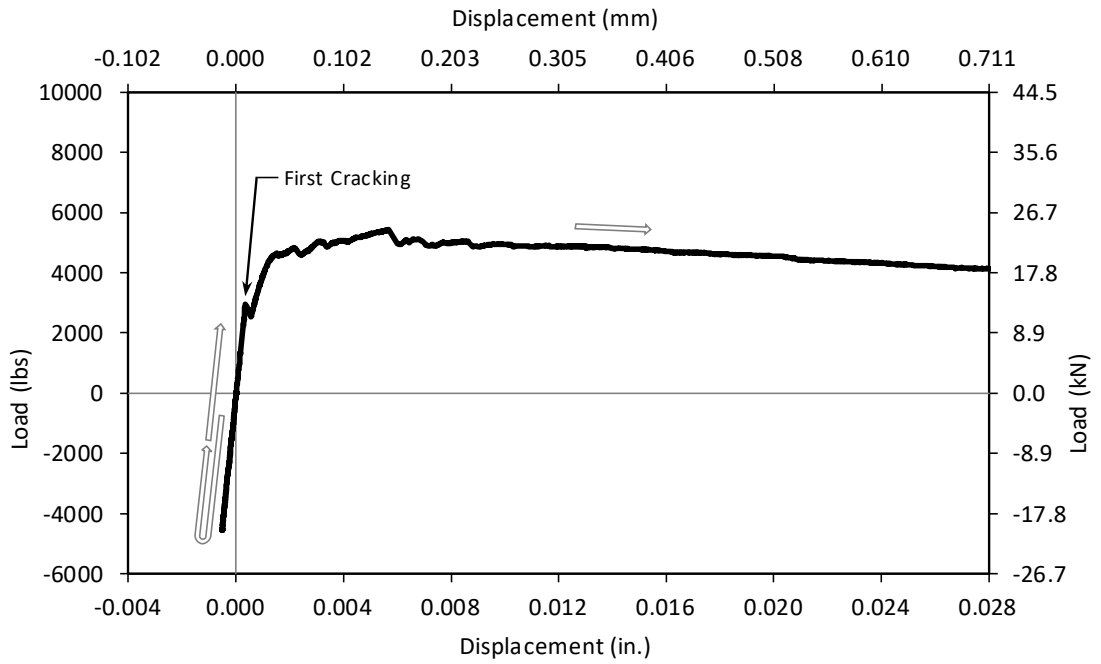

Figure X6.3—Applied Load versus Average Displacement within the Gauge Length

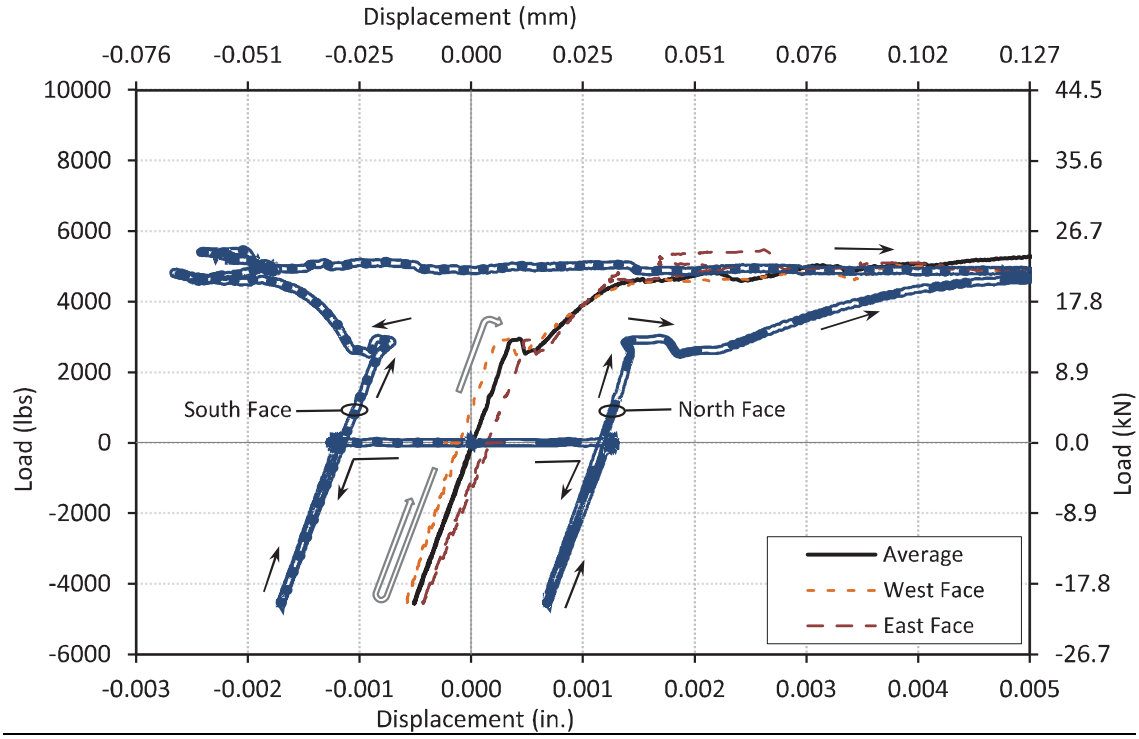

Figure X6.4—Initial Applied Load versus Displacement on Each of the Four Faces of the Test Specimen from Figure X6.3