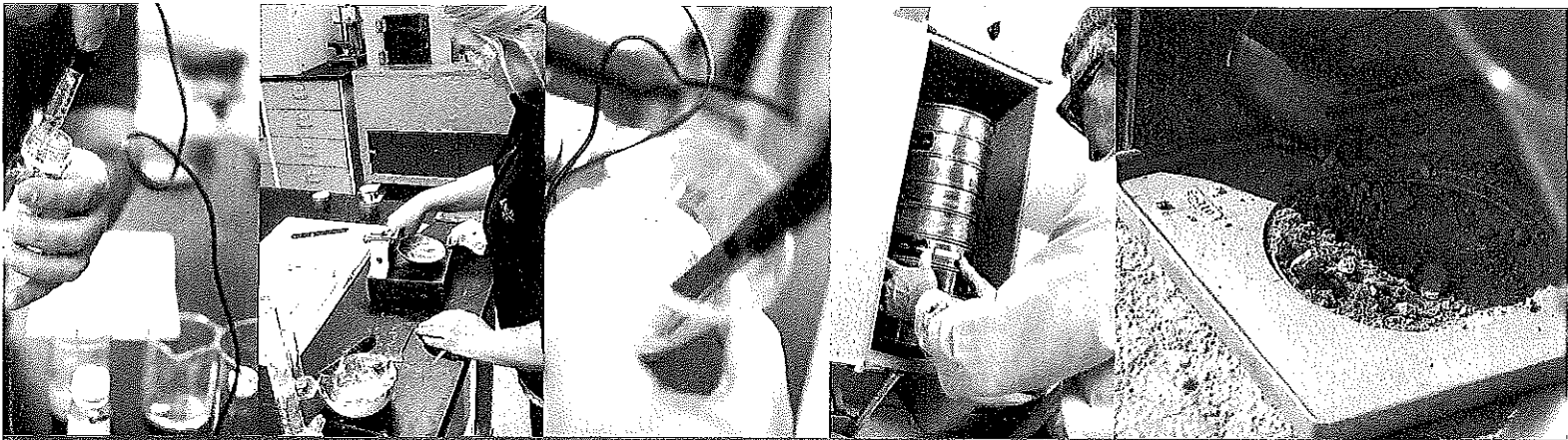


AMERICAN ASSOCIATION OF
STATE HIGHWAY AND
TRANSPORTATION OFFICIALS

AASHTO
THE VOICE OF TRANSPORTATION



STANDARD SPECIFICATIONS

for Transportation Materials
and Methods of Sampling and Testing

34TH EDITION • 2014

PART 2B: TESTS
T 233–T 253

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DELETED SPECIFICATIONS

No methods of test were deleted from the 34th Edition.

As an aid to the user of this volume, the following tabulation shows equivalencies between AASHTO and ASTM specifications. Where an asterisk () follows the ASTM number, there is a difference between the two specifications. These differences are explained in the endnote accompanying each individual specification.*

AASHTO Specifications	ASTM Equivalent	AASHTO Specifications	ASTM Equivalent
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T 11-05 (2013)	C 117-13*	T 131-10 (2014)	C 191-08
T 19M/T 19-14	C 29/C 29M-09	T 133-11	C 188-09
T 21-05 (2009)	C 40-04*	T 137-12	C 185-08
T 22-14	C 39/C 39M-05*	T 148-07 (2011)	C 174/C 174M-06*
T 23-14	C 31-06*	T 152-13	C 231/ C 231M-10
T 24M/T 24-07 (2011)	C 42/C 42M-04	T 153-13	C 204-11
T 27-14	C 136-06*	T 154-11	C 266-08
T 37-07 (2011)	D 546-05*	T 155-13	C 156-11
T 40-02 (2012)	D 140-01*	T 157-12	C 233/C 233M-10a
T 42-10	D 545-08*	T 158-11	C 232/C 232M-09
T 44-14	D 2042-01*	T 160-09 (2014)	C 157/C 157M-06
T 48-06 (2010)	D 92-05a*	T 161-08 (2012)	C 666/C 666M-03
T 49-14	D 5-06 ^{ε1} *	T 162-14	C 305-12
T 50-14	D 139-12*	T 164-14	D 2172/D 2172M-11*
T 51-09 (2013)	D 113-07*	T 168-03 (2011)	D 979-01 (2006) ^{ε1} *
T 53-09 (2013)	D 36-06*	T 177-10	C 293-08
T 65M/T 65-13	A 90/A 90M-11*	T 178-10	C 1084-02
T 71-08 (2012)	C 87/C 87M-10*	T 179-05 (2013)	D 1754-97 (2002)*
T 84-13	C 128-12	T 185-11	C 359-08
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T 96-02 (2010)	C 131-01*	T 190-14	D 2844-07
T 97-14	C 78-08	T 192-11	C 430-08
T 98-12	C 115-10	T 195-11	D 2489/D 2489M-08
T 100-14	D 854-00*	T 196M/T 196-11	C 173/C 173M-10
T 105-14	C 114-11b ^{ε1}	T 197M/T 197-11	C 403/C 403M-08
T 106M/T 106-13	C 109/C 109M-11b	T 198-09 (2014)	C 496/C 496M-04
T 107M/T 107-11	C 151/ C 151M-09	T 201-10	D 2170-07*
T 110-03 (2011)	D 1461-85 (2006)*	T 202-10	D 2171-07*
T 112-00 (2012)	C 142-97*	T 206-09 (2013)	D 1586-11
T 113-06 (2010)	C 123-04	T 207-12	D 1587-08
T 119M/T 119-13	C 143/C 143M-12	T 208-10	D 2166-00
T 121M/T 121-12	C 138/C 138M-10a	T 210-10	D 3744-03*
T 127-11	C 183-08	T 213M/T 213-11	A 428/A 428M-10*

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T 216-07 (2012)	D 2435-04	T 269-14	D 3203/D 3203M-11*
T 221-90 (2012)	D 1195/D 1195M-09	T 276-10	C 918-02
T 226-90 (2013)	D 2664-86	T 277-07 (2011)	C 1202-05
T 228-09 (2013)	D 70-08*	T 278-90 (2012)	E 303-93 (2008)
T 231-13	C 617-98 (2003)	T 279-14	D 3319-11
T 236-08 (2013)	D 3080-72 (2003)*	T 280-14	C 497-13*
T 240-13	D 2872-04*	T 281-14	C 301-13*
T 242-96 (2013)	E 274/E 274M-11*	T 282-01 (2010)	E 556-95 (2000)
T 243M/T 243-08 (2012)	A 673/A 673M-07 (2012)	T 295-13	D 3142/D 3142M-11
T 244-14	A 370-12a	T 297-94 (2012)	D 4767-88 ^{E1} *
T 246-10	D 1560-09*	T 327-12	D 6928-10*
T 247-10	D 1561-92	T 331-13	D 6752/D 6752M-11*
T 248-14	C 702/C 702M-11*	T 344-12	D 7115-05*
T 255-00 (2012)	C 566-97 (2004)*		

<i>ASTM Specifications</i>	<i>AASHTO Equivalent</i>	<i>ASTM Specifications</i>	<i>AASHTO Equivalent</i>
A 90/A 90M-11*	T 65M/T 65-13	C 266-08	T 154-11
A 370-12a	T 244-14	C 293-08	T 177-10
A 428/A 428M-10*	T 213M/T 213-11	C 301-13*	T 281-14
A 673/A 673M-07 (2012)	T 243M/T 243-08 (2012)	C 305-12	T 162-14
C 29/C 29M-09	T 19M/T 19-14	C 359-08	T 185-11
C 31-06*	T 23-14	C 403/C 403M-08	T 197M/T 197-11
C 39/C 39M-05*	T 22-14	C 430-08	T 192-11
C 40-04*	T 21-05 (2009)	C 451-08*	T 186-11
C 42/C 42M-04	T 24M/T 24-07 (2011)	C 496/C 496M-04	T 198-09 (2014)
C 78-08	T 97-14	C 497-13*	T 280-14
C 87/C 87M-10*	T 71-08 (2012)	C 566-97 (2004)*	T 255-00 (2012)
C 109/C 109M-11b	T 106M/T 106-13	C 617-98 (2003)	T 231-13
C 114-11b ^{e1}	T 105-14	C 666/C 666M-03	T 161-08 (2012)
C 115-10*	T 98-12	C 702/C 702M-11*	T 248-14
C 117-13*	T 11-05 (2013)	C 918-02	T 276-10
C 123-04	T 113-06 (2010)	C 1084-02	T 178-10
C 127-12	T 85-14	C 1202-05	T 277-07 (2011)
C 128-12	T 84-13	D 5-06 ^{e1} *	T 49-14
C 131-01*	T 96-02 (2010)	D 36-06*	T 53-09 (2013)
C 136-06*	T 27-14	D 70-08*	T 228-09 (2013)
C 138/C 138M-10a	T 121M/T 121-12	D 75-03*	T 2-91 (2010)
C 142-97*	T 112-00 (2012)	D 92-05a*	T 48-06 (2010)
C 143/C 143M-12	T 119M/T 119-13	D 113-07*	T 51-09 (2013)
C 151/C 151M-09	T 107M/T 107-11	D 139-12*	T 50-14
C 156-11	T 155-13	D 140-01*	T 40-02 (2012)
C 157/C 157M-06	T 160-09 (2014)	D 545-08*	T 42-10
C 173/C 173M-10	T 196M/T 196-11	D 546-05*	T 37-07 (2011)
C 174/C 174M-06*	T 148-07 (2011)	D 854-00*	T 100-14
C 183-08	T 127-11	D 979-01 (2006) ^{e1} *	T 168-03 (2011)
C 185-08	T 137-12	D 1195/D 1195M-09	T 221-90 (2012)
C 187-11 ^{e1}	T 129-14	D 1461-85 (2006)*	T 110-03 (2011)
C 188-09	T 133-11	D 1560-09*	T 246-10
C 191-08	T 131-10 (2014)	D 1561-92	T 247-10
C 204-11	T 153-13	D 1586-11	T 206-09 (2013)
C 231/C 231M-10	T 152-13	D 1587-08	T 207-12
C 232/C 232M-09	T 158-11	D 1754-97 (2002)*	T 179-05 (2013)
C 233/C 233M-10a	T 157-12	D 2042-01*	T 44-14

<i>ASTM Specifications</i>	<i>AASHTO Equivalent</i>	<i>ASTM Specifications</i>	<i>AASHTO Equivalent</i>
D 2166-00	T 208-10	D 3203/D 3203M-11*	T 269-14
D 2170-07*	T 201-10	D 3319-11	T 279-14
D 2171-07*	T 202-10	D 3744-03*	T 210-10
D 2172/D 2172M-11*	T 164-14	D 4767-88 ^{e1} *	T 297-94 (2012)
D 2435-04	T 216-07 (2012)	D 6752/D 6752M-11*	T 331-13
D 2489/D 2489M-08	T 195-11	D 6928-10*	T 327-12
D 2664-86	T 226-90 (2013)	D 7115-05*	T 344-12
D 2844-07	T 190-14	E 274/E 274M-11	T 242-96 (2013)
D 2872-04*	T 240-13	E 303-93 (2008)	T 278-90 (2012)
D 3080-72 (2003)*	T 236-08 (2013)	E 556-95 (2000)	T 282-01 (2010)
D 3142/D 3142M-11	T 295-13		

Revisions for 34th Edition of Standard Specifications for Transportation Materials and Methods of Sampling and Testing—Part 2

The balloted technical and editorial changes listed below are also indicated in the specifications by a change bar in the left margin. Non-balloted editorial changes do not receive a change bar.

Designation Number*	Title	Technical Section Number	2013 Ballot Revision
T 11-05 (2013)	Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing	1c	Reconfirmed in 2013.
T 19M/T 19-14	Bulk Density ("Unit Weight") and Voids in Aggregate	1c	Revised Section 5.5.1 to maintain equivalency with ASTM C 29/C 29M-09.
T 22-14	Compressive Strength of Cylindrical Concrete Specimens	3c	Revised Section 6.2 and added Sections 9.1.6.1 through 9.1.6.4.
T 23-14	Making and Curing Concrete Test Specimens in the Field	3c	Revised Section 6.2.
T 26-79 (2008)	Quality of Water to Be Used in Concrete	3b	Discontinued due to lack of use.
T 27-14	Sieve Analysis of Fine and Coarse Aggregates	1c	Revised Sections 8.1 and 8.6.
T 30-14	Mechanical Analysis of Extracted Aggregate	2c	Revised Sections 4.8, 7.2, 7.5, and 7.6, and added the new Table 1.
T 44-14	Solubility of Bituminous Materials	2b	Revised Section 9.2.
T 49-14	Penetration of Bituminous Materials	2b	Revised exception 4 to Section 7.2 of ASTM D 5-06 ^{e1} .
T 50-14	Float Test for Bituminous Materials	2a	Updated to maintain equivalency with ASTM D 139-12.
T 51-09 (2013)	Ductility of Asphalt Materials	2b	Reconfirmed in 2013.
T 53-09 (2013)	Softening Point of Bitumen (Ring-and-Ball Apparatus)	2b	Reconfirmed in 2013.
T 78-14	Distillation of Cutback Asphalt Products	2a	Revised Sections 2.2, 5.9, 6.2, and 8.6 and Note 2. Deleted Sections 2.3, 5.11, and 5.12.
T 85-14	Specific Gravity and Absorption of Coarse Aggregate	1c	Revised Section 8.4.
T 90-14	Determining the Plastic Limit and Plasticity Index of Soils	1a	Revised extensively.

Designation Number*	Title	Technical Section Number	2013 Ballot Revision
T 97-14	Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)	3c	Added Sections 2.3 and 8.4, including new Note 3.
T 100-14	Specific Gravity of Soils	1a	Revised extensively.
T 102-09 (2013)	Spot Test of Asphaltic Materials	2b	Reconfirmed in 2013.
T 105-14	Chemical Analysis of Hydraulic Cement	3a	Revised Sections 6.2.6, 18.1.2, and 18.2.2.1 to maintain equivalency with ASTM C 114-11b ^{e1} .
T 129-14	Amount of Water Required for Normal consistency of Hydraulic Cement Paste	3a	Revised Section 5.2 to maintain equivalency with ASTM C 187-11 ^{e1} .
T 131-10 (2014)	Time of Setting of Hydraulic Cement by Vicat Needle	3a	Reconfirmed in 2014.
T 134-05 (2013)	Moisture-Density Relations of Soil-Cement Mixtures	1b	Reconfirmed in 2013.
T 146-96 (2013)	Wet Preparation of Disturbed Soil Samples for Test	1a	Reconfirmed in 2013.
T 160-09 (2014)	Length Change of Hardened Hydraulic Cement Mortar and Concrete	3c	Reconfirmed in 2014.
T 162-14	Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency	3a	Revised Section 4.3 to maintain equivalency with ASTM C 305-12.
T 164-14	Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)	2c	Revised Sections 12.4, 25.2.6, and A1.3.2.1, and added Section A1.3.2.2.
T 176-08 (2013)	Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test	1a	Reconfirmed in 2013.
T 179-05 (2013)	Effect of Heat and Air on Asphalt Materials (Thin-Film Oven Test)	2b	Reconfirmed in 2013.
T 190-14	Resistance R-Value and Expansion Pressure of Compacted Soils	1a	Revised extensively.
T 191-14	Density of Soil In-Place by the Sand-Cone Method	1b	Revised Note 1.
T 194-97 (2013)	Determination of Organic Matter in Soils by Wet Combustion	1a	Reconfirmed in 2013.
T 198-09 (2014)	Splitting Tensile Strength of Cylindrical Concrete Specimens	3c	Reconfirmed in 2014.
T 206-09 (2013)	Penetration Test and Split-Barrel Sampling of Soils	1b	Reconfirmed in 2013.

Designation Number*	Title	Technical Section Number	2013 Ballot Revision
T 215-14	Permeability of Granular Soils (Constant Head)	1a	Revised extensively and adopted as an AASHTO standard.
T 217-14	Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Moisture Tester	1a	Revised Sections 5.2 and 6.3.
T 220-66 (2013)	Determination of the Strength of Soil-Lime Mixtures	1a	Reconfirmed in 2013.
T 226-90 (2013)	Triaxial Compressive Strength of Undrained Rock Core Specimens without Pore Pressure Measurements	1a	Reconfirmed in 2013.
T 228-09 (2013)	Specific Gravity of Semi-Solid Asphalt Materials	2b	Reconfirmed in 2013.
T 236-08 (2013)	Direct Shear Test of Soils under Consolidated Drained Conditions	1a	Reconfirmed in 2013.
T 237-05 (2014)	Testing Epoxy Resin Adhesive	4c	Reconfirmed in 2014.
T 242-96 (2013)	Frictional Properties of Paved Surfaces Using a Full-Scale Tire	5a	Reconfirmed in 2013.
T 244-14	Mechanical Testing of Steel Products	4f	Revised to maintain equivalency with ASTM A 370-12a.
T 245-14	Resistance to Plastic Flow of Asphalt Mixtures Using Marshall Apparatus	2d	Revised Sections 3.3.2 and 4.5.1, including adding a new Note 2.
T 248-14	Reducing Samples of Aggregate to Testing Size	1c	Revised Figure 3 and Sections 5.2 and 10.1.2. Added a new Section 5.3, including a new Note 2.
T 250-05 (2014)	Thermoplastic Traffic Line Material	4c	Reconfirmed in 2014.
T 252-09 (2013)	Measurements of Pore Pressures in Soils	1b	Reconfirmed in 2013.
T 258-81 (2013)	Determining Expansive Soils	1a	Reconfirmed in 2013.
T 267-86 (2013)	Determination of Organic Content in Soils by Loss on Ignition	1a	Reconfirmed in 2013.
T 269-14	Percent Air Voids in Compacted Dense and Open Asphalt Mixtures	2c	Revised Section 7.1.
T 273-86 (2013)	Soil Suction	1a	Reconfirmed in 2013.
T 279-14	Accelerated Polishing of Aggregates Using the British Wheel	5a	Revised Section 9.
T 280-14	Concrete Pipe, Manhole Sections, or Tile	4a	Revised Sections 13.4.3 and 16.4.3.

Designation Number*	Title	Technical Section Number	2013 Ballot Revision
T 281-14	Vitrified Clay Pipe	4a	Revised Sections 5.3.3.2 and 5.4.2 through 5.4.2.2. Deleted Sections 5.3.3.6 and 5.3.3.7.
T 283-14	Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage	2d	Revised extensively.
T 287-14	Asphalt Binder Content of Asphalt Mixtures by the Nuclear Method	2c	Revised Sections 3.4, 8.9, and A3.2.
T 289-91 (2013)	Determining pH of Soil for Use in Corrosion Testing	1a	Reconfirmed in 2013.
T 291-94 (2013)	Determining Water-Soluble Chloride Ion Content in Soil	1a	Reconfirmed in 2013.
T 302-05 (2013)	Polymer Content of Polymer-Modified Emulsified Asphalt Residue and Asphalt Binders	2a	Reconfirmed in 2013.
T 305-14	Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures	2c	Revised Section 7.1.2.
T 312-14	Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor	2d	Revised Annex A extensively.
T 317-04 (2013)	Prediction of Asphalt-Bound Pavement Layer Temperatures	5a	Reconfirmed in 2013.
T 319-14	Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures	2c	Revised Section 13.1.2.1.
T 321-14	Determining the Fatigue Life of Compacted Asphalt Mixtures Subjected to Repeated Flexural Bending	2d	Revised Sections 8, 9, and 10.
T 324-14	Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)	2c	Revised extensively.
T 326-05 (2013)	Uncompacted Void Content of Coarse Aggregate (As Influenced by Particle Shape, Surface Texture, and Grading)	1c	Reconfirmed in 2013.
T 335-09 (2013)	Determining the Percentage of Fracture in Coarse Aggregate	1c	Reconfirmed in 2013.
T 337-09 (2014)	Non-Instrumental Determination of Metallic Zinc in Zinc-Rich Primers	4c	Reconfirmed in 2014.
T 338-09 (2014)	Analysis of Structural Steel Coatings for Hindered Amine Light Stabilizer (HALS)	4c	Reconfirmed in 2014.
T 341-10 (2014)	Determination of Compression Capacity for Profile Wall Plastic Pipe by Stub Compression Loading	4b	Reconfirmed in 2014.

Designation Number*	Title	Technical Section Number	2013 Ballot Revision
T 350-14	Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)	2b	Adopted AASHTO Provisional standard TP 70 as a full standard.
T 351-14	Visual Stability Index (VSI) of Self-Consolidating Concrete (SCC)	3b	Adopted AASHTO Provisional standard TP 80 as a full standard.
T 352-14	Determining Formwork Pressure of Fresh Self-Consolidating Concrete (SCC) Using Pressure Transducers	3b	Adopted AASHTO Provisional standard TP 93 as a full standard.
T 353-14	Particle Size analysis of Hydraulic Cement and Related Materials by Light Scattering	3a	Adopted as a new standard.

- * The designation numbers of AASHTO materials standards are comprised of the following:
- a letter that reflects the type of standard—M for standard specifications, R for standard practices, or T for standard methods of test;
 - the unique sequential number of the standard in its type;
 - following a hyphen, the date of publication in its current form; and
 - in some cases, the year of its last reconfirmation in parentheses.

For example, T 333-07 (2012) would be a standard method of test, would carry the unique identifying number 333 in the list of specifications, was initially approved or last revised in 2007, and was reconfirmed without technical changes in 2012.