

ASPHALT CONCRETE STANDARD SPECIFICATION & TEST METHODS

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B	<u>Specification for Asphalt Concrete</u>	
	Standard Specification for Mixing Plants for Hot - Mixed , Hot - Laid Bituminous Paving Mixtures	AASHTO M 156
	Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures	ASTM D 3515
	Standard Specification for Hot-Mix Asphalt Material Properties	SCDOT Designation: SC-M- 402
	Hot rolled asphalt for roads and other paved areas, Part 1: Specification for constituent materials and asphalt mixtures	BS 594-1
	Hot rolled asphalt for roads and other paved areas, Part 2: Specification for the transport, laying and compaction of rolled asphalt	BS 594-2
	Specification for Hot binder distributors for road surface dressing	BS 1707
	Coated Macadam (Asphalt Concrete) for Roads and Other Paved Areas. Part 2: Specification for transport, laying and compaction	BS 4987
	Bitumen's for building and civil engineering, Part 3: Specification for mixtures of bitumen with pitch, tar and Trinidad lake asphalt	BS 3690
	Standard Specification for Trinidad Lake Modified Asphalt	ASTM D 5710
	Bitumen's for building and civil engineering, Part 2: Specification for mixtures of bitumen with pitch, tar and Trinidad lake asphalt	DES 6612
	Bitumen and bituminous binders, Specifications for paving grade bitumen's	BS EN 12591
	Standard Specification for Cold Mixed, Cold Laid Bituminous Paving Mixtures	ASTM D 4215
	Asphalt Cold Mix Manual	MS - 14
	Standard Specification for Designing Stone Matrix Asphalt (SMA)	AASHTO MP 8
	Standard Practice for Designing Stone Matrix Asphalt (SMA)	AASHTO PP 41

	The United Republic Of Tanzania Ministry of works , Central Materials Laboratory (CML)	Laboratory Testing Manual 2000
C	<u>Sampling</u>	
	Standard Practice for Sampling Bituminous Paving Mixture	AASHTO T 168 / ASTM D 979
	Standard Practice for Sampling Bituminous Mixtures for laboratory testing	ASTM D 5361
	Sampling and examination of bituminous mixtures for roads and other paved areas, Part 100: Methods for sampling for analysis	BS 598-100
	Bituminous mixtures test methods for hot mix asphalt , Part 6, Sampling	DES 6848.6
D	<u>Asphalt Mix Design</u>	
	Standard Recommended Practice for Bituminous Mixture Design using the Marshal and Heaven Procedures (Referred to Manual Series No. 2 (MS 2)	AASHTO R 12
	Asphalt Mix Design Methods (Marshal Method or Hveen Method)	MS-2
	Standard Specification for Superpave Volumetric Mix Design	AASHTO M 323
	Standard Practice for Superpave Volumetric Design for Hot - Mix Asphalt (HMA)	AASHTO R 35
	Volumetric Requirements for Superpave Mix Design , (National Cooperative Highway Research Program)	NCHRP, Report 567
	Superpave Mix Design: Verifying Gyration Levels in the Design Table, (National Cooperative Highway Research Program)	NCHRP, Report 573
	Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method: Technician's Manual (National Cooperative Highway Research Program)	NCHRP, Report 452
	Superpave Asphalt Mixture Design Workshop Workbook	U.S. Department of Transportation Federal Highway Administration
	Asphalt Materials and Mix Design Manual , By Irving Kett California State University	Los angeles , California
	Overseas Road Note 19, A guide to the design of hot mix asphalt in tropical and sub-tropical countries	OVERSEAS ROAD NOTE 19 (TRL)
	Hot Mix Asphalt Materials, Mixture Design and Construction	NCAT Auburn University
E	<u>Hot Mix Asphalt Tests</u>	
	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures	AASHTO T 269 /ASM D 3203
	Standard Method of Test for Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface - Dry Specimens	AASHTO T 166
	Standard Method of Test for Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method	AASHTO T331 /ASM D 6752
	Standard Test Method for Resistance to Plastic Flow o Bituminous Mixtures using Marshal Apparatus	AASHTO T 245 / ASM D 5581
	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures (GMM or MTD)	AASHTO T 209 / ASM D 2041

	Standard Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures	AASHTO T 164 /ASM D 2172
	Standard Method of Test for Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures	AASHTO T 319
	Standard Test Methods for Mechanical Size Analysis of Extracted Aggregate	AASHTO T 30 / ASM D 5444
	Standard Test Methods for Bitumen Content	ASM D 4
	Standard Test Methods for Asphalt Content of Bituminous Mixtures by the Nuclear Method	AASHTO T 287/ ASM D 4125
	Standard Test Methods for Asphalt Content of Hot Mix Asphalt by Ingition Method	AASHTO T308/ ASM D 6307
	Standard Method of Test for Recovery of Asphalt from Solution by Abson Method	AASHTO T 170 /ASM D 1856
	Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens	ASM D 3549
	Standard Method of Test for Reducing Samples of Hot - Mix Asphalt to Testing Size	AASHTO T 328
	Bituminous mixtures Test methods for hot mix asphalt Part 7: Preparation of samples for determining binder content, water content and grading	DES 6848-7
	Standard Method of Test for Preparation of test Specimens of Bituminous Mixtures by Means of California Kneading Compactor	AASHTO T247 /ASM D 1561
	Standard Practice for Mixture Conditioning of Hot - Mix Asphalt (HMA)	AASHTO R 30
	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples	AASHTO T 275/ ASM D 1188
	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures	ASM D 2726
	Standard Test Method for Calculating Percent Asphalt Absorption by the Aggregate in an Asphalt Paving Mixture	ASM D 4469
	Standard Test Method for Compressive Strength of Bituminous Mixtures	AASHTO T 167 / ASM D 1074
	Standard Method of Test for Moisture Content of Hot - Mix Asphalt (HMA) by Oven Method	AASHTO T 329
	Standard Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures	AASHTO T 165 / ASM D 1075
	Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures	AASHTO T 110 / ASM D 1461
	Bituminous mixtures Test methods for hot mix asphalt Part 5: Water content	DES 6848-5
	Standard Practice for Preparation of Bituminous Mixture Specimens for Dynamic Modulus Testing	ASM D 3496
	Standard Test Method for Dynamic Modulus of Asphalt Mixtures	AASHTO TP 62/ ASM D 3497
	Sampling and examination of bituminous mixtures for roads and other paved areas, Part 104: Methods of test for the determination of density and compaction	BS 598-104
	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods	ASM D 2950

	Standard Test Method for Density of Semi-Solid and Solid Bituminous Materials (Nickel Crucible Method)	ASM D 3289
	Standard Practice for Effect of Water on Bituminous - Coated aggregate Using Boiling Water	ASM D 3625
	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures	ASM D 4867 / D 4867 M
	By: Getachew , Feb./13/2020GC.	

<u>BITUMINOUS MATERIALS</u> STANDARD SPECIFICATION & TEST METHODS		
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	Standard Method of Testing for Sampling of Bituminous Materials	AASHTO - T 40, ASTM - D 140
	Standard Practice for Sampling Bituminous Materials	ASTM - D 140
C	<u>Specification for Bitumen's</u>	
	Standard Specification for Asphalt - Rubber Binder	ASTM - D6114
	Standard Specification for Penetration Graded Asphalt Cement	AASHTO - M 20-70
	Standard Specification for Penetration Graded Asphalt Cement for Use in Pavement Construction	ASTM - D 946
	Bitumen and Bituminous Binder - Specification for Paving Grade Bitumen's	BS EN - 12591
	Bitumen's for Building and Civil Engineering , Part 1 Specification for Bitumen's for Road and Other Pavement Areas	BS - 3690
	Standard Specification for Viscosity - Graded Asphalt Cement	AASHTO - M 226
	Standard Test Method for Viscosity - Graded Asphalt Cement for Use in Pavement Construction	ASTM - D 3381
D	<u>Cutback Asphalts</u>	
	Prime Coats & Bituminous Curing Membranes	TRL - South Africa
	Standard Practice for Selection of Cutback Asphalt	ASTM - D 2399
	Standard Practice for Estimating Application Rate of Bituminous Distributors	ASTM - D2995 - 95-04
	Standard Practice for Determining Rate of Bituminous Distributors	ASTM - D2995 - 93-98
	Standard Specification for Cutback Asphalts (Slow Curing Type)	ASTM - D 2026
	Standard Specification for Cutback Asphalts (Medium Curing Type) (Prime Coat)	AASHTO - T 82
	Standard Specification for Cutback Asphalts (Medium Curing Type) (Prime Coat)	ASTM - D 2027
	Standard Specification for Cutback Asphalts (Rapid Curing Type) (Tack Coat)	AASHTO - T 81
	Standard Specification for Cutback Asphalts (Rapid Curing Type) (Tack Coat)	ASTM - D 2028
	Standard Test Method for S.G, API Gravity , or Density of Cutback Asphalts By Hydrometer Method	AASHTO T 295/ ASTM - D 3142

	Standard Test Method for Density of Liquid Asphalts (Hydrometer Method)	ASTM - D 3142
	Standard Test Method for Flash and Fire Point of Cutback Asphalt With Tage Open - Cup Apparatus	ASTM - D 3143
	Standard Test Method for Distillation of Cutback Asphaltic (Bituminous Products)	AASHTO - T 78 ASTM - D 402
E	<u>Bituminous Mixtures</u>	
	Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixture	ASTM - D 1461
	Standard Test Method for Steam Distillation of Bituminous Protective Coatings	ASTM - D 255
F	<u>Semi - Solid Bituminous Materials</u>	
	Standard Test Method for water Petroleum Products and Bituminous Materials By Distillation	AASHTO - T 55 ASTM - D 95
	Standard Method of Test for Relative Density S.G, API Gravity , of Crude Petroleum and Liquid Petroleum Products By Hydrometer Method	AASHTO - T 227, ASTM - D 1298
	Standard Method of Test for S.G of Semi - Solid Bituminous Materials	AASHTO - T 228, ASTM - D 70
	Standard Test Method for Density of Semi - Solid Bituminous Materials (Pycnometer Method)	ASTM - D 70
	Standard Test Method for Density of Semi - Solid Bituminous Materials (Nickel Crucible Method)	ASTM - D 3289
	Standard Method of Test for Penetration of Bituminous Materials	AASHTO - T 49, ASTM - D 5
	Standard Specification for Penetration Graded Asphalt Cement	AASHTO - M 20-70
	Standard Test Method for Residue of Specified Penetration	ASTM - D 243
	Standard Specification for Penetration Graded Asphalt Cement for Use in Pavement Construction	ASTM - D 946
	Standard Method of Test for Softening Point of Bitumen (Ring and Ball apparatus)	AASHTO - T 53, ASTM - D 36
	Standard Method of Test for Ductility of Bituminous Materials	AASHTO - T51, ASTM - D 113
	Standard Method of Test for Elastic Recovery of Asphaltic Materials by Means of Ductlometer	AASHTO - T 301
	Standard Test Method for Elastic Recovery of Bituminous Materials by Ductlometer	ASTM - D 6084
	Standard Method of Test for Effect of Heat and Air on Asphaltic Materials (Thin - Film Oven Test)	AASHTO - T179, ASTM - D 1754
	Standard Test Method for Effect of Heat and Air on Asphaltic Materials (Thin - Film Oven Test)	ASTM - D 1754
	Standard Test Method for Effect of Heat and Air on Moving Film of Asphalt (Rolling Thin - Film Oven Test)	AASHTO T 240/ ASTM - D 2872
	Standard Method of Test for Flash and Fire Points By Cleveland Open Cup	AASHTO - T 48, ASTM - D 92
	Standard Test Method for Flash and Fire Points By Cleveland Open Cup	ASTM - D 92
	Standard Method of Test for Flash Point With Tag Open - Cup Apparatus for Use With Material Having a Flash Less Than 93.3°C (200°F)	AASHTO - T 79

	Standard Test Method for Sustained Burning of Liquid Mixtures Using the Small Scal Open - Cup Apparatus	ASTM - D 4206
	Standard Method of Test for Solubility of Bituminous Materials	AASHTO - T44, ASTM - D 2042
	Standard Test Method for Solubility of Bituminous Materials in Trichloroethylene	ASTM - D 2042
	Standard Test Method for Solubility of Polymer - Modified Asphalt Materials in 1.1.1 Trichloroethane	ASTM - D 5546
	Standard Method of Test for Spot Test for Asphaltic Material	AASHTO - T 102
	Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds	ASTM - D 6
	Standard Practice for Dark Oven Heat Exposure of Bituminous Materials	ASTM - D 5869
	Standard Test Method for Toughness and Tenacity of Bituminous Materials	ASTM - D 5801
	Standard Test Method for Staining Tendency of Asphalt (Stain Index)	ASTM - D 2746
	Standard Method of Test for Float Test for Bituminous Materials	AASHTO - T 50
G	<u>Viscosity of Asphalts (Bitumen's)</u>	
	Standard Specification for Viscosity - Graded Asphalt Cement	AASHTO - M 226
	Standard Test Method for Viscosity - Graded Asphalt Cement for Use in Pavement Construction	ASTM - D 3381
	Standard Viscosity Temperature Chart for Asphalt	ASTM - D 2493
	Standard Method of Test for Viscosity Determination of Asphalt Binder Using Rotational Viscometer	AASHTO - T 316
	Standard Method of Test for Kinematic Viscosity of Asphalts (Bitumen)	AASHTO - T 201, ASTM - D 2170
	Standard Practice for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Firol Viscosity	ASTM - D 2161
	Standard Method of Test for Saybolt Viscosity	AASHTO - T 72
	Standard Test Method for Saybolt Viscosity	ASTM - D 88
	Standard Test Method for Saybolt Firol Viscosity of Bituminous Materials at High Temperature	ASTM - E102
	Standard Method of Test for Viscosity of Asphalt by Vacuume Cappillary Viscometer	AASHTO - T 202, ASTM - D 2171
	Standard Test Method for Viscosity of Asphalt by Vacuume Cappillary Viscometer	ASTM - D 2171
	Standard Test Method for Viscosity of Asphalt With Cone and Plate Viscometer	ASTM - D 3205
	By: Getachew , Feb./13/2020GC.	

EMULSIFIED ASPHALT STANDARD SPECIFICATION & TEST METHODS

	Standard Specification for Emulsified asphalt	AASHTO - M 140
	Standard Specification for Emulsified asphalt	ASTM - D 977
	Bitumen Road Emulsions (Anionic & Cationic) - Part 1, Specification for Bitumen and Emulsion	BS - 434
	Evaluation of Asphalt Binders Used for Emulsions	Minnesota Local Road Research Board (America)
	Standard Specification for Cationic Emulsified Asphalt	AASHTO -M 208 , ASTM - D 2397
	Standard Specification for Polymer - Modified Cationic Emulsified asphalt	AASHTO - M 316
	Standard Recommended Practice for Selection and Use of Emulsified Asphalts	AASHTO - R 5 , ASTM - D 3628
	Standard Practice for Classifying Emulsified Agents	ASTM - D 5505
	Standard Method of Test for Testing Emulsified Asphalts	AASHTO - T 59, ASTM - D 244
	Standard Method of Test for Polymer Content of Polymer-Modified Emulsified Asphalt Residue and Asphalt Binders	AASHTO - T 302
	Standard Test Method Method for Apparent Viscosity of Asphalt Emulsion Residues and None - Newtonian Bitumen's by Vacuum Capillary Viscometer	ASTM - D 4957
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ROAD TAR STANDARD SPECIFICATION & TEST METHODS

	Standard Specification for Road Tar	ASTM - D 490
	Specification for Tars for Road Purposes	BS - 76
	Specification for Coal tar Creosote for Wood Preservation	BS - 144
	Standard Specification for Acrylonitrile - Butadiene Rubberized Tar	ASTM - D 2993
	Standard Volume Correction Table for Road Tar	ASTM - D 633
	Standard Practice for Paving Uses and Application Temperatures for Road Tars	ASTM - D 2728
	Standard Test Method for Distillation of Road Tars	ASTM - D 20
	Standard Test Method for Engler Specific Viscosity of Tar Products	ASTM - D 1665
	Standard Test Method for Rubberized Tar	ASTM - D 2994
	By: Getachew , Feb./13/2020GC.	

Concrete Test & Mix Design		
1	Concrete mix design reference books	
	ACI 211.1.91	
	ACI 214R - 02	
	ACI 318M-08	
	ASTM C685/ C685M	
1.1	For the mix design purpose are used ACI 211.1.91 & ACI 318M - 08	
1.2	ACI 211.1.91 mix design ios besed on 152*305mm cylinders for 28 days according with ASTM C31 & Curing moist at 23°C prior to testing.	
2	Slump test of fresh concrete reference books	
	BS1882 - P102	
	BS EN - 12350.2	
	ASTM C143/ C143M	
	AASHTO T- 119	
2.1	Slump test of fresh concrete are used BS1882 - P102	
	Slump cone	Diameter of Base = 200mm ± 2mm
		Diameter of Top = 100mm ± 2mm
		Height = 300mm ± 2mm
	Tamping Rod	Diameter = 16mm ±1mm
		Length = 600 ± 5mm
3	Water for concrete reference books	
	AASHTO - T26	
4	Sampling of fresh concrete reference books	
	BS1881 - P101	
	BS1881 - P125	
	ASTM C-172	
	AASHTO T-141	
5	Curing of concrete reference books	
	BS1881 - P111	
	BS1881 - P112	
6	Compressive Strength of concrete reference books	
	BS1881 - P116	
	BS EN 12390 P3	
	ASTM C-873	
	AASHTO T-22	
6.1	Compressive strength of concrete are used BS1881 - P116	
	Loading ; Without shock apply and increase the load continiously at a nominal rate with the range 0.2N/(MM2*S) to 0.4N/(MM2*S)	

7	Making and Curing Cubes						
	Standard Codes	Cylinder			Cube		Bangladish Manual
		BS	AASHTO	ASTM	BS	Tanzania Manual	
		BS1881 : P110 : 1983	AASHTO T- 23	ASTM C 31/C31M - 03a	BS1881 : P108 : 1983	Lab_Testing maual 2000	
	Molds	150 ± 0.15mm * 300mm	150 ± 0.15mm * 300mm	150 ± 0.15mm * 300mm	150 ± 0.15mm * 300mm	150 ± 0.15mm * 300mm	150 * 300mm
		100 ± 0.15mm * 200mm	100 ± 0.15mm * 200mm	100 ± 0.15mm * 200mm	100 ± 0.15mm * 200mm	100 ± 0.15mm * 200mm	100 * 200mm
	Maximu m size Aggregat e	For 150 ± 0.15mm = 40mm			For 150 ± 0.15mm = 40mm	For 150 ± 0.15mm = 40mm	
		For 100 ± 0.15mm = 20mm			For 100 ± 0.15mm = 20mm	For 100 ± 0.15mm = 20mm	
	Compacti ng Bar / Tamping Road	Compacting Bar	Tamping Rod	Tamping Rod	Compacting Bar	Compacting Bar	Cube 25mm square blunt ended tamping rod & 35 Blows
		Weight = 1.8 ± 0.1kg	For 150mm mold	For 150mm mold	Weight = 1.8 ± 0.1kg	Weight = 1.8 ± 0.1kg	
At least 380mm long		Diameter = 16mm	Diameter = 16mm	At least 380mm long	At least 380mm long		
Strocks or Blows and Layers	Raming face 25.0 ± 0.5mm square	For 100 mm mold	For 100 mm mold	Raming face 25.0 ± 0.5mm square	Raming face 25.0 ± 0.5mm square	Cylinder diameter = 16mm rounding end tamping rod, Length 60mm & 25 strocks	
		Diameter = 10mm	Diameter = 10mm				
	Length = 305mm	Length = 300 ± 2mm					
Strocks or Blows and Layers	For 150mm	For 150mm	For 150mm	For 150mm	For 150mm		
	30 Strocks and 3 Layer	25 Strocks and 3 Layer	25 Strocks and 3 Layer	Less than 35 Strocks and 3 Layer	Less than 35 Strocks and 3 Layer		
	(50mm Deep)	(50mm Deep)	(50mm Deep)	(50mm Deep)	(50mm Deep)		
Strocks or Blows and Layers	For 100mm	For 100mm	For 100mm	For 100mm	For 100mm		
	30 Strocks and 3 Layer	25 Strocks and 3 Layer	25 Strocks and 2Layer	25 Strocks and 2Layer	25 Strocks and 2Layer		
	(50mm Deep)	(50mm Deep)	(50mm Deep)	(50mm Deep)	(50mm Deep)		

7.1	For making and curing cube use BS 1881 Part 108 : 1983 standard specification		
7.2	For making and curing cylinders use BS 1881 Part 110 : 1983 Or ASTM C 31/C31M - 03a standard specification		
8	To change Cylinder to cube	*1.25	To change cube to cylinder /1.25
	By: Getachew , Feb./13/2020GC.		