

**Selected Tables from
Specifications For Rural Road
(First revision), 2014**

SECTION 300, EARTH WORK

Table 300.1 Minimum Density Requirements for Suitability of Embankment Materials

S.No.	Type of Work	Maximum Laboratory Dry Unit Weight, Tested as per IS:2720 (Part 7)
1)	Embankments not subject to flooding:	Not less than 14.4kN/m ³
2)	Embankments subject to flooding or exceeding 3 m height	Not less than 15.2kN/m ³

SECTION 300, EARTH WORK

Table 300.2 Compaction Requirements for Embankment

Type of Work/Material	Relative Compaction Percentage of Maximum Laboratory Dry Density Obtained by Standard Proctor Test as per IS:2720 (Part 7)
Embankment	Not less than 98%
Expansive Clays	90% - 95%

SECTION 400, GRANULAR SUB-BASES, BASES & SURFACINGS

Table 400.1-A Grading for Granular Sub-base Materials

IS Sieve Size	Percent by Weight Passing the IS Sieve		
	Grading I	Grading II	Grading III
75.0 mm	100	–	–
53.0 mm	–	100	–
26.5 mm	55-75	50-80	100
9.50 mm	–	–	–
4.75 mm	10-30	15-35	25-45
2.36 mm	–	–	–
0.425 mm	–	–	–
0.075 mm*	<15	<15	<15

* On clayey subgrades where otherwise drainage condition are encountered, the percent passing IS Sieve 0.075 mm shall not exceed 5

SECTION 400, GRANULAR SUB-BASES, BASES & SURFACINGS

Table 400.7 Physical Requirements of Coarse Aggregates for Water Bound Macadam for Sub-base/Base/Surfacing Courses

Test	Sub-base	Base	Surfacing
Aggregate Impact Value (IS:2386 Part 4 or IS:5640)	Less than 50	Less than 40	Less than 30
Flakiness Index (IS:2386 Part 1)	Less than 30	Less than 25	Less than 20
Soundness Test (IS:2386 Part 1)			
– Loss with Sodium Sulphate	Less than 12%	Less than 12%	Less than 12%
– Loss with Magnesium Sulphate	Less than 18%	Less than 18%	Less than 18%

SECTION 400, GRANULAR SUB-BASES, BASES & SURFACINGS

Table 400.2-A Grading Requirements for Sub-Base/Base Course

Sieve Size	Percent by Mass Passing IS Sieve Grading Designation		
	A	B	C
53 mm	100		
37.5 mm	97-100	100	
26.5 mm		97-100	100
19 mm	67-81		97-100
9.5 mm		56-70	67-79
4.75 mm	33-47	39-53	47-59
425 µm	10-19	12-21	12-21
75 µm	4-15	4-15	4-15

Table 400.2-B Grading Requirements for Soil-Aggregate Mixtures for Sub-Base/Base

Sieve Size	Percent by Mass Passing IS Sieve Grading Designation Nominal Maximum Size		
	80 mm	40mm	20mm
80 mm	100		
40 mm	80-100	100	
20 mm	60-80	80-100	100
10 mm	45-65	55-80	80-100
4.75 mm	30-50	40-60	50-75
2.36mm	-	30-50	35-60
600 µm	10-30	15-30	15-35
75 µm	5-15	5-15	5-15

Note: Less than 10% should be retained between each pair of successive sieves specified for use except for the pair comprising the first two sieves

SECTION 400, GRANULAR SUB-BASES, BASES & SURFACINGS

405.2.7 *Grading requirement of coarse aggregates*

The coarse aggregates shall conform to one of the Gradings given in **Table 400.8** as specified. The use of Grading No.1 shall be restricted to sub-base courses only.

Table 400.8 Grading Requirements of Coarse Aggregates*

Grading Designation	Size Range	IS Sieve No.	Passing Percent by Weight
1)	90 mm to 45 mm	125 mm	100
	90 mm	90-100	
	63 mm	25-60	
	45 mm	0-15	
	22.4 mm	0-5	
2)	63 mm to 45 mm	75 mm	100
	63 mm	90-100	
	53 mm	25-75	
	45 mm	0-15	
	22.4 mm	0-5	
3)	53 mm to 22.4 mm	63 mm	100
	53 mm	95-100	
	45 mm	65-90	
	22.4 mm	0-10	
	11.2 mm	0-5	

- * (i) The gradings for the aggregate are to be met with before using them for WBM construction. After rolling and compaction of WBM layer, the grading may vary from the specified values.
- (ii) Engineer may allow ± 5 percent variation from the specified upper and lower limits excluding the first and the last sieve in the gradings.

SECTION 400, GRANULAR SUB-BASES, BASES & SURFACINGS

Table 400.9 Grading for Screenings

Grading Classification	Size of Screenings	IS Sieve Designation	Percent by Weight Passing the IS Sieve
A	13.2 mm	13.2 mm	100
		11.2 mm	95-100
		5.6 mm	15-35
		180 micron	0-10
B	11.2 mm	11.2 mm	100
		9.5 mm	80-100
		5.6mm	50-70
		180 micron	15-35

The use of screenings shall be omitted in the case of soft aggregates, such as, brick metal, kankar, laterite, etc. as they are likely to get crushed to a certain extent under rollers.

Table 400.10 Approximate Quantities of Coarse Aggregates and Screenings Required for 100/75mm Compacted Thickness of Water Bound Macadam (WBM) Sub-base/Base/surfacing Course for 10 m² Area

Classification	Size Range	Compacted Thickness	Loose Quantity	Stone Screenings *		Crushable Screenings	
				Grading Classification & Size	For WBM Sub-base/Base Course (Loose Quantity)	such as moorum/gravel	
						Properties	Loose Quantity
	m ²	mm	m ³		m ³		m ³
Grading 1	90 to 45	100	1.21 to 1.43	Type A 13.2	0.27 to 0.30	LL<20; PI<6 Percent 0.075 passing mm <10	0.30 to 0.32
Grading 2	63 to 45	75	0.91 to 1.07	Type A 13.2	0.12 to 0.15	-do-	0.22 to 0.24
Grading 2	63 to 45	75	0.91 to 1.07	Type B 11.2	0.20 to 0.22	-do-	-do-
Grading 3	53 to 22.4	75	0.91 to 1.07	Type B 11.2	0.18 to 0.21	-do-	-do-

*Quantity of stone screenings for surfacing course will be about 80% of the quantity for sub-base/base course.

SECTION 400, GRANULAR SUB-BASES, BASES & SURFACINGS

405.2.2 Aggregates, like, brick bats, kankar, laterite, etc. which get softened in presence of water shall be tested for Aggregate Impact Value under wet conditions in accordance with IS:5640.

Table 400.7 Physical Requirements of Coarse Aggregates for Water Bound Macadam for Sub-base/Base/Surfacing Courses

Test	Sub-base	Base	Surfacing
Aggregate Impact Value (IS:2386 Part 4 or IS:5640)	Less than 50	Less than 40	Less than 30
Flakiness Index (IS:2386 Part 1)	Less than 30	Less than 25	Less than 20
Soundness Test (IS:2386 Part 1)			
– Loss with Sodium Sulphate	Less than 12%	Less than 12%	Less than 12%
– Loss with Magnesium Sulphate	Less than 18%	Less than 18%	Less than 18%

405.2.3 The requirement of flakiness Index shall be enforced only in the case of crushed or broken stone and crushed slag.

SECTION 500, BITUMINOUS SURFACING COURSES

Table 500.3 Physical Requirements for Aggregates for Bituminous Macadam

Property	Test	Specification
Cleanliness	Grain size analysis Max. 5% passing 75 micron sieve	
Particle shape	Flakiness Index ¹	Max. 25 percent
Strength	Aggregate Impact Value ²	Max. 30 percent
Durability	Soundness ³	
	Sodium Sulphate	Max. 12 percent
	Magnesium Sulphate	Max. 18 percent
Water Absorption	Water absorption ⁴	Max. 2 percent
Stripping	Coating and stripping of bitumen aggregate mixtures ⁵	Min. retained coating 95 percent

- Notes :** 1) IS:2386 Part 1 4) IS:2386 Part 3
 2) IS:2386 Part 4* 5) IS:6241
 3) IS:2386 Part 5

SECTION 500, BITUMINOUS SURFACING COURSES

Table 500.4 Composition of Bituminous Macadam

IS Sieve (mm)	Cumulative Percent Passing by Weight of Total Aggregate
26.5	100
19	90-100
13.2	56-88
4.75	16-36
2.36	4-19
0.3	2-10
0.075	0-5
*Bitumen content, percent by weight of total mixture	3.3-3.5
Bitumen Viscosity Grade	VG-10 to VG-30

* For conditions in cooler areas of India bitumen contents may be upto 0.5 percent higher, subject to the approval of the Engineer.

Selected Tables from Specifications For Rural Road (First revision), 2014

SECTION 500, BITUMINOUS SURFACING COURSES

Table 500.5 Mixing, Laying and Rolling Temperatures for Bituminous Mixes

(Degree Celcius)

Bitumen Viscosity Grade	Bitumen Temperature	Aggregate Temperature	Mixed Material Temperature	Laying Temperature	Rolling Temperature*
VG-40	160-170	160-175	160-170	150 Min	100 Min
VG-30	150-165	150-170	150-165	140 Min	90 Min
VG-20	145-165	145-170	145-165	135 Min	85 Min
VG-10	140-160	140-165	140-160	130 Min	80 Min

* Rolling must be completed before the mat cools to these minimum temperature

SECTION 500, BITUMINOUS SURFACING COURSES

Table 500.6 Grading Requirements for Aggregates Used for Surface Dressing

IS Sieve Designation (mm)	Cumulative Percent by Weight of Total Aggregates Passing for the Following Nominal Sizes (mm)			
	19	13	10	6
26.5	100	501	502	503
19	85-100	100	504	505
13	0-40	85-100	100	506
9.5	0-7	0-40	85-100	100
6.3	507	0-7	0-35	85-100
4.75	508	509	0-10	510
3.35	511	512	513	0-35
2.36	0-2	0-2	0-2	0-10
0.60	514	515	516	0-2
0.075	0-1.5	0-1.5	0-1.5	0-1.5
Minimum 65% by weight of aggregate	Passing 19 and retained on 13.2	Passing 13.2 and retained on 9.5	Passing 9.5 and retained on 6.3	Passing 6.3 and retained on 3.35

SECTION 500, BITUMINOUS SURFACING COURSES

Table 500.9 Quantities of Materials Required for 10 m² of Road Surface for 20 mm Thick Premix Carpet

Aggregate		Quantity
a)	Nominal Stone size 13.2 mm (passing 22.4 mm sieve and retained on 11.2 mm sieve)	0.18 m ³
b)	Nominal Stone size 11.2 mm (passing 13.2 mm sieve and retained on 5.6 mm sieve)	0.09 m ³
Total		0.27 m³

Binder		
a)	For 0.18 m ³ of 13.2 mm nominal size stone at 52 kg bitumen per m ³	9.4 kg
b)	For 0.09 m ³ of 11.2 mm nominal size stone at 56 kg bitumen per m ³	5.2 kg
Total		14.6 kg