

Item No,1:- Providing and laying 20 mm thick average for patchwork Mix seal surface using stone chips @66% by weight, gradation as per MORTH specification and using bitumin VG 30 grade at rate not less than 50.90KG/MT on BT surface using stone chips as per MORTH specification including heating the asphalt and aggregates by hot mix plant and spreading the same bt paver finisher including consolidation wit vibratory roller and providing, operating plant machineries, equipments, tools, plants, oil, fire wood, kerosene and all labour charges etc. complete. upto all lead.

SCOPE :-

This work shall consist of laying and compacting mix seal surfacing in a single course composed of suitable aggregates premixed with a bituminous binder on a previously prepared base in accordance with the requirements of these specification to serve as wearing course.

Materials

Binder

The binder shall be bitumen of VG-30 grade as directed by the Engineer-in-charge and satisfying the requirement of IS 73,217,454 or other approved cut bask.

Coarse aggregate.

The aggregates shall consist of crushed stone of Black trap Only They shall be clean strong, durable, of fairly cubical shape and free from disintegrated pieces, organic or other deleterious matter and adherent coating. The aggregates are to be used the bitumen shall preferably be treated with anti-stripping agents of approved quality in suitable dose as per Appendix-5. The aggregates shall satisfy the physical requirements set forth in table 500-3

No	Test	Test Method	Requirements
1.	* Los Angeles Abrasion Value	IS : 2386 (PART – 4)	40 Per Cent (Max)
2.	Aggregate Impact Value	IS : 2386 (PART-4)	30 per cent (Max)
3.	Flakiness and Elongation Indices (Total)	IS 2386 (Part – I)	30 Per cent Maximum
4.	Coating and Stripping of Bitumen Aggregates Mixture	AASHTOT 182	Minimum retained coating 95 per cent.
5.	Soundness (i) Loss with sodium Sulphate 5 cycle (ii) Loss with magnesium sulphate	IS 2386-(Part5)	12 per cent Maximum
			18 per cent Maximum
6.	Water absorption	IS : 2386(Part 3)	2 per cent Maximum

- * Aggregate ,may satisfy requirement of either of the two tests.
- ** To determine this combined proportion, the flaky stone from representative sample should first be separated out Flakiness index is weight of flaky stone metal divided by weight of stones sample Only the elongated particles be separated out from the remaining (non flaky) stone metal Elongation index is weight of elongated particles divided by total Non flaky particles. The value of flakiness index and elongation index so found are added up.

Fine aggregate

The fine aggregate shall consist of crusher run screenings, natural sand or a mixture of both these shall be clean, hard durable, uncoated, dry and free from injurious, soft or flaky pieces and organic or deleterious substances.

Aggregate Gradation

The coarse and fine aggregate shall be so graded or combined as to confirm to the grading set forth in table 500-10

Aggregate Gradation for Mix Seal Surfacing

Sieve Designation	Per cent by weight passing the IS Sieve
13.2 mm	--
11.20 mm	100
5.60 mm	52-88
2.80 mm	14-38
90 Micron	0-5
Proportioning of Materials	

The total quantity of the aggregate used for mix seal surfacing shall be 0.27 Cum per 10 Sqm area. The quantity of binder used for premixing in terms of straight run bitumen shall be 5.09% by weight of the total mix i.e. 50.90 Kgs per tonne of mix

Before starting the work the contractor shall get the job mix formula for the mix approved by the Engineer-in-charge.

Construction operations

Weather and seasonal limitation

Mix seal surfacing shall not be laid during rainy season or when the base course is damp or wet.

Preparation of base

The base on which mix seal surfacing is to be laid shall be prepared shaped and conditioned of the specified lines, grade and cross sections in accordance with M.O.S.T. specification clause – 601 as directed by the Engineer-in-charge the surface shall be thoroughly swept and scrubbed. clean and free of dust and foreign matter.

Preparation and transportation of Mix :

Mix seal surfacing mix shall be prepared in a drum mix plant of adequate capacity and capable to yield a mix of proper and uniform quality with thoroughly coated aggregate. The plant shall be drum mix type, the plant shall have coordinated set of essential units capable of producing uniform mix within the job mix formula such as laid down in appendix – A

- (a) In case of drum mix plant, the cold feed system shall have variable speed belt conveyors/or other suitable devices for regulating the accurate proportioning of aggregate to an even flow automatically from a Control operation/Control cabin
- (b) Bitumen Control Unit
Capable measuring metering and spraying required quantity of bitumen at specified temperature with automatic synchronization of bitumen and aggregate feed.

(c) Filler system

A fine feeder system suitable to receive bagged or bulk supply of filler materials and its incorporation to the mix in the correct quantity shall be necessary auxiliary

(d) Dust Control

A suitable built in Dust control equipment for the dryer to contain the exhaust of fine dust in to atmosphere for environmental control, wherever so specified by the Engineer.

(e) Suitable auxiliary Bitumen Boiler of Adequate capacity with self heating arrangement and temperature control device the boiler should be fitted with temperature indicating instruments.

The temperature of binder at the time of mixing shall in the range of 160-177 c and of aggregates in range of 155-163C C provided also that at no time shall be the difference in temperature between the aggregates and the binder exceed 14 C

Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all the particles of the mineral aggregates are coated. uniformly.

The mix shall be transported from the mix plant to the point of use in suitable vehicles. The vehicles employed for transport shall be clean and covered over the transit if so directed by the Engineer-in-charge.

Spreading

The mix transported from the drum mix plant to the site shall be spread by means of a self propelled mechanical paver with suitable screeds capable of spreading, temping, finishing the mix. true to specified grade, lines and cross sections, the temperature of mix at the time of laying shall be in the range 121-163 C

Longitudinal joints and edges shall be constructed true to the delineating lines paralld to the center line of the road Longitudinal joints shall be off-set by the least 150mm from those in the binder course all joints shall be cut vertical to the full thickness of the previously laid mix and the surface painted with not bitumen before placing fresh materials.

Rolling

Immediately after the spreading of mix it shall be thoroughly compacted by rolling with a set of 80 to 100 KN vibrtor rollers moving at a speed not exceeding 5 Km. per hours. The initial or break down rolling shall be done with 80-100 KN state weight smooth wheel roller three wheel rollers and the surface finished by final rolling with vibrator system shall be switched off.

The roller wheels shall be kept damp to prevant the mix from adhering to them but in no case shall fuel, lubricating oil be used for this purpose rolling shall commence longitudinally from the edge and progress towards the center, except that on super elevated portions, it shall progress from the lower to upper edge paralld to the fresh each of the roller shall uniformly overlap not less than one third of the track made in compaction and all the roller marks eliminated.

Opening of traffic

The traffic may be allowed immediately after completion of the final rolling when the mix has colled down to the surrounding temperature.

Surfacing finish & Quality control of work

The surface finish of construction shall conform to the requirement of MOST

Specification clause 901. Control on the quality of material and works shall be exercised by the Engineer-in-charge in accordance with MOST specification, Clause 902.

Arrangement for Traffic

The provision of MOST specification clause –105 shall apply as regards that flow of traffic during construction.

Measurement for Payment :

The payment shall be made on the tonnage basis of the weight of mix of aggregates and bitumen for this purpose. The contractor shall have to install a weight bridge of suitable capacity for the purpose of weighing of dumpers at suitable place at his cost as directed weight of empty and weight of loaded dumper will be recorded in bound and numbered register on plant site Department will be free to get some loaded dumpers test checked at other weight bridge Weight bridge will be periodically got calibrated and verified from weight and measure authorities.

For the purpose of application of tack coat, if the theoretical area as per sanctioned estimate for basis of tonne differs with the actual area of work done in the field, the reduction in or addition to payment shall have to be exceed respectively

Weight of mix materials will be done in presence of responsible person, not less than the rank of supervisor of department and the measurement shall be recorded by the Deputy Executive or Assistant Engineer or Addl. Asst. Engineer if so authorized, Record of each dumper will be maintained separately in bound and numbered register, which will be maintained by the departmental representative and signed by the contractor, Proper gate pass system shall be established for the vehicles coming to the plant site and out going from the plant site. The location of the kilometer, hecto meter and meter in which individual dumber are unloaded be recorded carefully.

Rate

The contract unit rate for mix seal surfacing shall be paid in full for carrying out the required operations including full compensation for all components.

- (i) Making arrangements for traffic to Clause 112 except for initial treatment to verge, shoulders and construction of diversion.
- (ii) Preparation of base except for laying of profile corrective course but including filling of potholes.
- (iii) Providing all materials to be incorporated in the work including arrangement for stock yards, all royalties, fees rents where necessary and all leads and lift.
- (iv) All labour, tools equipment's plant including installation of hot mix plant power supply units and all machineries, incidental to complete the work to the specifications
- (v) Carrying out the work in part widths of the road where directed.
- (vi) Carrying out all tests for control of quality.

Item No 2:- **Providing and laying 50mm thick B.M. With BT Aggregate VG-30 grade bitumen for Tack coat @ 2.50 kg/10 sqm using crushed stone aggregate 0.66 cum/ MT as per MORTH&H Specification & VG-30 grade bitumen for mixing @34.00 Kg/1 MT i.e. 3.4% of by weight of total mix incl. heating and mixing by drum mix plant and spreading the same with paver finisher consolidation with vibratory roller including cost of fuel, hire charges, all necessary equipments, tools and plant, fire wood, oil, kerosene labour changes etc complete.(Using contractor's own Machinery) upto all lead.**

1. SCOPE

The work shall be consist of Const. of One course of compacted Crushing aggregate aggregates premixed with a bituminous binder to serve as base/ binder course laid immediately after mixing on a base prepared previously in accordance with the requirement of these specification and in conformity with the lines and cross sections shown on the drawings or as directed by the Engineer-in charge.

2. MATERIALS

Bitumen :

The bitumen shall be paving bitumen of suitable penetration grade VG-30 as per I.S. 73. The actual grade of bitumen to be used shall be decided by the Engineer appropriate to the region, traffic, rainfall and other environmental conditions.

3. AGGREGATES

The aggregates shall consist of crushed stone of black trap Only. They shall be clean, strong, durable of fairly cubical shape and free from disintegrated pieces, organic or other. Deleterious matter and adherent coating. The aggregates shall preferably be hydro phonic and of low porosity. If hydrophonic aggregates are to be used the bitumen shall preferably be treated. aggregates shall satisfy the physical requirements set forth in Table 500-3 is :

TABLE – 500 – 3
PHYSICAL REQUIREMENTS OF AGGREGATES FOR
BITUMINOUS MACADAM

Sr. No.	Test	Test Method	Requirement
1	Loas Angles Abrasion Value	IS-2386 Part-4	40 Percent Maximum
2	Aggregates Impact Value*	IS-2386 Part-4	30 Percent Maximum
3	Flakiness and Elongation ** Indices (Total) Coating and AASHOTOT-182	IS-2386 Part-I	30 Percent Maximum Minimum retained coating 95 percent.
4	Stripping of bitumen aggregate mixture soundness	IS-2386 Part-5	12 Percent Maximum
5	i) Loss with sodium sulphate 5-cycles		18 Percent Maximum
	ii) Loss with magnesium sulphate 5-cycles.		
6	Water absorption	IS-2386 Part-3	2- Percent Maximum

* Aggregate may satisfy requirement of either of the two tests.

** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness Index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-Flay) Stone metal. Elongation index is weight of elongated (Particles divided by total non flaky particles. Value of flakiness index and elongation index so found are added up. The aggregates for bituminous macadam shall conform to one of the two grading in Table 500-4, Depending on the compacted thickness the actual grading shall be as specified in the contractor

4. PROPORTIONING OF MATERIALS

The bitumen content for pre-mixing shall be 3.40 percent by weight of the total mix except when otherwise directed by the Engineer.

TAHLE 500-4
AGGREGATE GRADING FOR BITUMINOUS MACADAM

Mix Designation Nominal aggregate Size layer thickness I.S. Sieve (mm)	Grading -2 Nominal aggregate size-19mm layer thickness – 50 – 75mm
45	--
37.50	--
26.50	100
19	90-100
13.2	56-88
4.75	16-36
2.36	4-19
0.30	2-10
0.075	0-8
Bitumen content % by weight of total mixture	3.40
Bitumen Grade	VG-30

The Maximum compacted thickness of a layer shall be 50mm. The quantities of aggregates to be used shall be sufficient. to yield the specified thickness after compaction.

5. VARIATION IN PROPORTIONING OF MATERIALS :

The Contractor shall have the responsibility for ensuring proper proportioning of materials and producing a uniform Mix. A variation in binder content + 0.3 Percent by weight of total mix shall however, be permissible for individual specimens taken for quality control tests vide section 900.

6. CONSTRUCTION OPERATIONS

(a) Weather And Seasonal Limitations:

The work of laying shall not be taken up during rainy or foggy weather or when the base course is damp or wet or during dust storm or when the atmosphere temperature in shade is 10 degree C or Less.

(b) Preparation of the base:

The base on which bituminous macadam is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross sections in accordance with Clause 501 and a priming coat where needed shall be applied in accordance with Clause-502 as directed by the Engineer.

(c) Tack coat :

A tack coat with asphalt Emulsion RS-1 grade as per Clause 503 to M.O.S.T. specifications shall be applied over the base. The tack coat at rate of 2.5 Kg/10 sqM shall be applied on existing B.T. Surface.

(d) Preparation & transport of Mix :

Bituminous Macadam Mix shall be prepared in Continuous batch mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates.

The plant shall be Continuous batch Mix type. The plant shall have Co-Ordinate set of essential units capable of producing uniform mix within the job mix formula such as laid down in Appendix-A.

(a) In Case of Drum Mix Plant :

In cold feed system shall have variable speed conveyors or other suitable devices for regulating the accurate proportion of aggregate in to even feed flow automatically from a Control Operation / Control cabin.

(b) Bitumen Control Unit:

Capable of measuring / Metering and spraying required quantity of bitumen at specified temperature with automatic synchronization of bitumen and aggregate feed.

(c) Filler System:

A fines feeder system suitable to receive bagged or bulk supply of filler material and its incorporation to the mix in the correct quantity shall be necessary auxiliary.

(d) Dust Control :

A suitable built-in dust control equipments for the dryer to contain the exhaust of fine dust into atmosphere for environmental control wherever so specified by the Engineer.

(e) Suitable auxiliary Bitumen Boiler of Adequate capacity with self-heating arrangement and temperature control device. The boiler should be fixed with temperature indicating instruments.

The temperature of binding at the time of mixing shall be in range of 150 degree C to 163 degree C and that of the aggregate in the range of 155 degree C to 163 degree C provided that the difference in temperature between the binder and aggregates at no time exceeds 14 degrees C. Mixing shall be thoroughly to ensure that a homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly, and the discharge temperature of mix shall be between 150 to 160 degree C.

The mixture shall be transported from the mixing plant to the point of use in suitable tipper vehicles. The vehicles employed for transport shall be clean and be covered en transit if so directed by the Engineer.

Any tipper causing excessive segregation of materials by its spring suspension or other contributing factor or that which shows undue delay shall be removed from the work unit and such conditions are corrected.

SPREADING :

The mix transported from the tipper at the site to the paver shall be spread immediately by means of self propelled mechanical paver with suitable screeds capable of spreading, tamping and finishing the mix true to the specified

lines, grades and cross sections,. The paver finisher shall have the following features:

- (a) Loading hoppers and suitable distributing mechanism.
- (b) All drives having hydrostatic drive/Control.
- (c) The machine shall have a Hydraulically extendable screed for appropriate width requirement,
- (d) The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface. It shall have adjustable amplitude & variable frequency.
- (e) The Paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.
- (f) The paver shall be fitted with an electronic control sensing device for automatic levelling and profile control within the specified tolerance.
- (g) The Screed shall have the internal heating arrangement.
- (h) The paver shall be capable of laying either 2.5 to 4.0m Width or 4.0 M width as stipulated in the contractor.
- (i) The paver shall be so deigned as to eliminated the skidding/slippage of the tyres during operation.

However in restricted locations and in narrow widths where the available plant can not be operated in the opinion of the Engineer, he may permit manual laying of the mix.

The temperature of the mix at the time of laying shall be in the range of 130 degree C to 160 degree C. In multi-layer construction, the longitudinal joints in one layer shall offset that in the layers below by about 150mm. However the joints in the top most layer shall be at the lane line of the pavement.

Longitudinal joints and edges shall be constructed true to the delineating line parallel to the centre line of the road. All joints shall be cur vertical to the full thickness of the previously laid mix and the surface painted with hot bitumen before placing fresh material. Longitudinal and transverse joints shall be offset by at least 250mm from those in the lower in the course and the joints

courses and the joints on the top most layer shall not be allowed to fall within the wheel path. Alls transverse joints shall be cut vertically to the full thickness of the previously laid mix with asphalt cutter/pavement breaker and surfaced painted with hot bitumen before placing fresh material. longitudinal joints shall be preferably hot joints. Cold longitudinal joints shall be properly heated with joint heater to attain a suitable temperature of about 80 degree C before laying of adjacent materials.

COMPACTION :

After the spreading of mix rolling shall be done by 80 to 100 Kn vibratory Roller. Rolling shall start as soon as possible after the materials has been spread deploying a set of rollers as the rolling is to be completed in limited time frame. The roller shall move at a speed not more than 5 Km./Hr. Rolling shall be done with care to avoid unduly roughening of the pavement surface.

Rolling of the longitudinal joints shall be done immediately behind the paving operation. After this, the rolling commence at the edges and progress towards the center longitudinally except that on super elevated and un directional cambered portions it shall progress from the lower tot he upper edge parallel to the centre line of the pavement.

The initial or break-down rolling shall be done with 80-100 Kn static weight smooth wheel roller (3-wheels or tandorn) as soon as it is possible to roll the mix without cracking the surface or having the mix pick up on the roller wheels. The second or intermediate rolling shall follow the break-down rolling with vibratory roller of 80 to 100 Km. Static weight on pneumatic tyred roller 150 to 250 Kn weight, with minimum 7 wheels and minimum tyre pressure of 0.7 Mpa as closely as possible to the paver and be done while the paving mix is still at a temperature that will result in maximum density. The final rolling, shall be done while material is still workable enough for removal of roller marks with 60-80 KN Tandom roller. During the final rolling, vibrator system shall be switched off. The joints and edges shall be rolled with 80 to 100 Kn static roller.

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding mix materials. The rolling shall then be continued till the surface has been rolled to 95 percent of the average laboratory density. (obtained from Marshall specimens compacted as defined in Table-S00-10) there is no crushing of 'Aggregates and all roller marks have been eliminated. Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. The roller wheel shall be kept damp if necessary to avoid bituminous material from sticking to the wheels and being picked-up. In no case shall fuel, lubricating oil be for this purpose, not excessive water poured on the wheels.

Rolling operation shall be completed in every respect before the temperature of the mix falls below 100 degree C,

Roller (s) shall not stand on newly laid materials while there is a risk that surface will be deformed thereby. The edges along and transverse of the bituminous macadam laid and compacted earlier shall be out to their full depth, so as to expose fresh surface which shall be painted with a thin surface coat of appropriate before the new mix is placed against it.

SURFACE AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirement of Control on the quality of materials and works shall be exercised by the Engineer-in accordance with Section 900.

The bitumen macadam shall be covered with either next pavement course or wearing course, as the case may be without any delay. If there is to be any delay, the course shall be covered by a seal coat to the requirement of clause-513 before allowing any traffic over it. The seal coat in such cases shall be considered incidental to the work and shall not be paid for separately.

ARRANGEMENT OF TRAFFIC

During the period of construction, arrangement of the traffic shall be done as per Clause-112

MEASUREMENT FOR PAYMENT:

The payment shall be made on the Tonnages basis of the weight of mix of aggregates and bitumen. For this purpose the contractor shall have to install a weight bridge of suitable capacity for the purpose of weighing of Dumpers at suitable place at his own cost as directed.

Weight of empty and weight of loaded dumpers will be recorded in bound and numbered register on plant site. Department will be free to get some loaded dumpers test checked at other weight bridge. Weight bridge will be periodically got calibrated and verified from weight & measure authorities.

For the purpose of application of tack coat, if the theoretical area as per estimate for basis of tonne differs with the actual area of work, done in the field, the reduction in or addition to payment shall have to be exceeded respectively.

Weight of mix materials will be done in presence of responsible person, not less than rank of Supervisor of the Department and the measurement shall be recorded by the Deputy Executive Engineer or Asstt. Engineer or Addnl. Asstt. Engineer if so authorized. Record of each dumper will be maintained by the departmental representative and signed by the contractor. Proper gate pass system shall be established for the vehicles coming to the plant site and out going from the plant site. The locations of the Kilometer, hectometer and meter in which individual dumper are unloaded be recorded carefully.

RATES:

The contract unit rate for the work shall be payment in full for Carrying out the required operations including full compensation for :

- (a) Making arrangements for traffic to Clause 112 except for initial treatment to verge shoulders and construction of diversions.
- (b) Preparation of the base except for laying of corrective course but including filling of pot holes.

- (c) Providing all materials to be incorporated in the work including arrangement for stock yards, royalties fees, rents where necessary and all lead and lift.
- (d) All labours, tools equipment, part including installation of Drum Mix plant, Power supply units and all machineries, identical to complete the work to the specification.
- (e) Carrying out the work in part widths of the road where directed.
- (f) Carrying out all tests for control of quality.
- (g) Unit rate for payment shall be as per 1 M.T. basis.

- Item No. 3** Providing & laying 37.5 mm Thick B.U.S.G (Manually) Patch work on road site using Bitumin for tack coat at the rate of 2.5Kg/10sqm. on Existing Road surface & with spreading stone aggregate at the rate of 0.50Cum./10 sqm. with dry rolling and spraying bitumin over it and spraying bitumin over it at the rate of 15 kg/10sqm layer. and then spreading over it stone aggregate at the rate of 0.13cum/10 Sqmt of key aggregate on top in accordance with the requirement of specification incl. cost of stone aggregate bitumin consolidation with vibratory roller necessary firrwood labour charges machineries equipment tools etc. complete upto all lead.

Scope

This work shall consist of construction in a single Layer 37.50mm thickness composite construction of compacted crushed coarse aggregates with application of bituminous binder after layer and key aggregate on top of layer in accordance with the requirement of this specifications to serve as a base course and a conformity with the lines, grade and cross section as directed by Engineer. Thickness of the course shall be 37.50mm

Materials

504. Bitumen: The bitumen shall be paving bitumen of Penetration Grade VG-30 as per IS. -73 .The actual grade of bitumen to be used shall be directed by the Engineer Appropriate to the region, traffic, rainfall and other environmental conditions. Guideline on selection of the grade of the bitumen are give in Appedix-4 bitumen shall be supplying by the department.

504. Aggregates:

504. The aggregates shall consist of crushed Stone of black trap only . They shall be clean , strong , durable of fairly cubical shape and free from disintegrate pieces , Organic or other deleterious matter and adherent coating . The aggregates shall preferably be hydrophobic and of low porosity . If hydrophobic aggregates are to be sued the bitumen shall preferably be treated with aniti-stripping agents of approved quality in suitable does as per Annexix -5 . The aggregates shall satisfy the Physical requirements set forth in Table 500-3

**TABLE 500-3. PHYSICAL REQUIREMENTS FOR AGGREGATES FOR
B.S.G. WORK**

Sr. No.	Test	Test Method	Requirement
1	Loas Angles Abrasion Value	IS-2386 Part-4	40 Percent Maximum
2	Aggregates Impact Value*	IS-2386 Part-4	30 Percent Maximum
3	Flakiness and Elongation ** Indices (Total) Coating and AASHOTOT-182	IS-2386 Part-I	30 Percent Maximum Minimum retained coating 95 percent.
4	Stripping of bitumen aggregate mixture soundness	IS-2386 Part-5	12 Percent Maximum
5	i) Loss with sodium sulphate 5-cycles		18 Percent Maximum
	ii) Loss with magnesium sulphate 5-cycles.		
6	Water absorption	IS-2386 Part-3	2- Percent Maximum

* Aggregate may satisfy requirement of either of the two tests.

** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness Index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles by separated out from the remaining (non-Flay) Stone metal. Elongation index is weight of elongated (Particles divided by total non flaky particles. Value of flakiness index and elongation index so found are added up.

The aggregates shall satisfy the Physical requirement set out in table-500-3

The course and key aggregates for build up spray grout shall confirm to the grading given in table 500-7

TABLE 500-7. Grading Requirement of Coarse and key aggregates for built up spray grout.

Sr. No.	IS Sieve Designation	Percent by Weight passing the sieve	
		Coarse Aggregates	Key Aggregates
1	53mm	100	-
2	26.5mm	40-75	--
3	22.4mm	-	100
4	13.2mm	0-20	40-75
5	5.6mm	-	0-20
6	2.8mm	0-5	0-5

Construction Operation

Weather and seasonal limitations:- The work of laying shall not be taken up during rainy and foggy weather or when the base course is damp or wet or during dust storm or when the atmosphere.

Preparation of base:- : The base on which the built-up spray grout course is to be laid shall be prepared shaped and condition to the specified lines, grades and cross-sections in accordance with the clause 501 . A priming coat where needed shall be applied in accordance with the clause 502 with suitable primer as directed by the Engineer.

TACK COAT :

The bitumen shall be heated to the temperature appropriate to the grade of bitumen used and approved by the Engineer-in –charge and sprayed on the base at the rate of 2.50kg /10sqm area on the Existing BT surface . The binder shall be applied uniformly. The tack coat shall be applied just ahead of the oncoming bituminous constructions.

SPREADING AND ROLLING COARSE AGGREGATES FOR THE FIRST LAYER

Immediately after the application of tack coat course aggregates in dry and clean form shall be spread uniformly and evenly by mechanical means at the rate of 0.50 cum per 10 sqm area . The surface of the layer shall be carefully checked with templates and all high and low spots remedied by removing or adding aggregates may be required . Immediately after spreading of the Key aggregates entire surface shall be rolled with a 80-100Kn vibratory roller . Rolling shall commence at the edges and progress towards the center except in super elevated and unidirectional cambered portions where it shall proceed from the lower edge to the higher edge. Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. After Initial rolling , the surface shall be checked transversely and longitudinally with templates and any irregularities corrected by loosening the surface, adding or removing necessary amount of aggregates , followed by rolling.

Rolling shall be stopped before voids in the aggregates layer are closed to such an extent as to prevent free and uniform penetration of the binder.

Application of Binder (First Spray)

The binder shall be heated to the temperature appropriate to grade of bitumen approved by the Engineer and sprayed on aggregate layer at the rate of 15kg per 10 sqm in a uniform manner specified rates and temperature . Excessive deposits of binder caused by stopping or starting of the spreaders or through leakages or any other reasons shall be corrected promptly.

Rolling shall be stopped before voids in the aggregates layer are closed to such an extent as to prevent free and uniform penetration of the binder.

APPLICATION OF KEY AGGREGATES :

Immediately after the application of binder key aggregates in dry and clean form shall be spread uniformly and evenly by mechanical means at the rate of 0.13 cum per 10 sqm so as the cover the surface completely. If , necessary the surface shall be broom to ensure uniform application of key

aggregates. The Entire surface shall be rolled with a 80-100Kn vibratory roller . Rolling shall commence at the edges and progress towards the center except in super elevated and unidirectional cambered portions where it shall proceed from the lower edge to the higher edge. Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. After Initial rolling , the surface shall be checked transversely and longitudinally with templates and any irregularities corrected by loosening the surface, adding or removing necessary amount of aggregates , followed by rolling.

Rolling shall be stopped before voids in the aggregates layer are closed to such an extent as to prevent free and uniform penetration of the binder.

SURFACE FINISH AND QUALITY CONTROL :

The Surface finish of construction shall conform to the requirement of clause 902 M.O.R.T. & H. specifications.

The control on quality of materials and works shall be exercised by the Engineer in accordance with clause 900 of M.O.R.T. & H. specifications.

The Built-up Spray grout shall be provided with final surfacing without any delay. If there is to be any delay , the course shall be covered by a seal coat to the requirement of clause 513 of M.O.R.T.& H. specifications. Before allowing any traffic over it. The seal coat in such cases shall be considered incidental to the work and shall not be paid for separately.

ARRANGEMENT OF TRAFFIC :

During the period of construction arrangement of traffic shall be done as per clause 112 of M.O.R.T. & H. specifications.

MEASUREMENT FOR PAYMENT :

Built-up spray grout shall be measured as finished work in sqm.

- (i) Making arrangement for traffic to Clause 112 except for initial treatment to verge, shoulders and construction of diversions.
- (ii) Preparation of the surface to receive the materials .

- (iii) Providing all materials to be incorporated in the work including arrangement for stock yards , all royalties, fees , rents where necessary and all leads and lifts.
- (iv) Mixing , transporting , laying and compacting the mix as specified .
- (v) All labour, tools ,equipment , plant including installation of not mix plant , power supply units and all machinery, incidental to complete the work to these specifications.
- (vi) Carrying out the work in part widths of the road where directed.
- (vii) Carrying out all test for control of quality and
- (viii) The rate shall cover the provision of bitumen at the rate specified in the contract with the provision that the variation in actual percentage of bitumen used will be assessed and the payment adjusted accordingly.
- (ix) The rates for premixed material are to include for all wastage in cutting of joints etc.
- (x) The rates are to include for all necessary testing , mix design , transporting and testing of samples and cores. If there is not a project specific laboratory , The contractor must arrange to carry out all necessary testing at an outside Laboratory approved by the Engineer and all costs incurred are deemed to be included in the rate quotes for the material.
- (xi) The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed to be included in the contractor's rates for the materials .

The payment shall be made on Sqmt. basis.

Item No. 4 Providing and laying compacted WBM of grading II B.T.M.C. Metal including spreading watering and consolidation by vibratory roller etc. complete.

5.01.00 This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub base as the case may be in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as necessary to lines, grades and cross-sections shown on the approved drawings or as direction by the Engineer. The thickness of a single compacted Wet mix macadam layer shall not be less than 75mm

5.02.00 Materials

5.02.01 Physical requirements : Coarse aggregates shall be crushed stone. If crushed gravel is used, not less than 90 percent by weight of the gravel pieces retained on 4.75mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements as given below table.

TABLE : PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR WET MIX MACADAM FOR BASE COURSES.

Sr. No.	Test	Test Method	Requirement
1	Losangeles abrasion Value or	IS-2386 (Part-4)	40% Max
2	Aggregates Impact Value	IS-2386 (Part-4) or IS : 5640	30 % Max.
3	Combined Flakiness and Elongation indices (Total)	IS:2386 (Part-1)	30 % Max.

* Aggregate may satisfy requirement of either of the two test.

** To determine this combined proportion, the flaky stone from a representative samples should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The value of flakiness index and elongation index so found are added up.

If the water absorption value of the coarse aggregate is greater than 2 per cent, the soundness test shall be carried out on the materials delivered to site as per IS: 2386 (Part-5)

Grading requirements : The aggregates shall conform to the grading given in Table below.

TABLE GRADING REQUIREMENTS OF AGGREGATES FOR WET MIX MACADAM

IS Sieve Designation	Per cent by weight passing the IS sieve.
53.00mm	100
45.00 mm	95 – 100
26.50 mm	-
22.40 mm	60 – 80
11.20 mm	40 – 60
4.75 mm	25 – 40
2.36 mm	15 – 30
600.00 Micron	8 - 22
75.00 micron	0 – 8

Materials finer than 425 Micron shall have plasticity Index (PI) not exceeding 6. The final gradation approved within these limits shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa.

5.03.00 Construction Operation

5.03.01 Preparation of base :

The Surface of the sub-base to receive the wet mix macadam course shall be prepared to the specified lines and crossfall (camber) and made free of dust and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained if necessary by sprinkling water. Any sub base surface irregularities, where predominant, shall be made good by providing appropriate type of profile corrective course (levelling course).

5.03.02 Provision of lateral confinement of aggregates :

While constructing wet mix macadam, arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of wet mix macadam layer.

5.03.03 Preparation of Mix

Wet Mix macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced/positive mixing arrangement like pugmill or pan type mixer of concrete batching plant.

Optimum moisture for mixing shall be determined in accordance with IS:2720 (Part-8) after replacing the aggregate fraction retained on 22.4mm sieve with material of 4.75mm to 22.4mm size. While adding water, due allowance should be made for evaporation losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and no segregation should be permitted.

5.03.04 Spreading of Mix

Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub-grade/Sub-base/base in required quantities, In no case should these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed stretch be permitted.

The Mix may be spread either by a paver finisher or motor grader. For portions where mechanical means cannot be used, manual means as approved by the Engineer shall be used. The motor grader shall be capable of spreading the material uniformly all over the surface. Its blade shall have hydraulic control suitable for initial adjustments and maintaining the same so as to achieve the specified slope and grade.

The paver finisher shall be self-propelled, having the following features:

- (i) Loading hoppers and suitable distribution mechanism
- (ii) The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface profile.

- (iii) The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregate as may be required. The layer may be tested by depth blocks during construction. No segregation of larger and fine particles should be allowed. The aggregates as spread should be of uniform gradation with no pockets of fine materials.

5.03.05 Compaction :

After the mix has been laid to the required thickness, grade and crossfall/camber the same shall be uniformly compacted to the full depth with suitable roller. If the thickness

of single compacted layer does not exceed 100mm, smooth wheel roller of 80 to 100kN weight may be used. for a compacted single layer upto 200mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100kN or equivalent capacity roller.

The speed of the roller shall not exceed 5 km/h.

In portions having unidirectional cross fall/super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least one third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1m way from any preceding stop.

In Portions in camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the centre parallel to the centre line of the road uniformly overlapping each of the preceding track by at least one third width until the entire surface has been rolled.

Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and/or removed and made good.

Along forms, kerbs, walls or other places not accessible to the roller, the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor, Skin patching on an area without scarifying the surface to permit proper bonding of the added material shall not be permitted.

Rolling should not be done when the subgrade is soft or yielding or when it causes a wave-like motion in the sub base/base course or subgrade. If irregularities develop during rolling which exceed 12mm when tested with a 3 metre straight edge, the surface should be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform surface conforming to the desired grade and crossfall. In no case should the use of unmixed material be permitted to make up the depressions.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material as determined by the method outlined in IS:2720 (Part-8)

After completion, the surface of any finished layer shall be well-closed, free from movement under compaction equipment or any compaction planes, ridges, cracks and loose material. All Loose, segregated or otherwise defective areas shall be made good to the full thickness of the layer and recompact.

5.03.06 Setting and drying

After final compaction of wet mix macadam course, the road shall be allowed to dry for 24 hours.

The payment shall be made on Cubic meter basis without deduction of voids.

E.E.