

**Item No.09 :- Providing and laying Tack coat with Bitumen emulsion (RS-1) at the rate of 4.00 Kg / 10 Sq.M. on the prepare bituminous surface etc complete as directed with all labour and materials**

**Scope**

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to an existing bituminous, cement concrete or primed granular surface preparatory to the superimposition of a bituminous mix, when specified in the Contract or instructed by the Engineer. The work shall be carried out on a previously prepared surface in accordance with Clause 501.

**Materials *Binder***

The binder used for tack coat shall be Rapid Setting Bitumen Emulsion Grade RS-1 complying with IS:8887 or suitable low viscosity paving bitumen of VG 10 grade conforming to IS:73. The use of cutback bitumen (Medium Curing grade) as per IS:217 shall be restricted only for sites at sub-zero temperature or for emergency applications as directed by the Engineer. The type and grade of binder for tack coat shall be specified in the contract.

**Weather and Seasonal Limitations**

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet.

**Construction *Equipment***

The equipment used for tack coat shall be self-propelled or tractor towed bitumen pressure distributor equipped for spraying the material uniformly at a specified rate. Hand spraying of small areas, inaccessible to the distributor, or in narrow strips, shall be permitted with a pressure hand sprayer, or as directed by the Engineer.

***Preparation of base***

The surface on which the tack coat is to be applied shall be clean and free from dust, dirt, and any extraneous material, and be otherwise prepared in accordance with the requirements of Clause 501. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom, or by other means as directed by the Engineer.

***Application of tack coat***

The binder shall be sprayed on the base at the rate specified in **Table 500.2**. The normal range of spraying temperature for a bituminous emulsion shall be 20°C–70°C. Paving bitumen if used for tack coat shall be heated to an appropriate temperature in bitumen boilers to achieve viscosity less than 2 poise. The normal range of spraying temperature for a cutback shall be 50°C-80°C. It shall be the responsibility of the Contractor to carefully handle the inflammable bituminous cutback material so as to safeguard against any fire mishap. The binder shall be applied uniformly with the aid of either self-propelled tractor towed bitumen

pressure distributor capable of spraying bitumen at specified rates and temperature so as to provide a uniformly unbroken spread of bitumen. Work should be planned so that no more than the necessary tack coat for the day's operation is placed on the surface. A spraying trial shall be carried out to demonstrate the efficacy of the equipment for uniformity of spread within specified tolerances.

**Table 500.2 Rate of Application of Tack Coat**

	Type of Surface Emulsion	Rate of Spray of Binder
		(kg/m <sup>2</sup> )
i)	Normal bituminous surfaces	0.20 to 0.25
ii)	Dry and hungry bituminous surfaces	0.25 to 0.30
iii)	Granular surfaces treated with primer	0.25 to 0.30
iv)	Cement Concrete Pavement	0.30 to 0.35

### ***Curing of tack coat***

The tack coat of emulsion shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles other than essentially required for construction shall be allowed on the tack coat.

### **Quality Control of Work**

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 1800 shall apply.

### **Arrangements for Traffic**

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Section 100.

### **Measurements for Payment**

Tack coat shall be measured in terms of surface area of application in square metres.

### **Rate**

The contract unit rate for tack coat shall be payment in full for carrying out the required operations including for all components listed in Clause 401.7 and as applicable to the work specified in these Specifications.

**Item No.10 :- Providing and laying Tack coat with Bitumen emulsion (RS-1) at the rate of 2.50 Kg / 10 Sq.M. on the prepare bituminous surface etc complete as directed with all labour and materials**

**Scope**

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to an existing bituminous, cement concrete or primed granular surface preparatory to the superimposition of a bituminous mix, when specified in the Contract or instructed by the Engineer. The work shall be carried out on a previously prepared surface in accordance with Clause 501.

**Materials *Binder***

The binder used for tack coat shall be Rapid Setting Bitumen Emulsion Grade RS-1 complying with IS:8887 or suitable low viscosity paving bitumen of VG 10 grade conforming to IS:73. The use of cutback bitumen (Medium Curing grade) as per IS:217 shall be restricted only for sites at sub-zero temperature or for emergency applications as directed by the Engineer. The type and grade of binder for tack coat shall be specified in the contract.

**Weather and Seasonal Limitations**

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet.

**Construction *Equipment***

The equipment used for tack coat shall be self-propelled or tractor towed bitumen pressure distributor equipped for spraying the material uniformly at a specified rate. Hand spraying of small areas, inaccessible to the distributor, or in narrow strips, shall be permitted with a pressure hand sprayer, or as directed by the Engineer.

***Preparation of base***

The surface on which the tack coat is to be applied shall be clean and free from dust, dirt, and any extraneous material, and be otherwise prepared in accordance with the requirements of Clause 501. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom, or by other means as directed by the Engineer.

***Application of tack coat***

The binder shall be sprayed on the base at the rate specified in **Table 500.2**. The normal range of spraying temperature for a bituminous emulsion shall be 20°C–70°C. Paving bitumen if used for tack coat shall be heated to an appropriate temperature in bitumen boilers to achieve viscosity less than 2 poise. The normal range of spraying temperature for a cutback shall be 50°C-80°C. It shall be the responsibility of the Contractor to carefully handle the inflammable bituminous cutback material so as to safeguard against any fire mishap. The binder shall be applied uniformly with the aid of either self-propelled tractor towed bitumen

pressure distributor capable of spraying bitumen at specified rates and temperature so as to provide a uniformly unbroken spread of bitumen. Work should be planned so that no more than the necessary tack coat for the day's operation is placed on the surface. A spraying trial shall be carried out to demonstrate the efficacy of the equipment for uniformity of spread within specified tolerances.

**Table 500.2 Rate of Application of Tack Coat**

	Type of Surface Emulsion	Rate of Spray of Binder
		(kg/m <sup>2</sup> )
i)	Normal bituminous surfaces	0.20 to 0.25
ii)	Dry and hungry bituminous surfaces	0.25 to 0.30
iii)	Granular surfaces treated with primer	0.25 to 0.30
iv)	Cement Concrete Pavement	0.30 to 0.35

#### ***Curing of tack coat***

The tack coat of emulsion shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles other than essentially required for construction shall be allowed on the tack coat.

#### **Quality Control of Work**

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 1800 shall apply.

#### **Arrangements for Traffic**

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Section 100.

#### **Measurements for Payment**

Tack coat shall be measured in terms of surface area of application in square metres.

#### **Rate**

The contract unit rate for tack coat shall be payment in full for carrying out the required operations including for all components listed in Clause 401.7 and as applicable to the work specified in these Specifications.

**Item No.11. : Providing & laying Bituminous grout 37.50 mm thick with asphalt of grade of VG-30 at the rate of 1.99% by weight of mix for mixing using B.T.Chips of required gradation including cleaning and heating asphalt premix materials by hot mix process in proper gradation and laying with paver finisher and consolidation by roller of 8 to 10 tonnes including cost of all materials, Asphalt, aggregates, labour Charges, royalty charges etc. completed as directed. including flushing key aggregate @0.13 Cum/10 Sq.m.**

**Note: For This Item Not Consider 4.00 kg./10 Sq.M. For tackcoat (VG30)**

### Scope

The work shall consist of construction, in a single course, of compacted crushed 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 Specifications and in conformity with the lines, grades and cross sections shown on the drawing or as directed by the Engineer. Thickness of the course shall be **37.5mm** materials.

### Materials

**Bitumen:** The bitumen shall be paving bitumen of suitable **viscosity grade VG-30 (60/70)** as per IS: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. Guidelines on selection of the grade of bitumen are given in *Appendix-4*.

### Viscosity Grade (VG) Bitumen Specification as per IS 73 : 2006

Characteristics	VG - 10	VG-20	VG-30	VG-40
Absolute Viscosity 60°C, poises, min	800	1600	2400	3200
Kinematic Viscosity 135°C CSI, min	250	300	350	400
Flash point, C, min	220	220	220	220
Solubility in trichloroethylene, % min	99.0	99.0	99.0	99.0
Penetration at 25°C	80-100	60-80	50-70	40-60
Softening point, C min	40	45	47	50
Test on residue from thin film oven test / RTFOT :				
(A) Viscosity ration at 60°C, max	4.0	4.0	4.0	4.0

(B) Ductility at 25°C, cm, min after thin film over test	75	50	40	25
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### Aggregates

The aggregates shall consist of crushed stone, crushed gravel/shingle or other stones. 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 hydrophobic and of low porosity. If hydrophilic 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.

**TABLE 500-3. PHYSICAL REQUIREMENTS OF AGGREGATES FOR BITUMINOUS GROUT**

S. No.	Test	Test Method	Requirement
1	Los Angeles Abrasion Value	IS:2386 (Part - 4)	40 percent Maximum
2	Aggregate Impact Value*	-do-	30 percent Maximum
3	Flakiness and Elongation Indices (Total)**	IS: 2386 (Part - 1)	30 percent (combined)
4	Coating and Stripping of Bitumen Aggregate Mixtures	AASHTO T 182	Minimum retained coating 95 per cent
5	Soundness:		
	(i) Loss with Sodium Sulphate 5 cycles	IS: 2386 (Part – 5)	12 percent Maximum
	(ii) Loss with Magnesium Sulphate 5 cycles		18 per cent Maximum
6	Water absorption	IS: 2386(Part - 3)	2 per cent Maximum

\* **Aggregates may satisfy requirements for 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 stone sample. Only the elongated particle 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.

**Proportioning of materials:**

The bitumen content for premixing shall be **1.99 % (percent)** by weight of the total mix except when otherwise directed by the Engineer.

The maximum compacted thickness of a layer shall be **37.5mm**.

The quantities of aggregates to be used shall be sufficient to yield the specified thickness after compaction.

**AGGREGATE GRADING FOR BITUMINOUS GROUT**

<u>IS Sieve</u>	<u>Percent by weight passing the sieve</u>
<u>Designation</u>	

53.0	mm	100
26.5	mm	75-100
22.4	mm	50-85
13.2	mm	20-40
5.6	mm	5-20
2.8	mm	0 – 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 per cent by weight of total mix shall however be permissible for individual specimens taken for quality control tests vide Section 900.

**Construction Operations:**

**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 atmospheric temperature in shade is 10 degree C or less.

**Preparation of base :** This work shall consist of preparing an existing granular or black topped surface bituminous course. The work shall be performed on such widths and lengths as shown in application drawing or as directed by the Engineer. The existing surface shall be firm and clean and treated with prime or tack coat as shown on the drawings as otherwise stated in the contract.

**Materials:**

**For scarifying and re-laying the granular surface:** The materials used shall be coarse aggregates salvaged from scarification of the existing granular base course supplemented by

fresh coarse aggregates and screenings so that aggregates and screening thus supplemented correspond to Clause 404. Water Bound Macadam or Clause 406. Wet Mix Macadam, as the case may be.

**For patching potholes and sealing cracks :** Where the existing surface to be overlaid is bituminous, any existing potholes and cracks shall be repaired and sealed in accordance with Clauses 3004.2 and 3004.3 or as directed by the Engineer.

**For Profile Corrective Course :** A profile corrective course for correcting the existing pavement profile shall be laid to varying thickness as shown on the Drawings, or as indicated in the Contract Documents. The profile corrective course shall be laid to tolerances and densities as specified for wearing course if a single layer, or base course, if it is to be covered with a wearing course layer.

**Profile corrective course and its application:** The type of material for use as a profile corrective course shall be as shown on the drawing. If it is to be laid as part of the overlay/strengthening course, the profile corrective course material shall be of the same specification as that of the overlay/strengthening course. However, if provided as a separate layer, it may be of the same specification as the layer over which it is to be laid or intermediate between underlying layers, as shown on the Drawing.

**Surface Levels:**

The levels of the sub grade and different pavement courses as constructed shall not vary from those calculated with reference to the longitudinal and cross-profile of the road shown on the drawings or as directed by the engineer beyond the tolerances mentioned in Table 900-1.

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Where the tack coat consists of emulsion the surface shall be slightly damp, but not wet. Where the tack coat is of cut back bitumen the surface shall be dry.

**Construction Equipment:**

The tack coat distributor shall be self propelled or towed bitumen pressure sprayer, quipped for spraying the material uniformly at a specified rate. Hand spraying of small areas inaccessible to the distributor or in narrow strips shall be sprayed with a pressure sprayer or as directed by the Engineer 503.4.2 of MORTH specification. Preparation of base : The surface on which the tack coat is to be applied shall be clean and free from dust, dirt and any extraneous material, and be otherwise prepared in accordance with the requirements of Clauses 501.8 and 902 as appropriate. Immediately before the application of the tack coat,



the surface shall be swept clean with a mechanical broom, and high pressure air jet, or by other means as directed by the Engineer.

#### **Application of tack coat:**

The application of tack coat shall be at the rate specified in the Contract, and shall be applied uniformly. If rate of application of Tack Coat is not specified in the contract then it shall be at the rate specified in TABLE 500-2 of MORTH specification. The normal range of spraying.

#### **~~TABLE 500-2 RATE OF APPLICATION OF TACK COAT:~~**

~~The emulsion asphalt at the rate of **4.00kg/10 Sq.mt area** shall be used for tack coat temperature for a bituminous emulsion shall be 20°C to 70°C and for a cut back 50°C to 80°C if RC 70/MC 70 IS used. Where geosynthetic IS proposed for use, the provisions of Clauses 703.3.2, and 703.4.4 of MORTH specification shall apply. The method of application of the tack coat will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.~~

~~Where the material to receive an overlay is a freshly laid bituminous layer, that has not been subjected to traffic, or contaminated by dust, a tack coat is not mandatory where the overlay is completed within two days.~~

~~**Curing of tack coat:** The tack coat shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No pant or vehicles shall be allowed on the tack coat other than those essential for the construction.~~

#### **Quality Control of Work :**

##### **TOLERANCES IN SURFACE LEVELS**

1.	Sub grade	+	20mm
			25mm
2.	Sub-base 4 - 10 mm		
	(a) Flexible pavement	-	20mm
	(b) Concrete pavement	+	6mm
	[Dry clean concrete or Rolled concrete]	-	10mm
3.	Base - course for flexible pavement	+	6mm
	(a) Bituminous course	-	6mm
	(b) Other than bituminous	+	10mm
	(i) Machine laid	-	10mm
	(ii) Manually laid	+	15mm
			15 mm

4. Wearing course for flexible pavement			
(a) Machine laid	+	6mm	6mm
(b) Manually laid	+	10mm	10mm
5. Cement concrete pavement	+	5mm	6mm
	-		

#### **~~TACK COAT:~~**

##### **~~Scope:~~**

~~This work shall consist of the application of a single coat of high viscosity liquid bituminous material to an existing bituminous road surface preparatory to the superimposition of a bituminous mix, when specified in the Contract or instructed by the Engineer.~~

##### **~~Materials:~~**

~~The binder used for tack coat shall be bitumen emulsion complying with IS:8887 of a type and grade as specified in the Section 500 of MORTH specification Contract or as directed by the Engineer. The use of cut back bitumen as per IS:217 shall be restricted only for sites at sub zero temperatures or for emergency applications as directed by the Engineer.~~

##### **~~Weather and Seasonal Limitations:~~**

~~For control of the quality of materials supplied and the works carried out for relevant provisions of Section 900 shall apply.~~

**~~Specification:~~** The rate shall cover the provision of **tack coat at 0.4 kg** per square meter with provision that the variation in actual quantity of bitumen used will be assessed and the payment adjusted accordingly.

##### **~~Preparation and transport of mix:~~**

Bituminous grout mix shall be prepared in a drum mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates.

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 conveyors/ or other suitable devices for regulating the accurate proportion of aggregate in to an even flood 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 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 the 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 be in range of 150 Degree C to 163 degree and that of the aggregate in the range of 155 degree C - 163 degree C provided that the difference in temperature between the binder and aggregate at no time exceeds 14 Degree C.

Mixing shall be thorough 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 130 Degree C to 160 degree C.

The mixture shall be transported from the mixing place to the point of use in suitable tipper vehicles. The vehicles employed for transport shall be clean and be covered in transit if so directed by the Engineer. Any tipper causing excessive segregation of materials by its spring suspension or other contributing factors or that which shows undue delay shall be removed from the work unit such conditions are corrected.

**Spreading:** The mix transferred from the tipper at 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 essential features:

- (a) Loading hoppers and suitable distributing mechanism.
- (b) All drives having hydrostatic drive/control.
- (c) The machine shall have a hydraulically extendable screed the 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 and 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 sensing device for automatic leveling and profile control within the specified tolerances.
- (g) The screed shall have the internal heating arrangement.
- (h) The paver shall be capable of laying either 2.5 to 4.0 m width or 4.0 to 7.0 m width as stipulated in the Contract.
- (i) The paver shall be so designed as to eliminate skidding/slippage of the tyres during operation.

However, in restricted locations and in narrow widths where the available plant cannot 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 120°C to 160°C. In multi-layer construction, the longitudinal joint in one layer shall offset that in the layer below by about 150 mm. However, the joint 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 cut 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 250 mm from those in the lower courses and the joint on the top-most layer shall not be allowed to fall within the wheel path. All transverse joints shall be cut vertically to the full thickness of the previously laid mix with asphalt cutter/pavement breaker and surface 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°C before laying of adjacent material.

**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 material 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/h. 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 shall commence at the edges and progress towards the centre longitudinally except that on super elevated and uni-directional cambered portions, it shall progress from the lower to the 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 tandem) 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 kN static weight or pneumatic tyred roller of 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 tandem roller. During the final rolling, vibratory system shall be switched off. The joints and edges shall be rolled with a 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 material. The rolling shall then be continued till the entire surface has been rolled to 95 per cent of the average laboratory density (obtained from Marshall specimens compacted as defined in Table 500-10), 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 used for this purpose, nor excessive water poured on the wheels.

Rolling operations shall be completed in every respect before the temperature of the mix falls below 100°C.

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

#### **Application of key aggregate :**

Immediately after second application of the binder key aggregate in a clean and dry state shall be spread uniformly at the rate of  $0.13 \text{ m}^2 / 10 \text{ m}^2$  so as to cover the surface completely. If necessary, the surface shall be broomed to ensure uniform application of the key aggregates. The entire surface shall then be rolled with a 8-10 tone smooth wheeled roller. While rolling is in progress, additional key aggregates where requited shall be spread by hand. Rolling shall

continue until the entire course is thoroughly compacted and the key aggregates are firmly in position.

**Surface Finish and Quality Control of Work :**

The surface finish of construction shall conform to the requirements of Clause 902. Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

The built-up spray grout shall be provided with next 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 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 for Traffic:**

During the period of construction, arrangement of traffic shall be done to Clause 112 of MORTH Specification.

**Passage of Traffic along a part of the Existing Carriageway under Improvement:**

For widening/strengthening existing carriageway where part width of the existing carriageway is proposed to be used for passage of traffic, treated shoulders shall be provided on the side on which work is not in progress. The treatment to the shoulder shall consist of providing at least 150 mm thick granular base course covered with bituminous surface dressing in a width of at least 1.5 m and the surface shall be maintained throughout the period during which traffic uses the same to the satisfaction of the Engineer. The continuous length in which such work shall be carried out, would be limited normally to 500 m at a place. However, where work is allowed by the Engineer in longer stretches passing places at least 20 m long with additional paved width of 2.5 m shall be provided at every 0.5 km interval.

In case of widening existing two-lane to four-lane the additional two lanes would be constructed first and the traffic diverted to it and only thereafter the required treatment to the existing carriageway would be carried out. However, in case where on the request of the Contractor work on existing two lane carriageway is allowed by the Engineer with traffic using part of the existing carriageway, stipulations as in para above shall apply.

After obtaining permission of the Engineer, the treated shoulder shall be dismantled the debris disposed of and the area cleared as per the direction of the Engineer.

**MEASUREMENTS 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. Weigh 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 Engineer 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, hectometer and meter in which individual dumper are unloaded shall be recorded carefully.

**RATE:**

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

- (i) Making arrangements for traffic to Clause 112 of MORTH specification except or 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, plant including installation of drum 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.12. :-Providing,laying &rolling 25 mm thick open graded premixed bituminous carpet with B.T. aggregate as specified and using bitumen (VG-30) for using bitumen for mixing with aggregate at the rate of 3.36% i.e. 33.60 kg/M.T. of total mix including heating and mixing in drum mix plant and spreading the same with paver finisher and consolidation with roller as per MORTH specification including necessary firewood, oil, lubricants, labour charges etc. using contractor's own drum mix plant and equipment, tools etc. completed in accordance with the requirement of specification.

**Note: For This Item Not Consider 2.50 kg./10 Sq.M. For tackcoat (VG30)**

**511.1** Open-graded Premix Surfacing using viscosity bitumen or Cutback.

**511.1.1 Scope:** This work shall consist of the preparation, laying and compaction of an open graded premix surfacing material of **25 mm thickness** composed of small sized aggregate premixed with a bituminous binder on a previously prepared base, in accordance with the requirements of these specifications, to serve as a wearing course.

**511.1.2 Materials**

**511.1.2.1 Binder :-** The binder shall be a bitumen of a suitable viscosity grade as specified in the Contract or as directed by the Engineer, and satisfying the requirements of IS:73.

**Viscosity Grade (VG) Bitumen Specification as per IS 73 : 2006**

Characteristics	VG - 10	VG-20	VG-30	VG-40
Absolute Viscosity 60°C, poises, min	800	1600	2400	3200
Kinematic Viscosity 135°C CSI, min	250	300	350	400
Flash point, C, min	220	220	220	220
Solubility in trichloroethylene, % min	99.0	99.0	99.0	99.0
Penetration at 25°C	80-100	60-80	50-70	40-60
Softening point, C min	40	45	47	50
Test on residue from thin film oven test / RTFOT :				
(A) Viscosity ration at 60°C, max	4.0	4.0	4.0	4.0
(B) Ductility at 25°C, cm, min after thin film over test	75	50	40	25

**511.1.2.2 Aggregate -** The aggregate shall conform to Clause 504.2.2 except that the water absorption shall be limited to a maximum of 1 percent. The Polished Stone Value, as measured by the test in BS 812-(Part 114), shall not be less than 55.

IS Sieve (mm)	Cumulative Per cent 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, % by weight of total mixture	3.3-3.5
Bitumen Penetration Grade	35 to 90

\* For conditions in cooler areas of India or where the per cent passing 0.075 mm sieve is on the higher side of the range, appropriate bitumen contents may be upto 0.5 per cent higher, subject to the approval of the Engineer.

**511.1.2.3 Proportioning of materials :-** The materials shall be proportioned in accordance with Table 500-23.

### **511.1.3 Construction operations**

**511.1.3 Weather and seasonal limitations -** Clause 501.5.1 shall apply.

**511.1.3.2 Preparation of surface -** The under lying surface on which the bituminous surfacing is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross-section in accordance with Clause 501. A prime coat where needed shall be applied in accordance with Clause 502 as directed by the Engineer.

**TABLE 500-23.**

### **QUANTITIES OF MATERIALS REQUIRED FOR 10 M<sup>2</sup> OF ROAD SURFACE FOR 20 MM THICK OPEN GRADED PREMIX SURFACING USING VISCOSITY BITUMEN OR CUTBACK**

<b>Aggregates</b>		
a.	Nominal Stone size 13.2 mm (passing 22.4 mm sieve and retained on 11.2 mm sieve)	0.18 m <sup>3</sup>
b.	Nominal Stone size 11.2 mm (passing 13.2 mm sieve and retained on 5.6 mm sieve)	0.09 m <sup>3</sup>
	<b>Total</b>	<b>0.27 m<sup>3</sup></b>
<b>Binder (quantities in terms of straight run bitumen)</b>		
a.	For 0.18 m <sup>3</sup> of 13.2 mm nominal size stone at 52 kg bitumen per m <sup>3</sup>	9.5 kg
b.	For 0.09 m <sup>3</sup> of 11.2 mm nominal size stone at 56 kg bitumen per m <sup>3</sup>	5.1 kg
	<b>Total</b>	<b>14.6 kg</b>

~~**511.1.3.3 Tack coat** — A tack coat complying with Clause 503, shall be applied over the base preparatory to laying of the surfacing.~~

**511.1.3.4 Preparation of premix :-** Hot mix plant of appropriate capacity and type shall be used for the preparation of the mix material. The hot mix plant shall have separate dryer arrangement for heating aggregate.

The temperature of the binder at the time of mixing shall be in the range of 150°C to 163°C and that of the aggregate in the range of 155°C to 163°C provided that the difference in temperature between the binder and aggregate at no time exceeds 14°C. Mixing shall be thorough 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 130°C and 160°C.

The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or hand barrows. The vehicles employed for transport shall be clean and the mix being transported covered in transit if so directed by the Engineer.

**511.1.3.5 Spreading and rolling** - The pre mixed material shall be spread by suitable means to the desired thickness, grades and cross-fall (camber) making due allowance for any extra quantity required to fill pup depressions, if any. The cross-fall should be checked by means of camber boards and irregularities leveled out. Excessive use of blades or rakes should be avoided. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 8-10 tonne rollers, smooth wheel tandem type, or other approved equipment. Rolling shall begin at the edge and progress towards the centre longitudinally, except that on superelevated and uni-directional cambered portions, it shall progress from the lower to upper edge parallel to the centre line of the pavement.

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 premixed materials. Rolling shall then be continued until the entire surface has been rolled and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. The roller wheels shall be kept damp to prevent the premix from adhering to the wheels.

In no case shall fuel/lubricating oil be used for this purpose. Excess use of water for this purpose shall also be avoided.

Rollers shall not stand on newly laid material. Rolling operations shall be completed on every respect before the temperature of the mix falls below 100°C. Joints along and transverse to the surfacing laid and compacted earlier shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a thin coat of appropriate binder before the new mix is placed against it.

**511.1.3.6 Seal coat** - A seal coat conforming to Clause 513 of the type specified in the Contract shall be applied to the surface immediately after laying the surfacing.

**511.1.4 Opening to traffic** - No traffic shall be allowed on the road until the seal coat has been laid. After the seal coat is laid, the road may be opened to traffic according to Clause 513.4.

**511.1.5 Surface finish and quality control of work** - The surface finish of construction shall conform to the requirements of Clause 902. For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

**511.1.6 Arrangements for traffic** - During the period of construction, arrangement of traffic shall be made in accordance with the provisions of Clause 112.

**511.1.7 Measurement for payment** - Open graded premix surfacing shall be measured as finished work, for the area instructed to be covered, in **M.T.** The area will be the net area covered, and all allowance for wastage and cutting of joints shall be deemed to be included in the rate.

**511.1.8 Rate** - The contract unit rate for open graded premix surfacing shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8.2. (i) to (xi).

## **511.2 Open graded premix surfacing using cationic bitumen emulsion**

**511.2.1 Scope:** This work shall consist of the preparation, laying and compaction of an open graded premix surfacing of **25 mm thickness** composed of small sized aggregate premixed with a cationic bitumen emulsion on a previously prepared surface, in accordance with the requirements of these specifications, to serve as a wearing course.

### **511.2.2 Materials**

**511.2.2.1 Binder** - The binder for premix wearing course shall be cationic bitumen emulsion of Medium Setting (MS) grade complying with I.S.8887 and having a bitumen content 65 percent minimum by weight. For liquid seal coat RS grade of Cationic bitumen emulsion shall be used. Where expressly specified in the Contract MS grade emulsion shall be used or otherwise directed by the Engineer. Slow Setting (SS) grade Cationic bitumen Emulsion shall be used for premix seal coat.

**511.2.2.2 Aggregate:** The requirements of Clause 511.1.2.2 shall apply.

### **511.2.3 Proportioning of materials**

The materials shall be proportioned as quantities given in Tables 500-24 and 500-25.

**TABLE 500-24. QUANTITIES OF AGGREGATE FOR 10 M<sup>2</sup> AREA**

<b>A) Premix Carpet :</b>		
a.	Coarse aggregate nominal 13.2 mm size; passing IS 22.4 mm sieve and retained on IS 11.2 mm sieve	0.18 m <sup>3</sup>
b.	Coarse aggregate nominal 11.2 mm size; passing IS: 13.2 mm sieve and retained on IS 5.6 mm sieve	0.09 m <sup>3</sup>
<b>B. For seal coat:</b>		
Refer to clause 500.13		

**TABLE 500-25. QUANTITIES OF EMULSION BINDER**

		<b>For 10 m<sup>2</sup> area</b>
<b>A)</b>	<b>For Premix Carpet</b>	20 to 23 kg
<b>B)</b>	<b>For Seal Coat:</b>	
a.	For liquid seal coat	12 to 14 kg
b.	For premix seal coat	10 to 12 kg

#### **511.2.4 Construction operations**

**511.2.4.1 Weather and seasonal limitations** - Clause 501.5.1 shall apply except that the minimum air temperature for laying shall be 10°C. Cationic bitumen emulsions shall not normally be stored below 0°C

**511.2.4.2 Preparation of surface** - The underlying surface on which the premix surfacing is to be laid shall be prepared, in accordance with the requirements of Clause 504.3.2 for a newly primed surface and in accordance with Clause 507.4.2 where an existing bituminous surface is to be overlaid.

**511.2.4.3 Preparation of binder** - Before opening, the cationic bitumen emulsion drums shall be rolled at slow speed, to and fro, at least 5 times, for a distance of about 10 metres, to distribute any storage sedimentation.

**511.2.4.4. Tack coat:** ~~A tack coat complying with Clause 503 shall be applied over the surface preparatory to laying of the surfacing where specified in the Contract, or directed by the Engineer.~~

**511.2.4.5. Preparation of premix** - Premixing of cationic bitumen emulsion and aggregates can be carried out in a suitable mixer such as cold mixing plant as per IS: 5435 (revised) or concrete mixer or by pay loaders in exceptional cases where approved by the Engineer. Where specified in the contract continuous mixing operation shall be done either in batch or continuous hot mix plant suitable for emulsion mixes.

When using concrete mixer for preparing the premix, 0.135 cu.m (0.09 cu.m of 13.2 mm size and 0.045 cu.m of 11.2 mm. size) of aggregates per batch shall be used which quantity will cover 5 sq.m of road surface with 20 mm average thickness.

The aggregates required for one batch should be prepared adjacent to the mixer.

First the coarse aggregate of 13.2 mm size shall be placed into the mixer followed by 5 to 6.5 kg of cationic bitumen emulsion and then the 11.2 mm size aggregate shall be added, followed by 5 to 6.5 kg of cationic bitumen emulsion. After the materials have been mixed thoroughly, the mix shall be immediately transported to the laying site in suitable vehicles. Too much mixing shall be avoided.

When mixed manually by shovels, with the approval of the Engineer, 0.06 cum. of aggregates can be conveniently mixed in one heap, with appropriate quantity of emulsion. It is preferable to make the aggregates damp before mixing as it reduces the effort required for mixing and also helps to get better coating of aggregates. The 13.2 mm size aggregates and emulsion are mixed first and then the 11.2 mm size aggregates and remaining quantity of emulsion are added and mixed. Too much mixing shall be avoided.

**511.2.4.6 Spreading and rolling:** The premixed cationic bitumen emulsion and aggregates shall be spread within 10 minutes of applying the tack coat. All levelling, raking, etc. should be completed within 20 minutes of the time of mixing.

The mix should be spread uniformly to the desired thickness, grades and crossfall (camber) making due allowance for any extra quantity required to fill up depressions, if any. The cross

fall should be checked by means of camber boards and irregularities leveled out. Too much raking is to be avoided.

The rolling shall start immediately after laying the premix. A smooth wheeled tandem roller of 8-10 tonnes shall be used, unless the Engineer, based on the results of laying trials approves other compaction methods, if necessary. While rolling, wheels of roller should be clean and kept moist to prevent the premix from adhering to the wheels. In no case shall fuel/lubricating oil be used for this purpose. Use of water for this purpose shall be strictly limited to an absolute minimum.

Rolling shall commence at the edges and progress towards the centre longitudinally except in the case of superelevated and uni-directional cambered sections where rolling shall be carried out from the lower edge towards the higher edge parallel to the centre line of the road.

After one pass of roller over the whole area, depressions or uncovered spots should be corrected by adding premix material. Rolling shall be continued until the entire surface has been rolled to maximum compaction and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. Roller(s) shall not stand on newly laid material. Joints both longitudinal and transverse to the road sections laid and compacted earlier, shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a thin surface coat of binder before the new mix is placed against it.

**511.2.4.7 Seal coat:** A seal coat, conforming to Clause 510 or Clause 513, as specified in the Contract, shall be applied 4 to 6 hours after laying the premix carpet.

**511.2.5 Opening to traffic:** Traffic should not be allowed over the premix surface with or without seal coat, for 6 to 8 hours after rolling. In case of single lane roads, traffic shall be allowed onto the surface once it has reached ambient temperature, but speed must be rigorously restricted to not more than 16 km per hour. If any premix material is picked up by vehicle tyres, the spot shall be filled up by new mix. If traffic conditions permit, the road shall not be opened until a full 24 hours after laying.

**511.2.6 Surface finish and quality control:** The surface finish of construction shall conform to the requirements of Clause 902.

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

**511.2.7 Arrangements for traffic:** During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112.

**511.2.8 Measurement for payment:**

Open graded premix carpet shall be measured as finished work, for the area specified to be covered, in square metres at the specified thickness, in cubic metres or in **tonnes** weight as specified in the contract. The area will be the net area covered, and all allowances for wastage and cutting of joints shall be deemed to be included in the rate.

### **511.2.9 Rate:**

The contract unit rate for premix carpet and seal coat shall be payment in full for carrying out the required operations including full compensation for all components listed below :

- (i) Making arrangements for traffic to Clause 112 except for initial treatment to verge, shoulders and construction of diversion;
- (ii) Preparation of the surface to receive the material.
- (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 hot mix plant, power supply units and all machinery, incidental to complete the work to these Specifications;
- (vi) Carrying out the work in part width of the road where directed;
- (vii) Carrying out all tests 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 quoted 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 material.

Bitumen quantities are to be as stated in Table 500-23 for premix, 2.5 Kg per 10 sq.m for tack coat, 13 kg per 10 sq.m. for liquid seal coat and 11 kg per 10 sq.m. for premix seal coat. The rate will be adjusted according to actual material used.

**Item No. 13. :- Providing & laying Bitumen seal coat with 0.18 Cmt/ 10 Smt. of stone chips 6mm size & binder grade VG-30 content at the rate of 4.50 % by total weight of mix . Hot mix laying process is including heating the asphalt aggregate continuous batching, transporting the mix and spreading the same by paver finisher & consolidation with power roller including providing necessary fire wood, oil, lubricant, labour charges, higher charges of machinery etc, complete.**

## **1. DESCRIPTION**

The work shall consist of construction of premix seal coat as wearing course on a previously prepared base to the requirement of these specification.

## **2. MATERIALS**

**2.1 Binder:** The binder shall be straight run bitumen of viscosity grade **VG-30** satisfying the requirement of IS:73. The actual grade of the binder to be used shall be decided by the Engineer-in-charge and it shall have to be brought by contractor to the site at his own cost unless otherwise specified in schedule 'A'.

### **Viscosity Grade (VG) Bitumen Specification as per IS 73 : 2006**

<b>Characteristics</b>	<b>VG - 10</b>	<b>VG-20</b>	<b>VG-30</b>	<b>VG-40</b>
Absolute Viscosity 60°C, poises, min	800	1600	2400	3200
Kinematic Viscosity 135°C CSI, min	250	300	350	400
Flash point, C, min	220	220	220	220
Solubility in trichloroethylene, % min	99.0	99.0	99.0	99.0
Penetration at 25°C	80-100	60-80	50-70	40-60
Softening point, C min	40	45	47	50
Test on residue from thin film oven test / RTFOT :				
(A) Viscosity ration at 60°C, max	4.0	4.0	4.0	4.0
(B) Ductility at 25°C, cm, min after thin film over test	75	50	40	25

**2.2 Coarse aggregates:** The coarse aggregate shall consist of crushed stone or crushed gravel.

These shall be clean, durable, of cubical shape, free disintegrated pieces, organic or other deleterious matter and adherent coatings. The aggregates shall preferably be hydrophobic and of low porosity and shall satisfy the physical requirements set forth in Table given in Item No. 18 Para 2. Except that the upper limit for water absorption value shall be one percent.

**2.3 Fine aggregates;** The fine aggregates 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 of flaky pieces and organic or deleterious substances.

**2-4 Filter:** The filler, where required, shall be an insert material the whole of which passes 600 micron sieve at least 90 percent passing 150 micron sieve and not less than 70 percent passing 75 micron sieve. The filler shall be cement, stone dust, hydrated lime, fly ash and other non-plastic mineral matter approved by the Engineer-in-charge.

**2.5 Aggregate gradation :** The mineral aggregates, including mineral filler shall be so graded or combined as to conform to gradings set forth in tables below:

**Table : Aggregate gradation Pre-Mix Seal Coat**

Sieve Designation	Percentage by wt passing through Sieve	
	For type 'A'	For Type 'B'
12.5 mm	-	100
10 mm	100	70-100
4.75 mm	40-85	20-40
2.35	5-20	5-20
75 micron	0 - 4	0 - 4

**2.6 Proportioning of materials :** The binder content for premixing shall be **45.00 kg per M.T. (4.5%** by weight) for mixing aggregate.

The quantities of aggregates shall be sufficient to yield the specified thickness after compaction. The contractor shall get the job-'mix formula for the mix approved by the Engineer-in.-charge before starting the work.

**2.7 Variation in Proportioning of material :** The Contractor shall have the responsibility of ensuring proper proportioning of materials in accordance with the approved job mix formula and producing a uniform mix. A variation in binder content of  $\pm 0.3$  percent by weight of total mix shall, however be permissible in individual specimen taken for quality control tests vide MOST Specification Section 900.

### **3. CONSTRUCTION OPERATIONS**

**3.1 Weather and seasonal limitation :** Premix seal coat shall not be laid during rainy weather or when the base course is damp or wet.

**3.2 Preparation of base :** The base on which premix seal coat is to be laid shall be prepared shaped and conditioned to the specified, lines, grade and cross section in accordance with MOST Specification Clause 601 as directed by the Engineer-in-charge. The surface shall be thoroughly swept" and scraped clean and free of dust and foreign matter.

**3.3 Tack coat (if applied) : Application of binder :** Binder shall be rapid setting emulsion shall be used and approved by the Engineer-in-charge and sprayed on the base at the rate specified hereafter. The rate of spread in terms of straight run emulsion shall be **2.50 kg per 10 square** metre area for an existing bitumen treated surface. The binder shall be applied uniformly with the aid of sprayers. The tack coat shall be applied just ahead of the oncoming bituminous construction.

**3.4 Preparation of the mix :** Hot mix plant of adequate capacity and capable of producing a proper and uniform quality shall be used for preparing the mix. The plant should be continuous type having a co-ordinated set of essential units such as dryer for heating the aggregates, device for feeding by weight or volume the required quantities of aggregates, a binder heating and control unit for metering out the correct quantity of heated binder together with a paddle mixer for intimately mixing of the binder and aggregates. For details regarding Hot mix plant the Annexure 'A' may be referred.

The temperature of-binder at the time of mixing shall be in the range of 150° C - 177° C and aggregates in the range of 150° C -163° C provided also that at no time shall the difference in temperature of the aggregates and the binder exceed 14° C.

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

**3.5 Spreading** : The mix, transported from the hot mix plant to the site, shall be spread by means of self propelled mechanical paver with suitable screens capable of spreading, tamping and finishing the mix, true to specified grade, line and cross sections. The temperature of mix at the time of laying shall be in the range of 121° C -163°C.

Longitudinal joints and edges shall be constructed true to the delineating lines parallel to the centre line of the road. Longitudinal joints shall be offset by at least 150 mm 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 hot bitumen before placing fresh material.

**3.6 Rolling** : Immediately after the spreading of mix, it shall be thoroughly compacted by rolling with a set of rollers moving at a speed not exceeding 5 km per hour. The initial or break-down rolling shall be with 8-12 tonne three wheeled rollers and the surface finished by final rolling with vibratory rollers or suitable pneumatic rollers. Rolling temperature shall not be less than 100°C in any case the rolling shall be completed the temperature of mix falls about 80° C.

The roller wheels shall be kept damp to prevent the mix 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 centre except that at super elevated portions, it shall progress from the lower to upper edges parallel to the centre line of the payment. The roller should proceed on the fresh material with rear or fixed wheel leading so as to minimize the pushing of the mix and each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass Rolling shall continue until the entire surface has been rolled to compaction and all the roller marks eliminated.

#### **4. OPENING TO TRAFFIC**

Traffic may be allowed immediately after completion of the final rolling when the mix has cooled down to the surrounding temperature.

#### **5. SURFACE FINISH AND QUALITY CONTROL OF WORK**

The surface finish of construction shall conform to the requirements 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.

#### **6. ARRANGEMENT FOR TRAFFIC**

The provision of MOST Specification Clause 105 shall apply as regards the flow to traffic during construction.

#### **7. 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 weigh bridge of suitable capacity for the purpose of weighing of dumpers at suitable place at his cost as directed. Weight of empty dumper and weight of loaded dumper will be recorded in bound and numbered register on plant side.

Department will be free to get some loaded dumper test checked at other weigh bridge. Weigh 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, then the reduction in or addition to payment shall have to be effected to the contractor on proportionate basis depending upon the area reduced or exceeded respectively.

Weigh of mix materials will be done in presence of responsible person, not less than the rank of supervisor of Department, Deputy Executive Engineer or Assistant Engineer or Addl. Assistant Engineer if so authorized.

Record of each dumper will be maintained separately in bound and numbered register which will be maintained by the departmental representatives 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, hectometer in which individual dumper are unloaded will be recorded carefully.

## **8. RATE**

The Contract unit rate for seal coat shall be for payment for carrying out the required operations including full compensation for all components listed in MOST Specification Clause 503.7.

