

No.DB3/4620/12/CE/LSGD

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## CIRCULAR

Sub:- Tack coat application for bituminous works.

Ref:- (1) Specification for Rural roads.

(2) IRC 14 - 2004 – Recommended practice for Open Grade Premix Carpets.

(3) IRC – 16 – 2008 – Standard specification and code of practice for Prime and tack coat.

The various bitumen producing companies are reducing production of VG10 bitumen. But VG30 bitumen is nowadays common in market. In this context, clarifications have been sought by various field offices about the suitability of using VG30 bitumen for tarring works. The VG30 bitumen can be used for road works except for tack coat.

The type of binder for tack coat applications should comply with the recommendations of clause 503.2.1 of Specification of Rural Road (MoRD) and IRC – 16 – 2008 – Standard specification and code of practice for prime and tack coat. Based on the above the binder used for tack coat shall be either Cationic Bitumen Emulsion (RS- 1) conforming to IS: 8887/ASTM D 2397 or suitable low viscosity paving bitumen of VG10 grade conforming to IS:73.

For tack coat, CPWD item No. 16.31.1 can be used. The relevant pages of the respective codes are attached along with this for reference. If RS-1 emulsion is used for tack coat in new roads, a prime coat shall be invariably provided as per MoRD specification (503.1.1). The binder for prime coat shall be slow setting emulsion complying the guidelines in IRC-16-2008, item No. 5.1 in MoRD data. Also VG10 bitumen if available can be used for the tack coat.

  
Chief Engineer

**STANDARD SPECIFICATIONS  
AND  
CODE OF PRACTICE  
FOR  
PRIME AND TACK COAT  
(Second Revision)**



**INDIAN ROADS CONGRESS  
2008**

be used for cleaning of surface. The surface to be primed (whether with SS-1 emulsion or medium curing cutback bitumen) should be kept dry in case cutback is used as primer. If Soil/Moorum binder has been used in the WBM surface, part of this should be brushed and removed up to a depth of 2 mm so as to provide good bond.

The dilution of SS-1 bitumen emulsion is not permitted.

### 3.3.4 Application of primer

After the base to be primed has been prepared as in section 3.3.3, the primer shall be uniformly applied using the appropriate equipment at application rate specified in Table 1 or 2 as applicable. The spraying should be carried out using pressure sprayer or distributor. The method of application of primer will also depend on the type of equipment to be used, size of nozzles, pressure at spray bar and speed of the forward movement of vehicle. A trial section shall be laid to check the efficacy of equipment as well as penetration depth (10 mm) of the priming material.

### 3.3.5 Temperature of application of primer

No heating of SS-1 bitumen emulsion is permitted at site. In case of cutback bitumen, temperature of application of primer should be high enough to permit the primer to be sprayed effectively through the jets of the spray bar and to cover the base course surface effectively. The temperature of product at the time of application should be more than 10°C.

### 3.3.6 Air curing and opening of traffic

The primed surface shall be allowed to cure for at least 24 hours or any other higher period, as is found to be necessary to allow all the moisture or volatiles to evaporate before any subsequent bituminous surface treatment or mix is laid. Excessive and unabsorbed primer if any, shall be blotted with a light

application of sand using the minimum quantity possible. A primed surface shall not be opened for traffic other than that necessary construction vehicles to lay the next bituminous course.

### 3.3.7 Arrangement for traffic

During the period of construction, appropriate arrangement for traffic diversion shall be made as specified in IRC:SP:55 to prevent any possible damage of primed surface.

## 3.4 Quality Control

The Quality Control shall be undertaken as under:

Test	Frequency of Tests
Quality of Binder	One set of test for a tanker or lot of 10 tonne as per IS:217 for cutback bitumen and IS:8887 for bitumen emulsion (Appendix-1)
Binder Temperature for application	Regular Intervals
Rate of spread of binder	1 test per 1000 m <sup>2</sup> and not less than two tests per day (Appendix 2)

## 4. TACK COAT

### 4.1. Definition

Tack Coat is a very light application of low viscosity liquid bituminous material to an existing bituminous, cement concrete or primed granular surface to ensure a bond between the surface being paved and the overlaying course. The tack coat material is not expected to penetrate into pavement and for this reason; the applications should be very light to provide adequate bond between two layers.

### 4.2. Materials

The binder used for tack coat shall be either Cationic Bitumen Emulsion (RS-1) conforming to

IS: 8887/ASTM D 2397 or suitable low viscosity paving bitumen of VG 10 grade conforming to IS:73. The use of cutback bitumen RC-70 (in cold climate) as per IS:217 shall be restricted only for sites where atmospheric temperature at the time of application reaches below 0°C or for emergency applications.

### 4.3 Construction

#### 4.3.1 Weather and Seasonal Limitations

Bituminous material shall not be applied during rainy season, dust storm or when the weather is foggy, rainy or windy or when the ambient temperature is less than 10°C. The surface should be totally dry in case of cutback bitumen. However, when using bitumen emulsion as tack coat, the surface should be slightly damp, but shall not be wet.

#### 4.3.2 Equipment

The tack coat shall be applied by a self-propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at a specified rate. Hand spraying may be permitted where tack coat is to be applied on small areas, inaccessible to the distributor, or in narrow strips, with a pressure hand sprayer. Pouring of tack coat using perforated can may be permitted in case of patchwork but shall not be permitted for major road works.

#### 4.3.3 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. The granular or stabilized surface shall be primed as per specifications given in Clause 3 of this Code. Immediately before the application of 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.

#### 4.3.4 Application of tack coat

**4.3.4.1** The rate of application for tack coat on various types of surfaces shall be as per **Table 3** and shall be applied uniformly. The quantity of cutback, when used as tack coat, will be same as that of emulsion.

**4.3.4.2** The method of application of tack coat will also depend on the type of equipment to be used, size of nozzles, pressure at spray bar and speed of the forward movement of vehicle. A spraying trial shall demonstrate that the equipment and method to be used is capable of providing a uniform spray, within specified tolerance limit. The quantity of tack coat shall be checked periodically using tray coating test as described in Appendix 2. The dilution of RS-1 bitumen emulsion is not permitted.

#### 4.3.5 Temperature of application of tack coat

No heating of RS-1 Bitumen Emulsion is permitted at site. Paving Bitumen if used shall be heated to its appropriate application temperature in bitumen boiler to achieve desired viscosity of less than 2 poise. The

**Table 3 : Rate of Application of Tack Coat**

Sl. No.	Type of Surface	Rate of Spray (Emulsion) (Kg/m <sup>2</sup> )	Rate of Spray (Bitumen VG-10) (Kg/m <sup>2</sup> )
(i)	Bituminous surface	0.20 to 0.30	0.30 to 0.40
(ii)	Granular Surface treated with primer	0.25 to 0.30	0.35 to 0.45
(iii)	Cement concrete pavement	0.30 to 0.35	0.40 to 0.50

IRC:14-2004

**RECOMMENDED PRACTICE  
FOR  
OPEN GRADED PREMIX  
CARPET**

*(Third Revision)*



**THE INDIAN ROADS CONGRESS  
2004**

TABLE 9. QUANTITY OF BINDER FOR SEAL COAT

Type of seal coat	Quantity per 10 m <sup>2</sup> area	Type
Type A (liquid seal coat)	12 to 14 kg	RS
Type B (premixed seal coat)	10 to 12 kg	SS

### 4.3. Construction

4.3.1. **Weather and seasonal limitation:** As per Clause 3.3.1.

4.3.2. **Preparation of surface:** As per Clause 3.3.2.

4.3.3. **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.

4.3.4. **Preparation of premix:** Premixing of cationic bitumen emulsion and aggregates can be carried out in a suitable mixer, such as, cold mixing plant or concrete mixer. Where specified in the Contract for large works continuous mixing operation shall be done either in batch or continuous cold mix plant suitable for preparation of emulsion mixes.

When using concrete mixer for preparing the premix, 0.135 cum (0.09 cum of 13.2 mm size and 0.045 cum of 11.2 mm size) of aggregate per batch shall be used to cover 5 sqm area of road surface with 20 mm average thickness. First the coarse aggregate of 13.2 mm shall be placed into the mixer followed by 4.5 to 5.5 kg of cationic bitumen emulsion and then the 11.2 mm size aggregate shall be added followed by remaining quantity of emulsion. After the materials have been mixed thoroughly, the mix shall be immediately transported to

the laying site in suitable vehicles. Too much mixing (exceeding 2 minutes) shall be avoided.

Where mixing is done manually by shovels, 0.06 cum of aggregates can be conveniently mixed in one heap, with appropriate quantity of emulsion, with the approval of the Engineer-in-Charge. It is preferable to make the aggregates damp before mixing as it reduce the effort required for mixing and also help to get better coating of aggregates. The 13.2 mm size aggregates and half of the emulsion are mixed first followed by 11.2 mm size aggregate and remaining quantity of emulsion.

**4.3.5. Spreading and rolling of premix:** The premixed material shall be spread within 10 minutes of applying the tack coat. The mix should be spread uniformly to the desired thickness, grades and cross fall (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 levelled 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-in-Charge, based on the results of laying trials, approves other compaction equipment. Rolling operation shall be carried out in accordance with the Clause 3.3.6.

**4.3.6. Application of seal coat:** Seal coat of Type A or Type B shall be applied 4 to 6 hours after laying cold mixed premix carpet. In case of seal coat Type A (liquid seal coat), immediately after spraying emulsion, clean and washed stone chips shall be spread uniformly at the specified rate, on the surface preferably by means of a self-propelled or towed mechanical grit spreader or by any other suitable means as directed by the Engineer-in-Charge so as to cover the surface

completely. If necessary, the surface shall be brushed to ensure uniform spread of chips. Rolling with 8-10 tonnes roller should start soon after spreading chips. The rolling operation shall be as indicated in Clause 3.3.7.1 as far as practicable. In case of seal coat Type B (premixed seal coat), grit of specified size and quantity shall be made wet with water before mixing with required quantity of SS grade emulsion as specified in Clause 4.2.2. The mixing, spreading and rolling shall be carried out as indicated in Clause 3.3.7.2 as far as practicable.

**4.3.7. Surface finish and quality control:** The surface finish of construction shall conform to the requirements of Clause 3.3.8.

#### **4.4. Opening to Traffic**

Traffic may be allowed over the premix carpet after 6 to 8 hours of laying the seal coat. However, in the case of single lane roads, traffic may be allowed after 4 hours or when the mix is properly set and the speed is restricted to not more than 16 km/hour. If vehicle tyres pick-up any premix material, the spot shall be filled-up by new mix. If traffic conditions permit, the road shall not be opened until 24 hours after laying.

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storm or when the air temperature at the surface is below 10°C or wind speed exceeds 40 km/h.

**3.3.2. Preparation of surface:** The underlying surface on which the bituminous surface is to be laid must be free from dust, caked mud or any loose and extraneous matter and shall be prepared and shaped to the specified profile. Where the existing surface is potholed or rutted, these irregularities must be corrected with premixed chippings or coated macadam, depending upon the depth of the depressions or pothole, laid after applying a tack coat of binder and well rammed, thereafter. The surface should be swept clean by removing caked earth and other foreign matter with wire brushes sweeping with brooms (mechanical broom) and finally dusting with air jet, washing or other means approved by the Engineer-in-Charge. **On granular surface prime coat shall be applied as per IRC:15.**

**3.3.3. Application of tack coat:** Before spreading of premixed material, a tack coat should be applied on the prepared/primed surface using a self propelled or towed pressure sprayer at the specified rate. Hand spraying for small areas inaccessible to the distributor can be done with the approval of the Engineer-in-Charge. The range of spraying temperature for bituminous emulsion shall be 20°C to 70°C. The tack coat shall be left to cure until all the volatiles have evaporated.

**3.3.4. Preparation of premix:** The bitumen shall be heated in boilers of suitable design approved by the Engineer-in-Charge, to the temperature appropriate to the grade of bitumen. Aggregates shall be heated to the required temperature. A mixer of appropriate capacity and type approved by the Engineer-in-Charge, preferably, a hot-mix plant shall be used for mixing aggregates and binder. It shall be ensured that bitumen does not come in direct contact with flame. Mixing

**502.4.5. Tack coat:** Over the primed surface, a tack coat should be applied in accordance with Clause 503.

**502.5. Quality Control of Work**

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

**502.6. Arrangements for Traffic**

During construction operations, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of the Ministry's Specification for Road and Bridge Works (third revision) 1995.

**502.7. Measurement for Payment**

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

**502.8. Rate**

The contract unit rate for prime coat with adjustments as described in Clause 502.7 shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 401.8 (i) to (v) of the Ministry's Specification for Road and Bridge Works (third revision) 1995, and as applicable to the work specified in these Specifications. Payment shall be made on the basis of the provision of prime coat at an application rate of 0.6 kg per square metre, with adjustment, plus or minus, for the variation between this amount and the actual amount approved by the Engineer after the preliminary trials referred to in Clause 502.4.3.

**503. TACK COAT**

**503.1. Scope**

This work shall consist of the application of a single coat of low 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.

**503.2. Materials**

**503.2.1. Binder:** The binder used for tack coat shall be bitumen emulsion complying with IS 8887 of a type and grade as specified in the

Contract or as directed by the Engineer. The use of cutback bitumen as per IS 117 shall be restricted only for sites at sub-zero temperatures or for emergency applications as directed by the Engineer.

**503.3. 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. Where the tack coat is of cutback bitumen, the surface shall be dry.

**503.4. Construction**

**503.4.1. Equipment:** The tack coat distributor shall be a self-propelled or towed bitumen pressure sprayer, 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 sprayed with a pressure hand sprayer, or as directed by the Engineer.

**503.4.2. 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.

**503.4.3. 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. The normal range of spraying

**TABLE 500-2. RATE OF APPLICATION OF TACK COAT**

Type of Surface	Quantity of liquid bituminous material in Kg per sq. m. area
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) Non bituminous surfaces	
a) Granular base.(not primed)	0.35 to 0.40
b) Cement concrete pavement	0.30 to 0.35