

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



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STANDARD SPECIFICATIONS AND CODE OF PRACTICE FOR PRIME AND TACK COAT

1. INTRODUCTION

1.1 The Standard for Prime Coat was originally published in 1956 as IRC:16. The first revision of the Standard was approved by the Specifications and Standards Committee in its meeting held on 7th April, 1989 and by the Executive Committee through circulation and by the Council in its meeting held at New Delhi on 29th April, 1989 for publication.

1.1.1 The decision to review and revise the code of practice was taken during the meeting of Flexible Pavement Committee (FPC) held on 30th April, 2004. The task was assigned to Dr. P. K. Jain of Central Road Research Institute (CRRI). The draft of the revised code was presented and discussed in the meeting of Flexible Pavement Committee held on 7th August, 2004. It was decided that the draft document should include specifications for Tack Coat also and may be modified in the light of the comments of the members. The draft Standard prepared by Dr. P.K. Jain was reviewed by the FPC in its meeting held on 12th August, 2005 and it was decided that a Group consisting of Dr. P. K. Jain, Shri Rajesh Kr. Jain and Shri. Gurdip S. Khinda of IRC will finalise the document incorporating the suggestions of the members and forward the same to Convenor, FPC for approval before circulating to HSS Committee. The draft Standard was finalized by the Group in its meeting held on 29th August, 2005 and 26th September, 2005 and sent to Convenor FPC. During the meeting of FPC held on 6th January, 2007, it was decided to publish the draft document in "Indian Highways". Draft document was published in issue of "Indian Highways". Comments of engineers from profession were discussed in the meeting of Flexible Pavement Committee held on 5th May, 2007 and incorporated in the revised document which was approved by Flexible Pavement Committee in its meeting

held on 5th May, 2007. The draft document was considered by the Highways Specifications and Standards Committee on 26th May, 2007 and was approved. The draft was approved by the IRC Council on 18th August, 2007 subject to certain modifications, keeping in view the comments of members and approval by the Convenor, Highways Specifications and Standards Committee.

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This Standard would supersede existing IRC:16-1989 titled "Specification for Priming of Base Course with Bituminous Primers (First Revision)".

1.2 Symbols and Abbreviations

1.2.1 For the purpose of this Standard, the following symbols for SI units and abbreviations shall apply.

1.2.1.1 Symbols for SI Units

°C	degree Celsius
kg	kilogram
m	metre
mm	millimetre
cSt	centi Stokes

1.2.1.2 Abbreviations

BS	British Standard by British Standard Institute
IRC	Indian Roads Congress
IS	Indian Standard by Bureau of Indian Standards
MC	Medium Curing
RC	Rapid Curing
RS	Rapid Setting
SS	Slow Setting
WBM	Water Bound Macadam
WMM	Wet Mix Macadam

2. SCOPE

This document covers the specifications and construction of bituminous prime coat for laying over granular surface and tack coat over primed granular surface, bituminous or cement concrete pavement.

3. PRIME COAT OVER GRANULAR BASE

3.1 Definitions and Objectives

3.1.1 Priming is spraying of low viscosity liquid bituminous materials on the surface of non-bituminous granular base course preparatory to the superimposition of bituminous treatment. The objectives of priming a granular surface are as under:

- (i) to penetrate the existing base course surface so as to plug capillary voids in it.
- (ii) to coat and bond loose mineral particles on the surface of the base course.
- (iii) to seal surface pores and make the surface of the base course water-resistant.
- (iv) To provide adhesion between the base and the superimposed bituminous surface course in conjunction with a tack coat.

3.1.2 Prime Coat is not to be regarded as a substitute for tack coat, the objective of which is to ensure a proper bond between the surface being paved and the new bituminous course being placed over it.

3.2 Materials

3.2.1 The bituminous material to be used as primer should be such that it can penetrate deep into base course (about 10 mm depth) to perform its intended function in an environment friendly manner. Bitumen emulsion or medium curing cutback bitumen can be used as primer.

3.2.2 Cationic bitumen emulsion SS-1 grade conforming to IS:8887/ASTM D2397 shall be used as primer. The quantity of SS-1 grade bitumen emulsion for various types of granular surfaces shall be as per **Table 1**. Cutback should not be prepared in the field.

Table 1 : Quantity of Bitumen Emulsion as Primer for Various Surface Types

Type of Surface	Rate of Spray (kg/m ²)
WMM/WBM	0.7 – 1.0
Mechanically stabilized soil base, lime/cement stabilized soil and lime cement base	0.9 – 1.2
Gravel Base, Crusher Run Macadam and Crushed Rock base	1.2 – 1.5

3.2.3 Medium curing cutback bitumen conforming to IS:217 shall be used as primer. The type and quantity of cutback bitumen to be used as primer shall be as given in **Table 2**.

3.3.2 Equipment

All equipments required for execution of priming work shall be in good working

Table 2 : Type and Quantity of Cutback Bitumen Primer

Type of Surface	Type of Cutback	Rate of Spray (kg/m ²)
WMM/WBM	MC 30	0.6 – 0.9
Mechanically stabilized soil base, lime stabilized soil, soil cement and lime cement base	MC 70	0.9 – 1.2
Gravel Base, Crusher Run Macadam and Crushed Rock base	MC 250	1.2 – 1.5

3.2.4 The correct quantity of primer will be the maximum amount that can be absorbed by the surface without causing run-off of excessive primer (some times referred as “finger” to form at the lower edges of the primed area) and is to be decided by the supervising engineer at the site to achieve desired penetration of 10 mm.

3.3 Construction

3.3.1 Weather and seasonal limitations

Cutback Bitumen as Primer shall not be applied on a damp or wet surface. Bitumen emulsion shall be applied on a damp surface. Surface shall be just wet with very light sprinkling of water. Primer shall not be applied during dust storm, rainy, foggy or windy weather. The ambient temperature during priming by bitumen emulsion should be above 10°C.

condition at site. The primer distributor shall be a self propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at specified rates and temperature. Hand spraying of small areas using pressure hand sprayer may be permitted at specific strategic locations, where distributor is not accessible or if narrow strips of (< 3 m) granular surface are to be primed. Pouring of primer using perforated can should not be permitted. SS-1 grade bitumen emulsion stored at site in the tank shall have arrangement like circulation pump to ensure its proper mixing before withdrawal from tank and transfer to browser.

3.3.3 Preparation of surface

The base course surface to be primed shall be swept clean and made free from dust. All loose material and other foreign material on the surface shall be removed completely. Power brooms or mechanical sweepers may

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 ² 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 ²)	Rate of Spray (Bitumen VG-10) (Kg/m ²)
(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

normal range of spraying temperature for a bituminous emulsion shall be 20°C to 70°C and for a cutback, 50°C to 80°C if RC-70/MC-70 is used. In case of cutback bitumen, temperature of application of primer should be high enough to permit the tack coat to be sprayed effectively through the jets of the spray bar and to cover the base course surface uniformly. In case of the use of paving grade bitumen, viscosity at the time of application shall be less than 2 poise so that spraying is uniform.

4.3.6 Curing of tack coat

After application of the Emulsion as tack coat, allow the bitumen emulsion to break i.e turn black before placing the bituminous mixture or overlay. Traffic should be kept off of the area where tack coat is being sprayed. No Plant or vehicles shall be allowed on the tack coat other than those essential for construction.

4.3.7 Arrangements for traffic

During the period of construction,

appropriate arrangements for traffic diversion shall be made.

4.4 Quality Control

Tests to be conducted on bitumen, cutback bitumen and bitumen emulsion are given in **Appendix-1**. Manufacturer shall provide test certificate for each batch indicating date of manufacture, batch number and signature of quality control in charge. The details of tray test for measurement of quantity are given in **Appendix -2**.

The Quality Control shall be undertaken as under:-

Test	Frequency of Tests
Quality of Binder test per batch of product by the manufacturer	One set of test for a tanker or lot of 10 tonne as per IS:73 for 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 ² and not less than two tests per day (Appendix 2)

APPENDIX - 1**Quality Tests for Tack Coat and Prime Coat**

In case of bitumen emulsion residue on 600 micron sieve, viscosity test and storage stability tests shall be conducted at site. In case of cutback bitumen, viscosity test, flash point test and residue test shall be conducted at site. In case of paving grade bitumen, viscosity at 60°C and 160°C shall be determined.

APPENDIX - 2**Method of Test for Measurement of Spread of Binder for Prime Coat and Tack Coat**

Aluminum or other light metal tray of 200 mm x 200 mm size and 20 mm depth are to be used. A set of three plates is essential for one test. All the plates are to be weighed and numbered. These are placed at intervals of 10 m along the road in path between wheels of bitumen distributor. After the distributor crosses a length of 50 m, trays are to be removed and wrapped in weighed polyethylene bags so that these can be handled, stocked safely for further weighing in laboratory. The trays shall be weighed to first place of decimal. Similarly, transverse distribution of liquid bituminous material can be checked by placing three numbers of plates at interval of 50 cm in the path of binder spraying equipment.

REFERENCES

The following IS Standards contain provisions, which through reference in the text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All Standards are subject to revision and parties to contract agreements based on this Standard are encouraged to examine the possibility of applying the most recent editions of the Standards indicated below :-

- | | |
|---------------|---|
| IS:73-2007 | Specifications of Paving Bitumen |
| IS:217-1988 | Specifications for Cutback Bitumen (Second Revision) |
| IS: 8887-2004 | Bitumen Emulsion for Roads (Cationic Type) Specifications (Second Revision) |

(The Official amendments to this document would be published by the IRC in its periodical, 'Indian Highways', which shall be considered as effective and as part of the code/guidelines/manual, etc. from the Date specified there in)