Indian Standard

(Reaffirmed 1999)

SPECIFICATION FOR CUTBACK BITUMEN

(Second Revision)

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0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards on 8 August 1988, after the draft finalized by the Bitumen, Tar and Their Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 This standard was published in 1951, and was revised in 1961 in view of the publication of IS : 1201 to 1220-1958*.

0.3 The Committee responsible for the preparation of this standard decided to revise the standard in order to update the same in accordance with the revised version of IS : 1201 to 1220-1978*. In the present version, six grades of rapid curing type (RC), medium curing type (MC) and slow curing type (SC) have been unified into four grades, five grades and four grades respectively, which are currently produced and marketed in the country.

0.4 This standard is one of the series of Indian Standards on bitumen. Other specifications so far published in the series are:

IS : 73-1961	Paving bitumen
IS : 454-1961	Digboi type cutback bitumen (*revised*)
IS : 702-1988	Industrial bitumen (*second revision*).

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Methods for testing tar and bituminous materials.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard covers the physical and chemical requirements of cutback bitumen produced by fluxing bitumen with distillates of petroleum or coal tar for use in road construction.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 334-1982* shall apply.

3. TYPES AND GRADES

3.1 Cutback bitumen shall be of the following three types:

a) Rapid curing (RC),

b) Medium curing (MC), and

c) Slow curing (SC).

3.2 The three types of cutback bitumen shall be classified into grades on the basis of inital kinematic viscosity and designated as under.

*Glossary of terms relating to bitumen and tar.

3.2.1 *Rapid Curing (RC)* — These shall be used with aggregates containing practically no fine aggregates passing through 2·36 mm sieve and shall be classified into four grades with following designations:

a) RC 70,

b) RC 250,

c) RC 800, and

d) RC 3 000.

3.2.2 *Medium Curing (MC)* — These shall be used with aggregates containing less than 20 percent of fine aggregates passing through 2·36 mm sieve and shall be classified into five grades with designations:

a) MC 30,

b) MC 70,

c) MC 250,

d) MC 800, and

e) MC 3 000.

3.2.2.1 MC 30 grade shall be used as primer.

3.2.3 *Slow Curing (SC)* — These shall be used with aggregates containing more than 20 percent of fine aggregates passing throught 2·36 mm sieve and shall be classified into four grades with designations:

a) SC 70,

b) SC 250,

c) SC 800, and

d) SC 3 000.

4. MANUFACTURE AND SOURCE

4.1 The material shall be prepared by fluxing bitumen with distillate from petroleum or coal tar.

4.2 The source and type shall be stated by the manufacturer.

5. REQUIREMENTS

5.1 Rapid curing cutback bitumen shall comply with the requirements specified in Table 1.

5.2 Medium curing cutback bitumen shall comply with the requirements specified in Table 2.

5.3 Slow curing cutback bitumen shall comply with the requirements specified in Table 3.

6. TESTS

6.1 Tests shall be carried out as described in the appropriate Indian Standards specified in col 7, 8 and 7 of Tables 1, 2 and 3 for rapid curing, medium curing and slow curing cutback bitumens, respectively.

7. PACKING AND MARKING

7.1 Packing — The material shall be supplied in drums of Type A or Type B according to IS : 3575-1977* or as agreed to between the purchaser and the supplier.

7.2 Marking — Each container of bitumen shall be legibly and indelibly marked with the following:

a) Manufacturer's name or trade-mark, if any;

b) Month and year of manufacture;

c) Type and grade of material; and

d) Batch number.

7.2.1 Each container may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or processors may be obtained from the Bureau of India Standards.

8. SAMPLING

8.1 Representative samples of the material shall be drawn and their conformity of the requirements to this standard be judged as prescribed in Appendix A.

*Specification for bitumen drums (*first revision*).

TABLE 1 REQUIREMENTS OF RAPID CURING (RC) CUTBACK BITUMEN

(*Clause* 5.1)

Sl No.	Characteristics	RC 70		RC 250		RC 80		RC 3 000		Method of Test, Ref to
		Min	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	
(1)	(2)	(3)		(4)		(5)		(6)		(7)
i)	Kinematic viscosity at 60°C, cSt	70	140	250	500	800	1 600	3 000	6 000	IS : 1206 (Part 3)-1978*
ii)	Flash point, Pensky Martens closed type, °C	26	—	26	—	26	—	26	—	IS : 1209-1978†
iii)	Distillate volume percent of total distillate up to 360°C.									IS : 1213-1978‡
	a) Up to 190°C	10	—	—	—	—	—	—	—	
	b) Up to 225°C	50	—	35	—	15	—	—	—	
	c) Up to 260°C	70	—	60	—	45	—	25	—	
	d) Up to 315°C	85	—	80	—	75	—	70	—	

*Methods for testing tar and bituminous materials: Determination of viscosity: Part 3 Kinematic viscosity (*first revision*).

†Methods for testing tar and bituminous materials: Determination of flash point and fire point (*first revision*).

‡Methods for testing tar and bituminous materials: Distillation test (*first revision*).

(*Continued*)

TABLE 1 REQUIREMENTS OF RAPID CURING (RC) CUTBACK BITUMEN — *Contd*

Sl No.	Characteristics	RC 70		RC 250		RC 800		RC 3 000		Method of Test, Ref to
		Min	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	
(1)	(2)	(3)		(4)		(5)		(6)		(7)
iv)	Residue from distillation up to 360°C, percent by volume (by difference)	55	—	65	—	75	—	80	—	
v)	Tests on residue from distillation up to 360°C									
	a) Viscosity at 60°C, Poises	600	2 400	600	2 400	600	2 400	600	2 400	IS : 1206 (Part 3)-1978*
	b) Ductility at 27°C, cm	100	—	100	—	100	—	100	—	IS : 1208-1978†
	c) Matter soluble in trichloroethylene, percent by mass	99	—	99	—	99	—	99	—	IS : 1216-1978‡
vi)	Water content, percent by mass	—	0·2	—	0·2	—	0·2	—	0·2	IS : 1211-1978§

*Methods for testing tar and bituminous materials: Determination of viscosity: Part 3 Kinematic viscosity (*first revision*).

†Methods for testing tar and bituminous materials: Determination of ductility (*first revision*).

‡Methods for testing tar and bituminous materials: Determination of solubility in carbon disulphide or trichloroethylene (*first revision*).

§Methods for testing tar and bituminous materials: Determination of water content (Dean and Stark method) (*first revision*),

TABLE 2 REQUIREMENTS OF MEDIUM CURING (MC) CUTBACK BITUMEN

(*Clause* 5.2)

Sl No.	Characteristic	MC 30		MC 70		MC 250		MC 800		MC 3 000		Metod of Test, Ref to
		Min	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	
(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)
i)	Kinematic viscosity at 60°C, cSt	30	60	70	140	250	500	800	1 600	3 000	6 000	IS : 1206 (Part 3)-1978*
ii)	Flash point Pensky Martens closed cup, °C	38	—	38	—	65	—	65	—	65	—	IS : 1209-1978†
iii)	Distillate volume, percent of total distillate upto 360°C.											IS : 1213-1978‡
	a) Up to 225°C	—	25	—	20	—	10	—	—	—	—	
	b) Up to 260°C	40	70	20	60	15	55	—	35	—	15	
	c) Up to 315°C	75	93	65	90	60	87	45	80	15	75	
iv)	Residue from distillation up to 360°C, percent volume by difference	50	—	55	—	67	—	75	—	80	—	
v)	Test on residue from distillation up to 360°C.											
	a) Viscosity at 60°C, Poises	300	1200	300	1 200	300	1 200	300	1 200	300	1 200	IS : 1206 (Part 3)-1978*
	b) Ductility at 27°C, cm	100	—	100	—	100	—	100	—	100	—	IS : 1208-1978§
	c) Solubility in trichloroethylene, percent	99	—	99	—	99	—	99	—	99	—	IS : 1216-1978‖
vi)	Water content, percent by mass	—	0·2	—	0·2	—	0·2	—	0·2	—	0.2	IS : 1211-1978¶

*Methods for testing tar and bituminous materials: Determination of viscosity: Part 3 Kinematic viscosity (*first revision*).

†Methods for testing tar and bituminous materials: Determination of residue of specified penetration (*first revision*).

‡Methods for testing tar and bituminous materials: Distillation test.

§Methods for testing tar and bituminous materials: Determination of ductility (*first revision*).

‖Methods for testing tar and bituminous materials: Determination of solubility in trichloroethylene (*first revision*).

¶Methods for testing tar and bituminous materials: Determination of water content (Dean and Stark method (*first revision*).

TABLE 3 REQUIREMENTS FOR SLOW CURING (SC) CUTBACK BITUMEN

(*Clause* 5.3)

Sl No.	Characteristics	SC 70		SC 250		SC 800		SC 3 000		Method of Test, Ref to
		Min	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	
(1)	(2)	(3)		(4)		(5)		(6)		(7)
i)	Kinematic viscosity at 60°C, cSt	70	140	250	500	800	1 600	3 000	6 000	IS : 1206 (Part 3)-1978*
ii)	Flash point, Pensky Martens closed type, °C,	65	—	79	—	93	—	107	—	IS : 1209-1978†
iii)	Total distillate up to 360°C volume, percent	10	30	4	20	2	12	—	5	IS : 1203-1978‡
iv)	Kinematic viscosity on distillation residue up to 60°C, Stokes	4	70	8	100	20	160	40	350	
v)	Tests on residue from distillation up to 360°C:									
	a) Residue of 100 penetration percent	50	—	60	—	70	—	80	—	IS : 1204-1978§
	b) Ductility of 100 penetration residue at 27°C, cm	100	—	100	—	100	—	100	—	IS : 1208-1978‖
	c) Solubility in trichloroethylene, percent	99	—	99	—	99	—	99	—	IS : 1216-1978¶
vi)	Water content, percent by mass	—	0·5	—	0·5	—	0·5	—	0·5	IS : 1211-1978**

*Methods for testing tar and bituminous materials: Determination of viscosity: Part 3 Kinematic viscosity (*firs revision*).

†Methods for testing tar and bituminous materials: Determination of flash point and fire point (*first revision*).

‡Methods for testing tar and bituminous materials: Determination of penetration (*first revision*).

§Methods for testing tar and bituminous materials: Determination of residue of specified penetration.

‖Methods for testing tar and bituminous materials: Determination of ductility (*first revision*).

¶Methods for testing tar and bituminous materials: Determination of solubility in trichloroethylene (*first revision*).

**Methods for testing tar and bituminous materials: Determination of water content (Dean and Stark Method) (*first revision*).

APPENDIX A

(*Clause* 8.1)

SAMPLING AND CRITERIA FOR CONFORMITY FOR CUTBACK BITUMEN

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment all the containers of the same type, same grade and belonging to the same batch of manufacture shall be grouped together to constitute a lot.

A-1.2 The number of containers to be selected from the lot shall depend upon the size of the lot and shall be in accordance with Table 4.

TABLE 4 SCALE OF SAMPLING

Lot Size	Number of Containers to be Selected
(1)	(2)
Up to 50	3
51 to 150	5
151 to 500	7
501 and above	10

A-1.3 These containers shall be selected at random from the lot. In order to ensure the randomness of selection, procedures given in IS : 4905-1968* may be followed.

A-2. PREPARATION OF TEST SAMPLES

A-2.1 From each of the containers selected according to **A-1.2** and **A-1.3**, a sample representative of the material in the container shall be drawn in accordance with the methods prescribed in IS : 1201-1978†, taking all the precautions mentioned therein. All these samples from individual containers shall be stored separately.

A-3. NUMBER OF TESTS

A-3.1 All the individual samples shall be tested for kinematic viscosity, flash point and ductility.

*Method of random sampling.

†Methods for testing tar and bitumen: Sampling.

A-3.2 For the remaining characteristic given in Table 1, Table 2 and Table 3 of the specification, a composite sample prepared by mixing together approximately equal quantities of bitumen from all individual samples shall be tested.

A-4. CRITERIA FOR CONFORMITY

A-4.1 The lot shall be declared as conforming to the requirements of this specification if **A-4.1.1** and **A-4.1.2** are satisfied.

A-4.1.1 From the test results of each of the characteristics given in **A-3.1** the mean ($\bar{X}$) and the range (R) shall be calculated as below:

$$\text{mean } (\bar{X}) = \frac{\text{sum of the test results}}{\text{number of test results}}$$

range (R) = difference in the largest and the smallest of the test results.

If the expression ($\bar{X} - 0{\cdot}6\,R$) is greater than or equal to the *minimum* specification limit, the expression ($\bar{X} + 0{\cdot}6\,R$) is less than or equal to the *maximum* specification limit and both the conditions are satisfied in case of two sided specification limits, the lot shall be considered to have met these requirements.

A-4.1.2 The composite sample, when tested for the characteristics mentioned in **A-3.2,** shall satisfy the corresponding specification requirements.

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