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सड़कों के लिए तारकोल — विशिष्टि

(तीसरा पुनरीक्षण)

Indian Standard

ROAD TAR — SPECIFICATION

(Third Revision)

UDC 662.749.3

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, 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.

This Indian Standard was first published in 1951 and was subsequently revised in 1961 and 1981. In the third revision, two types of road tar, namely, Type A and Type B have been mentioned to cover the requirements of road tar for surface dressing, dense tar surfacings and for open graded premix carpets with or without seal coat respectively. This has been done to utilize the crude tar produced as a by-product of carbonization of coal, more specifically to get satisfactory performance of roads under different climatic conditions prevalent in various parts of the country. The requirements for specific gravity, equiviscous temperature (for RT-5), sofening point (R & B), distillation fractions, softening point (R & B) of pitch residue of Type A tar have been modified and given in Table 1. The requirements of Type B tar have been given in Table 2.

The Sectional Committee responsible for the preparation of this standard has taken into consideration the views of producers, consumers and technologists and has related the standard to the manufacturing and trade practices followed in the country in this field. Due weightage has also been given to the need for international co-ordination among standards prevailing in different countries of the world.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ROAD TAR — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers two types of tar each having five grades of road tars with different viscosity ranges suitable for different types of road construction under the climatic conditions prevailing in various parts of the country.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revisions, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
334 : 1982	Glossary of terms relating to bitumen and tar (*second revision*)
1201 : 1978 to 1220 : 1978	Methods for testing tar and bituminous materials (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 334 : 1982 shall apply in addition to those given below.

3.1.1 *Pitch*

The residue obtained from the distillation of road tar having a softening point of 76°C (R & B) or 67°C (K & S).

3.1.2 *Anthracene Oil I*

The fraction of road tar distilling between 300°C and 350°C.

3.1.3 *Anthracene Oil II*

The fraction of road tar distilling between 350°C and till the pitch of 76°C (R&B) or 67°C (K & S) is obtained.

3.1.4 *Creosote Oil*

The fraction of road tar distilling between 200°C and 270°C.

4 TYPES AND GRADES

4.1 Road tars having pitch/anthracene oil ratios of 3, 3.5, 4 and 5 can be used to give satisfactory performance for surface dressings and dense tar surfacings. However, in case of open textured carpets with seal coat road tars of pitch/anthracene oil ratios of 3, 3.5 and 4 shall be used. If no seal coat is to be given then road tars of pitch/anthracene oil ratios of 3 and 3.5 alone are indicated. In view of these requirements, road tar shall be of the following two types:

Type A — for surface dressing and dense tar surfacings

Type B — for open graded premix carpet with or without seal coat.

4.2 Grades of Road Tars

There shall be five grades of road tar as follows:

RT-1	For surface dressing under cold weather conditions and use on hill roads at high altitude as well as for priming the base;
RT-2	For surface painting in normal climatic conditions;
RT-3	a) For surface painting and renewal coat; b) For premix chipping carpet (top course and light carpets);
RT-4	For premix tar macadam (base course) and dense tar surfacing; and
RT-5	For grouting and water proofing.

5 REQUIREMENTS

5.1 Road tars shall be prepared entirely from crude tar produced as a by-product of carbonization of coal to cover both high temperature (HT) and low temperature (LT) coal tars in coke ovens or retorts.

5.2 The material shall comply with the requirements given in Tables 1 and 2 for Type A and Type B respectively.

Table 1 Requirements for Type A Road Tars

(*Foreword*, and *Clause* 5.2)

Sl No.	Characteristics	Limits for Grades					Ref to	
		RT-1	RT-2	RT-3	RT-4	RT-5	IS No.	Annex
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Specific gravity at 27/ 27°C	1.16 - 1.26	1.16 - 1.26	1.18 - 1.28	1.18 - 1.28	1.18 - 1.28	1202 : 1978	—
ii)	Viscosity by standard tar viscometer (10 mm cup):						1206 (Part 1) : 1978	—
	a) Temperature of test, °C	35	40	45	55	65		
	b) Viscosity in seconds	30 - 55	30 - 55	35 - 60	40 - 60	40 - 60		
iii)	Equiviscous temperature (EVT), °C	32 - 36	37 - 41	43 - 46	53 - 57	63 - 68	1207 : 1978	—
iv)	Softening point (R & B), °C	15 - 19	20 - 24	26 - 29	26 - 40	45 - 50	1205 : 1978	—
v)	Distillation fractions, percent by weight (g per 100 g) Distilling :						—	A
	a) Light oil below 200°C	0.5	0.5	0.5	0.5	0.5		
	b) Middle oil 200°C - 270°C	5 - 12	2 - 9	1 - 6	0.5 - 4	0 - 4		
	c) Heavy oil 270°C - 300°C	4 - 10	4 - 8	3 - 6	2 - 7	1 - 5		
	d) Anthracene oil 300°C - 350°C	15 - 25	16 - 26	17 - 27	18 - 29	18 - 29		
	e) Pitch residue converted to 76°C (R & B)	45 - 60	50 - 65	55 - 70	60 - 75	65 - 80		
vi)	Softening point (R & B) of the pitch residue:						1205 : 1978	—
	a) at 300°C, *Max*	48	50	52	54	56		
	b) at 360°C, *Max*	90	90	90	90	90		
vii)	Water content, percent by weight, *Max*	0.5	0.5	0.5	0.5	0.5	1211 : 1978	—
viii)	Phenols, percent by weight, *Max*	2.0	2.0	2.0	2.0	2.0	1218 : 1978	—
ix)	Naphthalene, percent by weight, *Max*	4.0	3.5	3.0	2.5	2.0	1219 : 1978	—
x)	Raw anthracene, percent by weight, *Max*	3.5	4.0	4.0	4.0	4.0	—	B
xi)	Matter insoluble in toluene, percent by weight, *Max*	22	22	24	24	24	1215 : 1978	—

Table 2 Requirements for Type B Road Tars

(*Foreword*, and *Clause* 5.2)

Sl No.	Characteristics	Limits for Grades					Ref to	
		RT-1	RT-2	RT-3	RT-4	RT-5	IS No.	Annex
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Specific gravity at 27/27°C	1.10 - 1.28	1.10 - 1.28	1.12 - 1.28	1.12 - 1.28	1.14 - 1.28	1202 : 1978	—
ii)	Viscosity by standard tar viscometer (10 mm cup):						1206 (Part 1) : 1978	—
	a) Temperature of test, °C	35	40	45	55	65		
	b) Viscosity in seconds	30 - 55	30 - 55	35 - 60	35 - 70	35 - 70		
iii)	Equiviscous temperature(EVT), °C	32 - 36	37 - 41	43 - 46	53 - 57	63 - 67	1207 : 1978	—
iv)	Softening point (R & B),°C	—	—	—	—	45 - 50	1205 : 1978	—
v)	Distillation fractions, percent by weight (g per 100 g) Distilling:						—	A
	a) Light oil up to 170°C, *Max*	0.5	0.5	0.5	0.5	0.5		
	b) Middle oil 170°C - 270°C	5 - 12	2 - 9	1 - 6	0 - 4	0 - 4		
	c) Heavy oil 270°C - 300°C	4 - 10	4 - 8	3 - 6	2 - 7	1 - 5		
	d) Anthracene oil above 300°C	17 - 27	18 - 28	18 - 28	19 - 30	19 - 30		
	e) Pitch residue converted to 76°C (R & B)	50 - 70	61- 71	64 - 74	67 - 77	70 - 80		
vi)	Softening point (R & B) of the pitch residue, °C						1205 : 1978	—
	a) at 300°C, *Max*	40	40	40	40	40		
	b) at 350°C, *Max*	80	80	80	80	80		
vii)	Water content, percent by Weight, *Max*	0.5	0.5	0.5	0.5	0.5	1211 : 1978	—
viii)	Phenols, percent by volume, *Max*	2.0	2.0	2.0	2.0	2.0	1218 : 1978	—
ix)	Naphthalene, percent by weight, *Max*	4.0	3.5	3.0	2.5	2.0	1219 : 1978	—
x)	Raw anthracene, percent by weight, *Max*	3.5	4.0	4.0	4.0	4.0	—	B
xi)	Matter insoluble in toluene, percent by weight, *Max*	22	22	24	24	24	1215 : 1978	—

6 TESTS

6.1 Tests shall be carried out as described in IS 1201 : 1978 to IS 1220 : 1978 and Annex A and Annex B.

7 SAMPLING

7.1 Lot

In any consignment, all containers of road tar of the same type, grade and from the same batch of manufacture shall be grouped together to constitute a lot.

7.2 The number of containers to be selected at random from the lot shall depend upon size of the lot, and shall be in accordance with Table 3.

Table 3 Number of Containers to be Selected

Lot Size	No. of Containers
(1)	(2)
2 - 8	2
9 - 27	3
28 - 64	4
65 - 125	5
126 - 216	6
217 - 343	7
344 - 512	8
513 - 729	9
730 - 1000	10
1 001 - 1 331	11

7.3 From each of the containers selected as in 7.2 an average sample representative of the material in the container shall be drawn in accordance with the method described in IS 1201 : 1978 taking all the precautions mentioned therein. All these samples from individual container shall be stored separately.

7.4 Number of Tests

7.4.1 All the individual samples shall be tested for equiviscous temperature (EVT), softening point if applicable for a particular grade.

7.4.2 For the remaining characteristics, namely, specific gravity, viscosity, softening point of the pitch residue, water content, distillation fractions, phenols, naphthalene and matter insoluble in toluene, a composite sample, prepared by mixing together equal quantities of road tar from all individual samples shall be tested.

7.5 Criteria for Conformity

7.5.1 The lot shall be considered as conforming to the requirements of this specification if the conditions mentioned under **7.5.2** and **7.5.3** are met with.

7.5.2 From the test results of equiviscous temperature (EVT) and softening point, the mean ($\bar{X}$) and range (R) shall be calculated for a minimum of five tests. The following conditions shall be satisified:

a) $(\bar{X} - 0.6\,R)$ shall be greater than or equal to the minimum specified limit, and

b) $(\bar{X} + 0.6\,R)$ shall be less than or equal to the maximum specified limit.

7.5.3 The composite sample when tested for the characteristics mentioned in **7.4.2** shall satisfy the corresponding requirements of the tests.

8 MARKING

8.1 Each container shall be legibly and indelibly marked with the following information:

a) Name of the material;

b) Indication of the source of manufacture;

c) Date of manufacture; and

d) Type and grade of road tar.

8.2 BIS Certification Marking

Each container may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the Provisions of *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 6.1, and *Tables* 1 *and* 2)

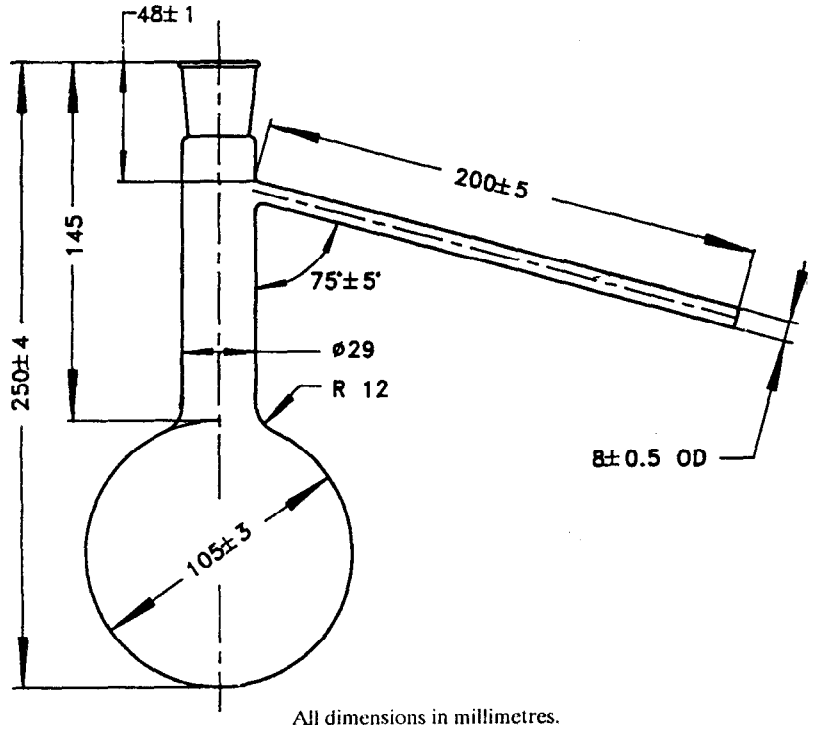
DISTILLATION OF ROAD TAR

A-1 APPARATUS

A-1.1 **Distillation Flask** — A side-neck distillation flask as shown in Fig. 1 conforming to following dimensions shall be used:

Distillation capacity	500 ml
Diameter of bulb inside	105 ± 3 mm
External diameter of side tube	8 ± 0.5 mm
Length of the side tube	200 ± 5 mm
Thickness of walls of bulb neck of side tube	1.0 to 1.5 mm

A-1.1.1 The distance from the centre of the side tube at the junction of the neck to the top of neck shall be 48 ± 1 mm.



All dimensions in millimetres.

FIG. 1 DISTILLATION FLASK

A-1.1.2 The side tube shall slope downwards from the junction with neck so that the acute angle between the side tube and the neck is 75° ± 5°.

A-1.2 Thermometer

Thermometer of high distillation, graduated in centigrade degrees as specified, having a range of −2° to 400 °C and conforming to the following requirements shall be used:

Liquid	Mercury
Filling above liquid	Nitrogen gas
Temperature range	−2° to 400°C
Sub division	1°C
Total length	378 - 384 mm
Stem diameter	6.0 - 7.0 mm
Bulb diameter	Not larger than stem diameter
Bulb length	10 - 15 mm
Distance of bottom of bulb to graduation line at 0°C	25 - 45 mm
Top finish	Glass ring
Longer graduation lines at each	5°C
Graduations numbered at each multiple	10°C

Scale error at any point up to 370°C shall not exceed 1°C

A-1.3 Condenser

A-1.3.1 *Condenser Glass (Water)*

A 250 mm glass-jacketed condenser with dimensions and tolerances as given below shall be used:

Length of jacket excluding the necks	250 ± 5 mm
Outside diameter of adapter of condenser tube	23 ± 1 mm
Length of adapter	75 ± 5 mm
Outside diameter of condenser tube proper	12.5 ± 0.5 mm
Overall length of condenser tube including adapter	475 ± 25 mm

A-1.3.2 *Condenser Glass (Air)*

It is made from a straight tube of good quality resistance glass with one end finished square with the axis and other end ground at an angle of 45° with the axis, conforming to the following dimensions:

Internal diameter	20 ± 1 mm
Overall length	600 ± 10 mm
Wall thickness	1.0 to 1.5 mm

A-1.3.3 The side arm of the flask shall extend at least 25 mm beyond the cork in the upper end of the condenser.

A-1.4 Adapter

An adapter of curved design having a heavy wall and reinforced top glass, with an angle of approximately 105° and with a diameter of 18 mm approximately at the large end. The outlet end shall be ground to an angle of 45± 5° with inside vertical. The small end shall have a diameter of not less than 5 mm.

A-1.5 Shield

Shield of galvanized iron, lined with 3 mm asbestos, fitted with transparent covered windows, shall be used to protect the flask from air currents and to prevent radiation. The cover may be of transit board made in two parts, or it may be of galvanized iron lined with 3 mm asbestos.

A-1.6 Crow Receivers

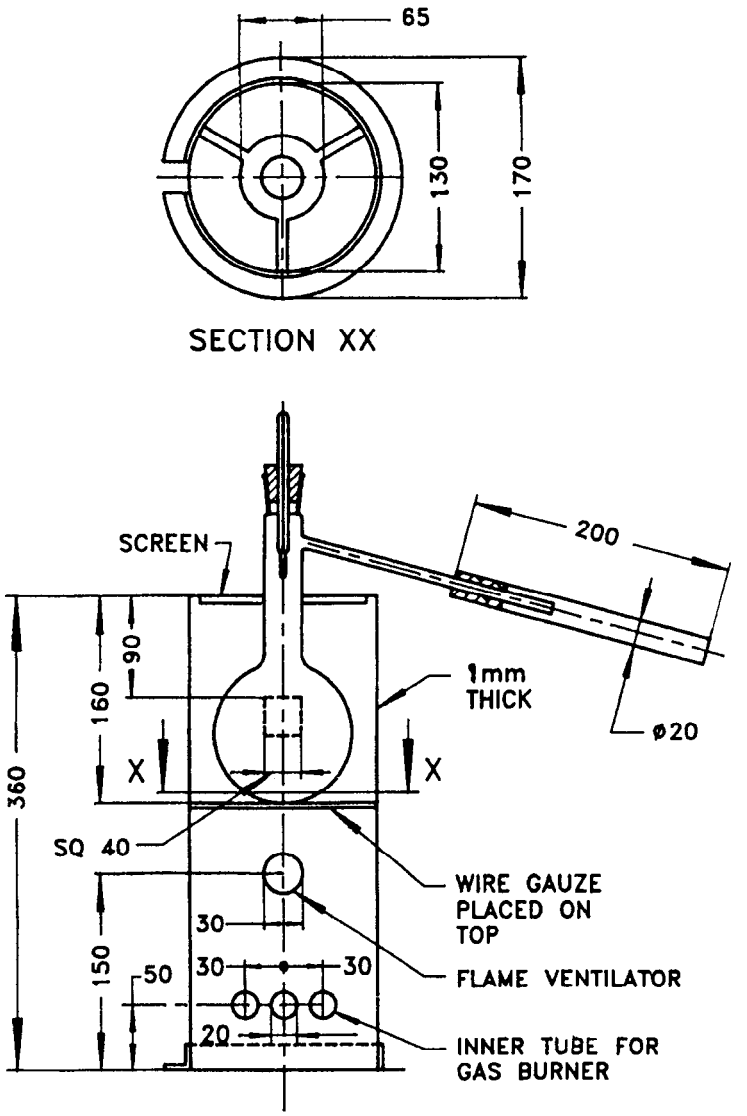
Crow receivers of 25 ml, 50 ml or 100 ml may be used.

A-1.7 Residue Container

The container for the distillation residue shall be a 225 g-container approximately 76 mm in the diameter and 54 mm deep, provided with a lid.

A-2 PROCEDURE

A-2.1 About 250 to 300 g of road tar is weighed in the distillation flask. The flask is fitted with a thermometer. The upper end of the mercury in the bulb shall be in level with the end of the side tube opening into the condenser. The air condenser is inclined at an angle of 75° to the neck of the flask. The heating is so adjusted that the distillation is continued at the rate of 5 ml per minute up to the prescribed temperature range without interruption (*see* Fig. 2).



All dimensions in millimetres.

FIG. 2 DISTILLATION APPARATUS ASSEMBLY

A-2.2 For road tar and coal tar the distillation analysis is conducted till the thermometer registers a temperature of 350°C. The portions of distillate shall be collected as follows :

		Type A	*Type B*
a)	Light oil	Below 200°C	Up to 170°C
b)	Middle oil	200 °C to 270°C	170 °C to 270°C
c)	Heavy oil	270 °C to 300°C	270 °C to 300°C
d)	Anthracene oil	300 °C to 350°C	Above 300 °C
e)	Pitch residue	At 350°C	At 350°C

A-2.2.1 The distillation portions after light heating are transferred into the receiver. The pitch residue in the flask is well shaken and collected in the residue container. Later, the softening of the pitch residue is determined.

A-2.3 The pitch residue at 350°C is converted to 67°C K & S (76°C R & B) assuming that for every 1.5°C around which the determined softening point lies above or below 67°C, 1 percent of the pitch so determined being added or subtracted. An equal amout of the so determined anthracene oil content shall be decreased or increased.

A-2.4 If needed, this Anthracene Oil (above 300°C) can be subdivided into Anthracene Oil I (300°C to 350°C) and Anthracene Oil II (above 350°C). The tar gives out Anthracene Oil II when by distilling up to 350°C, the softening point of the pitch residue lies below 67°C K & S (76°C R & B). The Anthracene Oil I is directly got from the distillation and is expressed as percentage by weight. The Anthracene Oil II is calculated according to the example given below :

Example : (*see* **A-2.3** and **A-2.4**)

Suppose the pitch residue at 350°C works out to be 66.5 percent and its softening point is 61°C K & S.

$$\text{Then } 67\text{-}61 = \frac{6}{1.5} = 4.0$$

$$\text{Anthracene Oil II} = 66.5 \times \frac{4.0}{100} = 2.7$$

And pitch residue of 67°C K & S = 66.5

$$\underline{-\ 2.7}$$

63.8 percent

A-2.5 The fractions to be collected are as follows:

	Percent by weight
Water	"
Light oil	"
Middle oil	"
Heavy oil	"
Anthracene oil above 300°C	"
Pitch of 67°C K&S (76 °C R&B)	"
Distillation loss	"
Total	100 percent, w/w

A-2.6 Precision

The mean of two results conducted in the same laboratory should not differ from the mean of two results in another laboratory by more than the following :

a)	170 °C - 270°C fraction	1.0 percent, *w/w*
b)	270 °C - 300°C fraction	1.0 percent, *w/w*
c)	300 °C - 350°C fraction	1.0, *w/w*
d)	Softening point of the residue	3°C
e)	Distillation loss permissible variation, *Max*	1.5 percent, *w/w*

ANNEX B

(*Clause* 6.1, and *Tables* 1 *and* 2)

DETERMINATION OF RAW ANTHRACENE IN ROAD TAR

B-1 APPARATUS

B-1.1 Filtering Device

Buchner funnel or preferably a metal container with perforated bottom to accommodate a 70 mm rapid filter paper.

B-1.2 Cooling System

Capable of maintaining a constant temperature of 5°C – 27°C with variation of ±1°C.

B-1.3 A Hand Press

Sufficient to squeeze oil from cooled Anthracene Oil.

B-2 PROCEDURE

B-2.1 The Anthracene Oil obtained from the distillation of road tar shall be cooled to 15°C ± 1°C for 4 hours with intermittent stirring. The solidified crystallized material shall be transferred to the sample container fitted with a filter with a filter paper and previously cooled to 15°C. After removal of most of the oil by a filter pump, the material shall be squeezed under a hand press until no more oil comes out. The operations after initial cooling of sample shall be done as rapidly as possible. The residue is wieghed and expressed as a percentage by weight of the quantity of tar taken for distillation.

B-3 REPRODUCIBILITY

B-3.1 Two results obtained by different operators in different laboratories shall not differ by more than ±0.4 percent.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'.

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Amendments Issued Since Publication

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