Indian Standard

GLOSSARY OF TERMS RELATING TO BITUMEN AND TAR

(Second Revision)

First Reprint JULY 1991

UDC 665.775:001.4

RUBBER RESEARCH INSTITUTE OF INDIA
LIBRARY
Acc. No. : S185
Date : 1.5.98
Initials : ds

© *Copyright* 1982

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

November 198

Gr 3

Indian Standard

GLOSSARY OF TERMS RELATING TO BITUMEN AND TAR

(Second Revision)

Bitumen and Tar Products Sectional Committee, BCDC 2

Chairman	*Representing*
PROF C. G. SWAMINATHAN	Central Road Research Institute (CSIR), New Delhi; *and* Indian Roads Congress, New Delhi
Members	
DR ARUN KUMAR (*Alternate* I to Prof C. G. Swaminathan)	Central Road Research Institute (CSIR), New Delhi
SHRI N. SIVAGURU (*Alternate* II to Prof C. G. Swaminathan)	Indian Roads Congress, New Delhi
DR K. P. BUCH	Naval Headquarters (Ministry of Defence)
LT-CDR R. K. BHATIA (*Alternate*)	
SHRI J. K. CHARAN	Engineer-in-Chief's Branch, Army Headquarters, New Delhi
LT-COL C. T. CHARI (*Alternate*)	
SHRI N. C. CHATTERJEE	National Test House, Calcutta
DEPUTY DIRECTOR (MET)-5	Ministry of Railways (RDSO), Lucknow
ASSISTANT RESEARCH OFFICER (CHEM)-2 (*Alternate*)	
SHRI M. R. GHOSH	Ministry of Defence (DGI), New Delhi
SHRI H. L. GUPTA (*Alternate*)	
SHRI G. C. GOSWAMI	Indian Oil Corporation Ltd (Assam Oil Division), Digboi
SHRI ISWAR CHANDRA (*Alternate*)	
SHRI A. Y. GUPTE	Hindustan Petroleum Corporation Ltd (Marketing Division), Bombay
DR HIMMAT SINGH	Indian Institute of Petroleum (CSIR), Dehra Dun
SHRI J. S. BAHL (*Alternate*)	
SHRI M. B. JAYWANT	Synthetic Asphalts, Bombay
SHRI V. A. JOLLY	Bharat Petroleum Corporation Ltd (Marketing Division), Bombay
SHRI A. D. NAYAK (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1982

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
SHRI K. L. KAPOOR	Public Works Department, Haryana
SHRI S. C. JAIN (*Alternate*)	
SHRI T. S. KRISHNAMURTHI	Indian Oil Corporation Ltd. (Refinery Division), Bombay
SHRI C. V. RAMAMURTHI (*Alternate*)	
SHRI S. B. KULKARNI	Indian Oil Corporation Ltd (Marketing Division), Bombay
SHRI M. R. MALYA	In personal capacity (*3 Panorma, 30 Pali Hill Road, Bombay*)
SHRI S. NATARAJAN	Highways and Rural Works Department, Government of Tamil Nadu, Madras
SHRI C. V. RAMASWAMY	Hindustan Petroleum Corporation (Refinery Division), Bombay
DR A. V. R. RAO	National Building Organization, New Delhi
DR R. S. RATRA (*Alternate*)	
REPRESENTATIVE	Directorate General of Supplies and Disposals, New Delhi
SHRI S. P. GUPTA (*Alternate*)	
SHRI T. K. ROY	Shalimar Tar Products (1935) Ltd, Calcutta
SHRI C. H. SAHEBA	Bharat Petroleum Corporation Ltd (Refinery Division), Bombay
SHRI K. R. RAO (*Alternate*)	
SHRI D. K. SEN	Central Fuel Research Institute (CSIR), Dhanbad
SHRI A. K. CHOUDURI (*Alternate*)	
SHRI N. SIVAGURU	Roads Wing (Ministry of Shipping and Transport), New Delhi
SHRI R. P. SIKKA (*Alternate*)	
SHRI G. RAMAN, Director (Civ Fngg)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI VIJAY RAJ
Assistant Director (Civ Engg), ISI

Indian Standard

GLOSSARY OF TERMS RELATING TO BITUMEN AND TAR

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 30 June 1982, after the draft finalized by the Bitumen and Tar Products Sectional Committee had been approved by the Civil Engineering Division Council and the Petroleum, Coal and Related Products Division Council.

0.2 This standard was first published in 1953 and subsequently revised in 1965. Since more standards on bitumen and tar were made later on, a further revision was necessitated.

0.3 Due to considerable developments in the applications of bitumen, tar and their products in the engineering and chemical fields resulting in an increase in the number of terms used, it became necessary to standardize the terminology on a more exact basis so as to avoid ambiguity and confusion. It is hoped that this revised standard glossary of terms will help in fixing a more precise meaning of words which have acquired too general usage. To facilitate ease of reference, the terms have been arranged alphabetically.

0.4 In the formulation of this standard, due weightage has been given to International co-ordination among the standards and practices prevailing in other countries and this has been met by drawing assistance from the following:

ASTM : D8-1981	Standard definitions of terms relating to materials for roads and pavements. American Society for Testing and Materials.
BS : 892-1967	Glossary of highway engineering terms. British Standards Institution.

1. SCOPE

1.1 This standard defines the terms relating to the products commercially known as bitumen and tar, and referred to in Indian Standards.

2. DEFINITIONS

2.1 Adhesion — The property by means of which a material in a liquid or semi-solid form adheres or sticks to the surface of a solid body.

2.1.1 *Adhesion Agent* — A substance used for the purpose of improving the adhesion or bond between the solid body and the binder used to coat it.

2.2 Anthracene Oil — The heavy fraction of distillate oil, obtained from coal tar, having a specific gravity between 1·05 and 1·1 at 38°C.

2.3 Ash — Inorganic residue remaining after ignition of combustible substances.

2.4 Asphalt — A natural or artificial mixture in which bitumen is associated with inert mineral matter. The word 'asphalt' should always be qualified by indication of its origin or nature.

NOTE — Difference exists between this definition and those given in ASTM D8-1981 and BS 892-1967.

2.5 Asphaltic Bitumen — A subdivision of the generic bitumen, which is manufactured by the oil industry from asphaltic petroleum.

2.6 Asphaltenes — The hydrocarbon fraction of bitumen which is soluble in carbon disulphide, but insoluble in light petroleum solvent.

2.7 Asphalt, Lake — A solid or semi-solid naturally occurring asphalt existing in well defined surface deposits.

2.8 Asphalt, Mastic — An intimate mixture of mineral fillers, well graded sand and/or stone chippings with a hard grade of bitumen, cooked and laid hot manually by means of a wooden float. The mixture settles to a coherent, voidless and impermeable solid or semi-solid mass under normal temperature condition.

2.9 Asphalt, Natural or Native — A mixture occuring in nature in which bitumen is associated with inert mineral matter.

2.10 Asphalt, Rock — A naturally occurring rock formation, usually calcareous, in the pores and veins, of which bitumen is found impregnated.

2.11 Bitumen — A black or dark brown non-crystalline solid or viscous material having adhesive properties, derived from petroleum either by natural or refinery processes and substantially soluble in carbon-di-sulphide.

NOTE — Differences exist between this definition and those given in ASTM D8-1981 and BS : 892-1967.

2.11.1 *Bitumen, Blown* — Bitumen, the properties of which are modified by blowing air through it at a comparatively high temperature.

2.11.2 *Bitumen, Concrete* (*Asphaltic Concrete*) — A well graded mixture of high quality aggregates with designed proportion of bitumen, hot mixed, hot laid and hot rolled into a uniform dense mass with specified design criteria.

2.11.3 *Bitumen, Cutback* — Bitumen, the viscosity of which is reduced with a suitable volatile diluent, usually a petroleum distillate.

2.11.3.1 *Cutback, rapid curing* — Bitumen, which is blended with a naphtha type distillate.

2.11.3.2 *Cutback, medium curing* — Bitumen, which is blended with a kerosene type distillate.

2.11.3.3 *Cutback, slow curing* — Bitumen, which is blended with or containing a higher viscous oil than in medium or rapid curing cutback.

2.11.3.4 *Cutback, digboi type* — Cutback made out of bitumen from waxy crude of Assam.

2.11.4 *Bitumen, Digboi Type* — Bitumen obtained from processing of waxy crude of Assam.

2.11.5 *Bitumen, Emulsion* — A liquid product in which a substantial amount of bitumen is dispersed in a finely divided condition in an aqueous medium containing an emulsifier and a stabilizer.

2.11.5.1 *Emulsion, anionic* — An emulsion in which the anion of the emulsifier is at the interface with the bitumen particles, which are negatively charged and the aqueous phase is alkaline.

2.11.5.2 *Emulsion, cationic* — An emulsion in which the cation of the emulsifier is at the interface with the bitumen particles, which are positively charged and the aqueous phase is acidic.

2.11.6 *Bitumen, Fluxed* — Paving bitumen, viscosity of which is reduced by adding a substantially non-volatile diluent to a small extent.

2.11.7 *Bitumen, Industrial* — Also known as blown or oxidised bitumen, needed for a variety of industrial applications.

2.11.8 *Bitumen, Lake* — *See* 'Asphalt, Lake'.

2.11.9 *Bitumen, Liquid* — Bitumen having a penetration of more than 350 at 25°C under a load of 50 g applied for one second.

2.11.10 *Bitumen, Mastic* — *See* 'Asphalt, Mastic'.

2.11.11 *Bitumen, Natural or Native* — *See* 'Asphalt, Natural or Native'.

2.11.12 *Bitumen, Paving* — Solid or semi-solid bitumens of specified penetration used for paving roads, air fields, etc.

2.11.13 *Bitumen, Rock* — *See* 'Asphalt, Rock'.

2.11.14 *Bitumen, Semi-solid* — Bitumen having a penetration at 25°C, under a load of 100 g applied for 5 seconds, of more than 10; and a penetration at 25°C, under a load of 50 g applied for 1 second, of not more than 350.

2.11.15 *Bitumen, Solid* — Bitumen having a penetration at 25°C, under a load of 100 g applied for 5 seconds, of not more than 10.

2.11.16 *Bitumen, Steam Refined* — Residue from distillation of crude petroleum processed further with the help of steam to a specified viscosity or penetration.

2.11.17 *Bitumen, Straight Run* — Bitumen obtained as the end product or residue from refining of crude petroleum.

2.12 Bituminous — Containing or treated with, bitumen, tar or other similar materials.

2.13 Carbenes — The organic components of bitumen which are soluble in carbon disulphide but insoluble in carbon tetrachloride.

2.14 Carboids — The inorganic matter present in bitumen which are insoluble in carbon disulphide.

2.15 Carbon, Fixed — The organic matter of residual coke obtained from heating hydrocarbon products in a covered vessel in the absence of free oxygen.

2.16 Creosote Oil — The oils or a blend of oils obtained from coal tar, when distilled above about 200°C.

2.17 Curing — The process of evaporation of the volatile material from the petroleum distillates, added to the bitumen in making cutbacks.

2.18 Dielectric Strength (Electric Strength) — A measure of the electrical insulating properties of bitumen, as the break down occurs or until a specified voltage is reached, when an increasing alternating voltage is applied to a sample under specified conditions.

2.19 Ductility — The property by which a material can be drawn out without breaking, for bitumen it is measured by the distance in centimetres to which it will elongate before breaking, when two ends of a briquette specimen of the material of the specified form and cross-section are pulled apart under water at a specified speed and temperature.

2.20 Emulsifier/Emulsifying Agent — An additive of the anionic or cateonic type to facilitate colloidal dispersion of two immisible liquids.

2.20.1 *Emulsion, Breaking* — The coagulation of the dispersed material in an emulsion whereby it becomes substantially separated from the aqueous part of the mixture.

2.20.2 *Emulsion, Stability* — The property of an emulsion whereby it resists influence tending to cause its breaking.

2.21 Equiviscous Temperature (EVT) — The temperature in degrees centigrade, at which the viscosity is 50 seconds as measured by the standard tar viscometer.

2.22 Fire Point — The lowest temperature at which the material gets ignited and burns under specified conditions of test.

2.23 Flash Point — The lowest temperature at which the vapour of the material can be ignited momentarily in air by a flame under specified conditions of test.

2.24 Float Value — A measure of the consistency of the bitumen and is the time in seconds that elapses between placing a sample of bitumen in water and the water breaking through it under specified conditions of temperature.

2.25 Flux Oil — A substantially non-volatile diluent used for reducing the viscosity of bituminous materials.

2.25.1 *FRAASS Breaking Point* — The temperature at which bitumen first becomes brittle as indicated by the appearance of cracks, when a thin film of bitumen on a metal plate is cooled and flexed in accordance with specified conditions.

2.26 Loss on Heating — The loss in weight, exclusive of water, of oil and ather constituents of bitumen when heated to a standard temperature and duration under other specified conditions of test.

2.27 Newtonian Liquid — It is a liquid in which the rate of shear is proportional to the shearing stress. The constant ratio of the shearing stress to the rate of shear is the viscosity of the liquid. If this ratio is not constant, the liquid is non-Newtonian.

2.28 Oils — The constituent of bitumen which is obtained after separation of resins from maltene and is characterized by a low temperature susceptibility.

2.29 Penetration — A measure of hardness or consistency of the bitumen. It is the vertical distance traversed by a standard needle entering the material under specified conditions of standard load, time and temperature; and is expressed in tenths of millimetre.

2.30 Phenols — A mixture of the constituents of coal tar, coal tar fractions or coal hydrogenated products, which is soluble in aqueous caustic soda solution.

2.31 Pitch, Coaltar — The black or dark brown, solid or semi-solid, fusible, and agglomorative residue remaining after partial evaporation or fractional distillation of coal tar.

2.32 Pitch, Mastic — A mixture of mineral matter and coal tar pitch suitably blended and laid hot manually by suitable float.

2.33 Primer — A low viscous binder made from bitumen, usually by mixing it with light diesel oil or furnace oil, and is applied cold over non-bituminous surfaces for arresting dust, filling capillary voids and for serving as a bond with the superimposed layer.

2.34 Resins — The dark brown constituent of bitumen separated by absorption on Fuller's earth, silica gel, etc, from the maltene or soluble portion of bitumen in a petroleum solvent.

2.35 Residue, Specified Penetration — Usually done for slow curing cutbacks and is the weight of residue of specified penetration after removal of volatile components from bitumen, expressed as a percentage of the original weight of sample.

2.36 Road Oil — A residue of low viscosity obtained under certain conditions of petroleum refining.

2.37 Road Tar — A product obtained by treating coal tar in such a manner that it conforms to a specification which defines its suitability for road construction.

2.38 Setting — The process by which a bitumen emulsion breaks by separation of water and thereby increases its viscosity.

2.39 Softening Point — The temperature (in °C) at which a standard ball passes through a sample of bitumen in a mould and falls through a height of 2·5 cm, when heated under water or glycerene at specified conditions of test.

2.40 Specific Gravity — The ratio of the mass of a given volume of a substance to the mass of an equal volume of water, the temperature of both being specified.

2.41 Stripping — The displacement of a coated bituminous film from the surface of a road stone due to the effect of water.

2.42 Tack Coat — Bitumen, road tar or an emulsion sprayed as a thin film on a surface to enhance the adhesion with a superimposed course.

2.43 Tar — A viscous material having adhesive properties, obtained from the destructive distillation of certain types of organic material. The word 'tar' shall be preceded by the name of the material from which it is produced, that is, coal, shale, peat, etc. Its mode of production shall also be indicated.

2.43.1 *Tar, Coal (Crude Coal Tar)* — Tar produced by the destructive distillation of coal.

2.43.2 *Tar, Coke Oven* — Tar produced as a bye-product at coke oven plant where coke is produced from coal.

2.43.3 *Tar, Emulsion* — An emulsion in which tar is suspended as minute droplets in water with suitable emulsifier.

2.43.4 *Tar, Gas House* — Tar produced in gas house retorts which produce illuminating gas from bituminous coal.

2.43.5 *Tar, High Temperature* — Tar obtained as a bye-product in the high temperature carbonization of coal at coke mass temperature above 950°C.

2.43.6 *Tar, Horizontal Retort* — Tar obtained as a bye-product in the carbonization of coal in a horizontal retort.

2.43.7 *Tar, Low Temperature* — Tar obtained in the low temparature carbonization of low grade coal.

2.43.8 *Tar, Refined* — Tar, from which water has been removed. It is obtained by direct distillation of coal tar or by fluxing tar pitch with a suitable distillate to the required consistency.

2.43.9 *Tar, Vertical Retort* — Tar obtained as a bye-product in the carbonization of coal in vertical retorts.

2.43.10 *Tar, Wood* — Tar obtained from the destructive distillation of wood.

2.44 Viscosity — The property of a liquid by which it resists flow due to internal friction and is measured by the ratio of the shearing stress to the rate of shear.

2.44.1 *Viscosity, Absolute or Dynamic* — The viscosity of a Newtonian liquid is an internal friction such that if a tangential force of one dyne acting on planes of unit area separated by unit distance of the fluid produces unit tangential velocity. The CGS unit for viscosity is one Poise.

2.44.2 *Viscosity, Kinematic* — For gravity flow under a given hydrostatic ic head, the pressure head of a liquid is proportional to its density P for any particular viscometer, and the time of flow of a fixed volume of liquid is directly proportional to its kinematic viscosity $v = n/p$ where, n is the viscosity coefficient. The CGS unit of kinematic viscosity is $1 cm^2/S$ and called one stoke, the frequently used unit is one centistoke ($1 cSt = 10^{-2} st$).

2.45 Water Content — The quantity of water present in a material and expressed as a percent by weight of the material.