EBON

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MAKE YOUR WAY

Smoother!!!

“With today’s rapidly developing road industry and increasing demand of green technology, the role of maintenance application has become more and more important. The durability of a road mainly depends on the raw materials, weather conditions and traffic condition. The assurance of maintenance quality and the use of proper technology, the efficiency and durability of the road will be greatly enhanced, it is our mission to deliver the right maintenance to our customer and accelerate the road industry development.”

Ebon assures that we work hand in hand with leading road consultant & construction authorities to satisfy the bituminous requirement by bringing to your doorstep advanced solution with the perfect balance of cost result ratio.

Products: Ebon manufactures & supplies various grades of bitumen emulsion , bitumen and special emulsion & applied products. The company manufactures innovative, competitive & high quality Bitumen emulsion (RS1, RS2, MS, SS1, SS2, CRMB, PMB) along with road repair product.
Bitumen Emulsion manufactured here is of Cationic types. Usually, it is the type of aggregate and climate that defines what type of Bitumen Emulsion should be used especially in tropical and with extreme climatic conditions countries. Cationic Emulsion represents more than 95% of the world Consumption today.

Laboratory: Ebon has numerous operating facilities and keeps highly qualified employees, engineers and workers at their R&D laboratory. Our lab not only tests and research on specific requests/products from clients but is also engaged in upgrading their knowledge and technology usage.

Machinery: Machines are fully automatic with imported technology. Sustainability and high quality products with large capacity of storage facility. As per client's requirement can also provide product in bulk as well as in drum.

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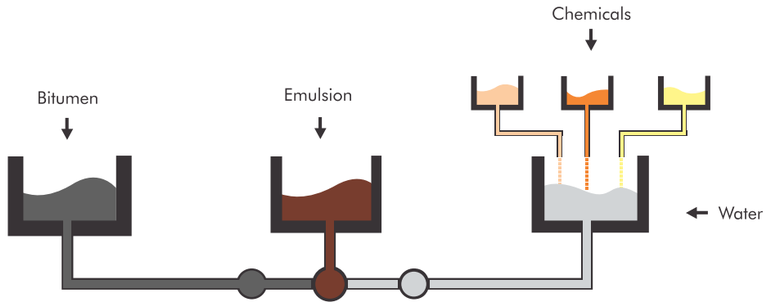
Bitumen Emulsion Technology

Bitumen, as a binder used in a road construction industry, needs to be temporarily liquefied by any of the 3 methods listed below before it can fulfill its role as a protectetive coating and adhesives for road pavement.

Ebon Emulsion Plant



1

Heat the bitumen up to a high temperature so as to get a **"Hot mix"**.

2

Dilute the bitumen with solvents to form a **"Cutback"**

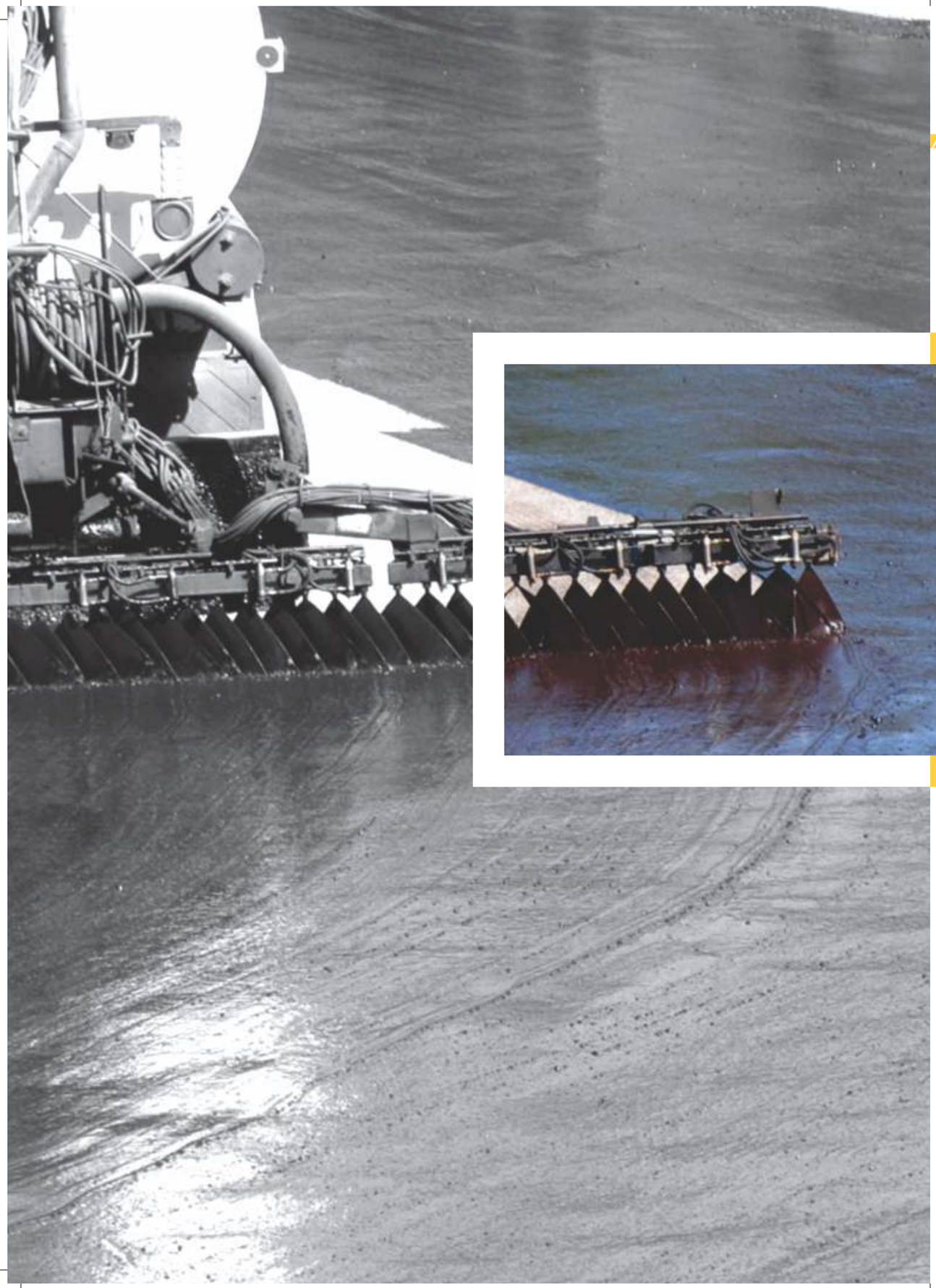
3

With aid from chemicals and other additives. Mix the bitumen with water to form a bitumen emulsion.

Unlike **"Hot Mix"** or **"Cutback"**, the bitumen emulsion technology relies on the breaking and setting property of the micro-size-bitumen particle surrounded by surfactant chemicals. Thus, the application can be applied to cold and wet aggregate surfaces, significantly increasing the efficiency of the maintenance process with great convenience of handling and logistic arrangement of the raw material on site.

Some Main Emulsion Application

- ☑ Pre-coat
- ☑ Tack Coat
- ☑ Chip Seal(Surface Dressing)
- ☑ Slurry Seal and Micro-Surfacing
- ☑ Cold Recycling and virgin Cold Mix
- ☑ Open Grade Cold Patching Mix
- ☑ Fog seal
- ☑ Prime Coat
- ☑ Soil Stabilization
- ☑ Water Proofing Agent



Rapid Setting Bitumen Emulsion RS

Break is rapid even with coarse aggregate of relatively low surface area. Rapid setting Emulsion is further sub divided into RS-1 and RS-2 types.

Rapid Setting-1 (RS-1)

Specially designed product for uniform and strong tack coat in bituminous road construction, suitable for penetration macadam and sand seal.

Tack coat

Tack Coat application is a light spray of Bitumen Emulsion, which may be hand or machine sprayed. It is used to ensure a good bond between an old and a new bituminous surfacing layer. Normally applied very thin and evenly over the entire surface.

Objectives: |1| Ensure a proper bond between existing surface and the new bituminous course being placed over it. |2| Ensure longevity of the road, it is important that the new bituminous surface bonds firmly with underneath surface. |3| Coat and bond loose mineral particles on the surface of the surface layer. |4| Seal surface pores and make the surface water- resistant. |5| Impart structural stability and prevent lateral movement of layers. |6| Assist adhesion between the base and super impose surface course.

Advantages

- ☑ Easy and Uniform Spray.
- ☑ Prevents lateral movements of structural layers.
- ☑ Enhances structural strength of layers.
- ☑ Water resistant and enhances easy drainage of water.
- ☑ Low Temperature Cure with High Adhesive Properties.
- ☑ Provide an impervious layer to prevent water ingress from table below the road layers.

Technical specification

Property / specification	Limits
Residue on 600 micron IS sieve (% by mass), max	0.05
Viscosity @ 50 °C (saybolt), sec	20-100
Storage stability after 24 hours,% max	2
Binder-residue by evaporation,% min	60
Setting time, minutes	~15

Key Properties as per IS 8887:2004

Product application

Application	Quantity in kg /10sqm area
1. Normal bituminous surfaces	2 to 2.5
2. Dry and hungry bituminous surfaces	2.5 to 3.0
3. Granular surfaces treated with primer	2.5 to 3.0
4. Non- bituminous surfaces. • Granular base (not primed) • Granular base (not primed)	 3.5 to 4.0 3.0 to 3.5

Application rate as per MORTH specifications

Rapid Setting-2 (RS-2)

A viscous liquid emulsion with high binder content. Suitable for surface dressing, grouting and penetration macadam applications

Applications

Surface Dressing: It consists of application in one or two coats, each consisting layer of bituminous binder sprayed on a previously prepared base, followed by a cover of stone chips rolled in to form a wearing course. RS-2 type cationic bitumen emulsion is ideal for surface dressing on the shoulders and for protection of freshly laid base course. Rate of application for two coat surface dressing as per (MORT&H) clause 510.2 is 28-32 kg/10 sq. m.

Grouting: For economical construction of low volume roads, a combined base and wearing courses can be made by an application of RS-2 cationic bitumen emulsion on the laid and compacted aggregates. This application can be carried out even when the stone layer is damp.

Sand Seal: A bituminous sand application for existing pavement surface to seal the surface and to function as a light-wearing course.

Penetration Macadam: It consists of construction of one or more layers of compacted crushed coarse aggregates with alternate application of bituminous binder and key aggregates to be used as base course on roads, subject to the requirements of the overall pavement design.

Advantages

- ☑ Easy Spray.
- ☑ Low Temperature Cure
- ☑ Enhances structural strength of layers.
- ☑ High Adhesive Properties.
- ☑ Prevents lateral movements of structural layers
- ☑ Provide an impervious layer to prevent water ingress from table below the road layers.

Technical specification

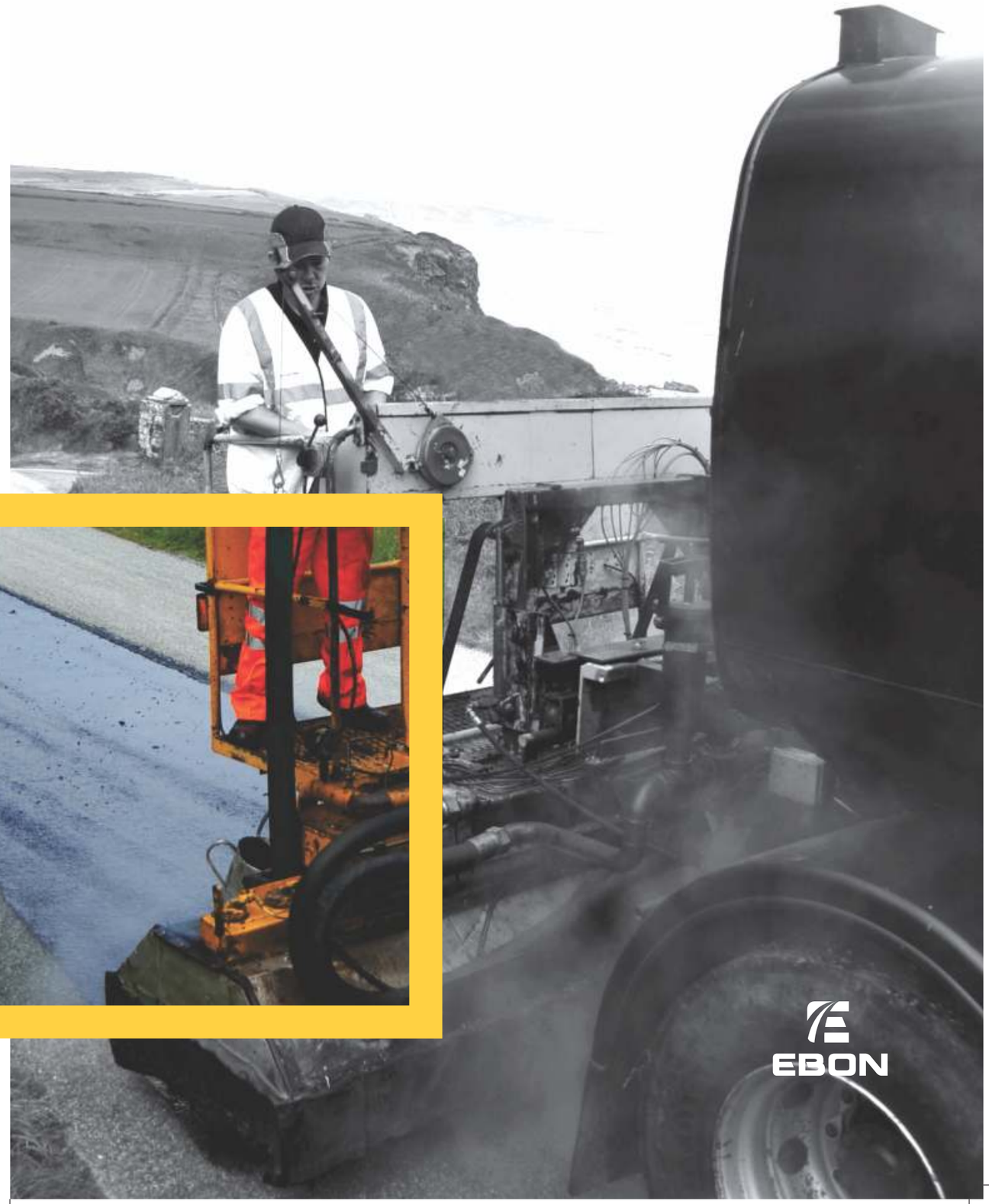
Property / specification	Limits
Residue on 600 micron IS sieve (% by mass), max	0.05
Viscosity @ 50 °C (saybolt), sec	100-300
Storage stability after 24 hours,% max	1
Binder-residue by evaporation,% min	67
Setting time, minutes	~15

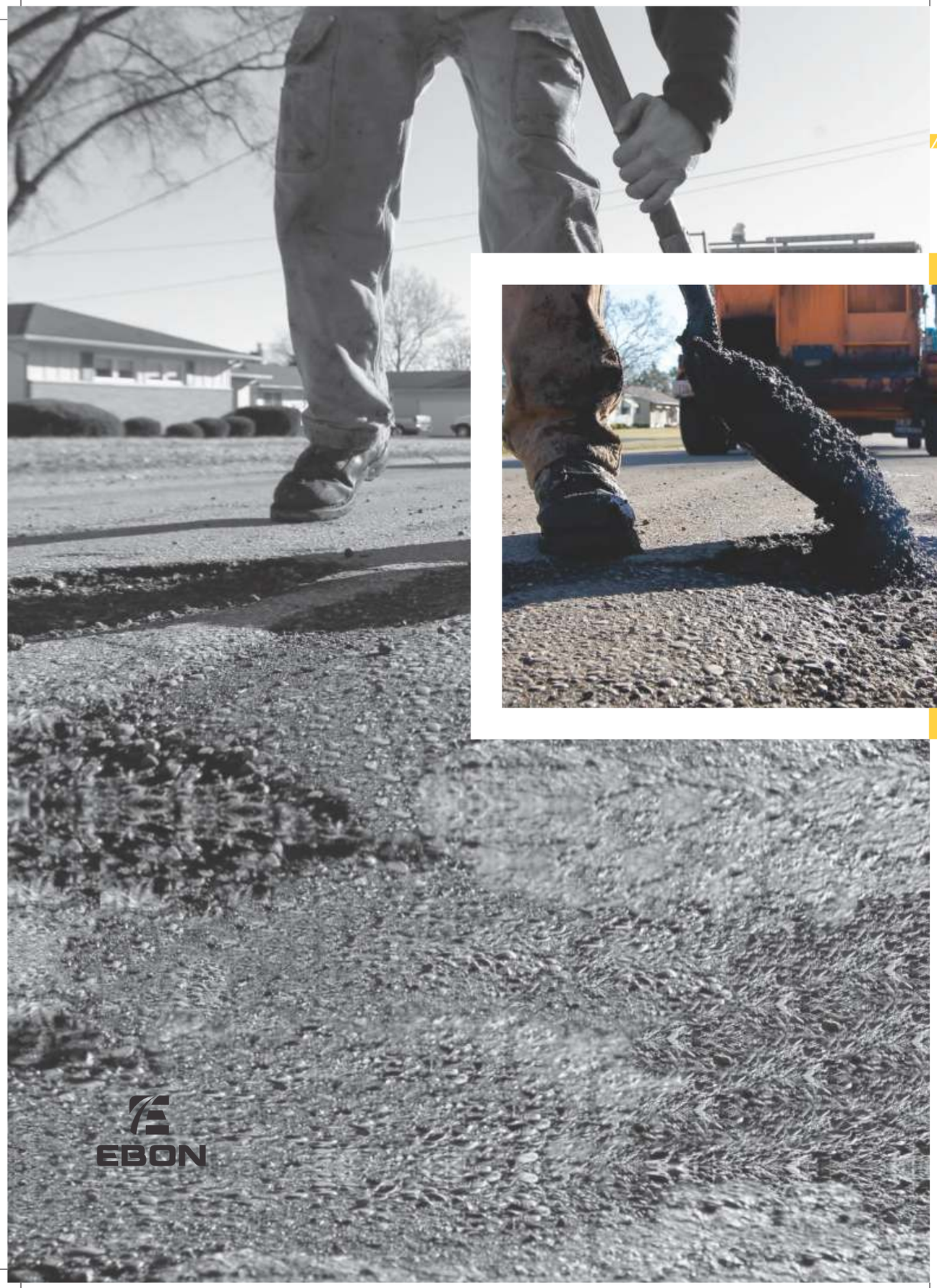
Key Properties as per IS 8887:2004

Product application

Application	Quantity in kg /10sqm area
Two coat surface dressing	28-32

Application rate as per MORTH specifications





Medium Setting Bitumen Emulsion MS

Break is sufficiently slow that the emulsion can be mixed with coarse aggregate containing a high proportion of fine material. Emulsion used for pot hole repair/patch work. Suitable for 20mm pre-mix carpet.

Maintenance mix: This high quality material now makes it possible to fill pot holes or carry out patch repair with open graded cold premix made on-site. The methods typically used for the repair of pot holes using asphalt emulsions are throw-and-roll and full-depth removal and replacement. All of these methods involve placing cold mix in the pot hole with a shovel and compacting with a truck tire, vibratory plate compactor or steel wheeled roller.

The Procedure: |1| Blow off water and debris from the pothole then cut to rectangular shapes with all sides vertical. |2| Remove loose material, spray tack coat of asphalt emulsion on all side and bottom. |3| Mix prepared of clean (preferably washed) and dry aggregates with MS cationic bitumen emulsion. |4| Typically 13.2mm and 11.2mm sized aggregates mixed in 2:1. |5| MS cationic bitumen emulsion content of approx. 7% by weight of aggregates works best. |6| Mix aggregates emulsion properly to ensure uniform coating, till entire emulsion is broken after that fill the premix immediately into the pot hole slightly higher than the adjoining road surface and roll properly. |7| Cover the repaired area with tack coat followed by a 6mm(passing) aggregate by opening the repaired pothole to traffic as soon as workers and equipment are clear.

Premix carpet: For economical and fast construction of wearing course, emulsion is used for Premix Carpet. Ministry of Road Transport & Highway (MORT&H) has also recommended use of emulsion for this application in their clause 506.2. A tack coat is applied on the cleaned surface. The cold mix is prepared and spread over the existing surface.

Advantages

- No heating required
- Bonds well, damp surfaces, Low temperature cure, Stable patches
- Environment friendly, Economical and Ease in application
- Resistance to peel off under traffic and to stripping by water
- Bond with existing surface and least interference with traffic
- Minimal preparation time for surface repair with instant setting and fast development of strength

Technical specification

Property / specification	Limits
Residue on 600 micron IS sieve (% by mass), max	0.05
Viscosity @ 50 °C (saybolt), sec	50-300
Binder-residue by evaporation,% min	65
Setting time, minutes	~30

Key Properties as per IS 8887:2004

Product application

Application	Quantity in kg /10sqm area
Premix carpet	20-23kg
Application	Quantity by weight of aggregate
Pothole repair	7%

Application rate as per MORTH specifications

Slow Setting Bitumen Emulsion SS

Break is sufficiently slow to allow mixing with aggregate containing fine material of relatively high surface area. Slow setting emulsion is further sub divided into SS-1 and SS-2 types.

Slow Setting-1 (SS-1): Invert emulsion used for prime coat and fog spray.

Objectives: |1| To coat and bond loose mineral particles on the surface of the base course. |2| To seal surface pores and make the surface of the base course water-resistant. |3| To penetrate the existing base course i.e., WMM surface so as to plug the capillary voids in it. |4| To harden and toughen the base course surface. |5| To assist adhesion between the base and the super imposed surface course in conjunction with a tack coat

Application

Cationic bitumen emulsion to an absorptive surface (like low to medium high Porosity Wet Mix Macadam or Water Bound Macadam), designed to penetrate, plug the capillary voids in the surface, bond and stabilize the existing surface and to promote adhesion surface and to promote adhesion between it and the construction course that follows. The pavements having inadequate priming of Wet Mix Macadam/Water Bound Macadam may have lesser life due to non-achievement of properties, as mentioned above.

Advantages

- ☑ Superior penetration into miniature pore of sub bases.
- ☑ Penetrate the cracks and crevices, impart strength to the layers
- ☑ Easy spray, Extended breaking, Low temperature curing.
- ☑ Prevents permeability of atmospheric air to the bottom layers
- ☑ High adhesive properties that binds loose aggregates together strongly
- ☑ Prevents raveling and rutting, water resistant and enhances easy drainage
- ☑ Compatible with Portland cement

Technical specification

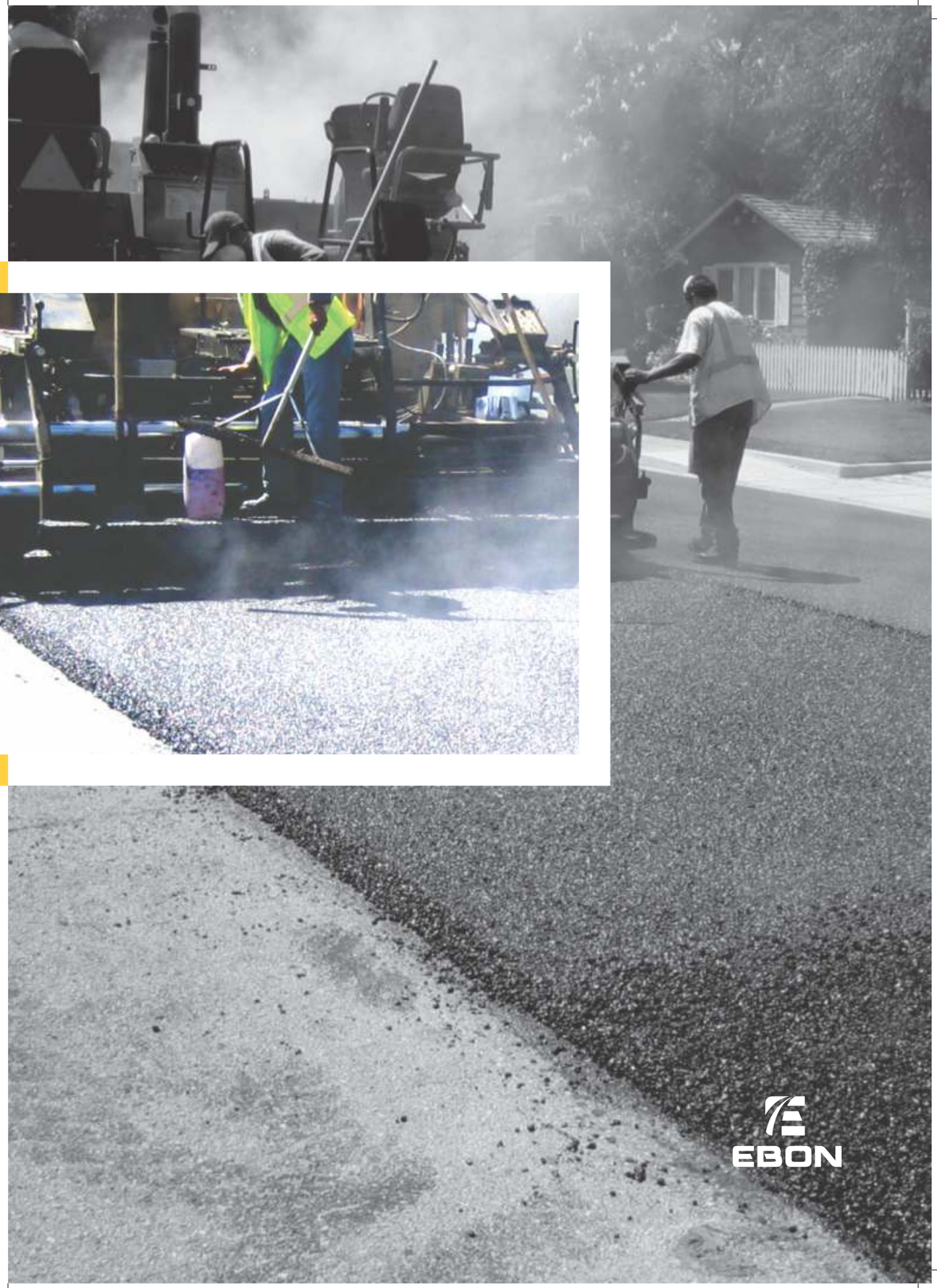
Property / specification	Limits
Residue on 600 micron IS sieve (% by mass), max	0.05
Storage stability after 24 hours, % max 2	2
Viscosity @ 25 °C (saybolt), sec	20-100
Binder-residue by evaporation, % min	50
Distillation (% by volume) At 190 OC At 260 OC At 225 OC At 315 OC	 20-55 30-75

Key Properties as per IS 8887:2004

Product application

Application	Quantity in kg /10sqm area
Prime coat -Low porosity -Medium porosity -High porosity	 6 to 9 9 to 12 12 to 15
Fog spray	5-10

Application rate as per MORTH specifications



Slow Setting-2 (SS-2)

Specially designed emulsion for prime coat. Suitable for slurry seal, premix seal coat and fog spray.

Application

Prime Coat: Application of Bitumen Emulsion SS-2 to an absorptive surface, designed to penetrate, bond and stabilize this existing surface and to promote adhesion between it and the construction course that follows. Recommended rate of application is 6 to 9 kg per 10 sq. m.

Fog Seal/ Crack Seal: Light application of Bitumen Emulsion SS-2 to an existing pavement as a seal to inhibit raveling, or to seal the surface, or both. Also used to fill and seal small cracks in existing pavements. Fog seal helps to rejuvenate an old oxidized road surface, thus extending its life. Recommended rate of application is 5 to 10 kg per 10 sq. m.

Slurry Seal: It is a surface treatment for structurally sound roads where the wearing course has deteriorated. Slurry seals are mixtures of fine aggregate, Portland cement filler, bitumen emulsions and additional water. When freshly mixed, they have thick consistency & can be sprayed to a thickness of 1.5 - 5 mm. They may be used to seal cracks, arrest fretting and fill voids and minor depressions. Recommended rate of application is 10 to 12 kg per 10 sq. m.

Premix Seal: Premix is a mixture of fine aggregate, Portland cement filler, bitumen emulsions and additional water. They may be used to seal wide cracks, fill voids and minor depressions. Recommended rate of application is 10 to 12 kg per 10 sq. m.

Advantages

- Good penetration into miniature pores of sub bases, Easy spray, Extended breaking
- Low temperature curing, High adhesive properties, Bonds well to cool, damp substrates/surfaces
- Binds loose aggregates together strongly, Prevents lateral movement of structural layers
- Penetrate the cracks and crevices, impart strength to the layers
- Prevents permeability of atmospheric air to the bottom layers
- Prevents raveling and rutting, water resistant and enhances easy drainage of water

Technical specification

Property / specification	Limits
Residue on 600 micron IS sieve(% by mass)	0.05
Viscosity @ 50 °C (saybolt), sec	30-150
Storage stability after 24 hours, % max	2
Binder-residue by evaporation, % min	60
Setting time, minutes	~30

Key Properties as per IS 8887:2004

Product application

Application	Quantity in kg /10sqm area
Prime coat	6 to 9
Fog spray	5-10
Slurry seal	10 to 12
Premix seal coat	10 to 12

Application rate as per MORTH specifications

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Crumb Rubber Modified Bitumen (CRMB)

CRMB is special type of Bitumen whose properties have been improved by the addition of crumb rubber and special types of additives like hydrocarbon materials, resins etc. Thus altering the physical properties of bitumen makes it more resistant to temperature variations, weather and high traffic loads, leading to enhanced pavement life, reduced maintance cost and excellent driving comfort.

Application: CRMB can be used for wearing courses at heavy trafficked roads, busy interesctions, bridge decks and round abouts for increased life of the surfing.|1| Reducing traffic noise |2| Bus by lane |3| Water proofing concrete structure, Sand asphalt |4| Heaving traffic lane, Slopes, roundabouts, junctions |5| Industrial and multimodel platform|6| Providing high skid resistance (thin overlay chip seal)|7| Porous asphalt and acoustic thin overlay|8|In Stress Absorbing Membrane Interlayer (SAMI)|9| For high rainfall regions|10| Airport runways and parking apron|11|Parking place of buses and trucks

Advantages

- Lower susceptibility to daily & seasonal temperature variations
- Better edge resistance properties, adhesion between aggregate & binder ensure longer life, strength & stability
- Overall improved performance in extreme climate condition & under heavy traffic condition
- Higher resistance to deformation at elevated pavement temperature
- Better water resistance, Prevents rutting, Resistance to creep & higher indirect tensile strengthen surface course
- Higher fatigue life of mixes due to high elastic recovery. Delay of cracking & reflective cracking

CRMB 60: recommended for hot climate areas.
CRMB 55: recommended for moderate climate areas.
CRMB 50: recommended for cold climate areas.

Technical specification

Property / specification	CRMB 50	CRMB 55	CRMB 60	Method
Penetration at 25°C	<70	<60	<50	IS 1203-1978
Softening point, (R&B), C Min.	50	55	60	IS 1205-1978
Elastic recovery of half thread in ductilometer at 15°C % Min.	50	50	50	IS 15462-2004
Flash point°C Min.	220	220	220	IS 1209-1978
Separation difference in softening point, (R & B)°C Max.	4	4	4	IS 15462-2004
Thin Film Oven Test(TFOT) on residue a. Reduction in penetration of residue at 25°C Max. b. Increase in softening point, °C Max. c. Elastic recovery of half thread in ductilometer at 25°C, % Min.	 60 7 35	 60 6 35	 60 5 35	 IS 1203-1978 IS 1205-1978 IS 15462-2004

Specification	
Mixing/ Coating	170-185°C
Laying	150-170°C
Beginning of compaction	Over 140°C
End of compaction	110-120°C

Key Properties as per IS 15462:2004

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Polymer Modified Bitumen (PMB)

Specifications designed for pavement applications. Heavy traffic intensity in terms of commercial vehicles, overloading of trucks and significiant variations in daily and seasonal temperature of the pavement have been responsible for early development of distress symptoms like raveling, undulations, rutting, cracking, bleeding, shoving and potholing of bituminous surfaces.

Objectives: |1| The polymer dosages and mix designs of the binder are selected to ensure optimum performance to the climate and traffic conditions that prevail on a particular project. |2| Extensive research has shown that the use of performance asphalts using polymer modified bitumen binders significantly increases stability, strength, anti-rutting properties and longer life-span, as demanded by the industry to meet today's and tomorrow's traffic conditions. |3| Stirring or circulation of storage tank before usage ensures complete homogeneity and temperature distribution in tank.

Applications

Polymer Modified Bitumen can be used in asphalt mix designs which result in the manufacture of cohesive asphalt mix with good elasticity suitable for type of traffic, Special attention to be given to the temperature while manufacturing, lying and copaction are performed.

Advantages

- ☑ Durable surface characteristics, Excellent anti-stripping properties
- ☑ High cohesivencess, High stiffness modulus leading to greater resistance to permanent deformation, Improved fatigue resistance than increased resistance to reflective cracks

Technical specification

Property / specification	PMB 120	PMB 70	PMB 40	Method
Penetration at 25°C	90-150	50-90	30-50	IS 1203-1978
Softening point, (R&B), C Min.	50	55	60	IS 1205-1978
Elastic recovery of half thread in ductilometer at 15°C % Min.	70	70	70	IS 15462-2004
Flash point°C Min.	220	220	220	IS 1209-1978
Separation difference in softening point, (R & B)°C Max.	3	3	3	IS 15462-2004
Thin Film Oven Test(TFOT) on residue				
a. Reduction in penetration of residue at 25°C Max.	35	35	35	IS 1203-1978
b. Increase in softening point, °C Max.	7	6	5	IS 1205-1978
c. Elastic recovery of half thread in ductilometer at 25°C, % Min.	50	50	50	IS 15462-2004

Key Properties as per IS 15462:2004

Storage, Health and Safety

Stringent heating and handling procedures must be followed at all times as per manufacturer guideline. Treat as hot bitumen Serious risk of bums. Follow personal hygiene and protection procedures at all times

PMB 120: recommended for cold climate areas.
PMB 70: recommended for moderate climate areas.
PMB 40: recommended for hot climate areas.

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Bitumen grades VG-10, VG-20, VG-30, VG-40

Bitumen is a thermoplastic material and its stiffness is dependent on temperature. The temperature-vs-stiffness relationship of bitumen is dependent on the source of crude oil and the method of refining.

The Bureau of Indian Standards (BIS) introduced paving grade bitumen specifications (IS: 73-1950) for the first time in the year 1950 and classified it on penetration. The specifications were revised in the years 1962 and 1992. To improve the quality of Bitumen, BIS revised IS-73-1992 specifications based on Viscosity (Viscosity at 60°C) in July 2006. As per these specifications, there are four grades VG-10, VG-20, VG-30 & VG-40. A few qualification tests like specific gravity, water content, ductility, loss on heating & Farass breaking point were removed from IS: 73-1992 specifications as these tests do not have any relationship either with the quality or performance of the product.

The Penetration grades have been replaced by Viscosity grade Bitumen. According to viscosity (degree of fluidity) grading, higher the grade, stiffer the Bitumen. Tests are conducted at 60°C and 135°C, which represent the temperature of road surface during summer (hot climate, similar to northern parts of India) and mixing temperature respectively. The penetration at 25°C, which is annual average pavement temperature, is also retained.

Different Grades of Bitumen marketed by Indian Oil :

VG-10 BITUMEN: It is widely used in spraying applications such as surface-dressing and paving in very cold climate in lieu of old 80/100 Penetration grade. It is also used to manufacture Bitumen Emulsion and Modified Bitumen products.

VG-20 BITUMEN: It is used for paving in cold climate & high altitude regions

VG-30 BITUMEN: It is primarily used to construct extra heavy duty Bitumen pavements that need to endure substantial traffic loads. It can be used in lieu of 60/70 Penetration grade.

VG-40 BITUMEN: It is used in highly stressed areas such as intersections, near toll booths and truck parking lots in lieu of old 30/40 Penetration grade. Due to its higher viscosity, stiffer. Bitumen mixes can be produced to improve resistance to shoving and other problems associated with higher temperature and heavy traffic loads.

Table: Viscosity Grade: (VG) BITUMEN SPECIFICATION AS PER IS 73: 2006

Characteristics	VG-10	VG-20	VG-30	VG-40
Absolute Viscosity, 60°C, poises, min	800	1600	2400	3200
Kinematic Viscosity, 135°C, CST, min	250	300	350	400
Flash point, C, min	220	220	220	220
Solubility in trichloroethylene, % min	99.0	99.0	99.0	99.0
Penetration at 25°C	80-100	60-80	50-70	40-60
Softening point, C, min	40	45	47	50
Tests on residue from thin film over test/RTFOT				
i.Viscosity ratio at 60°C, max	4.0	4.0	4.0	4.0
ii. Ductility at 25°C, cm, min, after thin film over test	75	50	40	25