

KAVASSU PMB

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INTRODUCTION :

SHALIMAR SEAL & TAR PRODUCTS PVT. LTD. is pioneer in Manufacturing / Marketing well known Shalimar brand high performance construction chemicals and waterproofing products. Various product segments are given below :

- **WATER REDUCING ADMIXTURES (PLASTICIZERS & SUPER PLASTICIZERS)**
- **CURING COMPOUNDS**
- **INTEGRAL CEMENT WATERPROOFING COMPOUNDS**
- **JOINT FILLERS / SEALANTS**
- **FOAMING/ RETARDERS/ ACCELERATING/ AIR ENTRAINING AGENTS/ HYPER PLASTICIZERS**
- **GROUTS & ANCHORS**
- **INDUSTRIAL FLOORINGS**
- **INSULATION PROTECTION**

- **SILICON SEALANTS**
- **ADHESIVES / TILE GROUTS**
- **WATERPROOFING CEMENTITIOUS**
- **ACRYLIC WATERPROOFING COATINGS**
- **DAMP PROOFING COARSE / EXTERNAL WALLS SEALANT**
- **PRIMERS / MISLENEOUS COATINGS**
- **ROAD EMULSION / FILLERS / GENERAL & INDS. BITUMEN**
- **APP & SBS MODIFIED MEMBRANES & BITUMEN FELTS**
- **ANTI CORROSIVE / RUST REMOVER & CONVERTOR COATINGS**

All products are manufacturing by India's biggest Plant of its kind. M/s. Shalimar Seal & Tar Products Pvt. Ltd., an ISO 9001 accredited company having a highly equipped in-house Research & Development laboratory with ultra modern facilities for manufacturing a quality product under technical guidance & specifications provided by both Shalimar Seal & Tar Products Pvt. Ltd. & M/s. Kavassu International Pvt. Ltd. Products are backed by world's leading company NILE WATERPROOFING COMPANY Egypt, ISOLTEMA SPA, Italy & CAPITAL UNITED, Canada. All products are timetested with varying climatic conditions through out India and have got very strong history of service and case studies in various application areas viz-a-viz construction of Buildings, Factories, Harbors, Dams, Canals, Bridges Atomic, Thermal, Hydel Power projects, Tunnels, Sub-way Boxes, Tube Railways, Roadways, NHAI etc. Shalimar's have got a wide range of products includes some special products, which are obviously not in our product range because of their end use in specific applications. Details can be provided on request. All products are manufacturing by using indigenous as well as imported raw materials to meet out the international quality standards & design to combat water and dampness in structures. All products are easy to use, environment eco-friendly and provide the user a very cost-effective remedy to sort out the problems, which unless and until considered unsolvable.



POLYMER MODIFIED BITUMEN

DESCRIPTION

Kavassu PMB is a polymer Modified Bitumen produced by blending any one of following polymers SBS, EVA, PE, PBD or EMA & other additives compatible with bitumen grade VG - 10, VG - 20 or VG - 30. Kavassu PMB is prepared in a centrally located state-of-the-art plant equipped with special high shear mixing facility, with high sheer homogenizer the first of its kind in our country. Kavassu PMB has been specially designed after extensive research to meet the requirements of high traffic intensity, increasing axle & point loads, and varying climatic conditions throughout the country.

Increasing traffic volumes vehicle loads and tyre pressures are causing accelerated degradation of our road pavements improved materials. Such as polymer modified binders (PMB) are being used as a means of better combating these effects. Kavassu PMB are generally considered to provide prolonged life or enhanced prolonged life or enhanced pavement performance in sprayed seal and interlayer (Membrane) application ,polymers can greatly prolong pavement life by inhibiting reflective cracking in dense graded asphalt application. Kavassu PMB are effective in reducing rutting and improving fatigue crack resistance the highers near resistance provided by Kavassu PMB can give beneficial effects in round abouts, tight corners and other high stress areas .polymers have also demonstrated the ability to prolong the life of open-graded surfacing by allowing thicker binder films, which are less prone to oxidation and tougher films that resists collection of foreign matter and dust thus maintaining the desirable water drainage capacity of these mixes. The role of a Kavassu PMB varies in each different application .also, the different PMBs work in different ways. It therefore very important to choose the correct binder for each application and it is equally important to design mix of seal correctly.

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DESCRIPTION OF POLYMER

Polymer is a derived word meaning “of many parts” Polymers can be thought as long chemical strands that are made up of many smaller chemical (monomers) that are joined together end-on-end polymer can therefore be made up of different numbers of the monomers and therefore they can have different chain lengths only certain chain lengths may be suitable for a particular polymer type when used in bitumen for example . The Polymer polystyrene is made up of many styrene molecules linked together one after the other . A copolymer had two different sorts of repeating molecular units. Block copolymers have these repeating molecular units in a regularly occurring block pattern. The physical and chemical properties of a polymer will depend on the nature of the individual molecular units the number of them in each polymer chain and their combination with other molecular types. Consequently ,the different polymers behave in different Kavassu PMB have to be tried out in bitumen application before they can be considered suitable. Two basic types of polymer are used in modifying bitumen for road application .

(i) Elastomers (ii) Plastomers

An elastomer is polymer that has a flexible rubber backbone and large side -chains in its structure. Styrene butadiene styrene (SBS) is an example of this type.

A plastomer is a polymer that will deform in a plastic or viscous manner at melt temperature and become hard and stiff at low temperatures ,i.e. The structure is reversibly broken down with the application of heat . An example of such a material is ethylene vinyl acetate (EVA).

Styrene butadiene styrene (SBS):

SBS is a block copolymer incorporation polystyrene section attached to a central poly-butadiene section . The polystyrene parts of different polymer chains within the bitumen come together to form domains within the binder structure at low temperatures . This results in a polymeric network structure within the binder which can be reversed by heating until the styrene molecules become more soluble in the bitumen based. As with all polymers, SBS is available in many different forms. The polymer molecules can be different lengths (different number of individual monomer molecules per polymer chain) & can have different arrangements of the molecules (micro structure). These differences can drastically affect the degree of modification provided by a polymer SBS polymer can have different quantities of styrene relative to the butadiene content (Usually expressed as % styrene . And typically around 30%). They can also have different arrangements of the polymer being either a linear or radial configuration i.e. one PMB containing 5% SBS may not have the same properties as

another PMB containing 5% SBS.

SELECTION CRITERIA

Polymer modified binders were introduced to the Indian market about ten years ago although their development began long before that with the use in Europe of natural and synthetic rubbers . It was not until the second generation of synthetic polymer such as styrene butadiene styrene (SBS) and ethylene vinyl acetate (EVA) became available that acceptance of these modified binders was helped by a requirement for more durable maintenance treatments and a need for improved binder properties to cope with increased traffic stresses on surfacings. The Indian PMB market had traditionally been supplied with three different polymer systems. They are styrene butadiene styrene(SBS) ethylene vinyl acetate (EVA)and scrap rubber other polymer systems which have previously been available in Australia or are used in small quantities for specialised application include polyethylene (PE) neoprene and epoxy resin polymer systems. Such as water based emulsion latexes of styrene butadiene rubber (SBR) and natural rubber, are commonly used in bitumen emulsions for spray sealing application and bituminous slurry surfacing over recent years. New polymer types such as polybutadiene and (PBD) and ethylmethacrylate (EMA) have been introduced to the market to provide improved performance over the traditional varieties all these polymer system provide different characteristics to the finished PMB and therefore some have advantages in specific applications over other polymer systems world wide there are many more polymer systems in common use. Initially SBS based PMBs were provide in the form of a concentrate which could be subsequently diluted to the requirement polymer content by blending with bitumen . The practice of blending a concentrate with bitumen results in particular polymer concentration being used for different applications for example , it become common to use about 4% to 5% SBS polymer to produce a binder suitable for SAM seals commonly used SBS concentration were 0.75%,1.5% ,3%, 3.75%, 5%,6% and 7.5% these concentration were used mainly become they correspond to simple dilution rates of 5% . 10% , 20%, 25% ,33.3%40% and 50% concentrate in bitumen respectively eventually . Specification were drafted around this common practice. SBS based PMBs are usually highly elastic, however the extent is dependent upon the quantity of polymer in the PMB, the type of polymer used. The nature of the bitumen and the method or extent of blending used during manufacturing . The polymer content of SBS based PMBs varies considerably in spray operations depending on the application . In spray sealing work around 1% to 2% SBS in typically employed to provide improved aggregate retention properties and 2% to 4% SBS is typically used in the first coat of two coat strain alleviating membrane (SAM) applications followed by a 2nd coat containing 1% SBS.

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BS strain alleviating membrane alleviating membrane inter layer (SAMI) application are believed to require very high elasticity and to achieve this, SBS contents up to 7% or 8% have been used crack filling applications as usually under taken with SBS concentrations of about 15% polymer .

Ethylene Vinyl Acetate (EVA)

Like SBS there are many types of EVA polymer available . EVA polymer can contain different ration of ethylene to vinyl acetate levels are 18% and 33 these polymer are considered to be plastomeric and act by making the PMB stiffer than conventional bitumen this feature is particularly useful in asphalt application where they find most use however stripping, possibly due to brittle failure of the PMB has been a problem in some seal applications. EVA polymers are easily blended into bitumen by simple low shear mixing. As with most PMB systems, there must be compatibility between the base bitumen and the EVA polymer to ensure optimum properties are achieved. Although EVA finds application in sealing work, Particularly to provide high shear resistance to aggregates loss , the major applications are in open-graded asphalt and for the provision of deformation resistance in dense -graded asphalt.

Polybutadiene

Polybutadiene (PBD) is a polymer system which was introduced to the Australian market in 1989. PBD is an elastomeric polymer and when properly incorporation into bitumen , provided a tough and strongly cohesive and adhesive binder .PBD has been extensively used in Europe in applications ranging form sprayed seals through to open graded and dense graded asphalt . The PBD based PMBs are manufactured with special high-shear blending equipment and exhibit negligible polymer separation during storage and transport. Polymer modified significantly alters the rheological properties of binders. As a result polymer modified binders cannot be characterized by the conventional empirical binder properties such as penetration and ring and ball temperature using the traditional definition if however the traditional empirical binder properties penetration and ring and ball temperature can be shown to be related to fundamental rheological properties i.e. Those properties obtained from dynamic shear rheometer (DSR) measurement s, there is really no need to start using expensive equipment for relatively simple practical purposes. It is show also polymer modified bitumen (PMB) that the penetration and ring and ball temperature can be related to the complex shear modulus and /or the complex viscosity . A relationship between the complex shear modulus & the penetration was obtained similar to that obtained by ring ball temperature for PMB.

Three Polymer types were selected ,an EVA polymer a linear SBS polymer and a radial SBS polymer . The EVA polymer & the linear SBS polymer are, respectively .representative for plastomer and elastomer polymer normally used in polymer modified binder the polymer were added to a VG- 10 bitumen in amounts of .5% ,1.5% and 4% m/m. The base bitumen VG- 10 was heated to 150'C then polymer was added while gently mixed to let it dissolve or disperse. The temperature should be maintained at 185 'C and stirred at 400-600 rpm, for at least two hours. This procedure was used for the binders containing EVA polymer and those containing linear SBS polymer . For the binders with radial SBS polymer a slightly different procedure was used. A longer mixing time for the 4% mix . The radial SBS polymer grains were first crumbled in a high shear mixer at 4800 rpm before it was mixed with the bitumen. This was found necessary in order to obtain a binder sample with finely dispersed radial SBS.

ADVANTAGES

- Homogenous product free from separation & settlement.
- Improves adhesion between aggregate and binder.
- Higher resistance to deformation at elevated pavement temperature.
- Higher fatigue life of mixes.
- Delay of cracking and reflective cracking.
- Lower susceptibility to seasonal temperature variations.
- Improved ageing resistance.
- Improved resistance to stripping/moisture damage.
- High Marshall stability.
- Overall improved performance in extreme climatic and under heavy traffic conditions.
- Does not require change in construction practices/machinery.
- Overall improved performance in extreme climatic conditions and under heavy traffic conditions

Kavassu PMB is the ideal binder to overcome the concurrent problems of raveling, rutting, undulations, cracking, bleeding, shoving and pot-holding in existing bituminous pavement. Bituminous mix, prepared with Kavassu PMB has a higher stiffness modulus, enhanced fatigue life, better resistance to creep & higher indirect tensile strength and quite suitable as renewal course & overlay materials on surface which are badly cracked and subjected to heavy traffic. Polymer Modified Bitumen is recommended for roads with heavy traffic and located in extreme climatic conditions. Kavassu PMB performs better than neat bitumen in heavy rainfall areas and in situation where the aggregates are prone to stripping. Due to its better creep resistance properties, Kavassu PMB can also be used at busy intersections, bridge decks, and round about for increased life of surfacing. Kavassu PMB also finds useful applications in porous asphalts. The selection of the grade of Kavassu PMB will be based on traffic intensity and climatic conditions as given in page no. 2. Even it is much better than

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using antistripping compound with bitumen for getting better coating on aggregates.

TESTED BY

Kavassu PMB is produced in a state of the art central plant with a high sheer blender & homogenizer as per the guidelines laid down by IRC SP: 53 & Indian standard IS: 15462 specifications for Polymer & Rubber Modified Bitumen. Kavassu PMB has been tested by premier institutes of the our country like Delhi Test House, New Delhi, Star Wire Laboratories Faridabad, Ministry of Small & Medium & MicroEnterprises Hyderabad etc. as per IRC: SP: 53 and IS: 15462 & has been found to fully meet the guidelines and standard specifications. Kavassu PMB has given excellent field performance and is found to be cost effective in long term applications. Kavassu PMB is available in bulk as well in drums.

RECOMMENDED FOR

- Increasing the life of periodical maintenance.
- Optimization of cost vs. life.
- Heavy trafficked lines.
- Airport runways and parking apron.
- Industrial and multimodal platforms.
- Reducing traffic noise.
- Waterproofing concrete structure.
- For High rainfall Areas.
- In Stress Absorbing Membrane Interlayer (SAMI)

GRADES

- Kavassu PMB 40: Recommended for Hot climate areas
- Kavassu PMB 70: Recommended for moderate climate areas
- Kavassu PMB 120: Recommended for cold climate areas

STAGewise TEMPERATURE REQUIREMENT

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

PROPERTIES

	Kavassu PMB 40	Kavassu PMB 70	Kavassu PMB 120	Method of Test
Penetration at 25°C 0.1mm, 100g 5 Sec.	30 to 50	50 to 90	90 to 150	IS: 1203-1978
Softening Point (R&B), °C, min	60	55	50	IS: 1205-1978
Frass Breaking point, °C, max	-12	-18	-24	IS: 9381-1978
Ductility at 27 °C, cm, min	75	75	75	IS: 1208-1978
Flash Point COC, °C, min	220	220	220	IS: 1209-1978
Elastic Recovery of Half Thread in Ductilometer at 15 °C, % min	75	75	75	IS: 15462-2004
Separation, difference in Softening Point, R&B, °C, maxes.	3	3	3	IS: 15462-2004
Thin Film Oven test on Residue (IS:9382-1992)				
Penetration at 25°C, 0.1mm, 100g 5 Sec., Min, % of original	60	60	60	IS: 1203-1978
Increase in Softening Point, °C, max.	5	6	7	IS: 1205-1978
Elastic Recovery of Half Thread in Ductilometer at 25 °C, % min.	50	50	50	IS: 15462-2004 I

QUALITY ASSURANCE

As per ISO-9001



Manufactured By:

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IMPORTANT NOTE :

Products are available at all leading cement, hardware, Tile & Paint stores through our wide network of distributors across the country. The product information & application details given by the company & agents has been provided in good faith & meant to serve only as a general guideline during usage. Users are advised to carry out tests & take trials to ensure the suitability of products meeting their requirement prior to full-scale usage of our products. Since the correct identification of the problems, quality of other materials used & on-site workmanship are factors beyond our control there are no expressed or implied guarantee/warranty to the results obtained. The company does not assume any liability or any consequential damage for less than satisfactory results, arising from the use of our products. The leaflet supersedes the previous one and a new issue may take place without notice to supersede this edition as and when it becomes necessary.

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(STRENGTH OF CONSTRUCTION)