

Preparing the Asphalt Industry for the future

Introducing cellulose fibres for

**STONE MATRIX ASPHALT
& BITUMEN MODIFICATION**



INTRO

DESCON Infrastructures Pvt. Ltd. is an engineering organisation shaping the face of highway & urban infrastructure ecosystem. The conventional design modules of the last century are being constantly replaced with designs & technologies which are functional, smart and sustainable over longer period of time.

As an Infrastructure Development Company, **DESCON** designs and constructs products as well as offers services showcasing modern and innovative technology to deliver safe and sustainable roads. In the 25th year of its operation, we are proud to present ourselves as an engineering organisation catering to various infrastructural demands to construct long life roads.

Highway infra

DESCON has been long promoting the need for sustainability in the highway sector. It is with this view that we are offering services for production of **Stone Matrix Asphalt (SMA)** - A gap graded mix, highly rut resistant, tough, stable, skid resistant, with a high quantity of coarse aggregates that relies on the stone to stone contact and load transfer to provide strength & durability.

Issues faced in Pavement Construction

Increasing traffic volumes, higher axle loads, changes in our climate are amongst the various challenges, road construction experts around the globe have to face. **Stone Mastic Asphalt (SMA)** has shown its outstanding performance amongst a variety of road surfaces throughout the world for more than 40 years - making SMA one of the most popular surface courses used.

- Rutting of the pavement leading to short pavement life.
- Aggregates scarcity as it is a natural material.
- Bitumen behaviour changes.

With SMA, **DESCON** aims to deliver a single point solution which shall take care of the issues being faced in the construction of pavements. Our technology partner **J. Rettenmaier & Söhne, Germany**, is the earliest promoter of the **Stone Matrix Asphalt (SMA)** technology in Germany. **JRS** is a dedicated group who have directed their efforts in the development and processing of high - quality, organic fibres derived from natural and sustainable raw materials. Their R&D expertise, application know - how and innovations have earned them unparalleled reputation in the asphalt industry. JRS's flagship product **VIATOP®** pellets - fibres with bituminous coating and functional additives are the benchmark for fibre additives delivering high quality and functionality for modern asphalt concepts. With dedicated production facilities in Germany, United Kingdom & Russia, JRS is equipped to provide world class technology to highway developers all over the world.

DESCON together with **J. Rettenmaier & Söhne, Germany**, shall deliver the world class **VIATOP®** pellets and the technical expertise to construct long life pavements.

Products

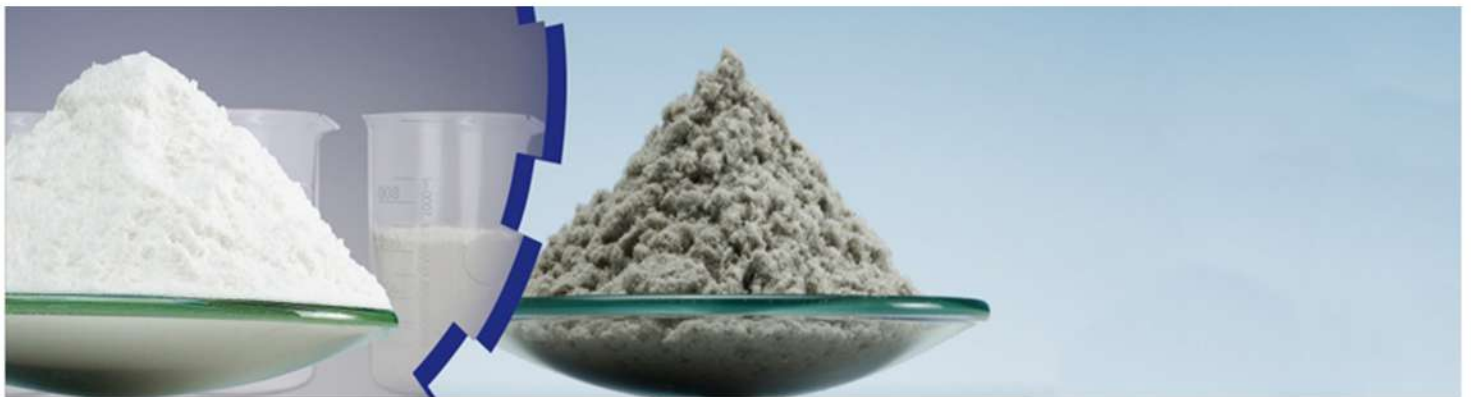
Green Philosophy - Bitumen coated cellulose fibres

Descon is committed to the task of bringing sustainability to the Indian Asphalt/Pavement Industry. **Descon** is committed to delivering research, high-quality, functional organic fibers made from renewable, plant-based raw materials. With the innovative JRS organic fiber technology, the many functions of these valuable natural substances are available to industry.



Extensive research is being carried out to open new perspectives in asphalt road construction. Together with **JRS, Descon** is participating in the development of future pioneering asphalt concepts as an innovation & system partner. Asphalt concepts with perspectives, such as

- Noise-reducing Stone Matrix Asphalt (SMA Plus).
- Stone Matrix Asphalt Binder Course (SMA BC)
- 2 in 1 combination layer for rural roads AC Duopave.



Our Product Range

1. VIATOP® Premium

VIATOP® Premium is the highest quality of bitumen coated cellulose fiber which have been developed with the aim of achieving a consistent & highly stable asphalt surface. Natural fibers made from specially treated cellulose qualities which are combined with bitumen to ensure a quick and uniform dispersion in the mix.

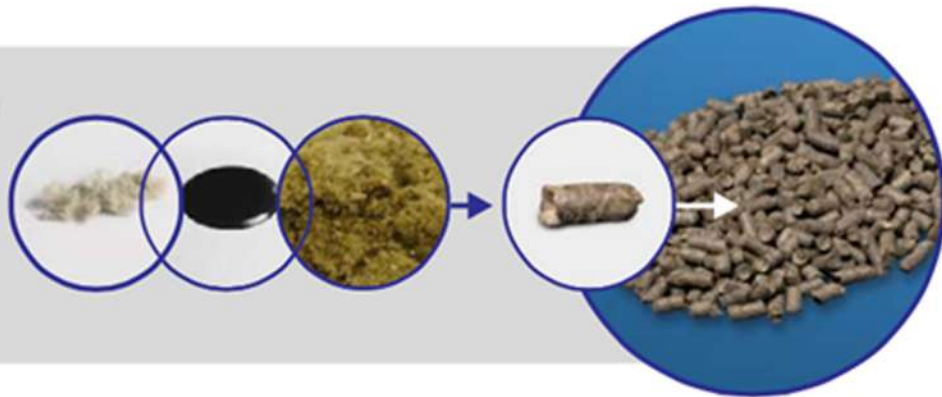


VIATOP® premium

is a pelletized blend of:

90 % by weight
ARBOCEL® ZZ 8/1

10 % by weight
Bitumen 50/70



USP

- Excellent efficiency and stabilizing effect due to a dense three-dimensional fiber network
- Economical asphalt production – no capacity or energy losses caused by unnecessary dry mixing time.
- Highest quality standards ensure continuous and consistent asphalt quality
- Automatic dosing – big bag and silo systems small bags available

Applications

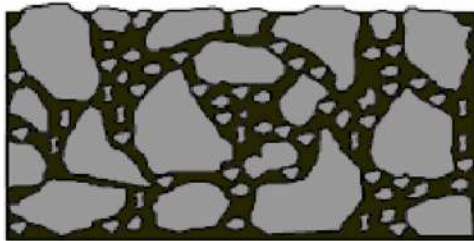
- Stone Matrix Asphalt
- Stone Matrix Asphalt plus
- Stone Matrix Asphalt BC
- Porous Asphalt
- AC Duopave

Stone Mastic Asphalt (SMA) is based on the concept of a self-supporting stone skeleton, with a thick mastic and high binder content. This is made possible by using high performance fiber pellets. The low void content makes the compacted layer practically impermeable to water. With these features, SMA fulfils all the requirements of modern pavements– offering its benefits to road users, local authorities and the asphalt industry alike.

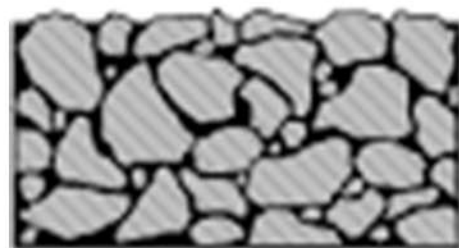
The Philosophy of the SMA-concept

- High stability to permanent deformation and higher wear resistance by an excellent particle interlock and a high content of crushed premium aggregates.
- Longevity and durability to premature cracking and ravelling by a very high content of bitumen and a void less mastic mortar which fills the voids of the stone skeleton and binds it together: Good quality of bitumen is prerequisite for a long useful service life.
- Stabilizing additives assures the homogeneity (no binder drainage) of the mix during the manufacturing, transportation and laying. As a side effect, they improve the stability.

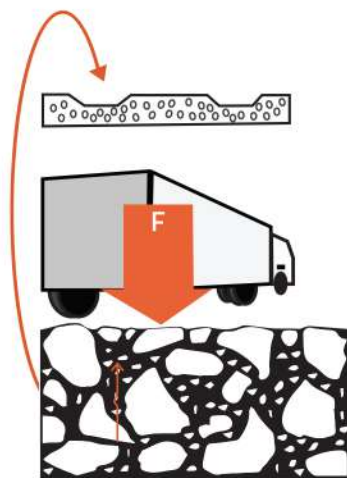
Conventional BC mix principle (VS) SMA principle



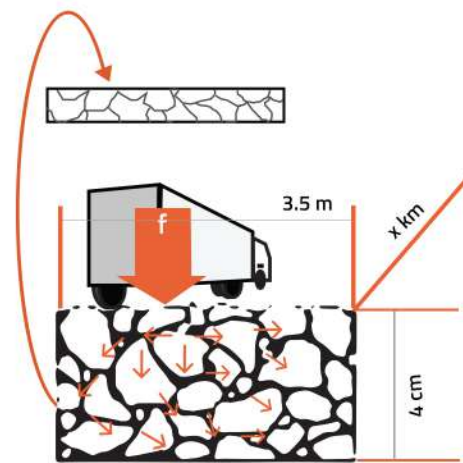
Dense Graded Mix
Bituminous Concrete (BC)



Gap Graded Mix.
Stone Matrix Asphalt (SMA)



Stability in a BC-Mix



Stability in a SMA-Mix

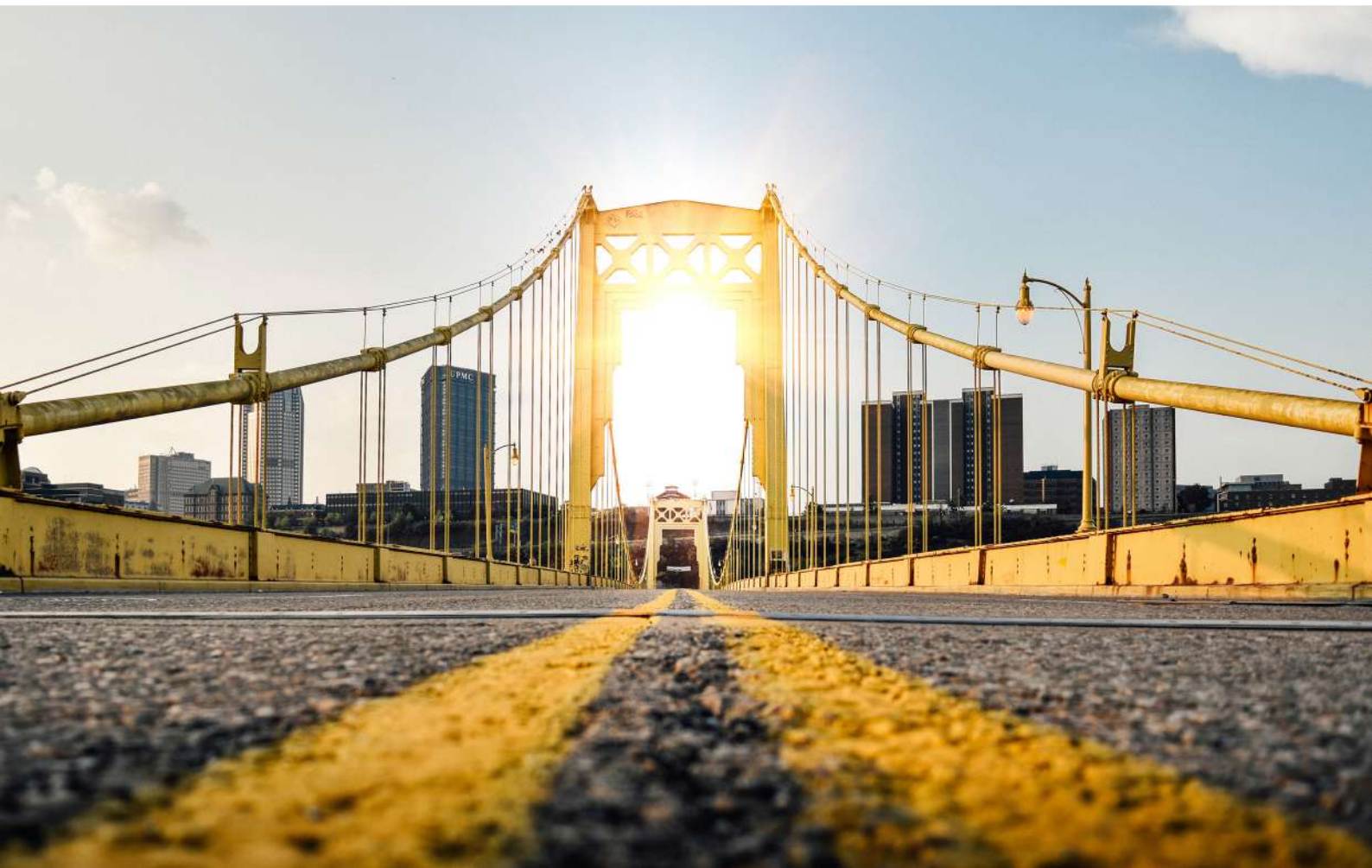
The stability in a SMA- Mix is obtained through the Internal friction in the self supporting stone skeleton

Composition of Stone Matrix Asphalt

Combined grading of CA, FA & Mineral filler (included hydrated lime if used) shall be neither limits as shown in table 500-37:

SMA Designation	13 mm SMA	19 mm SMA
Course where used	Wearing course	Binder (intermediate) course
Nominal aggregate size	13 mm	19 mm
Layer thickness	40-50 mm	45-75 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing	Cumulative % by weight of total aggregate passing
26.5	-	100
19	100	90-100
13.2	90-100	45-70
9.5	50-75	25-60
4.75	20-28	20-28
2.36	16-24	16-24
1.18	13-24	13-21
0.600	12-18	12-18
0.300	10-20	10-20
0.075	8-12	8-12

As per IRC-2013: Specifications for Road & Bridge Works



SMA Advantages

1. Rutting Resistance

- Development of rutting depends upon the shear strength of an asphalt mix, which is the result of binder and aggregate interactions.
- Research across the world proves SMA to be rut resistance course. This is due to a very strong skeleton of coarse particles of an aggregate mix.

2. Crack Resistance

- Asphalt courses with increased crack resistance are characterized by considerable shear and tensile strength.
- SMA's distinctive feature is that it possesses the greatest potential of slowing the occurrence of reflective cracking.

3. Fatigue Life

- Fatigue is an effect consistent with the formation of cracks in material caused by a series of repetitive tensile stress cycles that do not exceed the tensile strength of the material.
- The Fatigue limit of an SMA mixture is higher than any comparative specimen of other Bituminous mixtures.

4. Noise Reduction Properties

- The problem of noise is the growing concern of many researchers as the noise irrespective of their frequency and level are harmful.
- Silent pavements are those with the reasonably high sound absorption capabilities. Absorption depends upon the characteristics of the pavement surface and the shape of available air voids.
- Generally, the macrotexture of SMA makes it 2dB(A) quieter than BC and 5dB(A) quieter than PCC.

5. Durability

- The composition of mixture-the type of aggregate, gradation of the mix, the type and quantity of binder, the presence of additives and the content of air voids has an impact on durability.
- High Durability in SMA is the result of superior quality of aggregates, high binder content and a thicker binder coating on an aggregate in mix.

6. Antiskid Properties

- The SMA macrotexture depends on the maximum aggregate size in the mix and the design of mix.
- The SMA surface provides adequate skid resistance.
- However, initial skid resistance of SMA surface is slightly low. This can be taken care by gritting the surface.

7. Anitspray and Light Reflection Properties

- Proper SMA macrotexture is an important parameter which has a major role in reducing generation of water mist and splash caused by vehicle tyres during rainfall which reduces visibility.
- SMA courses reduce water splash in comparison with BC pavements. A suitable depth of macrotexture and air voids in SMA provides quick water discharge after rainfall.
- Further, macrostructure of SMA significantly improves the visibility of road marking after or during rainfall. Also, at night the light reflection of vehicles travelling in the opposite direction is reduced.

8. Permeability

- Permeability is related to the content of air voids and the size, distribution, and the existence of interconnections between internal pores.
- The thick mastic between the coarse aggregates makes it practically impermeable.
- The gradation of the SMA mixture influences the permeability.

9. Fuel Consumption

- Rolling resistance is one of the numerous factors of intense interest when considering the problem of fuel consumption while driving.
- At a constant speed of 80km/h, approximately 12% of fuel is consumed in overcoming the rolling resistance. The rolling resistance is affected by microtexture, macrotexture, megatexture and the unevenness of a wearing course.
- According to Dutch research rolling resistance of SMA is least indicating lower consumption of fuel.

10. Economic Effectiveness

- SMA mixtures have initial cost of constructions 20% to 30% higher than bituminous concrete due to large amount of binder, stabilizer and higher production temperature.
- However, high initial cost can be accepted by road administrations owing to the better durability of SMA pavements. -The higher initial cost is compensated for their longer durability, lower maintenance costs, lower cost of operation due to absence of road repair need and hence, fewer traffic disruptions for road users.
- The economical efficiency of SMA is higher than that of other bituminous mixes.

Areas of Application

- Highways requiring Long life pavements.
- Highways requiring rut resistant pavements.
- City Roads - having problem of waterlogging.
- Rotaries - having transverse forces resulting into higher damages.
- Underpasses - having problem of waterlogging & quick maintenance is a problem.
- Bridge Decks - on wearing course as SMA has less susceptibility to weather conditions.
- Shipping Ports.
- Industrial Areas.
- Airport Runways.



Stone Matrix Asphalt on Bridges

Concern for wearing coarse pavement on Bridge Deck:

Surfacing on bridge should not be like of a standard pavement on a soil subgrade. The essential difference lies in a different mode of operation.

The cooling and warming effect developing from underneath the bridge deck pavement caused by changes in air temperature under the steel structure and faster changes of the pavement temperature due to wind action.

Structural deflections of a bridge's deck caused by passing vehicles.

The amplitude of the bridge deck vibration is much higher than that of conventional road pavement.

Much more intensive application of leading to the quick degradation of asphalt mixes applied on bridges.

Therefore, while designing a combination of bridge pavement courses, some additional points level to be observed:

-The critical element influencing the pavement service life is the durable bonding of all the layers together.

-The more flexible the structure , the more elastic the asphalt layers should be .

-Good compaction must be ensured to avoid water permeability.



West Bridge on the Great Belt Link, Denmark

An example of SMA practice on bridge application in Europe is found on one of the longest bridge in the continent- The Great Belt Link connecting Denmark to Sweden.

A 6600m long pre-stressed structure with an Stone Matrix Asphalt Wearing Course, which is expected to last 25 years on the bridge. It was opened in 1998 and served 20 years already.

SMA ON BRIDGE DECK

- 1 Even distribution of the load to the bottom layer
- 2 Sufficient Resistance to permanent deterioration
- 3 Less susceptible to water conditions
- 4 Ability to reduce Water Splashing
- 5 Provides Safe and Comfortable ride
- 6 Flexible to sustain Vibrations
- 7 High Resistance to permanent deformation & Shear Failure
- 8 Good Skid Resistance
- 9 Noise reduction properties

2. VIATOP® Plus FEP - Innovative Pellets for Bitumen Modification

VIATOP® Plus FEP represents the new generation of elastomer modifier for standard asphalt mixtures as a cost - efficient & environmental friendly solution. In VIATOP® Plus FEP, the cellulose fiber is pelletized using **Functional Elastomeric Polymer** (thus the name FEP), with a cross linker. Here cellulose fibers are used, for carrying the polymer in the hot mix plant.



VIATOP® plus FEP

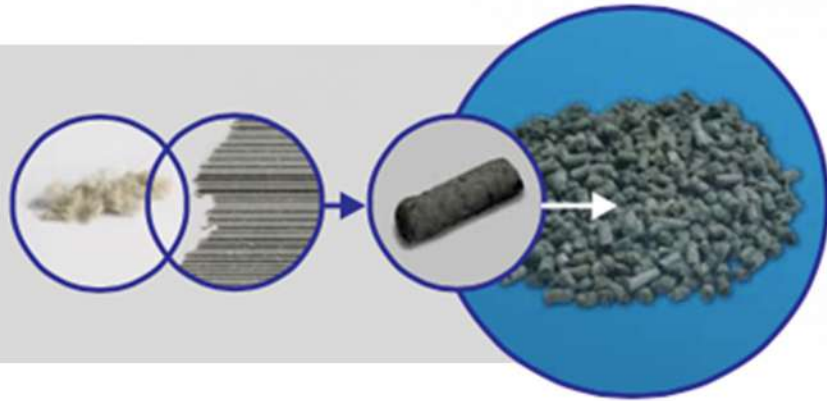
Das Pellet.

VIATOP® plus FEP

is a pelletized blend of:

20 % by weight
ARBOCEL® ZZ 8/1

80 % by weight
Functional additive



NOTE: VIATOP® Plus FEP, when dosed in the hot mix, this modifies the BC mix or in other words, this modifies the VG30 bitumen grade to the level of PmB40. An addition of 12.5% of Viatop Plus FEP, of the bitumen content, will modify the bitumen with softening temperature of 70°C. (A 10% will modify to 60°C & 15% will modify to 80°C. A 5% addition, will modify VG30 to the level of VG40).



The Need for Modified Bitumen

With exposure to increased traffic volume, higher axle load & drastic climatic changes, bituminous courses suffer from increased fatigue & rutting. In order to achieve improved performance, polymer sciences have been introduced to the asphalt industry. Polymer Modification ensures increased resistance against higher traffic volumes, improved adhesion and cohesion & higher performance in colder temperatures.








In addition to this, a non - homogenous supply of high grade bitumen PmB 40 and the constant fluctuation in prices is a major barrier in the development of good quality bitumen courses. With **VIATOP® Plus FEP**, pavement construction can be carried out at economical costs by combining bitumen of grade VG 30 with **VIATOP® Plus FEP**, thereby attaining similar results as PmB 40.

Advantage VIATOP® Plus FEP

- Limited availability of polymers
- Stability in price
- High flexibility and long storage life
- Compatible with all standard road construction bitumen types
- Sustainable product by saving natural resources
- Reduction of greenhouse gas emissions
- No additional costs for the modification process
- No health and safety problems at handling and dosing
- Modification without reaction time (dry process)
- Economical product - cost savings possible



Other Products

Product	Composition	Properties	Applications
 <p>VIATOP[®] plus C 25 Das Pellet.</p>	<p>75% Fibers 25% FT-Wax</p>	<ul style="list-style-type: none"> -Drainage inhibitor -Compaction enhancement -Temperature reduction 	<p>SMA SMA plus SMA BC PA AC Duopave</p>
 <p>VIATOP[®] plus CT 40 Das Pellet.</p>	<p>60% Fibers 40% FT-Wax</p>	<ul style="list-style-type: none"> -Drainage inhibitor -Compaction enhancement -Temperature reduction -Deformation resistance enhancer 	<p>SMA SMA plus SMA BC PA AC Duopave</p>
 <p>VIATOP[®] plus CT 80-AC Das Pellet.</p>	<p>20% Fibers 80% FT-Wax</p>	<ul style="list-style-type: none"> -Compaction enhancement -Temperature reduction -Deformation resistance enhancer 	<p>AC AC B C MA</p>
 <p>VIATOP[®] plus AD 10 Das Pellet.</p>	<p>83% Fibers 7% Adhesion promoter 10% Bitumen</p>	<ul style="list-style-type: none"> -Drainage inhibitor -Anti stripping agent 	<p>SMA SMA plus SMA BC PA AC Duopave</p>
 <p>VIATOP[®] plus RC Das Pellet.</p>	<p>50% Fibers 50% Rejuvenator</p>	<ul style="list-style-type: none"> -Rejuvenator for mixes with RAP 	<p>All asphalt mixes with RAB inside</p>
 <p>VIATOP[®] premium Das Pellet.</p>	<p>90% Fibers 10% Bitumen</p>	<ul style="list-style-type: none"> -Drainage inhibitor 	<p>SMA SMA plus SMA BC PA AC Duopave</p>
 <p>VIATOP[®] plus FEP Das Pellet.</p>	<p>20% Fibers 80% Elastomeric Additive</p>	<ul style="list-style-type: none"> -Elastomeric modification of bitumen 	<p>AC AC B C AC Duopave</p>

Projects



Bijapur, Karnataka State

Length : 0.5 km

Surface : SMA13

Used Product

VIATOP® premium



Mayur Vihar Toll Plaza, Delhi

Length : 6.2 Km

Surface : SMA13

Used Product

VIATOP® 66



K G Road, Bengaluru

Length : 12 Km

Surface : SMA 13

Used Product

VIATOP® premium



Kishangarh, Ajmer

Length : 21 Km

Surface : SMA 13

Used Product

VIATOP® 66



NH 14, Palanpur, Gujarat

Length : 5 Km

Surface : SMA 13

Used Product

VIATOP® 66



Thane, Maharashtra

Length : NA

Surface : SMA 13

Used Product

VIATOP® premium



Modi Hospital Road, Bengaluru

Length : 6.5 Km

Surface : SMA 13

Used

Product



Piramal Underpass, Ahmedabad

Length : 5 Km

Surface : SMA 13

Used

Product



NH 69A, Chhindwara, Nagpur

Length : 10 Km

Surface : SMA 13

Used

Product



Orai-Bhognipur

Length : 14 Km

Surface : SMA 13

Used

Product



NH 21, Dausa, Rajasthan

Length : 175 Km

Surface : SMA 13

Used

Product



Oragadam, Chennai

Length : 14.4 Km

Surface : SMA 13

Used

Product





J.RETTENMAIER & SOHNE
GMBH + CO.KG GERMANY



DESCONTM

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Reflective Signage:



Authorised Converter:

Thermoplastic Road Marking:



Sole Distributor:

