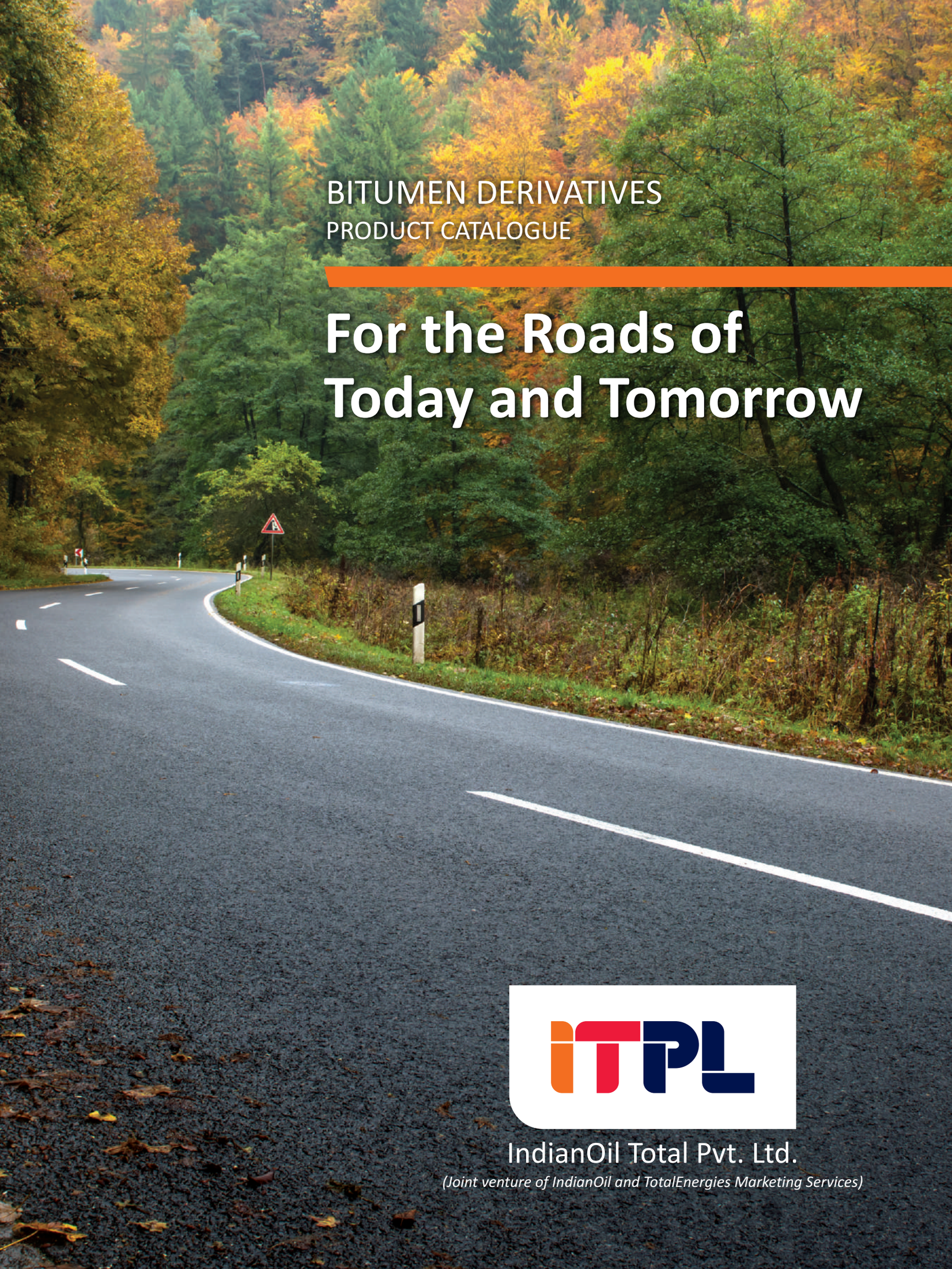


BITUMEN DERIVATIVES
PRODUCT CATALOGUE

For the Roads of Today and Tomorrow

IndianOil Total Pvt. Ltd.
(Joint venture of IndianOil and TotalEnergies Marketing Services)

About Us

Road construction sector in India is undergoing a paradigm shift with a renewed focus on sustainable infrastructure development. Modern and emerging technologies are instrumental in changing the face of Indian road construction. This will lead to the rise of demand for improved material for road construction.

IndianOil Total Private Limited has been formed in 2020 as a 50:50 Joint Venture Company between TotalEnergies, which is the one of the biggest producers and supplier of bitumen products in Europe and Indian Oil Corporation, the country's leading refiner and retailer of petroleum products.

The venture produces and markets high quality bitumen derivatives for India's booming road construction industry and is headquartered in Mumbai. The commercial operation of the company has commenced in March 2021.

ITPL combines the Marketing and R&D strengths of both IndianOil and TotalEnergies to manufacture and market innovative bitumen formulations and superior quality products.

With our culture of innovation, safety, and sustainability, ITPL is poised to contribute significantly to the pavement sector in India.

Our Promoters

Indian Oil Corporation

Indian Oil Corporation (IOCL) is India's highest-ranked energy PSU in fortune global 500 listing. IOCL is an integrated energy major with a presence in almost all the streams of oil, gas, petrochemicals, and alternative energy sources.

IOCL is the largest producer and market leader in viscosity grade Bitumens in India with a state-of-the-art R&D center based in Faridabad.

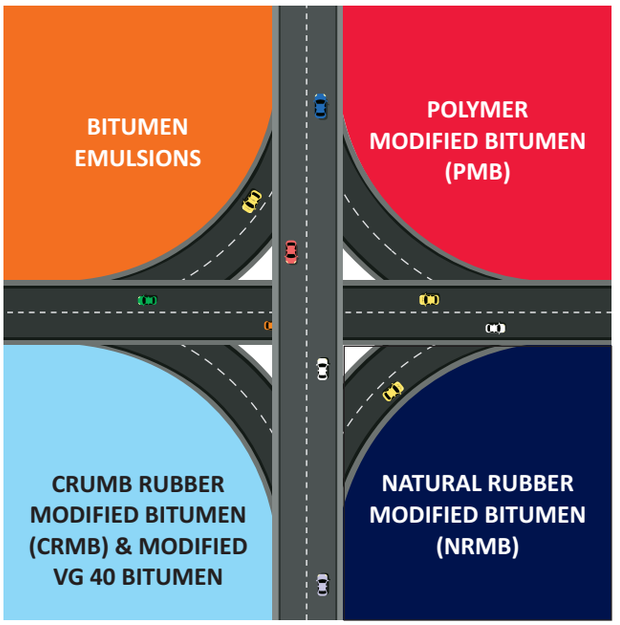
TotalEnergies

TotalEnergies is a broad energy company that produces and markets energies on a global scale, oils and biofuels, natural gas and green gases, renewables, and electricity.

Active in more than 130 countries, TotalEnergies puts sustainable development in all its dimensions at the heart of its projects and operations to contribute to the well-being of people.

A Comprehensive Range of Bitumen Derivatives

ITPL offers a comprehensive range of bitumen derivative products for all the requirements of road construction. Our products are manufactured in strict accordance with the highest quality and safety standards in adherence to our HSEQ policy.



Bitumen Product Range

EMULSION – RAPID SETTING
DURAPAVE EMULSIS RS1

EMULSION – MEDIUM SETTING
DURAPAVE EMULSIS MS

EMULSION – SLOW SETTING
DURAPAVE EMULSIS SS1
DURAPAVE EMULSIS CSS-1h (ASTM)
DURAPAVE EMULSIS SS2

COLD MIX EMULSION
DURAPAVE EMULSIS CM
DURAPAVE EMULSIS CM MS
DURAPAVE EMULSIS CM MS2
DURAPAVE EMULSIS CM SS2

POLYMER MODIFIED EMULSION
DURAPAVE EMULSIS RS PoMo
DURAPAVE EMULSIS SS PoMo

MODIFIED VG 40 BITUMEN
VG 40 M

MICRO SURFACING EMULSION
DURAPAVE EMULSIS MiSu

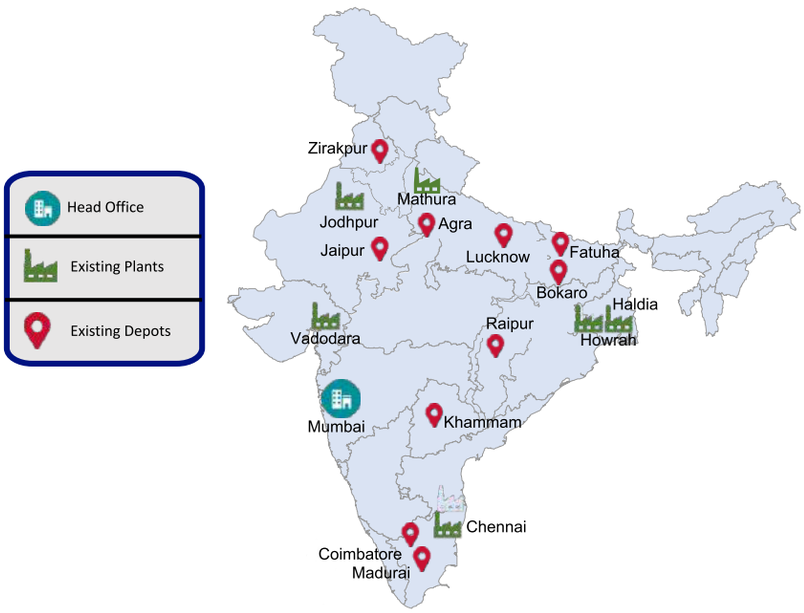
POLYMER MODIFIED BITUMEN (PMB)
Styrelf® PMB 40
Styrelf® PMB 70
Styrelf® PMB 40 Super
Styrelf® PMB 40 Hyma
Styrelf® PMB 64-10 S/H/V/E
Styrelf® PMB 70-10 S/H/V/E
Styrelf® PMB 76-10 S/H/V/E
Styrelf® PMB 82-10 S/H/V/E
Styrelf® PMB 76-22 S/H/V/E

A technology of Total

CRUMB RUBBER MODIFIED BITUMEN (CRMB)
CRFlex® 55 / CRFlex® 60

NATURAL RUBBER MODIFIED BITUMEN (NRMB)
NRFlex 40 / NRFlex 70

Manufacturing Facilities & Depots



To ensure an efficient and reliable supply of products to the customers, ITPL has set up manufacturing facilities & depots at strategic locations. At present, ITPL has full-fledged state-of-the-art manufacturing plants at Jodhpur in the state of Rajasthan, Haldia & Howrah in the state of West Bengal, Mathura in the state of Uttar Pradesh, Vadodara in the state of Gujrat and Chennai in the state of Tamil Nadu.

Research and Development

ITPL offers a detailed technical evaluation of a complete range of products to the customers. ITPL's state-of-the-art labs are equipped with the latest equipment for analysis of Performance Grade Binders (PMB/CRMB) with DSR (Dynamic Shear Rheometer) and short term and long-term aging process through RTFO (Rolling Thin Film Oven) / PAV (Pressure Aging Vessel).

Technical Assistance

The Technical Assistance to customers is a result of in depth experience and expertise of IndianOil and TotalEnergies which includes:

- Training on storage, handling, and applications of the products.
- Technical Assistance to define the best conditions to obtain the required performance of the products.
- Laboratory support for optimal mix design.
- Technical support on Hot Mix and Cold Mix processes from production to applications.

IndianOil Total Pvt. Ltd.

(Joint venture of IndianOil and TotalEnergies Marketing Services)

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POLYMER MODIFIED BITUMEN

Styrelf® PMB

A technology of TotalEnergies

APPLICATIONS:

STYRELF® PMB comprises a range of elastomerically modified bitumen. It is developed to provide high performance over a range of different applications and different conditions. STYRELF® PMB meets specifications of IRC SP53:2010 having advanced properties of softening point & elastic recovery. Styrelf® PMB Bitumen is modified with elastomeric polymers using a TotalEnergies innovative cross-linking technology which gives them exceptional properties in terms of storage stability, cohesiveness, elongation capacity and resistance to aging. The Styrelf® PMB is homogenous and superior quality PMB; which enhances life of the pavement.

PRODUCT CERTIFICATIONS: Bureau of Indian Standards (BIS): CM/L-No-3269160

AVAILABLE GRADES:

- STYRELF® PMB 40
- STYRELF® PMB 70
- STYRELF® PMB 40 Super

BENEFITS:

- Resistance at higher temperatures surface against rutting and ambient temperatures against fatigue.
- Higher resistance at low temperatures against thermal cracking because of viscoelastic nature.
- Better stripping resistance and ITSR (Indirect Tensile Strength Ratios).
- Better resistance against aging and oxidation.
- Proven record of longer life of pavement.
- Saves natural resources and reduced pollution levels by deferring the frequency of overlays and period maintenance.
- Suitable as per Indian geography of moderate to extreme temperatures with lower susceptibility to temperature variation.
- For national/ state highway/ city roads/ fly overs/ round about etc. with overall improved mix performance.

PACKING: STYRELF® PMB is available in Bulk.

FOR TECHNICAL QUERIES, PLEASE CONTACT:

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IndianOil

TotalEnergies

TECHNICAL SPECIFICATIONS

Property	Test Method	STYRELF PMB - 40	STYRELF PMB -70	STYRELF PMB-40 Super
Penetration at 25°C, 0.1mm, 100gm.5Sec	IS 1203-1978	30-50	50-80	30-50
Softening Point, (R & B), °C, Min	IS 1205-1978	60*	55	70
FRAASS breaking point, °C, Max	IS 9381-1979	-12	-16	-12
Flash Point, COC, °C, Min	IS 1209-1978	220	220	220
Elastic Recovery of half thread in ductilometer 15°C, %, Min	IRC: SP: 53-2010 ANNEX-2	60	60	70
Complex Modulus (G*/Sin δ) as Min. 1.0 kPa at 10 rad/s, at a temperature °C.	IRC: SP: 53-2010 ANNEX-1	76	70	76
Separation, difference in Softening point (R & B), °C, Max	IRC SP 53-2010 ANNEX -3	3	3	3
Viscosity at 150°C, Poises	1206 Part 1	5-9	3-6	5-9
Thin film oven tests on residue				
Loss in Mass, %, Max	IS 9382-1979	1.0	1.0	1.0
Increase in Softening point, °C, Max	IS 1205-1978	5	6	5
Reduction in penetration of residue, at 25 °C, %, Max	IS 1203-1978	35	35	35
Elastic Recovery of half thread in ductilometer 25 °C, %, Min OR	IRC: SP: 53-2010 ANNEX-4	50	50	50
Complex Modulus (G*/Sin δ) as Min. 2.2 kPa at 10 rad/s, at a temperature °C	IRC: SP: 53-2010 ANNEX-1	76	70	76

Procedure	Recommended Temperature Range
Mixing / Coating with Aggregates	170 - 185 °C
Laying of Mix	150-170 °C
Beginning of Compaction	Over 140 °C
End of Compaction	110-120 °C

POLYMER MODIFIED BITUMEN

Styrelf® PMB 40 HYMA

A technology of TotalEnergies

APPLICATIONS:

Styrelf® PMB 40 (Hyma) is modified with elastomeric SBS polymers using a TotalEnergies innovative cross- linking technology. It is manufactured in state of the art facility with high shear process. It gives uniform mixing & dispersion of polymer for superior adhesion between aggregate & binder ensuring, longer life, flexural strength, reduced oxidation & overall stability of the pavement.

PRODUCT CERTIFICATIONS:

Bureau of Indian Standards (BIS): CM/L-No-3269160

SPECIFICATIONS:

STYRELF® PMB 40 (HYMA) meets the specifications as per AASHTO M332: 2014

BENEFITS:

- Highly modified binders can give dramatic improvement in pavement resistance to rutting and fatigue damage.
- In severe distress situations, highly modified binders are likely to double pavement life.
- Ideal for extreme temperatures & loading areas such as airport runway applications, critical areas, flyovers, junctions and roundabouts.
- Higher resistance at low temperatures (<-28°C) and higher temperatures surface (80°C) against thermal cracking & rutting because of extreme viscoelastic nature.
- Helps reduce crust thicknesses up to 20 %, ideal for perpetual pavements

PACKING:

STYRELF® PMB 40 HYMA is available in Bulk.

FOR TECHNICAL QUERIES, PLEASE CONTACT:

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IndianOil

TotalEnergies

SPECIFICATIONS IN ACCORDANCE WITH AASHTO M332: 2014

Property	Test Method	Specification
Grade	AASHTO M 332:2014	PG76E-28
Viscosity@135°C, Max, Pa.s	ASTM D4402	3
Separation Test: Absolute difference between G* @ 76°C and 10 rad/s of Top and Bottom Specimens, Max %	ASTM D7173	10
Solubility, Min, %	ASTM D2042	99
Flash Point, Min °C	ASTM D92	230
Softening Point (R & B) °C Min	IS 1205	90
Elastic Recovery of Half Thread in ductilometer at 15°C %, Min	IRC SP 53:2010	90
Rolling Thin Film Oven (RTFO) Residue		
Mass Change, Max, %	ASTM D2872	1
MSCR Jnr3.2 @ 76°C, Max, kPa-1	ASTM D7405	0.1
MSCR, Recovery R3.2@ 76°C, Min, %	ASTM D7405	90
Pressurized Aging Vessel (PAV) Residue		
PAV Aging Temperature °C	ASTM D6521	100
Dynamic Shear, G*Xsin delta @ 25°C and 10rad/s, Max, kPa	ASTMD7175	5000
Bending Beam, S @ -18°C and 60°C, Max, Mpa	ASTM D6648	300
Bending Beam, m-value @ -18°C and 60°C, Min , Mpa	ASTM D6648	0.3

Procedure	Recommended Temperature Range
Mixing / Coating with Aggregates	170 - 185 °C
Laying of Mix	150-170 °C
Beginning of Compaction	Over 140 °C
End of Compaction	110-120 °C

POLYMER MODIFIED BITUMEN

Styrelf® PMB PG GRADING

A technology of TotalEnergies

APPLICATIONS:

The STYRELF® PMB group of binders comprising a range of elastomerically modified bitumen. It is developed to provide high performance over a range of different applications and different conditions. Styrelf® PMB Bitumen is modified with elastomeric polymers using a TotalEnergies innovative cross-linking technology which gives them exceptional properties in terms of storage stability, cohesiveness, elongation capacity and resistance to aging. The Styrelf® PMB is homogenous and superior quality PMB; which enhances life of the pavement.

PRODUCT CERTIFICATIONS: Bureau of Indian Standards (BIS): CM/L-No-3269160

AVAILABLE GRADES:

- STYRELF® PMB 64-10 S/H/V/E
- STYRELF® PMB 70-10 S/H/V/E
- STYRELF® PMB 76-10 S/H/V/E
- STYRELF® PMB 82-10 S/H/V/E
- STYRELF® PMB 76-22 S/H/V/E

BENEFITS:

- Resistance at higher temperatures surface against rutting and ambient temperatures against fatigue.
- Higher resistance at low temperatures (-10°C) against thermal cracking because of viscoelastic nature.
- Better stripping resistance and ITSR (Indirect Tensile Strength Ratios).
- Better resistance against aging and oxidation compared to normal VG grades.
- Proven record of longer life of pavement.
- Saves natural resources and reduced pollution levels by deferring the frequency of overlays and period maintenance.
- Suitable as per Indian geography of moderate to extreme temperatures with lower susceptibility to temperature variation.
- Recommended for national/ state highways/ city roads/ fly overs/ round about etc. with overall improved mix performance.
- PMB grades available from selection criteria of standard (S) to extremely heavy (E) traffic condition as per IS 15462:2019.

PACKING: STYRELF® PMB is available in Bulk.

FOR TECHNICAL QUERIES, PLEASE CONTACT:

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IndianOil

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TABLE 1 REQUIREMENTS OF POLYMER MODIFIED BITUMEN (PMB) IS 15462:2019

(Clause 6.5 and 9.5.3)

Characteristics	Grades and Requirements					Method of Test, Ref to	
	PMB 64-10	PMB 70-10	PMB 76-10	PMB 82-10	PMB 76-22	Annex	IS/ASTM
(A) Tests to be Carried out on Original Binder							
Softening Point (R & B), °C, Min.	60	65	70	80	75	–	IS 1205
Elastic recovery of half thread in ductilometer at 15 °C, Min.	70	70	70	85	80	Annex A	–
Flash Point, COC, °C, Min.	230	230	230	230	230	–	IS 1209
Viscosity at 150 °C, Pa.s, Max	1.2	1.2	1.2	1.6	1.5	–	ASTM D 4402
Complex modulus (G*) divided by Sin delta (G*Sin δ) as Min 1.0kPa,25mm Plate,1mm Gap, at 10 rad/s, at a temperature, °C, Min.	64	70	76	82	76	Annex B	–
Phase Angle (δ), Degree Max.	75	75	75	75	75	Annex B	–
Separation, difference in softening point (R & B), °C, Max	3	3	3	3	3	Annex C	–
FRAASS breaking point, °C, Max.	-10	-10	-10	-10	-22	–	IS 9381
B)Tests to be carried out on Rolling Thin Film Oven (RTFO) residue[2]							
Loss in mass, %, Max.	1.0	1.0	1.0	1.0	1.0	–	IS 9382
Complex modulus (G*) divided by Sin delta (G*Sin δ) as Min 2.2kPa, 25mm Plate,1mm Gap, at 10 rad/s, at a temperature, °C	64	70	76	82	76	Annex B	–
MSCR TEST							
a) Standard Traffic (S) Jnr 3.2 Max 4.5 kPa-1, Jnrdiff Max75 percent Test Temperature, °C	64	70	76	82	76	Annex D	–
b) Heavy Traffic (H) Jnr 3.2 Max 2 kPa-1, Jnrdiff Max75 percent Test Temperature, °C	64	70	76	82	76	Annex D	–
c) Very Heavy Traffic (V) Jnr 3.2 Max 1 kPa-1, Jnrdiff Max75 percent Test Temperature, °C	64	70	76	82	76	Annex D	–
d) Extremely Heavy Traffic (E) Jnr 3.2 Max 0.5 kPa-1, Jnrdiff Max75 percent Test Temperature, °C	64	70	76	82	76	Annex D	–
C)Tests to be carried out on Pressure Vessel (PAV) residue[3]							
Complex modulus (G*) multiplied by Sin delta (G*sin δ) as Max 6000 kPa, 8mm Plate, 2mm Gap, at 10 rad/s, at a temperature	31	34	37	40	31	Annex C	–

1) FRAASS Breaking Point only to be evaluated in case the project site has subzero temp conditions.
2) Method for Preparation of Rolling Thin Film Oven (RTFO) Residue is given in Annex E.
3) Method for Preparation of Pressure Aging Vessel (PAV) Residue is given in Annex F.

Procedure	Recommended Temperature Range
Mixing / Coating with Aggregates	170 - 185 °C
Laying of Mix	150-170 °C
Beginning of Compaction	Over 140 °C
End of Compaction	110-120 °C

MODIFIED VG-40 BITUMEN

APPLICATIONS:

VG-40M is a modified VG Grade bitumen, confirming to IS: 73-2013, specially designed & developed to provide high performance over a wide range of different highway applications. The product can be used in DBM / BC layers. It is designed with greater absolute viscosity at 60˚C under IS 1206 (Part-2) to overcome issues of rutting observed at higher temperatures.

PRODUCT SPECIFICATIONS: The product is manufactured as per IS: 73:2013.

AVAILABLE GRADES:

- VG-40M

BENEFITS:

- VG 40 M would have high resistance to deformation at elevated pavement temperatures.
- Lower susceptibility to daily & seasonal temperature variations.
- Enhancing the overall durability of Pavement by withstanding the severe overloading traffic conditions.

REQUIRMENTS OF MODIFIED VG-40 BITUMEN

Characteristics	Test Method	Unit of Measurement	Specification (IS: 73:2013)		Test Results
			Min	Max	
Penetration at 25˚C, 0.1mm,100gm,5Sec.z	IS 1203-1978	-	35	-	39.5
Softening Point, (R & B)	IS 1205-1978	˚C	50	-	52.8
Kinematic Viscosity at 135˚C	IS 1206(Part-3)		400	-	578
Flash Point, COC	IS 1209-1978	°C	220	-	318
Absolute Viscosity at 60˚C	IS 1206(Part-2)	Poise	3800	4800	4120
Solubility in trichloroethylene	IS 1216-1978	%	99	-	99.3
RTFO Test a) Viscosity Ratio @60˚C b) Ductility @ 25˚C	IS 1206(Part-2) IS 1208-1978	- Cm	- 25	4 -	2.21 67

PACKING: VG-40M IS AVAILABLE IN BULK.

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