TIKI TAR INDUSTRIES

50 YEARS OF INNOVATION

PRODUCT HANDBOOK : Roads, Highways, Runways.

The Evolution...

The Romans called it gwitu-men (pertaining to pitch) or pixtu-men (bubbling pitch), converted, after the barbarian invasions to bitumen. The word passed into French, and then, after the Norman conquest of England in 1066, into English, where it was used interchangeably with tar for over a thousand years (though tar is derived from coal and bitumen from petroleum).

Bitumen is a lot older than you think. Although now associated with roads and produced in large, complex, modern refineries belonging to enormous petrochemical companies, natural bitumen was found long before this, among the desert dunes of Arabia.

The oldest known engineering material, Bitumen has been in use from the earliest times as an adhesive, sealant and waterproofing agent. Down the ages, back in 6000 BC, naturally occurring bitumen was used in the thriving ship-building industry in Sumeria, discovered in surface seepage in the area.

Unparalleled. That's how versatile Bitumen's construction material really is. Used over a period of over 8,000 years as an adhesive, sealant and waterproofing agent, its uses now include: the construction and maintenance of roads, airfields and all areas where Bitumen is used; roofing; damp proofing; dam, reservoir and pool linings; soundproofing, pipe coatings, paints and many others.

The Revolution...

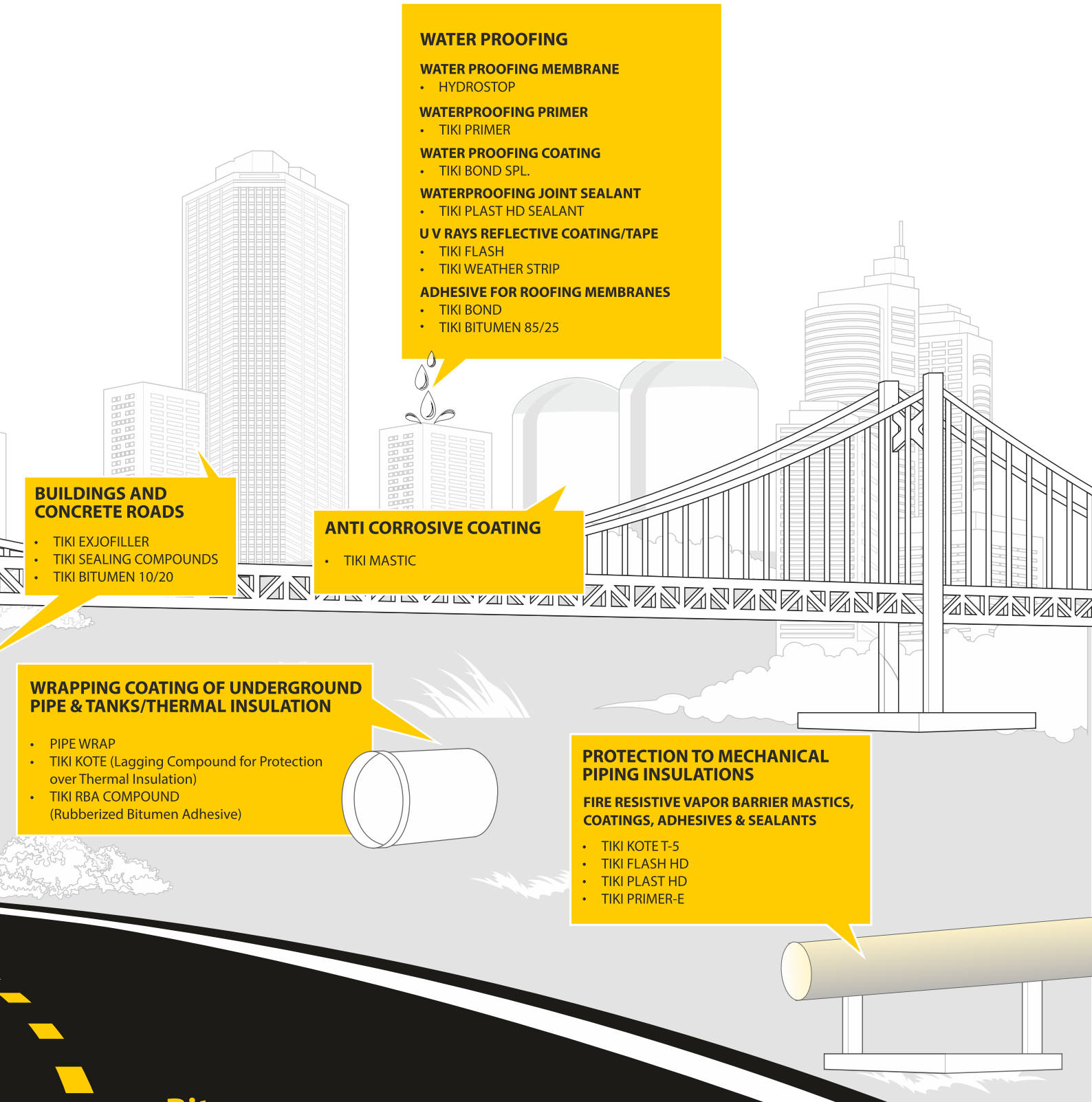
A revolution (from the Latin revolutio, "a turn around") means fundamental change that takes place in a relatively short period of time. That's what Tiki Tar precisely did when it entered the Bitumen business. Tiki Tar is termed as a radical and far reaching change in the Bitumen Industry.

Bitumen has proved to be the most versatile and reliable of building material for roads, standing the test of time, weather and disaster with marked resilience. In a sense, Tiki Tar Industries embodies the versatile qualities of this wonder material. Acknowledged as the pioneer and trendsetter in Bitumen, Tiki Tar Industries has continued to stand apart as an enduring name since 1964 with its widest range of Bitumen products.

With countrywide presence of Plants, Sales Offices and Vast Network, the organization is used as a benchmark for its capabilities, processes and good practices. Tiki Tar's consummate engineering and stringent parameters render a product that's known for its impeccable quality and longevity. Tiki Tar Brand name is synonymous with Bitumen in India and is likely to remain so in future as well, embracing and fulfilling the aspirations of generations, transforming tomorrow.

No wonder we are proud of our company. As we rightly say, we are forever"revolutionizing bitumen".


INDUSTRIES
TIKI OXIDISED BITUMEN
WIRE CABLE
• TIKI CAB
ASPHALT ROADS, RUNWAYS, BRIDGES & HIGHWAYS
• TIKI BITUMEN VG10, VG30 & VG40
• TIKI CRMB (Crumb Rubber Modified Bitumen)
• TIKI PMB (Polymer Modified Bitumen)
• TIKI EMULSIFIED BITUMEN (Bitumen & Modified Bitumen Emulsion)
• TIKI CUTBACK
• TIKI ANTI STRIPPING AGENT
• TIKI ALFRESCO SEALER
• TIKI ez REPAIR PREMIX
• ASPHALTOSEAL
• STRESEAL



Bitumen
...uncommon course for communal contact

Without knowledge when humans are moving on Bitumen, they come in contact with each other. Tiki Tar Industries is working endlessly to evolve this key surface of connectivity, one of the most significant element supporting our contemporary living. We carry out undertakings of Bitumen in India. This social innovation par excellence is a base that fixes, smoothens, encourages and channels our communication.

Tiki Tar offers an unrivalled breadth of products and supports it with technically advanced services that can deliver a tailor-made solution wherever it is needed.

Passion for operational excellence.

Over 5 decades and still going strong. This has been made possible due to our infinite and boundless passion to achieve excellence that trickles down to the minutest of details.

With our unmatched scale and diversity, we benefit from the rich store house of Technical Know-How. This is deployed in a systematic manner to get the best out of every operation, every process, every function around the country. At Tiki Tar, we follow a systematic and holistic approach to processes. Our achievements are the result of unique customer insights and innovative products that target high value projects under strict deadlines.

We are proud of our accomplishment when eminent clientele like Indian Oil Corporation Limited and Bharat Petroleum Corporation Limited trust us to build and operate state-of-art plants from scratch. We have out performed any Bitumen company across India in terms of productivity and quality.

Looking Beyond Today Foreseeing Bitumen of Tomorrow

All Bitumen, All Grade, All Applications.

Innovation is at the very core of Tiki Tar. We constantly discover and evolve to streamline our products and services. Insisting on the best, we closely follow the global technological trends and accordingly devise cutting edge technologies and products. We are the only producer offering and developing full range of Bitumen products and services. Breadth of our product range and the diversity of our customers help insulate us from shifting demand patterns.

Wherever and however Bitumen can play a role, Tiki Tar Industries is there to provide skill, expertise and the quality to make a difference.

Accomplishing Expectations

A measure of our achievement is the trust and respect gained from our customers across the country. Over the years, we have managed to exceed expectations.

This has been possible through our continuous innovation and emphasis on excellence at any given point in time. Among the pioneers in the field of bituminous products, "Tiki" Brand products have captured a substantial share due to continuous emphasis on high quality and reliability. The Company boasts about its prestigious NABL Certified Laboratory and is accredited with key Certifications like ISO 9001-2008, ISO/IEC 17025:2005, Indian Road Congress (IRC), Central Road Research Institute (CRRI), and Ministry of Road Surface and Transport (MORT & H), Indian Institute of Technology (IIT), Indian Standards Institute (ISI), Bureau of Indian Standards (BIS), National Test House (NTH).

Research and development lies at the heart of Tiki Tar's strategy to lead innovation in the world of bitumen. We employ highly experienced researchers around India developing next generation Bitumen & solutions that transform the range of options open to our customers.

Vision

Tiki Tar is dedicated to excellence through competitive advantages from a comprehensive point-of-view concerning materials and technologies. We aspire to instill highest standards of business values and ethics through our commitment to safety, health and environment to enrich quality of life. Tiki Tar's vision is to continue developing superior products & technologies, while maintaining its position as the most innovative and quality oriented organization in the bitumen industry.

Our position as an industry leader demands no less.

Our Philosophy. Our Values. Our Mission.

Our mission is to provide the leadership that will transform the Indian Bitumen Industry. We know our position in Bitumen Industry brings us unique responsibilities. We are committed in creating globally recognized standards with the needs of future generations in mind. A future, underpinned by the consistent set of values.

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TIKI POLYMER AND RUBBER MODIFIED BITUMEN

(AS PER IRC:SP:53-2010 & IS:15462:2004) (ISI MARKED)

GENERAL

This invention relates to the process for the preparation of a Polymer and Rubber modified binder, which is useful for the construction of roads catering to heavy traffic and also for the formation of airfields surfacing, besides its use as binder for stress absorbing membrane (SAM) and stress absorbing membrane interlayer (SAMI) for sealing of cracks, preventive maintenance of flexible pavement and delaying reflective cracking. Modified bitumen performs better than ordinary bitumen in high rain fall area and in situations where the aggregates are prone to stripping.

Flexible pavements constitute major portion of existing road network and airfields in India. An extensive highway network with desired high speed corridors and air-fields constructed with long lasting pavement and overlays are felt essential. The growth of the economy of a country depends largely upon efficient transport system with minimal possible hindrance to road user due to frequent maintenance needs.

The quality and longevity of pavement as well as overlays and renewals must be, therefore restored in order to reduce road user cost and achieve road safety. Increased number of traffic loads with over loading in excess of permissible limits, higher tyre pressure have caused widespread problems with flexible pavement of National highways. The available VG grade bitumen produced at refineries are not suitable for high traffic intensity roads and airfield pavement due to extremely high tyre pressure of air-crafts. The statistics of various overlay / renewals performance suggested that useful life of bituminous overlay has declined from an average value of 8-10 years in the past to about 3-4 years in recent years.

Hence under the prevailing heavy traffic and extreme climatic conditions, conventional overlays, in general are not meeting durability requirement. The accelerated deterioration of flexible pavement overlays or renewals prematurely, burdens the maintenance budget and poses fund's constraints on using binders, which act as multigrade binders and also offer resistance to deformation and cracking. The binders should also enable the pavement to have longer fatigue life to resist the repeated application of high axle loads and prevent cracking or reflective cracking.

Research carried out on the available bitumens from Indian refineries indicated that these are not suitable for airfields catering to Boeing 747 class or A380 of aircraft. It is also well known that, if polymer in a small quantity when added to VG grade bitumen, result in a product, which has a fatigue life 10-18 times higher than conventional VG grade bitumen. TIKI Polymer & Rubber Modified Bitumen is also found to be capable to seal cracks effectively, when applied over extensively cracked flexible or rigid pavement. Plastomeric thermoplastic based modified bitumen are not considered suitable for SAM & SAMI.

Extensive road trials conducted by CRRI and elsewhere globally proved that life of road can be extended 50 to 100% times, resulting in enormous savings in pavement materials and funds.

Polymer and Rubber modified binder are classified as per type of mofifier as under:

	Type of Modifiers	Examples
Synthetic Polymers	Plastomeric Thermoplastics	Polyethylene (PE), Ethylene Vinyl Acetate (EVA), Ethylene Butyl Acrylate (EBA) & Ethylene Ter Polymer (ETP), etc.
	Elastomeric Thermoplastics	Styrene Isoprene Styrene (SIS), Styrene-Butadiene Styrene (SBS) Block Copolymer, etc.
Synthetic Rubbers	Synthetic Rubber Latex	Styrene-Butadiene Rubber (SBR) latex and any other Suitable synthetic Rubber
Other Rubbers	Natural Rubber	Latex or Rubber Powder
	Crumb rubber	Crumb Rubber Modifier

SPECIFIC ADVANTAGES

The specific improvements of TIKI POLYMER AND RUBBER MODIFIED BITUMEN produced by this new process are as under:

- **TIKI POLYMER AND RUBBER MODIFIED BITUMEN** improves resistance to cracking, resulting in stronger and more durable overlays for corridors in the areas of extreme climatic conditions and heavy traffic loads.
- It reduces deformation on road, this is specifically true at elevated temperature (50°C to 70°C), where rutting is excessive. It is achieved due to improved viscosity and elastic recovery of polymer and rubber based modified bitumen, compared to conventional bitumen.
- Promote binder adhesion and cohesion to mineral aggregates. The stripping level and ravelling of aggregates from surface are reduced and offer resistance to creep deformation.
- Low temperature brittleness properties of bitumen in pavement due to excessive ageing are improved as evident from improved ductility and elastic recovery values at low temperature.
- Polymer & Rubber based modified binder extend life of pavement by 50% to 100%, when compared to conventional bitumen overlays or renewal as proved by field trials.
- Polymer & Rubber based modified binders act as multigrade bitumen and are economical, when life cycle cost is taken into consideration.
- It can be used as membrane overlays for preventive maintenance of pavement.

Easy to Use:

Tiki Polymer and Rubber Modified Bitumen can be used in the construction, maintenance and renewal of roads, airfields and heliports in a manner similar to the existing hot mix process using the same manpower, tools and plant.

PRODUCT SPECIFICATIONS (as per IS:15462:2004)
PROPERTIES OF TIKI POLYMER AND RUBBER MODIFIED BITUMEN

Designation	Elastomeric Thermoplastic Based			Crumb Rubber Modified Binders			Method of tests
	PMB 120	PMB 70	PMB 40	CRMB 50	CRMB 55	CRMB 60	
Penetration, at 25°C, 100 g, 5 sec, in 1/100cm	90 to 150	50 to 90	30 to 50	< 70	< 60	< 50	IS: 1203-1978
Softening point,(R&B),°C,Minimum	50	55	60	50	55	60	IS: 1205-1978
Frass Breaking Point, °C, Maximum	-20	-16	-12	-	-	-	IS: 9381-1979
Flash Point by COC, °C, Minimum	220	220	220	220	220	220	IS: 1448 (P-69)
Elastic Recovery of Half Thread in Ductilometer at 15°C, %, Minimum	70	70	70	50	50	50	IS: 15462 Annex A
Separation Difference in Softening Point (R&B),°C,Maximum	3	3	3	4	4	4	IS: 15462 Annex B
Viscosity at 150 °C, Poise	1-3	2-6	3-9	1-3	2-6	3-9	IS: 1206 (P - I)
Thin Film Oven Test (TFOT) on Residue (IS:9382-1992)							
Loss in Mass % Maximum	1.0	1.0	1.0	1.0	1.0	1.0	IS : 9382-1992
Increase in softening point (R&B) °C Maximum	7	6	5	7	6	5	IS: 1205
Reduction in Penetration of Residue at 25°C % Maximum	35	35	35	40	40	40	IS: 1203
Elastic Recovery of Half thread in Ductilometer at 25°C % Min	50	50	50	35	35	35	IS: 15462 Annex A

PRODUCT SPECIFICATIONS (as per IRC:SP:53-2010)
PROPERTIES OF MODIFIED BITUMEN

*Relevant to snow bound cold climate area.
*We also manufacture Modified Bitumen as per IS: 15462:2004

Highest mean air temperature	**<20°C**	**20°C to 35°C**	**>35°C**	
Lowest mean air temperature	**< -10**	**-10 to 10**	**> 10**	
TEST PARAMETTERS	**SPECIFIED VALUES FOR THE BITUMEN**			**TEST METHOD**
Penetration, at 25°C, 100 g, 5 sec, in 1/100cm	60 to 120	50 to 80	30 to 50	IS: 1203
Softening point,(R&B),°C,Minimum	50	55	60*	IS: 1205
Frass Breaking Point, °C, Maximum	-20	-16	-12	IS: 9381
Flash Point by COC, °C, Minimum	220	220	220	IS: 1448 (P-69)
Elastic Recovery of Half Thread in Ductilometer at 15°C, %, Minimum	50	60	60	IRC:SP:53 Annex 2
Separation Difference in Softening Point (R&B),°C,Maximum	3	3	3	IRC:SP:53 Annex 3
Viscosity at 150 °C, Poise	1 - 3	3 - 6	5 - 9	IS: 1206 (P - 2)
Thin Film Oven Test (TFOT) on Residue (IS:9382-1992)				
Loss in Mass % Maximum	1.0	1.0	1.0	IS : 9382-1992
Increase in softening point (R&B) °C, Maximum	7	6	5	IS: 1205
Reduction in Penetration of Residue at 25°C, %, Maximum	35	35	35	IS: 1203
Elastic Recovery of Half thread in Ductilometer at 25°C, %, Minimum	35	50	50	IRC:SP:53 Annex 4

TIKI EMULSIFIED BITUMEN

(AS PER IS:8887:2004 & ASTM D2397)

Tiki Bitumen Emulsion is available as Anionic, Cationic and Nonionic types. Usually, it is the type of aggregate and climate that defines what type of Bitumen Emulsion should be used. Cationic Emulsion represents more than 95% of the world consumption today.

The technology for the emulsion chemistry and type of application equipment make it the most logical class of emulsion to use, especially in case of tropical countries and countries with extreme climatic conditions.

The application advantages of Cationic Bitumen Emulsion depend on coalescence of the Bitumen droplets when they contact aggregate or road surfaces. Such coalescence is called breaking. Emulsions are broadly classified according to the speed with which they break when contacted with aggregate.

Rapid Setting 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.

Medium Setting Emulsion (MS):
Break is sufficiently slow that the emulsion can be mixed with coarse aggregate containing a high proportion of fine material.

Slow Setting 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.

Technical Requirements of Bitumen Emulsion (Cationic Type) IS:8887:2004 (Clauses 4.2 and 6.2)

Sr. No.	Characteristics	Grade of Emulsion					Test
		RS-1	RS-2	MS	SS-1	SS-2	
1	2	3	4	5	6	7	8
1.	Residue on 600 micron IS sieve (Percent by mass) Max.	0.05	0.05	0.05	0.05	0.05	IS: 8887Annex B
2.	Viscosity by Saybolt Furol Viscometer, Second						
	(a) 25°C	-	-	-	20-100	30-150	IS: 3117
	(b)50°C	20-100	100-300	50-300	-	-	
3.	*1) Coagulation of Emulsion At low temperature	Nil	Nil	Nil	Nil	Nil	IS: 8887 Annex C
4.	Storage Stability after 24 hrs. Percent Max.	2	1	1	2	2	IS: 8887 Annex D
5.	Particle Charge	Positive	Positive	Positive	Weak	Positive	IS: 8887 Annex E
6.	Coating ability and water resistance						
	(a) Coating dry aggregate	-	-	Good	-	-	
	(b) Coating after spraying	-	-	Fair	-	-	IS: 8887 Annex F
	(c) Coating, wet aggregate	-	-	Fair	-	-	
	(d) Coating after spraying	-	-	Fair	-	-	
7.	Stability to mixing with cement (percentage coagulation) Max.	-	-	-	2	2	IS: 8887 Annex G
8.	Miscibility with water	No coagulation	No coagulation	No coagulation	-	No coagulation	IS: 8887 Annex H
9.	**Tests on residue:**						
	(a) Residue by evaporation percent Min.	60	67	65	50	60	S: 8887 Annex J
	(b) Penetration 25°C/100g/5 sec/1/10mm.	80-150	80-150	60-150	60-350	60-120	IS: 1203
	(c) Ductility 25°C/cm Min.	50	50	50	50	50	IS: 1208
	(d) Solubility in trichloroethylene Min.%	98	98	98	98	98	IS: 1216
10.	Distillation percent, by volume at:						
	(1) 190°C	-	-	-	20-55	-	
	(2) 225°C	-	-	-	30-75	-	
	(3) 260°C	-	-	-	40-90	-	
	(4) 315°C	-	-	-	60-100	-	
11.	Water content, percent by mass, Max	-	-	-	20		

*1) The requirement shall be applicable only under situations where the ambient temperature is below 15°C

GUIDELINES FOR SELECTION OF EMULSION TYPE

APPLICATION	RAPID SETTING	MEDIUM SETTING	SLOW SETTING
PENETRATION MACADAM		✓	
PRIME COAT		✓	✓
TACK COAT	✓		
SLURRY SEAL		✓	✓
FOG SEAL			✓
SOIL STABILISATION		✓	✓
SURFACE DRESSING	✓		
DUST BINDING			✓
CRACK FILLER			✓
COLD MIX		✓	✓
MULCH TREATMENT			✓

Technical Requirements of Bitumen Emulsion (Cationic Type) ASTM D 2397

Sr. No.	Test Parameters	Grade of Emulsion					
		CRS-1	CRS-2	CMS-2	CMS-2h	CSS-1	CSS-1h
1.	Viscosity by Saybolt Furol Viscometer, Second						
	(a) 25°C	-	-	-	-	20-100	20-100
	(b)50°C	20-100	100-400	50-450	50-450	-	-
2.	Storage Stability after 24 hrs. Percent Max.	1	1	1	1	1	1
3.	Particle Charge	Positive	Positive	Positive	Positive	Positive	Positive
4.	Sieve Test, %, Max.	0.10	0.10	0.10	0.10	0.10	0.10
5.	Cement Mixing Test, %, Max.	-	-	-	-	2.0	2.0
6.	Coating ability and water resistance						
	(a) Coating dry aggregate	-	-	Good	Good	-	-
	(b) Coating after spraying	-	-	Fair	Fair	-	-
	(c) Coating, wet aggregate	-	-	Fair	Fair	-	-
	(d) Coating after spraying	-	-	Fair	Fair	-	-
7.	**Tests on residue:**						
	(a) Penetration 25°C/100g/5 sec /dmm	100-250	100-250	100-250	40-90	100-250	40-90
	(b) Ductility 25°C/cm Min.	40	40	40	40	40	40
	(c) Solubility in trichloroethylene Min.%	97.5	97.5	97.5	97.5	97.5	97.5
8.	Distillation						
	1) Oil distillate by volume of emulsion, %, Max.	03	03	12	12	-	-
	2) Residue , %,Min.	60	65	65	65	57	57

PRECAUTIONS WHILE USING TIKI BITUMEN EMULSION

We suggest following precautions while using Tiki Bitumen Emulsion to get best result from the product.

1. Stir drum should be rolled four to five times.
2. Emulsion should not be stirred with wood or steel rods.
3. Both the aggregate and the surface to be laid should be dust free.
4. Barrel should not be kept open for longer period.
5. Emulsion should be used before its shelf-life period.
6. Emulsion should not be stored below 5°C.
7. Emulsion should be used when the ambient temperature is >5°C.
8. Emulsion should not be heated above 85°C.
9. The tack coat must be left to cure until all the volatile has evaporated before any subsequent construction is started.
10. No plant or vehicles should be allowed on the tack coat, other than those essentials for the construction.

TIKI MICRO SURFACING EMULSIONS

(POLYMER MODIFIED BITUMEN EMULSION as per MORT & H 2013, CLAUSE 514.3.1)

The humble chip seal and other road surface treatments that use bitumen emulsions are being taken to new heights by a variety of modifiers that enhance performance, albeit at a higher price.

Thus polymer-modified bitumen emulsions can improve performance to the point that with the right design, they can challenge hot-mix bitumen as an overlay option for high-level, high-traffic pavements.

Polymer modifiers are extremely common as binder modifiers because they enhance aggregate/binder bonding and other benefits. The tradeoff is a higher quality, typically about 40% over non-modified emulsions.

Polymer modifiers are taking the chip seal well beyond its classic application on low-volume roads. For example, polymer modification allows the use of emulsions in new, robust applications such as microsurfacing, ultrathin bonded wearing course, and macrosurfacing.

One of the most versatile tools in the road maintenance arsenal, Microsurfacing is a polymer-modified cold-mix paving system that can remedy a broad range of problems on today's streets, highways, and airfields. Microsurfacing has added capabilities, thanks to the use of high-quality, carefully monitored materials, including advanced polymers and other modern additives.

PRODUCT SPECIFICATIONS (as per MORT & H 2013 CLAUSE 514.3.1)

Requirements	Specifications	Test Method
Residue on 600 µm IS sieve (percent by mass), maximum	0.05	IS: 8887
Viscosity by Say bolt Furol Viscometer, at 25°C, in second	20-100	IS: 8887
Coagulation of emulsion at low temperature	Nil	IS: 8887
Storage stability after 24 h (168 h), % maximum	2(4)	IS: 8887
Particle charge, + ve/-ve	+ve	IS: 8887
TEST ON RESIDUE		
a) Residue by evaporation, % minimum	60	IS: 8887
b) Penetration at 25°C/100 g/5 sec/dmm	40-100	IS: 1203
c) Ductility at 27°C, cm, minimum	50	IS: 1208
d) Softening point, in °C, minimum	57	IS: 1205
e) Elastic recovery*, %, minimum	50	IS: 15462
f) Solubility in tri-chloroethylene, % minimum	97	IS: 1216

* In case, elastic recovery is tested for Torsional Elasticity Recovery as per Appendix-8 of IRC 81, the minimum value shall be 20%.

Micro Surfacing

Chip Seal

TIKI BITUMEN VG40

(VISCOSITY GRADE PAVING BITUMEN as per IS:73/2013)

TIKI Bitumen VG40, Viscosity Grade Paving Bitumen is manufactured under controlled process conditions to obtain the desired optimum balance of the bituminous components producing higher viscosity and stiffer bitumen, which provides utmost resistance to cracking (at lowest pavement temperature) and rutting (at maximum pavement temperature).

TIKI Bitumen VG40 when used in the manufacture of hot bituminous mix for bases and wearing courses, it produces cohesive mix suitable for heavy traffic road, airport runway and taxiway, etc., enhancing the pavement performance and extending its durability. The benefits derived includes:

- Enhanced resistance to fatigue at normal operating temperatures
- Improved resistance to shoving
- High resistance to rutting under heavy traffic loads and hot summer
- High resistance to cracking under cold winter conditions
- High resistance to susceptibility to low and high temperatures
- Higher traffic bearing capacity

PRODUCT SPECIFICATIONS (as per IS:73/2013)

Properties	Unit	Min	Max	Test Method
Flash Point Temperature	°C	220	-	IS 1448 (P-69)
Absolute Viscosity at 60°C	Poises	3200	4800	IS 1206 (Part2)
Kinematic Viscosity at 135 °C	Cst	400	-	IS 1206 (Part3)
Solubility in Trichloroethylene	%	99	-	IS 1216
R & B Softening Point	°C	50	-	IS 1205 : 1978
Penetration @ 25°C, 100g, 5 sec	dmm	35	-	IS 1203 : 1978
ROLLING THIN FILM OVER RESIDUE				
Viscosity Ratio @ 60 °C	-	-	4	IS 1206 (Part2)
Ductility @25°C	cm	25	-	IS 1208 : 1978

PROPERTIES OF VARIOUS GRADES OF PAVING BITUMEN (as per IS:73/2013)

Test Parameters	VG-10	VG-20	VG-30	VG-40
Absolute Viscosity at 60 °C, Poises.	800-1200	1600-2400	2400-3600	3200-4800
Kinematic Viscosity at 135 °C, cSt, Min.	250	300	350	400
Flash Point (COC) °C, Min.	220	220	220	220
Solubility in Trichloroethylene, %, Min.	99.0	99.0	99.0	99.0
Penetration at 25 °C, 100gm, 5 sec, dmm,Min.	80	60	45	35
Softening Point (R&B), °C, Min	40	45	47	50
THIN FILM OVEN TEST ON RESIDUE				
Viscosity Ratio at 60 °C, Max.	4.0	4.0	4.0	4.0
Ductility at 25 °C, cm, after thin film oven test Min.	75	50	40	25

TIKI BITUMEN 10/20

(FOR MASTIC ASPHALT as per MORT & H 2013, Table 500-3g)

TIKI Bitumen 10/20 is hard paving grade bitumen with low penetration values especially suitable for the production of impervious mastic asphalt.

AREAS OF APPLICATION

It is mainly used in the manufacture of hot mix asphalt for bases and wearing courses both on flexible and on concrete surface (generally on bridge and concrete decks).

It is widely suitable for use in pipe coating, manufacture of roofing felts, damp-proof course, sealant (e.g. battery), electric cable protection, joint filling compounds and many other applications of benefit.

It is used in the flooring of industrial buildings, warehouses, grain storage structures and various other special floorings.

It is used as a base coat to receive floor coverings like linoleum, flexible PVC sheets and rubber sheet.

TIKI Bitumen 10/20 contributes to following technical advantages when used in production of mastic asphalt

- Durability
- Water Resistant
- Bleed Prevention
- Vibration & Shock Absorbing
- Low and Easy Maintenance
- Chemical Stability
- Void Free Dense Matrix
- Enhanced Wear Resistance
- Increased Resistance to Rutting (Deformation)

PRODUCT SPECIFICATIONS (as per MORT & H 2013, Table 500-3g, Page no. 225.)

Test Parameters	Requirements	Test Method
Softening Point (R &B) °C	65 ± 10	IS: 1205
Penetration at 25 °C, 100gm, 5sec, dmm	15 ± 5*	IS: 1203
Ash Content (Mineral Matter), % by Mass, Max.	1.0	IS: 1217
Loss on Heating for 5h at 163°C, % by Mass, Max.	2.0	IS: 1212
Solubility in Trichloroethylene, % by Mass , Min.	95	IS: 1216

*In cold climatic regions VG40 grade bitumen may be used

TIKI Bitumen 10/20 shall be broken up into small pieces and heated gradually to the desired application temperature ensuring that the temperature during heating should not exceed 240°C and mixed with other ingredients at required dosage as per the specific job requirement.

STRESEAL®

(STRESS ABSORBING PAD INTERLAYER SYSTEM FOR RETARDING REFLECTIVE CRACKING IN ASPHALT OVERLAYS)

"Carries Accreditation Certificate from Indian Roads Congress"

Reflective cracking in the road surface is a major problem. It reduces the design life and efficacy of the road transport system increasing the ultimate cost on maintenance and reconstruction. Reflective cracks destroy surface continuity, decrease structural strength, and allow water to enter sub-layers, thereby weakening the road structure.

Reflective cracks in road paving cause rainwater to pass through into the unbound layers of foundation, leading to the pumping effect and subsequently progressive collapse. Simple repairs by applying additional new layer of asphalt is rarely a lasting solution.

To delay the occurrence of reflective cracking and extend the effective lifetime of the road paving, **STRESEAL** is specifically designed for use as interlayer system to reinforce the bound layers and increase resistance to thermally and traffic induced stresses and at the same time to act as a watertight barrier preventing passage of water through in to the unbound layers.

STRESEAL is laid on to the cracked surfacing after thorough repairs and are than overlaid with asphalt concrete.

STRESEAL acts as stress absorbing interlayer at the bottom of new overlay and reduces tensile stresses in the new pavement originating from the cracks in old pavement. This reduction prolongs the time required for the cracks to reflect on the surface.

STRESEAL also prevents pavement deterioration due to capillary water rise through the sub grade base found beneath the pavement.

With **STRESEAL** two engineering principles are accomplished - "Stress Relief" and "Water Tight Barrier".

USES

- To delay, control and reduce occurrence of reflective cracking in asphalt pavement overlays.

AREAS OF APPLICATIONS

- Highways and Motorways
- Airport Runways and Taxiways
- Streets and Roadways
- Parking Areas and Carriageways
- Toll Plazas and Car Parks
- Container Port Terminals

BENEFICIAL FEATURES

- Significantly inhibits and reduces reflective cracking in asphalt overlays.
- Improves ride comfort by delaying deterioration of asphalt overlays due to reflective cracking.
- Reduces the traffic induced strain in pavement underlay.
- Seals pavement underlays thereby preventing infiltration of water through cracked overlay in to pavement underlays.
- Suitable for year round application on both concrete and asphalt surfaces.
- High stress absorbing characteristic coupled with robust physical barrier to water infiltration maintains structural integrity of road structure.
- Protects asphalt overlay from damage due to capillary rise of ground water through sub grade and underlays.
- Absorbs and dissipates stresses induced in cracked underlay thereby inhibiting progress of differential stresses between underlay & new overlay
- High crack bridging and tensile strength limits crack severity and reduces its number.
- Reduces the pumping effect due to water infiltration through surface cracks.
- Quick and easy installation process without the need for sophisticated equipment and machinery saves construction time.
- Inhibits transmission of cracks
- Reduces repair and maintenance cost.

ASPHALTOSEAL®

(SPECIALLY DESIGNED FOR BRIDGE DECK)

"Carries Accreditation Certificate from Indian Roads Congress"

ASPHALTOSEAL is 3mm heavy duty machine compacted polymeric composite mastic pad specially designed for Bridge Deck Waterproofing in lieu of Mastic Asphalt under AC / BC / DBM overlay. It is delivered in rolls of 1M X 10M size.

ASPHALTOSEAL enhances the adhesion of concrete bridge deck substrate with the AC / BC / DBM that follows above it

AREAS OF APPLICATIONS

ASPHALTOSEAL is used to provide total impermeability to concrete structures utilizing Asphaltic Wearing Course, such as

- Bridges
- Elevated Roadways
- Rail over Bridges
- Viaducts
- Subways

BENEFICIAL FEATURES

- Value engineering system
- Protects concrete deck from ingress of water, corrosive salts and aggressive chemicals, thus preventing corrosion of steel reinforcing bars and structural damage
- High stress absorbing and crack bridging characteristic
- Good adhesion to concrete deck and asphalt surfacing.
- Exhibits better fatigue resistance in relation to traffic load
- Superior performance with uniform thickness and quality
- Zero maintenance and high durability ensures lower life cycle cost
- No curing period required – works can be continued without waiting period
- Unlike mastic asphalt, pre-fabricated **ASPHALTOSEAL** eases application resulting in neat operation, free of cooking fumes, pollution

APPLICATION

The general application steps are as follows:

- The bridge deck needs to be thoroughly cleaned free of dust and foreign particles.
- A coat of **TIKI PRIMER** is applied. For reasons of compatibility, **TIKI PRIMER** is supplied along with **ASPHALTOSEAL.**
- On primer drying, **ASPHALTOSEAL** is installed using Torch-On method.
- No Tack Coat is recommended prior to laying of AC / BC / DBM.
- Paving can commence as soon as **ASPHALTOSEAL** cools down.

ASPHALTOSEAL after installation does not require special protection board during paving operations, as it can withstand temporary slow traffic from site vehicles equipped with rubber tires or rubber tracks (surfacing machine), but it should be protected from damages from mechanical abuses of metallic objects, tools and aggregates

TIKI ALFRESCO SEALER (SPECIAL GRADE)

(TIKI COLD EMULSIFIED BITUMEN)

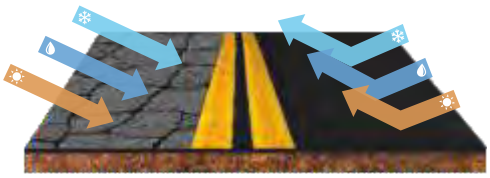
TIKI COLD EMULSIFIED BITUMEN ALFRESCO SEALER (SPECIAL GRADE) is specially formulated bituminous emulsion for maintaining the weathered airfield flexible pavements, which have been deteriorated due to oxidation and penetration of water during its service. This rejuvenation method is quick and cost effective means of prolonging the lifetime of the airfield flexible pavement.

ALFRESCO SEALER, owing to its unique chemistry, high quality components, and low viscosity, on application, it gets readily drawn into the air permeable voids of asphalt pavement surface, thereby sealing and rejuvenating the asphalt binder.

ALFRESCO SEALER does not reduce the PCN (Pavement Classification Number – Runway Strength Rating and Load Control System) of runway nor does it alter the textured depth of the airfield asphalt pavement, ensuring good frictional characteristics.

USES

- To prevent generation of asphalt based foreign object debris (FOD).
- To rejuvenate and protect pavement binder from further oxidation.
- To seal pavement surface against water ingress.
- To extend pavement life through timely preventive maintenance.
- To repair pavement exhibiting signs of minor segregation or ravelling.
- To seal age cracking, roller cracking and block cracking (<3mm) in aged pavement.



Embrittlement, cracking and water ingress in airfield pavement due to asphalt oxidation

ALFRESCO SEALER preservation of airfield pavement

AREAS OF APPLICATION

ALFRESCO SEALER is recommended for use on un-grooved and grooved* airfield pavements, which include:

- Runways
- Shoulder Pavements
- Parking Areas
- Taxiways
- Servicing Aprons
- Heliports

*Application on grooved surfaces should be trialled, with multiple passes at low rates, and / or brooming (parallel to the grooves), to avoid filling of grooves with **ALFRESCO SEALER.**

TECHNICAL SPECIFICATION

S.No.	Parameter	Value	Standard
01.	Colour	Chocolate Brown	-
02.	Saybolt Furol Viscosity @ 25°C, seconds, minimum	20	IS: 3117
03.	Particle Charge	Non-Ionic	IS: 8887
04.	Miscibility with Distilled Water	Miscible	IS: 8887
	TEST ON RESIDUE		
a)	Softening Point, °C, minimum	70	IS: 1205
b)	Penetration @ 25°C/ 5 second / 100gm, dmm, minimum	20	IS; 1203
c)	Ductility @ 25°C, cm, minimum	3	IS: 1208
d)	Solubility in Carbon-Di-Sulphide, minimum	99%	IS: 1216

BENEFICIAL FEATURES

- Mitigates generation of asphalt related "Foreign Object Debris" (FOD).
- Penetrates and seals airfield asphalt pavement surface against intrusion of air and water.
- Reduces the rate of environmental degradation of airfield flexible pavement – increases durability
- No de-bonding / peeling off under the action of high shear forces from breaking / acceleration of aircraft.
- Binds loose aggregates and oxidised asphalt in pavement completely.
- Improves resistance to transverse and block cracking and ravelling.
- Reduces non-load related pavement distresses.
- Prevents binder-aggregate stripping.

TIKI EXJO FILLER

(COMPRESSIBLE RESILIENT NON-EXTRUDIBLE JOINT FILLER BOARD as per IS:1838:PART I:1983 - ISI MARKED)

Engineers & Architects the world over are in accordance that because of seasonal variation in temperature, provision must be made to accommodate the expansion and contraction that invariably occurs in concrete structures such as construction of runways, roads and long span building. Therefore to maintain the evenness of the surface and prevent it from cracking, correct Joint Filling and Sealing Compound should be used so as to extend the life of these constructions.

Expansion Joints are thus provided at designed intervals both transversely and longitudinally 18mm or 25mm width between butting slabs of reinforced concrete.

EXPANSION JOINTS & ITS FUNCTIONS

- Prevents cracking of concrete slabs during expansion.
- Projects the subgrade by providing a water-tight seal thereby preventing infiltration of surface water.
- Resists entry of foreign matter and maintains free movement of the slabs thus preventing damage to slabs.

TIKI EXJO FILLER and **TIKI SEALING COMPOUND** fulfil these functions admirably.

TIKI EXJO FILLER is a pre-moulded fibre board impregnated with bituminous materials to render it durable and rot proof. It is easily compressible and recovers nearly to its original thickness after compression is released.

AREAS OF APPLICATION

- Concrete traffic surfaces like Runways, Highways, Driveways, Aprons, Streets and other areas.
- Concrete structures like Retaining walls, Abutments, Piers, etc.

BENEFICIAL FEATURES

- Environmental friendly as opposed to Thermocol / Synthetic plastic filler board
- Low moisture absorption due to Bitumen impregnation
- Good resistence to thermal cycles
- Good bond development with poured concrete
- High recovery and Low extrusion

TIKI EXJO FILLER is available in thicknesses of 12mm, 18mm and 25mm & in dimensions of 1.22m x 1.22m.

This joint filler board is specified 25mm less in height than the slab thickness and preformed gap is primed with **TIKI PRIMER** and subsequently filled with **TIKI SEALING COMPOUND** to close the joint against hydrostatic pressure.

TIKI SEALING COMPOUND

(HOT APPLIED SEALING COMPOUNDS FOR SEALING JOINTS IN CONCRETE as per IS:1834 / 1984 - ISI MARKED)

The important properties required in sealing compounds are that it can be applied without difficulty, are not unduly affected by temperatures variation, adhere strongly to the concrete, and resist any tendency to flow out of the joint under hot weather conditions or loss of resiliency during cold weather conditions.

AREAS OF APPLICATIONS

TIKI SEALING COMPOUND is intended for use in sealing joints in concrete roads, runways, bridges and other concrete structures.

INSTRUCTIONS FOR USE OF TIKI SEALING COMPOUND

Sealing compounds shall be employed for filling contraction and construction joints as well as a sealing medium above expansion joints fillers to a depth not exceeding 40mm.

TIKI PRIMER should be applied to the vertical faces of the concrete joint before pouring sealing compound. **TIKI SEALING COMPOUND** must be heated before use & it should not be heated directly. (The supplied 20kg drums should never be placed over direct heat i.e. gas or wood fire). Cut the 20 Kg. drum of **TIKI SEALING COMPOUND** in to small pieces before placing in the directly heated separate container. Melt a few pieces of **TIKI SEALING COMPOUND**, then gradually add more pieces to the molten sealant material, stirring continuously. Heat until the compound reaches correct pouring Temperature (175^0 C to 185^0 C).Only melt enough sealing compound to be poured the same day.

A 20 kg drum of **TIKI SEALING COMPOUND** will take 2-3 hrs. at 175°C to 185°C for complete melting under gradual stirring.If for any reason bubble (frothing) appears during melting, keep the temperature around 180°C for longer time with slow manual stirring till the bubble disappears. Care should be taken to see that the temperature in the heater is carefully controlled within the recommended pouring Temperature.

Do not over heat **TIKI SEALING COMPOUND** beyond the recommended pouring Temperature (175°C to 185°C), as it would result in the degradation of elastic properties of Sealing Compound. Do not heat **TIKI SEALING COMPOUND** beyond 200°C, as it will not only destroy the sealant's properties but may also result in a fire / blast.

Use sealing compound as soon as possible after heating, preferably within 1 to 2 hours. DO NOT allow water to contact hot material, as it will react violently and splatter the hot compound causing severe burns. DO NOT exceed maximum safe heating temperature (175^0C to 185^0C)

GRADES

This standard covers two grades of sealing compounds:
a) GRADE A (Ordinary) b) GRADE B (Fuel Resistant)

Grade A is suitable for use in concrete constructions other than those which are subjected to spillage of kerosene or other petroleum oils.

Grade B is suitable for use in construction where resistance to kerosene or other petroleum oil is required.

COVERING CAPACITY

Covering capacity estimation guide for joint Sealing Compounds required per 100 meters running in kg. of 25mm depth is as under:-
12mm - 40 kg.
18mm - 60 kg.
25mm - 80 kg.
Consider 5% wastage during application.
Primer coverage approx 0.9 ltrs. per 100 running meters for 25mm depth of joints.

TIKI ezREPAIR PRE-MIX

(QUICK SETTING COLD APPLIED ASPHALT REPAIR COMPOUND)

TIKI ezREPAIR PRE-MIX is ready to use fast setting cold applied tough and durable high performance pavement repair material. It is specifically manufactured from a mixture of graded aggregates coated with a blend of modified bitumen. It displaces water and enhances bond formation with old asphalt / concrete under wet conditions and improves adhesion properties of the binder during its service life.

The aggregate grading ensures optimal aggregate interlock after placement and hence good resistance to deformation under traffic.

USES

- To carry maintenance activities such as pothole repairs, trench repair, asphalt patching, core hole infill, utility cuts repair and other pavement repair applications in areas such as railroad crossings, vehicle parking, service drives.
- To carry repair of damaged asphalt around manhole cover, water valve, water drains etc.

ADVANTAGES

- Fast setting and cost effective pavement repair system
- Pre-mixed – ease of application and less labor requirement
- Good adhesion to asphalt and concrete surfaces, both dry and wet
- Quick re-opening of traffic and high resistance to traffic loads
- Durable performance under cyclic movements and thermal cycles
- Excellent workability
- No heating required – Environ friendly – Saves fuel and energy

PROPERTIES

• **COLOR**	Black
• **WORKING TIME**	15 to 30 minutes
• **SETTING TIME**	30 to 60 minutes
• **TRAFFIC**	Within 2 hours
• **COVERAGE PER 25 KG. BAG (Trench Filling)**	5 meter to 6 meter length at 25mm depth and 50mm Width
• **CONSUMPTION (Pothole Repair)**	75 kg. to 90 kg. to repair 1 m^2 of pothole to 25 mm depth

APPLICATION INSTRUCTION

After thorough surface preparation, place **TIKI ezREPAIR PRE-MIX** directly from the bag in to the prepared repair area, spread with shovel and compact to required thickness in minimum 25mm thick layers.

Always apply a small crown to repair area to allow for additional compaction.

TIKI ANTISTRIPPING AGENT

(AS PER IS:14982/2001 & MORT & H 2013 REF. 509.2.4)

The adhesion between bitumen binder and aggregate is an important factor for the stability and durable performance of bituminous pavements to its design life. The stripping due to wet aggregate, moisture or water damage in bituminous pavement is a common phenomenon, resulting in early distress and failure in pavement.

The stripping problem in bituminous pavements can be prevented most effectively and economically by the use of **TIKI ANTI-STRIPPING AGENT**, an adhesion promoter for bitumen binder.

Method of use:
TIKI ANTI-STRIPPING AGENT at calculated dosage is added to hot bitumen binder. The modified hot bitumen binder than would be used directly in hot mix applications or are further processed to produce emulsions, cutbacks, formulations etc., for cold mix applications.

Dosage:
The optimum dosage of **TIKI ANTI-STRIPPING AGENT** should be calculated in the field laboratory before starting the work and it ranges from 0.50% to 1.0% by weight of bitumen binder in the mix

TECHNICAL SPECIFICATION

S.no.	Test parameters	Requirement
1	Appearance	Liquid/solid
2	Odour	Agreeable
3	Pour Point in °C	Max. 42
4	Specific Gravity @ 27 °C in gm/ml	0.86 to 1.03
5	Water Content % by Volume	Max. 1.0
6	Solubility in Diesel Oil (HDO & LDO) in 2:98 Ratio @ 50 °C	Completely soluble
7	Stripping Value with Bitumen containing 1% Anti-Stripping Agent @ 40 °C, 24 hrs.	No stripping
8	Under Water Coating Test	Complete coating
9	Thermal Stability @163 °C, 5 hrs.	No appreciable change in efficacy
10	Nitrogen content % by Weight	Min. 7
11	Boiling Water Test % min. Coating	95
12	Flash Point, COC in °C	Min. 150
13	Total Base Value mg KOH/gm	Min.200

TIKI CUTBACK

(BITUMEN PRIMER as per IS:217 & IRC:16)

TIKI CUTBACK BITUMEN is a low viscosity, cold applied bituminous primer. Cutback Bitumen is produced by fluxing bitumen with distillates of petroleum for use in road construction. A bituminous prime coat is an initial application of low viscosity liquid material to an absorbent surface preparatory to any super-imposed treatment or construction. The object of priming is to promote adhesion between the existing surface and the super-imposed treatment or construction.

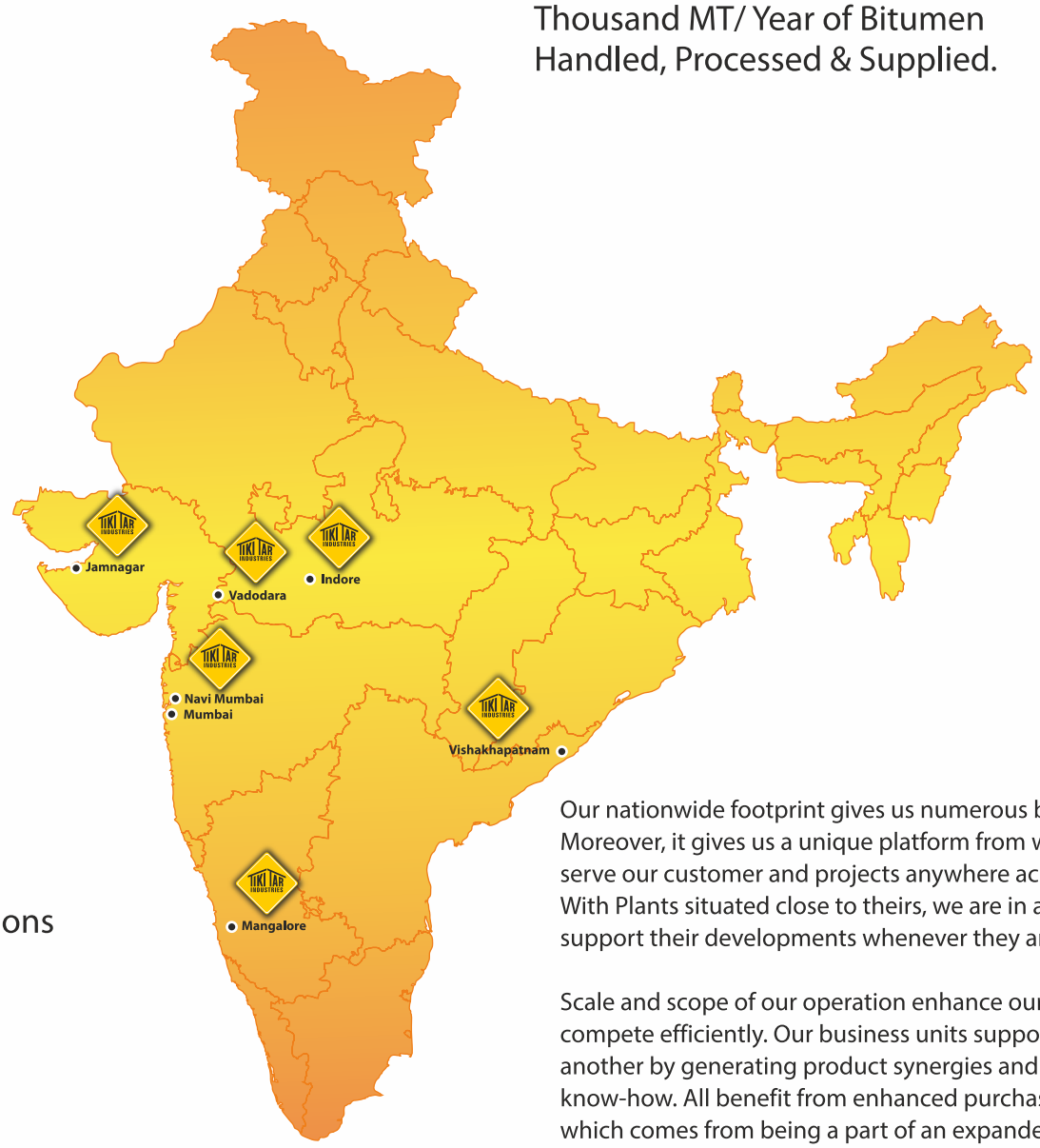
The choice of a bituminous primer shall depend upon the porosity characteristics of the surface to be primed. Cutback bitumen Primer is classified into rapid curing (RC), Medium Curing (MC) & Slow Curing (SC) based on viscosity.

Preparation Of Road Surface: The surface to be primed shall be swept clean, free from dust and for best results to be dry. Potholes, depressions, large irregularities, etc. shall be repaired prior to priming. Minor depressions and holes may be ignored until after the surface is primed, after which they should be patched with suitable premixed material prior to the surface treatment. Traffic shall be kept off the prepared area prior to priming.

Recommended Use: TIKI CUTBACK BITUMEN as primer shall be sprayed uniformly over the dry surface at the rate of 0.75kg to 1.5 kg. per sq. mtr., depending on surface porosity, preferably using mechanical sprayers. Application temperature of primer need only be enough to permit the primer to be sprayed effectively through the jets of the sprayer and to cover the road surface effectively. Generally it may vary from 40 to 80°C for the range of viscosities of the primer. Any pools of excess primer left on any part of the surface shall be swept out over the adjacent surface, and then a light spreading of sand shall be applied. The primed surface shall be allowed to cure for not less than 24 hours. During this period traffic shall be kept off of the primed surface.

CLIENTELE LIST

250
Thousand MT/ Year of Bitumen
Handled, Processed & Supplied.



7
Locations

Our nationwide footprint gives us numerous benefits. Moreover, it gives us a unique platform from which we serve our customer and projects anywhere across India. With Plants situated close to theirs, we are in a position to support their developments whenever they arise.

Scale and scope of our operation enhance our ability to compete efficiently. Our business units support one another by generating product synergies and sharing know-how. All benefit from enhanced purchasing power which comes from being a part of an expanded group. All share the fruits of our continuous investments in our research and product development.

Allied to our product breadth, our national presence gives us unrivalled capacity to deliver what our customers require.

TIKI TAR INDUSTRIES

Since 1964

TIKI TAR INDUSTRIES (BARODA) LIMITED

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ISO 17025 : 2005 ISO 9001 : 2008

TIKI TECH