



EMULSION | MODIFIED BITUMEN

GIVES STRENGTH

About GRIL

Incepted in the year 1965 under the worthy and constructive guidance and support of Shri Gumani Ram Agarwal, GR Infraprojects Ltd. has successfully emerged and established itself as one of the top leading organizations in Infrastructure segment and Road Manufacturing. Spanned across multiple segments namely, Roads and Highway Development, Airport Construction, Housing, Metal Crash Barrier, PMB/Emulsion and Road Sign Manufacturing, GRIL is all set to expand its Polymer Bitumen Emulsion/ PMB and CRMB division by setting up its second plant in Guwahati. Post success of its first plant in Udaipur, GRIL is keen on extending its reachability PAN India and Overseas.

Promoted, managed and operated by skilled, experienced, knowledgeable and successful professionals, GRIL is focused towards achieving "No Compromising on Safety" mantra. With unconstrained expertise and competence, GRIL has succeeded in establishing COLD ROLL FORMING TECHNOLOGY. Being one of the pioneers in the road manufacturing and construction industry, GRIL has gradually expanded and set up different verticals for producing, manufacturing and supplying Metal Crash Barrier, Bitumen Emulsion, Polymer Modified Bitumen (PMB)/CRMB and Road signs.

Equipped with sturdy and robust manufacturing plants in India, GRIL has succeeded in establishing its very own world class Polymer Bitumen Emulsion/PMB/CRMB manufacturing plant in Udaipur, Rajasthan. With prime and major focus on quality and safety, our manufacturing plants create, produce and supply products with quality make and finish. Our Bitumen Emulsion plant is well equipped with self-reliant functionalities. It produces quality conscious material from all grades of Bitumen Emulsion, PMB/CRMB for road safety and several other construction companies.

With our state of the art technological resources and expertise, GRIL focuses and ensures to abide and adhere to quality standards and safety measures. We consider ourselves responsible towards safeguarding lives by producing and manufacturing high on quality products under one roof. With ample resources, manpower and machineries, we are capable of manufacturing monthly capacity of 2000 tons of steel. Accredited with ISO – 9001 certification, GRIL possesses superior, preeminent and excellent equipments meeting every requisite.



Vision

To leave Indian footprints in global infrastructure industry backed by world class performance and operational excellence

To build its position among the most admired infrastructure companies in India and become the best in class service provider globally

Mission

- Maintain high standards of precision, quality and punctuality
- Displaying technical soundness and construction effectiveness in all our deliverables
- Preserving nature and enriching life of public at large
- Setting new benchmarks of resource utilization and efficiency
- Creating value for stakeholders



Values

- Business Ethics and Integrity
- Respect time value and expectation of all associates
- Empowerment of Human Resources
- Agile Work Culture
- Building trustworthy relationship with customers, stakeholders and society

Strengths

- One of the pioneers in manufacturing and commissioning engineering products and services and infrastructural set up.
- Backward integration of resources: self owned dedicated in-house manufacturing plants with world class technology.
- Manpower as an Asset – Our employees at GRIL possess rich experience, knowledge and on site expertise in commissioning and implementation.
- Safety and Quality is our prime religion – We develop and deliver products ensuring a healthy and safe experience to our customers.
- Servicing our clients with integrity, innovation, focus, customer services and safety oriented products for meeting construction, engineering and infrastructural needs.
- Customized business solutions for products and services.

PMB

Polymer Modified Bitumen

An additional requisite to bitumen and a contributing agent for road sustainability, PMB which is better known as Polymer Modified Bitumen showcases brilliance and efficiency in road construction, development and maintenance. PMB is formed by compiling polymer and rubber made modified binder for roads that are exclusively developed for easy and regular transportation of heavy traffic namely, trucks, carriers, aircrafts, etc... The unique qualities of rigidity, resistance, crack repellent, water resistance, heat resistance and durability makes PMB an ideal product in road development. The layering of PMB improvises road resistance towards cracking, turbulence, pressure and weight that is caused due to heavy vehicles.

Application of PMB

1. Sturdy, dynamic and strong road development, construction and maintenance for sustaining heavy vehicular movement and high volume of traffic
2. Binding layer in sealing cracks of stressed pavements
3. High loading Runway for airfield, airplanes, fighter jets, etc.
4. Roads experiencing higher amplitude in temperature levels



CRMB

Crumb Rubber Modified Bitumen:

A superior and resistant emulsifier, Crumb Rubber Modified Bitumen (CRMB) emerges to be an idealistic product for development, construction and maintenance of Indian Roads. An affordable, durable and long lasting solution, CRMB can address to different issues namely, rutting, undulations, raveling, potholes, cracking, bleeding, etc... of roads. The manufacturing process of CRMB includes crumb rubber, resins, hydrocarbon materials, natural asphalt, rubber latex, etc... that are de-vulcanized partially and mechanically treated by chemicals. Crumb Rubber Modified Bitumen performs exceptionally well in showcasing superior flexibility, stability and resistance towards extreme weather conditions, permanent deformation, low and high temperature cracking, etc.

Application of CRMB

1. Road construction, development and maintenance
2. Highways, Junctions, Traffic denser roads, Airfield Runways, Heavy Traffic roads of Sea port, etc...

Bitumen Emulsion

Bitumen emulsions are formed by dispersion of small droplets of one liquid in another liquid. The product is regarded as the key manufacturing agent for road construction. It acts as a binding agent right in the midst of two different bituminous layers for road building. Ensuring a long, durable and robust impact, the roads become capable of sustaining for longer duration. Abiding by the Road development standards of Indian Roads Congress and Ministry of Surface Transport, Bitumen Emulsion is applied in cold form in Surface Dressing, Premix Carpeting, Pot Hole Repairs, Seal Coatings, etc... Being a key agent in International Road Development, Bitumen Emulsion is actively being introduced in the construction and development of roads in India as well. The quality of being a low cost variable utility product, the roads require less maintenance.

Application of Bitumen Emulsion:

1. Road development, construction and maintenance
2. Dressing up road surfaces
3. Applied as prime and tack coating
4. Mixing aggregate for road construction
5. Other applications namely, crack seal, fog seal, pot hole repairing, seal coating, etc...

Rapid Setting (RS) Emulsions

The rapid setting emulsions or better known as RS Emulsions is mainly utilized for surface dressing. Ideal and perfect for road constructing, the RS Emulsion ensures strength and uniformity in applying tack coat. Since the material of tack coat cannot penetrate within the pavement, it becomes essential to utilize it at its least. This will there after ensure and assure strength and bonding between the layers of pavement. It is strictly recommended to utilize tack coat in the quantity of 2 Kgs to 3.5 Kgs per 10 square meter. It is essential to consider the condition and situation of surface before application. Rapid Setting Emulsions can be well used in foundations, walls, basements and roof. Being an energy efficient material, RS Emulsion comes in a ready to use condition. Post application of RS Emulsion, the road will require a minimum amount of maintenance.

Slow Setting (SS) Emulsions

Bitumen emulsions with low viscosity and extended setting time, Slow Setting emulsion are the most stable. These properties make it an ideal product for prime coating on high porous surfaces and road maintenance applications. The slow setting emulsion well penetrates within the surface and coats and bonds the loose mineral substances with the base and seal course surface. In order to achieve better performance, SS emulsion is recommended to use between 6-12 kg per 10 sqmtr. It is a free flowing liquid at ambient temperature and is chocolate brown in colour. GRIL slow setting emulsion is strictly manufactured as per ASTM D 2397-05 and IS: 8887-2004.

GRIL Emulsion CSS-1h is ideally suited for maintenance work (Fog seal, premix seal coat and slurry seal) and can also be used for prime coating of WBM.

Slurry Seal and Micro Surfacing Emulsion

Slurry Seal and Micro Surfacing techniques have emerged as world class and superior mode for enhancing the quality of life, efficiency and performance of roads. The technique of micro surfacing has proved to be an ideal way to fill ruts and reduce the frequency of rutting by almost 40%. This further aid in enhancing the friction attributes of road or pavement. Slurry Seal Emulsion is formed by mixing finely graded dense aggregate, mineral fillers, asphalt emulsion and water. These essentials are mixed together to form an ideal mixture for paving roads. GRIL succeeds in manufacturing slurry seal and micro surfacing emulsion in their Udaipur plant. The emulsion is basically utilized for sealing and waterproofing road surfacing for preventing any mishappening, skidding or accidents. Micro surface involves the usage of polymer for ensuring high performance, formulation and effectiveness for smooth movement in traffic. Slurry and micro surface seal can be utilized for both concrete and asphalt pavements. The emulsion is applied in parking lots, taxiways, arterial roads, highways, residential area, runways, freeways, high speed roads and for industrial usage.

GRIL Cold Mix

Cold mix is a bituminous mixture containing mineral aggregate, water and binder (custom designed cationic bitumen emulsion) prepared by a suitable device like concrete mixer or cold mix plant or a modified hot mix plant.

Cold Mix Technology is cost effective as well as environment friendly but also construction work can proceed in all seasons and even with wet aggregates. Due to topographical constraints, rural roads projects in North Eastern States of India like Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim and others are got delayed. Use of Cold Mix Technology is proved to be suitable in these states. The biggest advantage of the technology is that it saves on an average approximately 1500L of precious fossil fuel per kilometer of road construction. Cold mix pavement can provide energy savings of over 50% compared with hot mix. So it can be considered as green technology for infrastructure Projects. Cold mix is gaining considerable popularity in road projects and more than 4000km job completed in North-East by cold mix technology.

GRIL Cold Mix is specially designed water based bitumen emulsion with moderate viscosity and optimized setting time for mixing stability with wide variety of graded aggregate. GRIL Cold Mix grade is formulated to mix properly with open graded as well as dense graded aggregate. GRIL Cold Mix is recommended for premix carpeting as well as premix seal coat applications due to its high binder content and moderate viscosity and is manufactured strictly as per IS 8887: 2004. GRIL Cold mix is in Chocolate brown in colour and is a free flowing liquid at ambient temperature.

We always strive to delight our customers by providing right products and best solutions. We take responsibility for our actions and results. We have supplied GRIL Cold Mix to every part of North East and earn good feedback from our end users.

Application of GRIL Cold Mix

Construction Process of 20 mm Open Graded Premix Carpet (Using Concrete Mixer)

The cold mixed open graded premix may also be prepared in a concrete mixer. For this purpose, the blended aggregates of 13.2mm and 11.2mm size in 2:1 ratio shall be charged into concrete mixer.

The required quantity (7-8% by wt of aggregate) of GRIL Cold Mix shall be added and mixed with aggregates for two minutes. Prolong mixing (more than two minutes) shall be avoided as it tends to decoat the binder from aggregates.

The GRIL cold mix when start indicating brownish colour shall be discharged into trolley to transport for use. Compaction of cold mix with 8-10 tone roller shall be carried out to get the finished premix carpet surface.

To ensure better performance use GRIL Cold Mix without diluting with any solvent. It is recommended to roll the drums in to and fro motion before application.

GRIL committed for plethora of technical services to our valued customers.

GRIL Cold Mix is available in 200 Kg (Net) MS and HDPE drums, own fleet of tankers ensure smooth and safe deliveries of Bulk Supplies.

PREMIX-CARPETING USING BITUMEN EMULSION (GRIL Cold Mix)

AGGREGATES

The quantities of aggregate required for 20mm premix carpeting and seal coat is as per below mention tables.

Quantity of Aggregates for Premix Carpeting

Aggregate Size	Qty per 10m ² of road surface
Coarse Aggregate- Nominal Size 13.2 mm	0.18 cu.m.
Coarse Aggregate – Nominal Size 11.2 mm	0.09 cu.m.
Total quantity of aggregate	0.27 cu.m

Quantity of Aggregates for Seal Coat

Seal Coat Type/ Aggregate Size	Qty per 10m ² area of road surface
For Type A Seal Coat- Aggregate Size -6.7 mm	0.09 cu.m
For Type B Seal Coat- Fine Aggregates- Medium coarse sand or fine grit	0.06 cu.m.

BINDER

The quantity of binder required for Tack Coat, Premix carpeting and Seal Coat is as under

Quantity of Binder (Tailor-made Bitumen Emulsion) for Tack Coat

ITEM	Qty per 10m ² area of road surface
On a Granular Surface (already primed)	2.5 to 3.5 kg
On an existing black top surface	2.0 to 3.0 kg

Quantity of Binder (Tailor-made Bitumen Emulsion) for PREMIX CARPET - 20mm

ITEM	Qty per 10m ² area of road surface
For 13.2 mm size coarse aggregate	13-15 Kg (GRIL Cold Mix)
For 11.2 mm size coarse aggregate	6-7 kg (GRIL Cold Mix)
Total	19-22 kg

Quantity of Binder (Tailor-made Bitumen Emulsion) for Seal Coat

ITEM	Qty per 10m ² area of road surface
For Type A Seal Coat (Liquid seal coat)	12-14 kg (RS Grade)
For Type B Seal Coat (Premix seal coat)	10-12 kg (GRIL Cold Mix)

Source: IRC:14-2004 (Recommended Practice for Open Graded Premix Carpet)

IRC:SP:100-2014 (Use of Cold Mix Technology in Construction and maintenance of Roads Using Bitumen Emulsion)

Plant & Technology

With state of art facilities and resources, GRIL in association with ENH Engineering A/S Denmark has established its Emulsion plant in Udaipur and Guwahati for producing world class grades of Bitumen Emulsion, Polymer Modified Bitumen (PMB) and Crumb Rubber Modified Bitumen (CRMB). Our industrial set up possesses an in-house fleet of Bitumen Tankers for logistic management of Bitumen from refineries to industrial sites. The objective behind an in-house logistic support is to prevent the contamination of Bitumen caused due to the ignorance of outsources logistics agencies.

Safety being the key focus and parameter, GRIL is associated with ENH Engineering A/S, Denmark to avail highly technically sound, dynamic, robust and world class superior equipments for plant functioning and maintenance. ENH Engineering A/S Denmark is recognized as an International leader and producer of fully automatic PLC based plant. With well set infrastructural arena and technical equipments, GRIL produce all grades of Bitumen Emulsion, Polymer Modified Bitumen and Crumb Rubber Modified Bitumen in different road construction applications.

GRIL follows an "In-Line System. An "In-Line System" is a smart concept wherein the product does not require a separate premixing process of water solutions, polymer and chemicals. Instead, it automatically adds these requisites during production process. Facilitating higher levels of flexibility, the system ensures ease in injecting these ingredients in the milling system individually. With advanced and highly technological control systems in our plants, we guarantee an ease in producing homogeneous material continuously.



Plant Attributes

1. Sophisticated, planned and advanced PLC based control system in our manufacturing plants ensures highest level of quality production.
2. The milling units in our plant are equipped with adjustable air gapping property. It enables appropriate distribution and accurate bitumen droplets in emulsion.
3. Backed with intelligent systems for production no manual requirement of introducing chemicals, water solutions and polymer.
4. Dedicated stream for Bitumen, Water and Chemicals on individual basis.
5. Efficient integration of inlet filter, pH meter and flow meter with PCS.
6. Chemical Unit pumps and flow meters are resistant to chemicals.
7. Functionally strong and sturdy boilers for heating up water.
8. Equipped with Heat Exchangers – Controls water and emulsion temperature.
9. Equipped and capable of manufacturing all possible types of bitumen emulsion/PMB and CRMB.

Our plants in Udaipur and Guwahati are run, managed, maintained and operated by our skilled, knowledgeable and experienced professionals; under the supervision of whom we ensure and promise our clientele with quality delivery of products.

An in-house “Laboratory Unit” in both the plants is capable of examining, testing, analyzing and ensuring the quality and R&D of all the different types of Bitumen Emulsion/PMB and CRMB.

Plant Capacity

In line, Bitumen Emulsion plant, Capacity 15 – 20 MT/Hr

In line mixer, PMB/CRMB plant, Capacity 20 – 25 MT/Hr

Combined PMB/CRMB and Emulsion Pilot Unit for R&D purpose



Quality Control

Considering Quality to be a pioneering factor above all, GRIL has ensured to install high grade and world class equipments, machineries, instruments, processes and workforce in their manufacturing plants since inception. By emphasizing on quality control, the Bitumen Emulsion plants in Udaipur and Guwahati are equipped with sophisticated, sound and an eye for detail testing facilities. By continuing with the legacy of quality checks, GRIL calibrates instruments on regular basis to ensure accuracy in testing process. The production process considers sample check in specified quantity as directed by IS Standards.

MTC of Quality Control

We conduct below mentioned tests for Bitumen, Emulsion and PMB/CRMB as per the IS: 1201 – 1978 to IS1220 – 1978, IS 8887:2004, IS 15642 standard:

Bitumen:

- a) Penetration Test at 25 Deg C, 100 gms, 5 Sec
- b) Softening Point Test
- c) Ductility Test at 25 Deg C on residue of TFOT
- d) Solubility in Trichloroethylene

Bitumen Emulsion:

- a) Residue on 600 mic IS Sieve
- b) Viscosity by Saybolt Furol Viscometer in Seconds at 25 and 50 Deg C
- c) Coagulation of Emulsion at low temperature
- d) Storage Stability after 24 Hours, percentage
- e) Particle Charge Test
- f) Coating ability Water Resistance (Dry and Wet aggregate)
- g) Stability to mixing with cement (percentage coagulation)
- h) Miscibility with water
- i) Test on residue
 1. Residue by Evaporation
 2. Penetration at 25 Deg C
 3. Ductility at 27 Deg C/cm, Min
 4. Solubility in trichloroethylene
- j) Distillation in percent, by Volume at 190, 225, 260, 315 Deg C
- k) Water content

P M B (E l a s t o m e r i c Thermoplastic Based) Type B and CRMB (Crumb and Modified Crumb Rubber Based) Type D (As per IS 15462: 2004):

- a) Penetration Test at 25 Deg C
- b) Softening Point Test
- c) Elastic Recovery of half thread in Ductilometer at 15 Deg C
- d) Separation Difference in Softening
- e) Viscosity at 150 Deg C
- f) Thin Film Oven Test on Residue
 1. Loss in Mass, percentage
 2. Increase in softening point, Deg C
 3. Reduction in penetration of residue
 4. Elastic Recovery of half thread in Ductilometer at 25 Deg C.



Packing and Dispatch

With in-house logistics facilities, GRIL is successfully engaged in packaging and dispatch of bitumen emulsion, PMB and CRMB PAN India. With power packed fleet of tankers with us, we ensure to smoothly deliver a capacity of 15, 19 and 25 MT. emulsion with safety. Abiding by customer delight and promises made, our tankers supply and deliver emulsions within the project schedule of our clients.

With smart, idealist and efficient management systems and process flow at our end, the material is supplied within one to two working days post receiving of confirmed purchase order and payment.

To prevent adulteration during transit, we have ensured a unique seal at the opening point of the tankers which showcases individual serial number.

We also supply Emulsions in packaged PVC drums and MS Drums on order.



BITUMEN EMULSION (CATIONIC TYPE) - SPECIFICATION							
S.No.	Characteristic	Parameter of Bitumen Emulsions					CODE
		SS - 1	RS - 1	SS - 2 / Slurry Seal	Microsurfacing (IRC:SP 81-2008)	CSS-1h (ASTM D 2397-02)	
1.	Residue on 600 microns, % by mass max.(Sieve Test).	0.05	0.05	0.05	0.05	0.1	IS 8887-2004
2.	Viscosity by saybolt Furol viscometer, seconds.						IS 8887-2004
	at 25°C	20-100	-	30-150	20-100	-	-
	at 25°C SFS	-	-	-	-	20-100	-
	at 50°C	-	20-100	-	-	-	-
3.	Coagulation of emulsion at low temperature.	NIL	NIL	NIL	NIL	NIL	IS 8887-2004
4.	Storage stability after 24 hours, % Max.	2%	2%	2%	2%	1%	IS 8887-2004
5.	Particle Charge.	Weak Positive	Positive	Positive	Positive	Positive	IS 8887-2004
6.	Stability to mixing with cement (% coagulation), Max.	2	-	2	-	2	IS 8887-2004
7.	Miscibility with water.	-	No Coagulation	No Coagulation	-	-	IS 8887-2004
8.	Residue by evaporation, % Min.	50	60	60	60	57	IS 8887-2004
9.	Penetration 25°C / 100 g / 5 Sec.	60-350	80-150	60-120	40-100	40-90	IS 8887-2004
10.	Ductility 27°C / cm, Min.	50	50	50	50	40	IS 8887-2004
11.	Softening Point, in °C, Min.	-	-	-	57	-	-
12.	Elastic Recovery, % Min.	-	-	-	50	-	-
13.	Solubility in trichloroethylene % by mass, Min.	98%	98%	98%	97%	97.5%	IS 8887-2004
14.	Distillation in percent, by volume at :-	-	-	-	-	-	IS 8887-2004
	at 190°C	20-55	-	-	-	-	-
	at 225°C	30-75	-	-	-	-	-
	at 260°C	40-90	-	-	-	-	-
	at 315°C	60-100	-	-	-	-	-
15.	Water content, percent by mass, Max.	20	-	-	-	-	IS 8887-2004

POLYMER MODIFIED BITUMEN SPECIFICATION								
S.No.	Characteristic	Plastomeric Thermoplastic Based - Type A			Elastomeric Thermoplastic Based - Type B			CODE
		PMB - P - 120	PMB - P - 70	PMB - P - 40	PMB - E - 120	PMB - E - 70	PMB - E - 40	
1.	Penetration at 25°C, 0.1 mm, 100g, 5s.	90-150	50-90	30-50	90-150	50-90	30-50	IS 15462 - 2004
2.	Softening Point, (R&B), °C, Min.	50	55	60	50	55	60	IS 15462 - 2004
3.	Fraass breaking point, °C, Max.	-20	-16	-12	-20	-16	-12	IS 15462 - 2004
4.	Flash point, COC, °C, Min.	220	220	220	220	220	220	IS 15462 - 2004
5.	Elastic recovery of half thread in ductilometer at 15°C, % Min.	50	40	30	70	70	70	IS 15462 - 2004
6.	Separation, difference in softning point, R&B, °C, Max.	3	3	3	3	3	3	IS 15462 - 2004
7.	Viscosity at 150°C, Poise.	1 to 3	2 to 6	3 to 9	1 to 3	2 to 6	3 to 9	IS 15462 - 2004
8.	Thin film oven tests and test on residue.	-	-	-	-	-	-	IS 15462 - 2004
	(a) Loss in mass, %, Max.	1.0	1.0	1.0	1.0	1.0	1.0	IS 15462 - 2004
	(b) Increasing in softning point, °C, Max.	7	6	5	7	6	5	IS 15462 - 2004
	(c) Reduction in penetration of residue at 25°C, % Max.	35	35	35	35	35	35	IS 15462 - 2004
	(d) Elastic recovery of half thread in ductilometer at 25°C, % Min.	35	35	35	50	50	50	IS 15462 - 2004

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