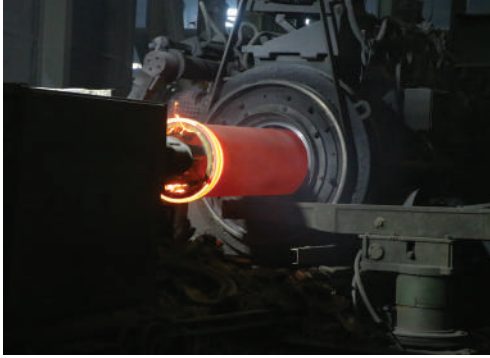


# RASHMI

GROUP



Carrying Water, Establishing Lifeline

# About Rashmi Group



*“Rashmi Group envisions a future of innovation, sustainability, and global collaboration. Together, we lead with purpose, pioneering solutions that enrich lives and inspire progress for generations to come.”*

Rashmi Group stands as a prominent Business Conglomerate in India, recognized for its expansive operations. Pioneering the integration of Iron & Steel Products, Cement, Power, and Ferro Alloys, the group is under the astute guidance of **Mr. Sajjan Kumar Patwari** along with his three sons - **Mr. Sunil Kumar Patwari, Mr. Sanjib Kumar Patwari, and Mr. Sanjay Kumar Patwari.**

Strategically headquartered in Kolkata, the group maintains its operational footprint through strategically positioned manufacturing facilities in Kharagpur and Jhargram. The product portfolio boasts a diverse array, encompassing DI Pipes and Fittings, TMT Bars, Pig Iron, Wire Rods, MS Billets, Sponge Iron, Sinter, Ferro Alloys, Pellets, Cement, Nitrile Gloves, Seamless Pipes & Tubes, Digital Networking Devices, and Dredging solutions.

Rashmi Group holds a notable position as a prime exporter of Iron Ore Fines to China & various South East Asian nations, while simultaneously catering to global markets with mineral-based products. This achievement is underscored by the accolade of **"Ultra Mega Project"** status conferred upon the group by the West Bengal government, further complemented by its distinction as one of the earliest recipients of environmental and pollution clearances within the state.



# Introduction to **Rashmi Metaliks**

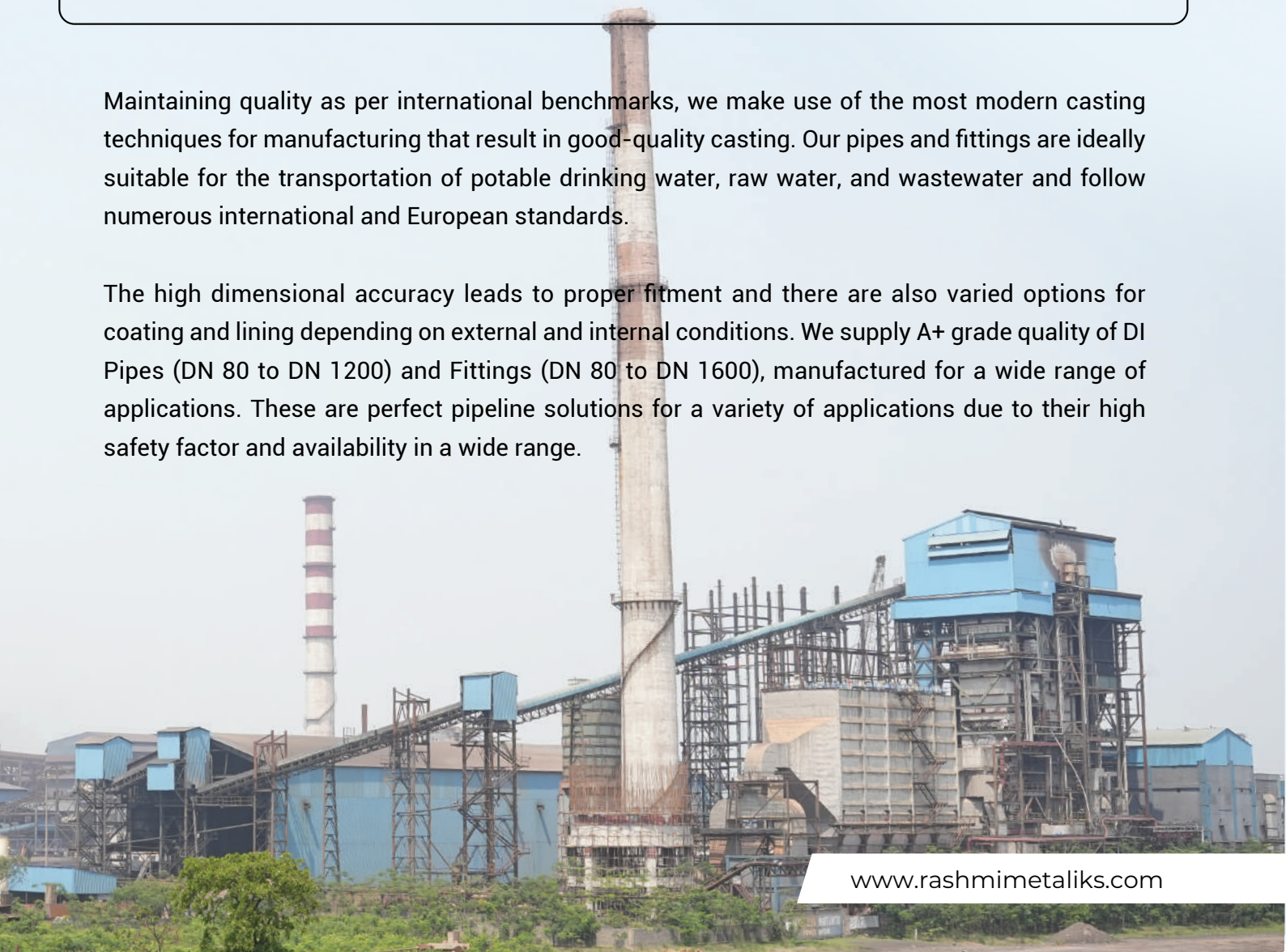
Rashmi Metaliks Limited is a name synonymous with reliability & quality in Eastern India's iron & steel manufacturing industry. It is one of the flagship companies of Rashmi Group, incorporated in the year 2004 in West Bengal. We have a State-Of-The-Art Integrated Steel manufacturing facility comprised of Pellet, Sinter, Pig iron, Sponge Iron, Ductile Iron Pipe and Fittings, Billet, TMT & Wire Rod.

Rashmi Metaliks is one of the leading manufacturers of DI Pipes & Fittings in India. We have a substantial number of jointing options with various internal and external coating types when it comes to fittings. Since its inception, Rashmi Metaliks has been expanding at an unbeatable CAGR of 62%. We have upgraded our production to **7,70,000 Metric Tonnes of DI Pipes & 26,000 Metric Tonnes of DI Fittings** annually.

*Today, Rashmi Metaliks stands as the largest manufacturer of DI Pipes & Fittings in India and holds the second position in the globe.*

Maintaining quality as per international benchmarks, we make use of the most modern casting techniques for manufacturing that result in good-quality casting. Our pipes and fittings are ideally suitable for the transportation of potable drinking water, raw water, and wastewater and follow numerous international and European standards.

The high dimensional accuracy leads to proper fitment and there are also varied options for coating and lining depending on external and internal conditions. We supply A+ grade quality of DI Pipes (DN 80 to DN 1200) and Fittings (DN 80 to DN 1600), manufactured for a wide range of applications. These are perfect pipeline solutions for a variety of applications due to their high safety factor and availability in a wide range.



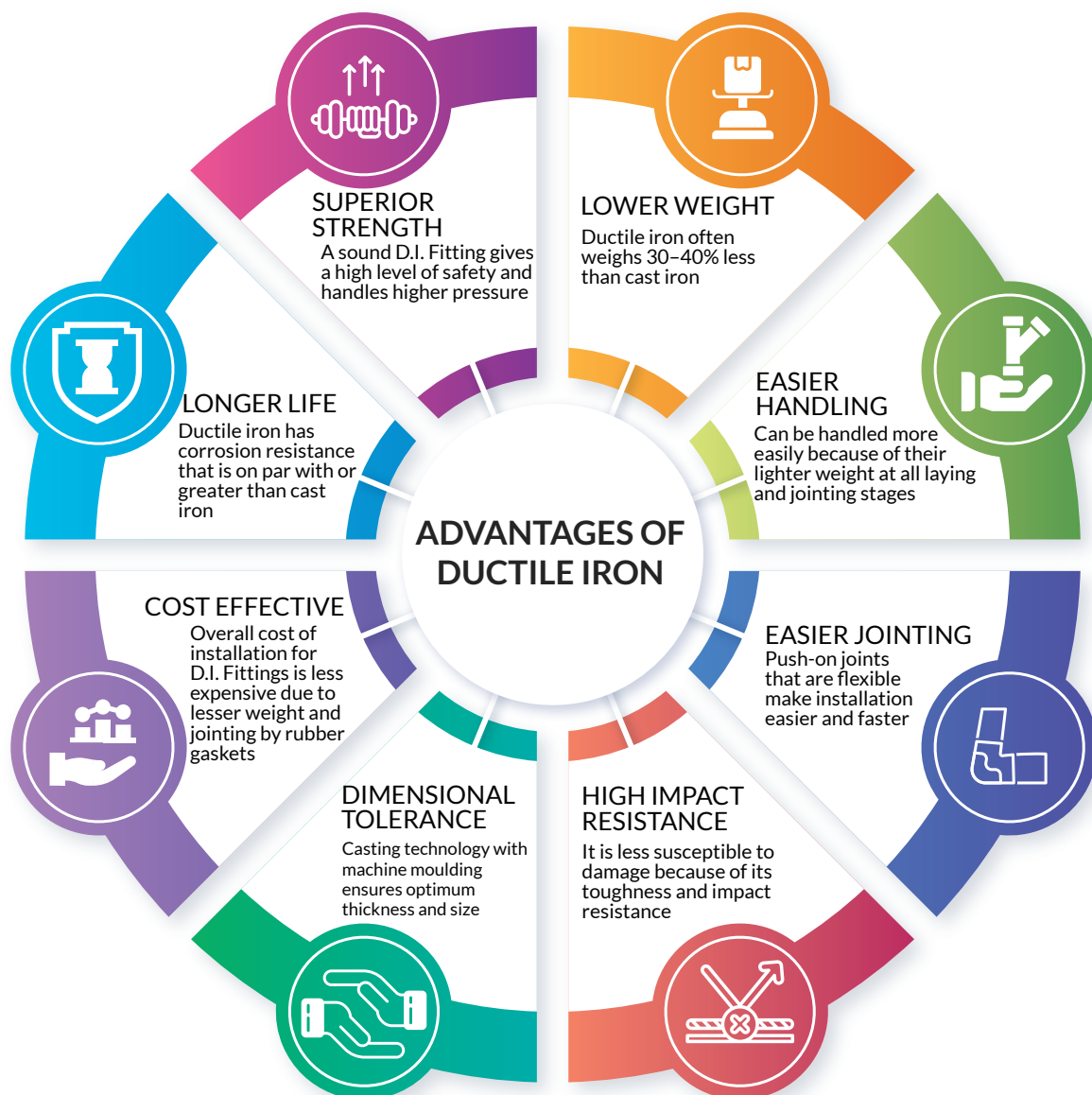
# Ductile Iron

## Pipes and Fittings

Renowned for our superior quality Ductile Iron Pipes & Fittings, Rashmi Metaliks is the favored choice for water supply and pressure sewerage applications. Our adherence to stringent standards and commitment to quality assurance has garnered us a dominant stand in the market.

To fulfill the growing demand for Ductile Iron Pipes and Fittings, we have elevated our production capacity to a phenomenal 7,70,000 MT per annum for Pipes & 26,000 MT for Fittings. Our adoption of state-of-the-art casting methodologies ensures precision in casting with exact dimensional accuracy, guaranteeing optimal fitment. Additionally, we offer a range of coating and lining options tailored to external and internal conditions, enhancing the durability of our products.

At Rashmi Metaliks, we are dedicated to propelling the industry forward with innovation, quality, and reliability.



# Ductile Iron

## Production Facility



2 high-capacity blast furnaces with a combined capacity of 7,70,000 MT annually



20 dedicated induction furnaces



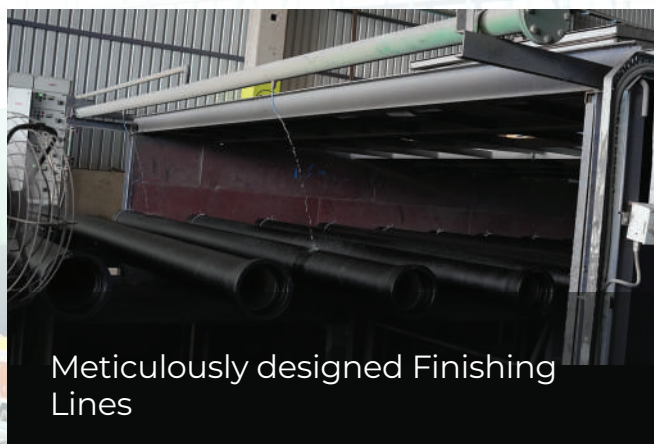
20 horizontal centrifugal casting machines



Specialized annealing furnace



Dedicated lines for Zinc and Bitumen coating



Meticulously designed Finishing Lines



# Ductile Iron Pipe

## Casting Process



### **SELECTION OF MATERIAL:**

Refined liquid iron directly from the blast furnace.



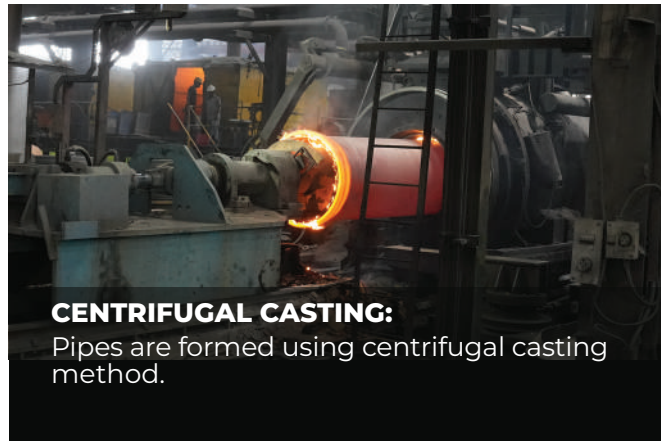
### **COMPOSITION ADJUSTMENT:**

If the molten iron composition deviates from established standards, it is rectified by introducing alloy and other elements.



### **MAGNESIUM TREATMENT:**

A small quantity of pure magnesium is introduced into the molten iron to foster the development of a spheroidal graphite microstructure.



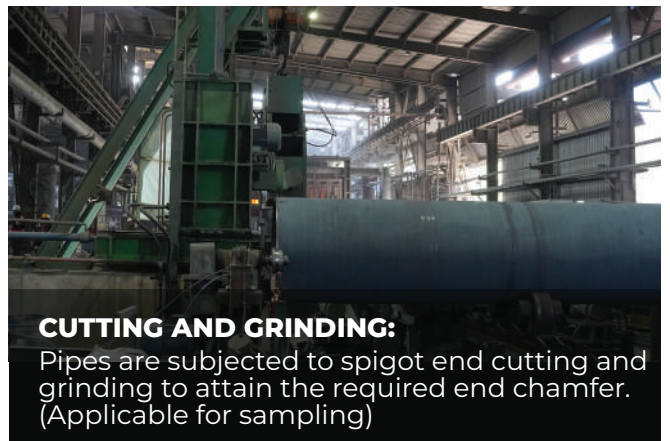
### **CENTRIFUGAL CASTING:**

Pipes are formed using centrifugal casting method.



### **ANNEALING:**

The heat treatment process is employed to enhance the mechanical properties of the pipes.



### **CUTTING AND GRINDING:**

Pipes are subjected to spigot end cutting and grinding to attain the required end chamfer. (Applicable for sampling)



### **HYDROSTATIC PRESSURE TESTING:**

To perform the leak test, hydrostatic pressure is applied internally and is steadily maintained for 10 seconds.



### **CEMENT MORTAR LINING:**

The lining thickness is 3 mm for DN 80 – DN 300, 5 mm for DN 350 – DN 600 and 6 mm for DN 700 – DN 1200 pipes.

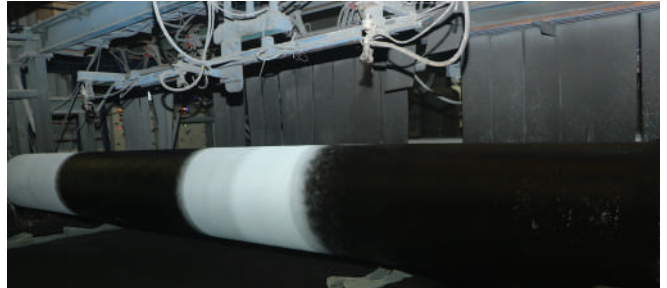
# Ductile Iron Pipe

## Finishing & Despatch



### ZINC COATING:

Zinc coating, due to the galvanizing effect, increases the corrosion resistance of the pipe.



### BITUMINOUS COATING:

Bituminous paint is applied uniformly by a spraying machine. The mean thickness of the coating is 70  $\mu\text{m}$ .



### QUALITY TESTING:

The pipes are rigorously tested on all predefined parameters to ensure the highest quality standards.



### STORAGE:

The quality-approved pipes are stacked in a controlled environment and marked for transportation.

## TRANSPORT



# DI Pipes by **Rashmi Metaliks**

The Ductile Iron Pipes by Rashmi Metaliks have Tremendous Tensile Strength and sustain external static or dynamic loading. The company's impeccable track record of quality assurance has placed it in a commanding position in the market.

***Being the largest manufacturer in India, Rashmi Metaliks produces 770,000 MT of Ductile Iron Pipes annually.***

The DI Pipes made by Rashmi Metaliks conform to IS 8329 as well as International Product Standards ISO: 2531, BS EN 545, BS EN 598, ISO 7186 and Management Standards ISO 9001, ISO 45001 & ISO 14001. Our dedicated adherence to these parameters has made us win the trust of many domestic and international clients.

## **Technical Specifications:**

| <b>Product</b>              | <b>Ductile Iron (DI) Pipes suitable for Push-on-Joints*</b>                                                                                                  |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Size Range                  | DN 80 to DN 1200                                                                                                                                             |
| Class of DI Pipes           | C20, C25, C30, C40, C50, C64, C100, PP, K-7 & K-9                                                                                                            |
| Standard Length (in Meters) | 5.5                                                                                                                                                          |
| Types                       | Push-on Joint, Restrained Joint                                                                                                                              |
| Internal Linings            | Cement Mortar Lining of OPC / BFSC / SRC / HAC<br>Cement Mortar Lining with Seal Coat<br>Internal Fusion Bond Epoxy Coating<br>Internal Polyurethane Coating |
| External Coating – 1        | Zinc Coating<br>Alloy of Zinc & Aluminium (ZnAl)<br>Bitumen Coating post Zn or ZnAl                                                                          |
| External Coating - 2        | Blue or Red Epoxy<br>External Fusion Bond Epoxy Coating<br>External Polyurethane Coating                                                                     |
| Conforming Specifications   | IS 8329/IS 9523, ISO 2531, BS EN 545, ISO 2531, ISO 7186,<br>BS EN 598, ISO 4179 & ISO 8179                                                                  |

\* RML also provides customize pipe joint design suitable for Restrained/Anchor Joints as per customer requirement.

# Ductile Iron Fittings

Rashmi Metaliks is a leading manufacturer of Ductile Iron Fittings in India. Our fittings are crafted using advanced casting methods like VLFP and High-Pressure Moulding. They provide durability and strength for water, sewage, wastewater, and slurry applications. Our facilities boast top-notch machinery, finishing units, and testing labs.

We offer fittings in diameters DN 80 to DN 1600 mm, with various jointing options, coatings, and linings. To ensure high performance in harsh environments, our fittings are Fusion Bonded Epoxy coated (internally and externally) with a minimum thickness of 250µm. Options include WRAS-approved Black & Blue (Potable water) or Red (Sewerage) in line with EN 545 / EN 598 and EN 14901. Alternative coatings are also available upon request.

## Benefits of DI Fittings :

- ▶ Ability to effectively handle consistent alterations in pressure, temperature, and environment.
- ▶ Greater strength and resistance than the other material.
- ▶ Offers high-quality performance for well over 100 years.
- ▶ Much lighter, which makes them easier to lay out in sewer lines than most other Fittings.
- ▶ No additional encasements or treatments are needed for their installation.

## Quality Testing :

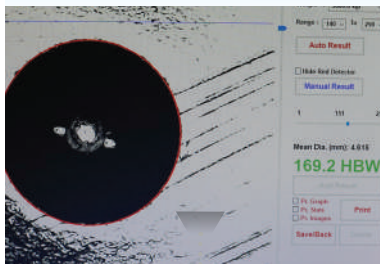
### Spectrographic Analysis:

The composition is assessed through spectrographic analysis.



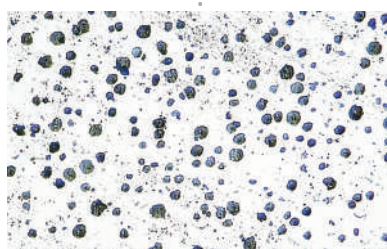
### Assessment of Mechanical Testing:

Tensile and hardness tests are conducted.



### Final Inspection:

Fittings are inspected carefully before shipping.



### Examination of Spheroidal Graphite:

The spheroidal graphite microstructure is scrutinized through microscopic testing.



### Hydrostatic Pressure Test:

Every fitting undergoes a hydrostatic test to verify its water leak tightness.

# Ductile Iron Fittings

## Casting Process



### Vacuum Lost Foam Process

VLFP (Vacuum Lost Foam Process) uses Polystyrene patterns of the design of the required fittings placed in a sand-filled MS mold box. After compacting with vibration, the molten metal is poured under vacuum pressure.

The next processes involve knockout, shot blasting, and fettling, resulting in the removal of excess material or imperfections from the fittings. Then the fittings are hydro-tested and forwarded for protective coatings and linings like Zinc Coating, Cement Lining, Bitumen Coating, FBE Coating, and PU Coating, each offering distinct benefits for corrosion resistance and durability. Castings are then marked, packed, and dispatched after undergoing quality assurance processes.

### Benefits:

- The vacuum pressure and controlled expansion lead to minimal defects, resulting in high-quality patterns and castings.
- As patterns are formed by joining segments, tooling costs can be reduced compared to traditional methods.
- The process enables faster pattern production and assembly, which can accelerate overall casting production timelines.
- VLFP can be applied to a wide range of alloys and casting sizes, making it adaptable for various applications.
- The process' controlled parameters result in consistent patterns and castings, reducing variations between parts.
- Steam expansion of EPS beads create smooth and uniform patterns, resulting in improved surface finishes on the final castings.

# Ductile Iron Fittings

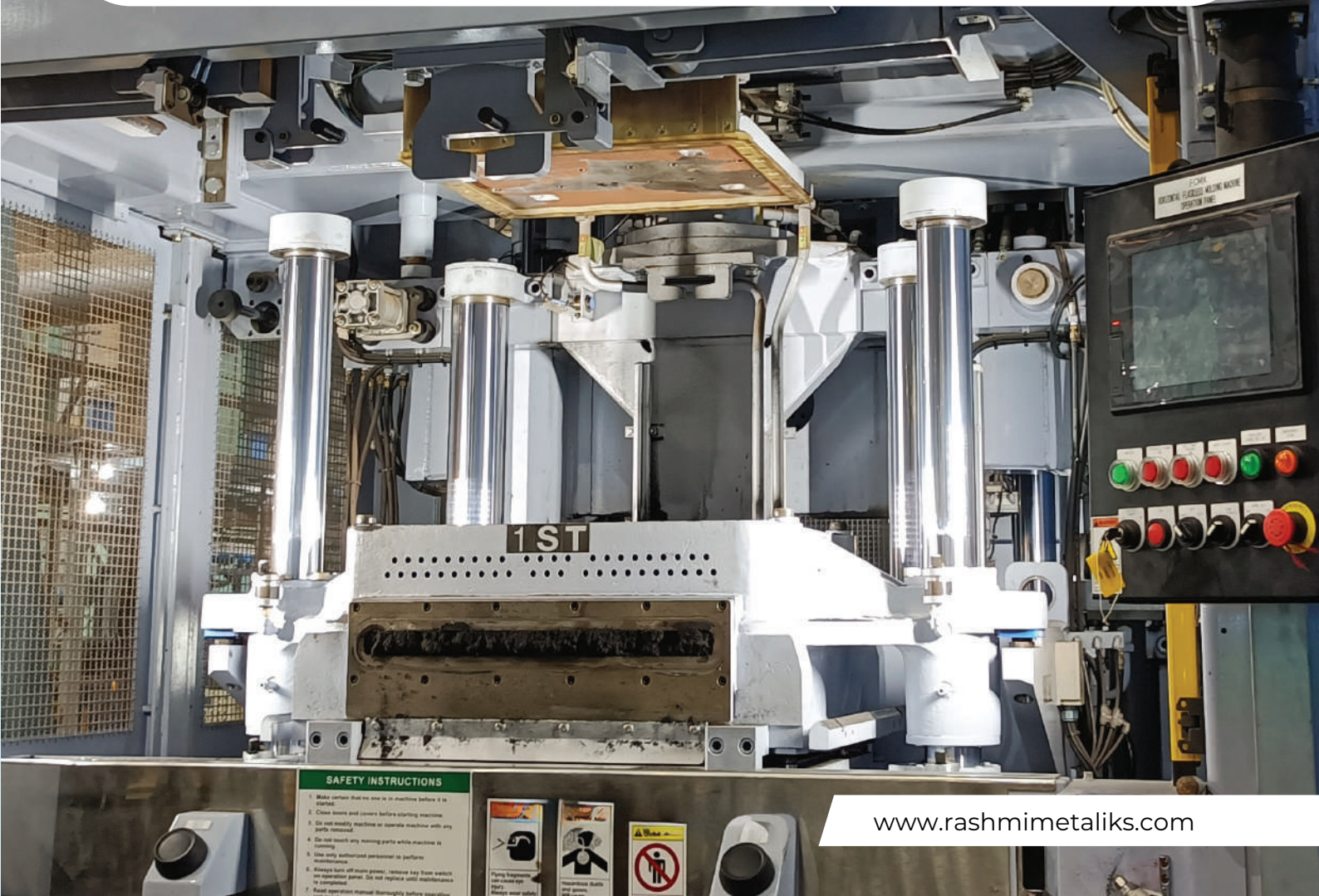
## Casting Process

### High-Pressure Molding Process

The unique high-pressure molding process creates DN-80 to DN-250mm diameter fittings and accessories. Sand is compacted around a pattern in the High-Pressure Molding Machine to form a mold. The molten metal fills the mold via the pouring line. After solidification, casting is removed via knockout process and then shot blasted to attain the desired quality. After fettling and Zinc Coating, all the fittings are hydro-tested for water leak tightness and then processed through Cement Lining and Bitumen/FBE/PU Coating for corrosion resistance. Castings are then packed, stored, and dispatched after undergoing quality assurance processes.

### Benefits:

- Ensures precise dimensional accuracy, superior surface finish, and reduced porosity in the final products.
- Enhances mechanical properties, leading to increased durability and strength, vital for reliable water and wastewater systems
- Minimizes material wastage and energy consumption, making it environmentally friendly.
- With shortened production cycles and streamlined operations, High-Pressure Moulding optimizes efficiency and cost-effectiveness, contributing to high-quality DI fittings that meet stringent industry standards.



# Range of Fittings



**Push-On Joint Fittings:** Push-On joints offer the most straightforward assembly method for underground purposes. These joints consist of a rubber gasket, which is placed into a groove within the socket positioned at the bell end of the fittings. Subsequently, by applying lubricant, the beveled end of the fittings is pushed through the gasket, resulting in its compression and the formation of a resilient, pressure-sealed connection.



**Flanged Fittings:** A flanged joint is a type of connection achieved through bolts, where two equal flanges are joined and held together by tightening the bolts. In this arrangement, a unique flat gasket is placed between the flanges, and as the bolts are tightened, the gasket is compressed. The sealing action is accomplished through the compression of a flat elastomer gasket positioned between the two flange

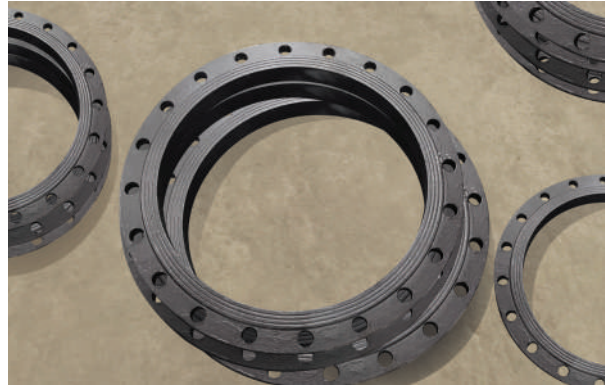


**Mechanical Joint Fittings:** The mechanical connection relies on the concept of a stuffing box and comprises a bell featuring an integrated flange, a gland made of cast or ductile iron, a rubber seal, and the required bolts and nuts. This design allows for substantial flexing and accommodates both longitudinal expansion and contraction within the pipeline.

# Range of Fittings



**Welded Flanged Pipes:** Flanges are welded on either or both ends of the barrel. As per customer requirement, flanges are sometimes welded on the barrel at a point other than the ends which are called Puddle flanges.



**Screwed Flanged Pipes:** Flanges are tapped and drilled to be threaded onto ductile iron pipe. The DI pipe is cut to the exact length needed and put into a chaser machine where the threads are cut into the pipe where the flange is attached and tightened.



**"As Cast" Flanged Pipes:** "As Cast" Flanged Pipes are casted as a single unit advanced Lost Foam Casting technique based on the specific requirements.



Our Ductile Iron Fittings are manufactured following ISO: 2531: 2009, BS EN: 545: 2006, BS EN: 598: 2006, IS: 9523: 2000 and their associated standards.

| Ductile Iron Fittings                   |            |                                                                            |                                                                                                                                                                                                                                                                                                |                                                |                 |
|-----------------------------------------|------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------|
| Fittings                                | DN Range   | Bends Range                                                                | Fitting                                                                                                                                                                                                                                                                                        | External Coating                               | Internal Lining |
| Push-On Joint Fittings                  | 80 to 1600 | 90 <sup>0</sup> , 45 <sup>0</sup> , 22.5 <sup>0</sup> , 11.25 <sup>0</sup> | Double Socket Bends, Double Socket Duck Foot Bends, All Socket Tees, Concentric Reducers, Double Socket Flanged Branch Tee, Wash Out Tee, All Socket Y-Tee, All Socket Cross, Push On Collar, Push-on Flanged Socket, Cap, Plug                                                                | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Fusion Bonded Epoxy (FBE)                      | FBE             |
| Flanged Fittings                        | 80 to 1600 | 90 <sup>0</sup> , 45 <sup>0</sup> , 22.5 <sup>0</sup> , 11.25 <sup>0</sup> | Double Flanged Bends, Double Flanged Duck Foot Bends, All Flanged Tees, Flanged Concentric & Eccentric Reducer, All Flanged Cross, Double Flanged Semi Circular Bend, All Flanged Scour Tee, Blank Flange, Flanged Bell Mouth, Screwed & Welded Flange, Push-on Flanged Socket, Flanged Spigot | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Fusion Bonded Epoxy (FBE)                      | FBE             |
| Mechanical Join Fittings                | 80 to 1600 | 90 <sup>0</sup> , 45 <sup>0</sup> , 22.5 <sup>0</sup> , 11.25 <sup>0</sup> | MJ Collar, MJ Bend, MJ Flange Socket, MJ All Socket Tee, MJ Double Socket Flange Branch Tee etc.                                                                                                                                                                                               | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Fusion Bonded Epoxy (FBE)                      | FBE             |
| DI Special Fittings                     | 80 to 1600 | —                                                                          | Flanged Adaptor & Dismantling Joint                                                                                                                                                                                                                                                            | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Fusion Bonded Epoxy (FBE)                      | FBE             |
| Restrained Joint Fittings (RASHMI-LOCK) | 80 to 1600 | —                                                                          | —                                                                                                                                                                                                                                                                                              | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                                         |            |                                                                            |                                                                                                                                                                                                                                                                                                | Fusion Bonded Epoxy (FBE)                      | FBE             |

| Ductile Iron Flanged Pipes |            |             |                        |                                                |                 |
|----------------------------|------------|-------------|------------------------|------------------------------------------------|-----------------|
| Fittings                   | DN Range   | Bends Range | Fitting                | External Coating                               | Internal Lining |
| Welded Flanged Pipes       | 80 to 1200 | —           | —                      | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
| Screwed Flanged Pipes      | 80 to 450  | —           | —                      | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                            |            |             |                        | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                            |            |             |                        | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
| “As Cast” Flanged Pipes    | 80 to 1200 | —           | Length (Under 2 meter) | Zinc Coating followed by Black Bitumen Coating | Cement Lining   |
|                            |            |             |                        | Zinc Coating followed by Blue Epoxy Coating    | Cement Lining   |
|                            |            |             |                        | Fusion Bonded Epoxy (FBE)                      | FBE             |

# Restrained Joint

The RASHMI-LOCK Restrained Jointing system offers a restrained, semi-flexible push-in jointing for Ductile Iron Pipes. It's a self-restrained socket and spigot joint that allows deflection within the designed range. The system transfers internal pressure from fluid flow to the adjacent pipe. This is achieved through weld beads on the spigot and lock segments.

This jointing system eliminates the need for thrust blocks, enabling trenchless laying of pipes. It's suitable for seismic zones, fault crossings, liquefaction zones, connections to structures, floating pipelines, Hydro Power plants, steep slopes, firefighting mains, and dewatering pipelines. Complies with EN545/ISO 2531/ISO10804-1 standards and is available in sizes DN 40-DN 1000.

## Technical Specifications

|                           |                                                                                                                                                                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name              | RASHMI –LOCK<br>suitable for restrained semi flexible<br>Push-on-Jointing                                                                                                                                                           |
| Size Range                | DN 40mm to DN 1000mm                                                                                                                                                                                                                |
| Standard Length           | 5.5 m or customized length *                                                                                                                                                                                                        |
| Internal Linings          | <ul style="list-style-type: none"><li>• Sulphate resisting cement</li><li>• Blast furnace slag cement</li><li>• Ordinary Portland cement</li><li>• High Alumina cement</li><li>• Polyurethane coating</li><li>• Seal coat</li></ul> |
| Outside Coatings          | <ul style="list-style-type: none"><li>• Zinc or Zinc-Aluminium deposition of 130 gm/m<sup>2</sup> / 200 gm/m<sup>2</sup> / 400 gm/m<sup>2</sup> with finishing layer of Blue or Red Epoxy, Bitumen</li></ul>                        |
| Coating of Joint Area     | Blue or Red Epoxy / Bituminous coating                                                                                                                                                                                              |
| Conforming Specifications | Design : ISO 10803<br>Product : ISO 2531; BS EN 545<br>Joint : ISO 10804<br>Rubber Gasket : ISO 4633, BS EN 681-1                                                                                                                   |

\*Options available only with prior arrangement

# Advantages

- Provides a robust pipe system with a simple locking mechanism.
- Ranges from DN 40 to DN 1000 respectively.
- Can withstand pressure surges.
- Saves a great deal of installation time.
- Polyurethane coating and lining provide extraordinarily high C-value.
- The deflection in the jointing system provides flexibility during operation.
- Can be used in regions with elevated earthquake or earth settlement risks.
- Suitable even for laying in complicated and demanding intersections.

**RASHMI-LOCK Pipe Dimensions**

| Size | Dimensions (mm) |                  |                           | P1  | WL  |
|------|-----------------|------------------|---------------------------|-----|-----|
| DN   | DE              | Water / Sewerage | High Pressure Application |     |     |
|      |                 | A                | A                         |     |     |
| 100  | 118             | 180              | 180                       | 121 | 85  |
| 150  | 170             | 238              | 238                       | 127 | 85  |
| 200  | 222             | 290              | 290                       | 144 | 90  |
| 250  | -               | -                | -                         | -   | -   |
| 300  | 326             | 423              | 423                       | 173 | 106 |
| 350  | 378             | 480              | 480                       | 176 | 110 |
| 400  | 429             | 522              | 522                       | 184 | 112 |
| 450  | 480             | 585              | 585                       | 198 | 117 |
| 500  | 532             | 643              | 643                       | 199 | 117 |
| 600  | 635             | 750              | 750                       | 208 | 122 |
| 700  | -               | -                | -                         | -   | -   |
| 750  | -               | -                | -                         | -   | -   |
| 800  | 842             | 944              | 944                       | 199 | 112 |
| 900  | 945             | 1080             | 1080                      | 231 | 129 |
| 1000 | -               | -                | -                         | -   | -   |

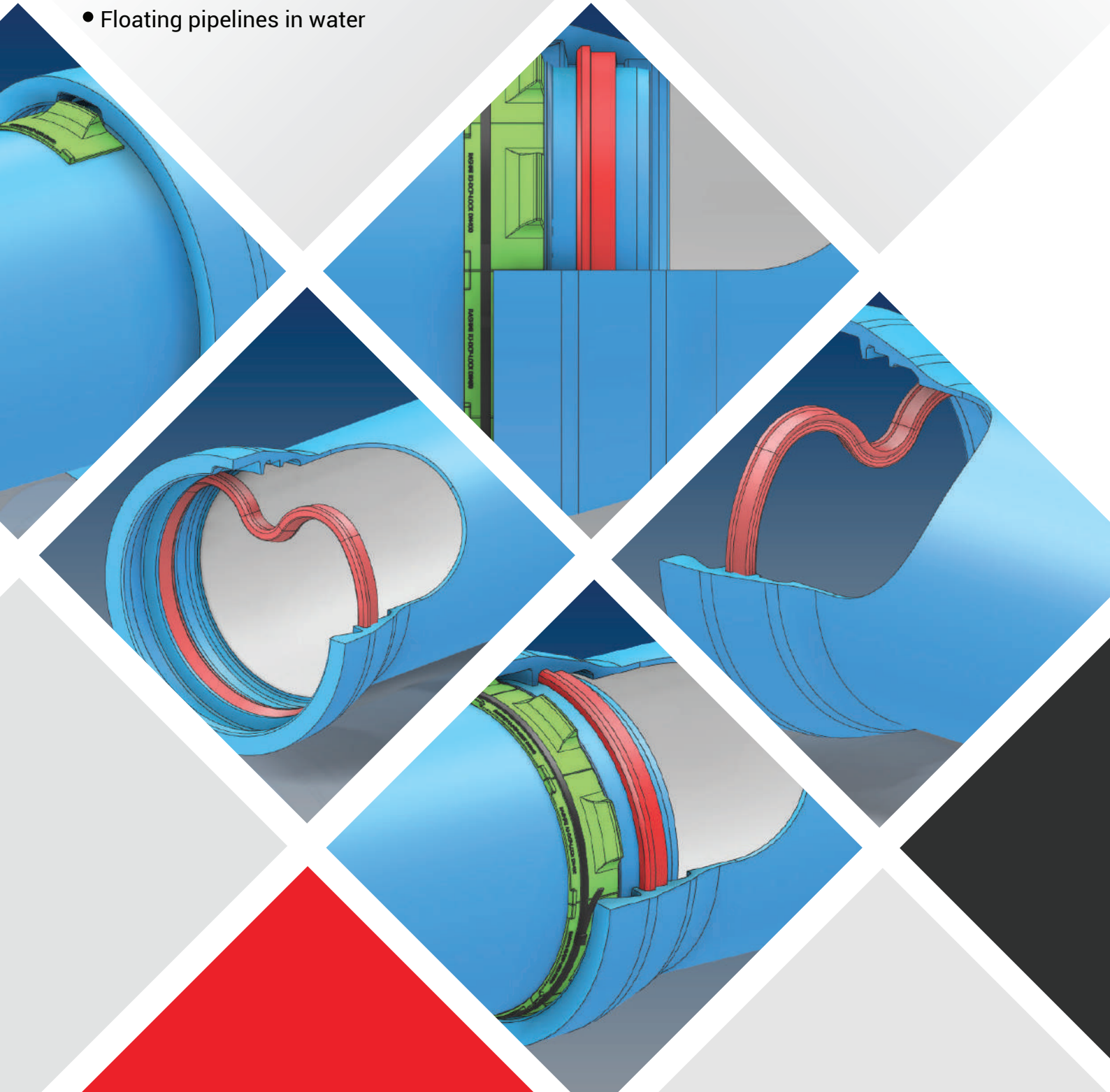
**RASHMI-LOCK Allowable Pressure**

| Size | PFA *(Allowable operating Pressure), bar |                           | Allowable Angular Deflection | No. of Locks |
|------|------------------------------------------|---------------------------|------------------------------|--------------|
| DN   | Water / Sewerage                         | High Pressure Application |                              |              |
|      |                                          |                           | {0}                          | (KN)         |
| 100  | 40                                       | 100                       | 5                            | 5            |
| 150  | 40                                       | 100                       | 5                            | 5            |
| 200  | 40                                       | 64                        | 4                            | 8            |
| 250  | 40                                       | 64                        | 4                            | 8            |
| 300  | 40                                       | 45                        | 4                            | 8            |
| 350  | 30                                       | 38                        | 3                            | 8            |
| 400  | 30                                       | 35                        | 3                            | 8            |
| 500  | 30                                       | 35                        | 3                            | 9            |
| 600  | 35                                       | *                         | 2                            | 10           |
| 700  | 25                                       | *                         | 1.5                          | 10           |
| 750  | 25                                       | *                         | 1.5                          | 10           |
| 800  | 25                                       | *                         | 1.5                          | 10           |
| 900  | 25                                       | *                         | 1.5                          | 12           |
| 1000 | 25                                       | *                         | 1.5                          | 12           |

\*Details will be made available on request.

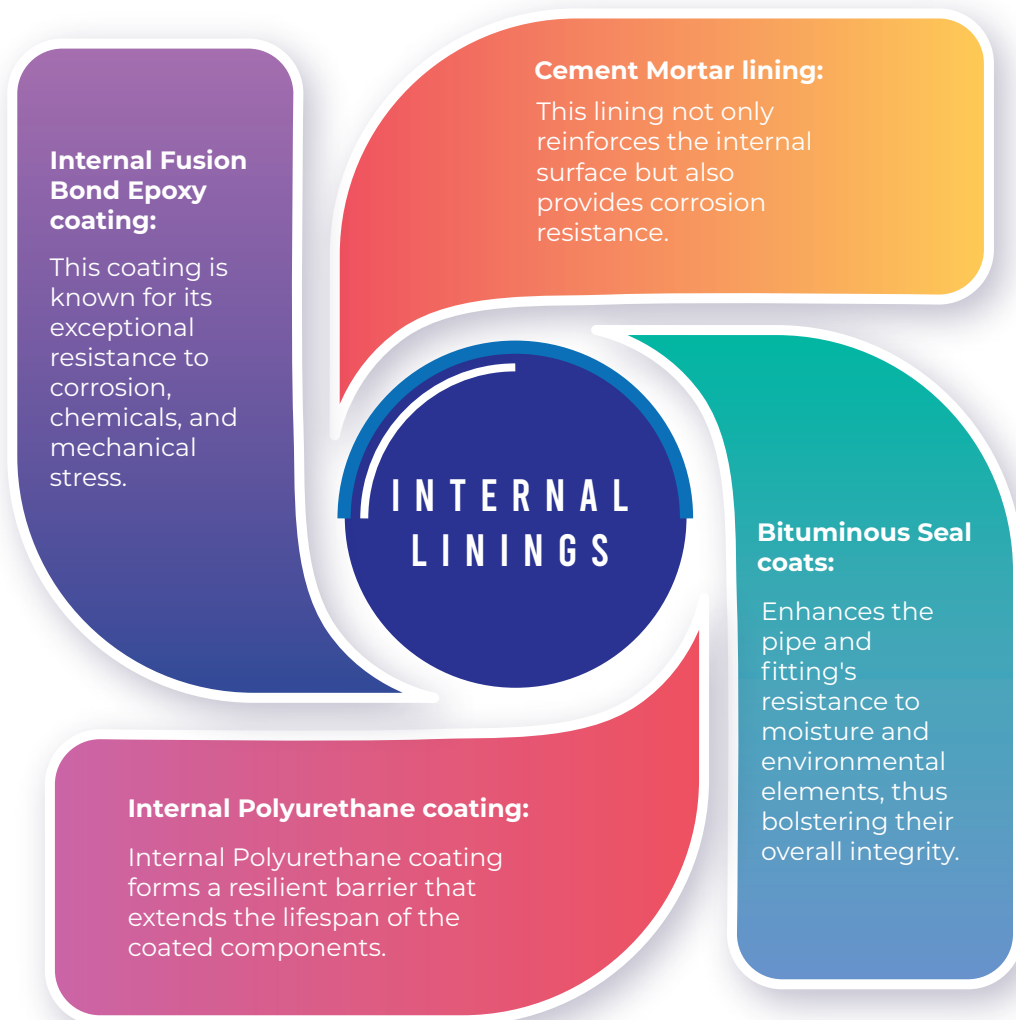
# Applications

- Trenchless laying of Ductile Iron pipelines
- Laying of Ductile iron pipelines without thrust blocks – for Water Application
- Laying of pipelines on steep slopes
- Hydro-power applications
- Mining applications such as dewatering and temporary water distributions
- Bridge pipelines
- Laying by Horizontal Directional Drilling -Trenchless Application
- Snow-making pipelines
- Firefighting Mains
- District Cooling/Heating Pipelines
- Floating pipelines in water



# DI Pipes & Fittings

## Linings & Coatings



# DI Pipes & Fittings

## Internal Protection

### Cement Mortar Lining

Rashmi Metaliks' DI Pipes & Fittings are supplied with manually applied cement mortar lining. The lining is composed of cement, sand and water.

#### Thickness of the Lining

| DN (mm)  | Thickness (mm)                                                |                                                                  |
|----------|---------------------------------------------------------------|------------------------------------------------------------------|
|          | Normal value                                                  | Tolerance                                                        |
| 100-300  | For IS 9523 - 3.0<br>For BSEN 545 - 4.0<br>For ISO 2531 - 3.5 | For IS 9523 : -1.5<br>For BSEN 545 : -1.5<br>For ISO 2531 : -1.0 |
| 350-600  | 5.0                                                           | -2.0                                                             |
| 700-1200 | 6.0                                                           | -2.5                                                             |

Seal coat of asphaltic material on Cement Mortar Lining is also done on request.



### Bitumen Coating

To protect Pipes & Fittings from external conditions an external layer of min. 70 microns thick bituminous coating, that comply with ISO 2531 / EN 545, is applied to ensure weather-proofing and corrosion resistance.

#### General Specifications

| Property                    | Value                       | Unit     |
|-----------------------------|-----------------------------|----------|
| Coating Thickness           | Min. 70                     | microns  |
| Operating Temperature Range | -10 to 60                   | °C       |
| Adhesion Strength           | 500 - 1000                  | psi      |
| Impact Resistance           | 10 - 20                     | inch-lbs |
| Abrasion Resistance         | 50 - 100                    | mg loss  |
| Chemical Resistance         | Moderate                    |          |
| Salt Spray Resistance       | 500 - 1000                  | hours    |
| UV Resistance               | Yes                         |          |
| Application Method          | Hot-Applied or Cold-Applied |          |
| Coating Color               | As per requirement          |          |

# DI Pipes & Fittings

## Internal Protection

### Fusion-Bonded Epoxy (FBE) Coating

Fusion-Bonded Epoxy (FBE) Coating involves application of thermosetting epoxy resin layers to Ductile Iron (DI) Fittings through an electrostatic process. This protective coating serves as an effective corrosion barrier, renowned for its ability to withstand corrosion across a broad temperature spectrum. Additionally, it exhibits exceptional adhesion to the surface of ductile iron.

### Specifications of Internal FBE Coating

| Property                    | Value              | Unit      |
|-----------------------------|--------------------|-----------|
| Coating Thickness           | min. 250           | microns   |
| Operating Temperature Range | -30 to 120         | °C        |
| Adhesion Strength           | 3500 - 4500        | psi       |
| Impact Resistance           | 20 - 30            | inch-lbs  |
| Abrasion Resistance         | 50 - 100           | mg loss   |
| Chemical Resistance         | Excellent          |           |
| Salt Spray Resistance       | 1500 - 2000        | hours     |
| Dielectric Strength         | 1000 - 1500        | volts/mil |
| Flexibility                 | Yes                |           |
| UV Resistance               | Yes                |           |
| Application Method          | Powder Coating     |           |
| Cure Temperature            | 180 - 220          | °C        |
| Coating Color               | As per requirement |           |



# DI Pipes & Fittings

## External Protection

### FBE Coating

External Fusion-Bonded Epoxy (FBE) coating on Ductile Iron Fitting increases the fitting's longevity and ensures sustained structural integrity in demanding industrial environments. Its application creates a seamless, resilient shield, safeguarding against chemical and mechanical wear, ensuring top-tier pipeline protection.

### Surface Preparation

| Parameter         | Description                                             |
|-------------------|---------------------------------------------------------|
| Surface Cleaning  | Shotblasting to achieve SA 2.5 or SSPC-SP 10 standard   |
| Surface Profile   | 40-70 microns (1.5-2.7 mils) roughness (anchor pattern) |
| Surface Condition | Clean, dry, and free of contaminants                    |
| Preheating        | Optional, based on substrate and coating thickness      |

### Advantages of Fusion Bond Epoxy Coating

Excellent Chemical Resistance

Better Resistance to External Corrosion

High abrasion and scratch resistance



Perfect for transporting various liquids

Excellent adhesion with a glossy and smooth coating

Different colour options are available based on usage

# FBE Coating

## External Coating Application and Testing

| Parameter               | Description                                                          |
|-------------------------|----------------------------------------------------------------------|
| Coating Thickness       | Min. 250 microns on the body. Over jointing portion min 150 microns. |
| Application Method      | Electrostatic spray                                                  |
| Application Temperature | 200-220°C                                                            |
| Dwell Time              | 5-10 minutes (may vary with thickness)                               |
| Curing Temperature      | 170-190°C                                                            |
| Inspection              | Visual inspection for uniformity, adhesion, and defects              |
| Adhesion Testing        | ASTM D4541 or equivalent pull-off test                               |
| Holiday Detection       | High-voltage spark testing (ASTM G62) or equivalent method           |
| Hardener                | ASTM D2517-99, Type I, Grade 2, Class C                              |
| Filler Powder           | Conforms to manufacturer's recommendations                           |
| Preheating Oven         | Temperature Range: 270°C - 290°C                                     |
| Fusion Bond Gun         | Conforms to manufacturer's specifications                            |
| Blast Equipment         | Complies with SA 2.5 or SSPC-SP 10 standard                          |
| Operating Temperature   | -20°C to + 110°C (Ambient temperature 60°C)                          |
| Thickness Testing       | ASTM D4138-82 (Dry Film Thickness)                                   |
| Cure Schedule           | Follow manufacturer's recommended cure schedule                      |

**Note:** All fittings coated with Fusion Bonded Epoxy coating are compliant with European Standard EN 14901



## Polyurethane (PU) Coating

A polyurethane coating is applied to the surface of DI Pipes & Fittings to protect it from the inflowing fluids. This coating helps protect fittings from various types of defects such as corrosion, weathering, abrasion, and other deteriorating processes.

Our PU Coated DI Pipes conforms to the international standards EN15655 and EN 15189.

### Specifications of PU Coating

| Property                    | Value              | Unit     |
|-----------------------------|--------------------|----------|
| Coating Thickness           | 800 - 2000         | microns  |
| Operating Temperature Range | Upto 45/50         | °C       |
| Adhesion Strength           | >1450              | psi      |
| Impact Resistance           | >75                | inch-lbs |
| Abrasion Resistance         | <100               | mg loss  |
| Chemical Resistance         | Yes                |          |
| Flexibility                 | Yes                |          |
| Application Method          | Spray Coating      |          |
| Cure Time                   | 24 - 48 hours      |          |
| Coating Color               | As per requirement |          |

### PU Coating - Quality Testing

| Parameter                                 | Requirement                                                                            | Clause | Test method                                                   | Clause  |
|-------------------------------------------|----------------------------------------------------------------------------------------|--------|---------------------------------------------------------------|---------|
| Chemical Resistance                       | Less then 15% weight increase after immersion<br>Less then 2% weight loss after drying | 6.1    | Immersion in deionised water<br>EN ISO 62method 2             | 7.2.1.1 |
|                                           | Less then 10% weight increase after immersion<br>Less then 4% weight loss after drying |        | Immersion in diluted sulphuric acid 10%<br>EN ISO 62 method 2 | 7.2.1.2 |
| Impact Strength                           | 8 J/mm PU-coated pipe barrel<br>5 J/mm EP-coated spigot end (see EN 14901)             | 6.2    | Dropping weight<br>High voltage test                          | 7.2.2   |
| Indentation Resistance                    | < 10% at 10 MPa                                                                        | 6.3    | Indentation test                                              | 7.2.3   |
| Elongation at Break                       | >2.5%                                                                                  | 6.4    | Tensile test                                                  | 7.2.4   |
| Specific Coating Resistance in 0.1 M NaCl | >108 $\Omega$ m <sup>2</sup>                                                           | 6.5    | Resostovotu test towel method<br>or vessel method             | 7.2.5   |
| Ratio of Coating Resistance               | >0.8                                                                                   | 6.5    | Res.d/res. 70d                                                | 7.2.5   |

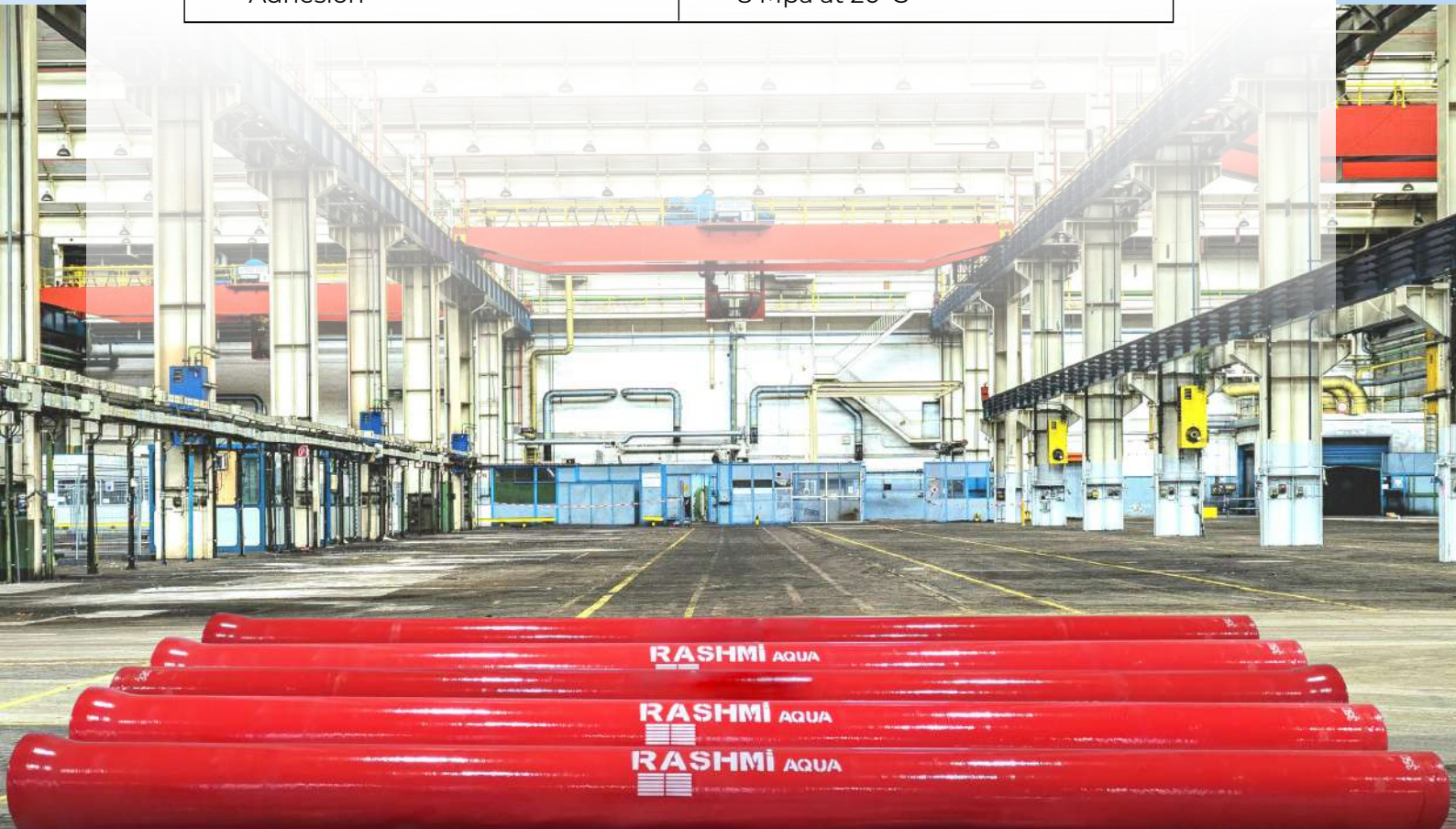
# DI Pipes & Fittings

## External Protection

### PU Coating

External polyurethane (PU) coating on DI Pipes & Fittings enhances corrosion resistance. It extends the fittings' service life, providing a durable barrier against harsh environmental conditions while maintaining the integrity of the fluid conveyance system.

| Property                     | Specification                         |
|------------------------------|---------------------------------------|
| Chemical Structure           | Polyurethane                          |
| Coating Thickness            | 800 - 2000 microns                    |
| Hardness                     | >70 Shore D                           |
| Density                      | Typically 1.0 - 1.2 g/cm <sup>3</sup> |
| Elongation at Break          | >2.5%                                 |
| UV Resistance                | Yes                                   |
| Abrasion Resistance          | Yes                                   |
| Curing Time                  | 1 - 48 hours                          |
| Dry Film Thickness (microns) | 800 - 2000                            |
| Adhesion                     | >8 Mpa at 20°C                        |



## PU Coating

### Polyurethane Coatings Thickness by Application

| Property                      | Specification<br>(Unit - microns) |
|-------------------------------|-----------------------------------|
| Water Distribution Systems    | 800 - 2000                        |
| Sewage and Wastewater Systems | 800 - 2000                        |

### Advantages of Polyurethane Coating

- Highly resistant to abrasion
- Strong impact resistance
- Chemical resistance
- Suitable for handling heavy flows of fluids
- Provides UV resistance
- Aggressive fluid conveyance
- Protection from corrosion and weathering



# Rashmi Metaliks

## Quality Assurance

Rashmi Metaliks holds the belief that Quality Control plays a pivotal role in ensuring the creation of flawless Ductile Iron Pipes and Fittings. This commitment to quality control is integrated into every phase of production, beginning with the scrutiny of Raw Materials and culminating in the thorough examination of the Finished Product.

We diligently uphold a regime of in-process inspection and quality control throughout the entirety of the production process. These practices are meticulously recorded and managed according to international standards within our documented Management System.

### Design



Design Department

### Sand Testing



Permeability Meter Universal Strength Machine



Pattern Shop



Sieve Shaker

Compactability Tester

# Rashmi Metaliks

## Quality Assurance

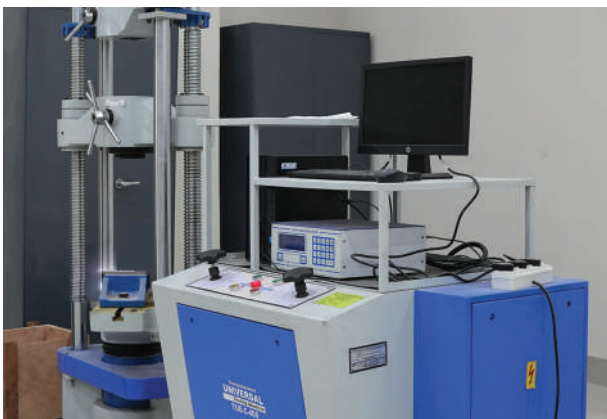
### Physical Testing



Spectrometer



Metalsoft microscope



Universal Testing Machine



Hardness Testing Machine

### Finishing Facility



Shot Blasting Facility



Fettling

# Rashmi Metaliks

## Quality Assurance

### Dimension Inspection



Dimensional checking



Inspection with Go, No-Go gauge

### Machining Facility



Maching being done



Drilling being done

Multi Drilling



Hydrostatic Pressure Testing of Fittings



Machine Shop

# Rashmi Metaliks

## Quality Policy

Having an integrated iron and steel plant supplying raw materials to Rashmi Metaliks enhances quality control by ensuring consistent material standards and reducing variability. This integration streamlines production processes, lowers transportation costs, and optimizes resource allocation, enabling competitive pricing for ductile iron pipes and fittings while maintaining high quality and reliability.

### Key elements of our quality policy include:

**Customer Satisfaction:** Understanding and fulfilling our customers' needs is our top priority. We strive to consistently deliver products and services that meet or surpass their expectations.

**Compliance:** We rigorously adhere to industry standards and regulations to ensure the quality and integrity of our manufacturing processes.

**Continuous Improvement:** We foster a culture of continuous improvement, encouraging innovation and efficiency in our manufacturing methods, products, and services.

**Employee Engagement:** We empower our team members through training and involvement, encouraging them to take ownership of quality at every stage of production.

**Sustainability:** We are committed to environmental responsibility, promoting eco-friendly practices to reduce our ecological impact.



# Rashmi Metaliks

## Quality Certificates



### Kitemark™ Certificate

This is to certify that:

Rashmi Metaliks Limited (DIP Division)  
VIII-Gopinathpur  
PO-Changsal, Kharagpur,  
Paschim Medinipur  
West Bengal  
721301  
India

Holds Certificate Number:

KM 793698

In respect of:

**BS ISO 2531**  
Ductile iron pipes, fittings, accessories and their joints for water applications

This issues the right and licence to use the Kitemark in accordance with the Kitemark Terms and Conditions governing the use of the Kitemark, as may be updated from time to time by BSI Assurance UK Ltd (the "Conditions"). All defined terms in this Certificate shall have the same meaning as in the Conditions.

The use of the Kitemark is authorized in respect of the Product(s) detailed on this Certificate provided at or from the above address.

For and on behalf of BSI:

  
Shahm Barhom, Group Product Certification Director

First Issued: 2023-09-28  
Latest Issue: 2023-09-28

Effective Date: 2023-09-28  
Expiry Date: 2026-08-23

Page: 1 of 7

This certificate has been issued by and remains the property of BSI Assurance UK Ltd, Kitemark Court, Davy Avenue, Knowlton, Milton Keynes MK9 3PQ, United Kingdom and should be returned immediately upon request.  
To check its validity telephone +44 (0) 345 080 9000. An electronic certificate can be authenticated [online](#).

BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.  
A member of BSI Group of Companies.



### Kitemark™ Certificate

This is to certify that:

Rashmi Metaliks Limited (DIP Division)  
VIII-Gopinathpur  
PO-Changsal, Kharagpur,  
Paschim Medinipur  
West Bengal  
721301  
India

Holds Certificate Number:

KM 793696

In respect of:

**BS EN 545**  
Ductile iron pipes, fittings, accessories and their joints for water pipelines

This issues the right and licence to use the Kitemark in accordance with the Kitemark Terms and Conditions governing the use of the Kitemark, as may be updated from time to time by BSI Assurance UK Ltd (the "Conditions"). All defined terms in this Certificate shall have the same meaning as in the Conditions.

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A member of BSI Group of Companies.



### Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2015

This is to certify that:

Rashmi Metaliks Limited  
Premilata Building, 6th Floor  
39, Shakespeare Sarani  
Kolkata 700 017  
West Bengal  
India

Holds Certificate No:

**EMS 620622**

and operates an Environmental Management System which complies with the requirements of ISO 14001:2015 for the following scope:

The Manufacture of Various Grades and Sizes of Ductile Iron Pipes for Different Application.

For and on behalf of BSI:

  
Theuns Kotze, Managing Director Assurance - IMETA

Original Registration Date: 2015-01-05  
Latest Revision Date: 2023-11-27

Effective Date: 2023-12-31  
Expiry Date: 2026-12-30

Page: 1 of 2



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Printed copies can be validated at [www.bsi-global.com/Certification](#) or telephone +44 (0) 345 080 9000.  
Further certifications regarding the scope of this certificate and the applicability of ISO 14001:2015 requirements may be obtained by consulting the organization.  
This certificate is valid only if provided original copies are in complete set.

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlton, Milton Keynes MK9 3PQ, UK. Tel: +44 345 080 9000  
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.  
A member of the BSI Group of Companies.



### Certificate of Registration

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM - ISO 45001:2018

This is to certify that:

Rashmi Metaliks Limited  
Premilata Building, 6th Floor  
39, Shakespeare Sarani  
Kolkata 700 017  
West Bengal  
India

Holds Certificate No:

**OHS 620627**

and operates an Occupational Health and Safety Management System which complies with the requirements of ISO 45001:2018 for the following scope:

The Manufacture and Supply of Various Grades and Sizes of Ductile Iron Pipes for Different Application.  
  
[Previously certified to BS OHSAS 18001:2007 since 06-04-2015]

For and on behalf of BSI:

  
Theuns Kotze, Managing Director Assurance - IMETA

Original Registration Date: 2020-12-07  
Latest Revision Date: 2024-02-05

Effective Date: 2024-02-05  
Expiry Date: 2027-02-04

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This certificate is valid only if provided original copies are in complete set.

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlton, Milton Keynes MK9 3PQ, UK. Tel: +44 345 080 9000  
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.  
A member of the BSI Group of Companies.

# Rashmi Metaliks

## Quality Certificates

**bsi.**

**Certificate of Registration**

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Rashmi Metaliks Limited  
Premiata Building, 6th Floor  
39, Shakespeare Sarani  
Kolkata 700 017  
West Bengal  
India

Holds Certificate No: FM 578917

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

The Design & Development, Manufacture and Supply of Various Grades and Sizes of Ductile Iron Pipes for Different Applications.

For and on behalf of BSI:

Theunis Kotze, Managing Director Assurance - IMETA

Original Registration Date: 2011-09-07  
Latest Revision Date: 2023-07-14

Effective Date: 2023-08-24  
Expiry Date: 2026-08-23

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Printed copies can be validated at [www.bsiglobal.com/ClientDirectory](https://www.bsiglobal.com/ClientDirectory) or telephone +44 13 2953 9000.  
Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.  
This certificate is valid only if provided original copies are in complete set.

Information and Contact: BSI, Kitemark Court, Davy Avenue, King's Lynn, Norfolk PE36 7PP, UK. Tel: +44 1463 255 9000  
BSI Assurance UK Limited, registered in England under number 2003321 at 389 Chiswick High Road, London W4 4AL, UK.  
A Member of the BSI Group of Companies.

**NABL**

**National Accreditation Board for Testing and Calibration Laboratories**

**CERTIFICATE OF ACCREDITATION**

**RASHMI METALIKS LIMITED (DI PIPE DIVISION)**  
**QUALITY CONTROL LABORATORY**

has been assessed and accredited in accordance with the standard

**ISO/IEC 17025:2017**

**"General Requirements for the Competence of Testing & Calibration Laboratories"**

for its facilities at

NH-06,VILL-GOKULPUR P.O SHYAMRAIPUR, KHARAGPUR, MEDINIPUR WEST, WEST BENGAL, INDIA

in the field of

**TESTING**

Certificate Number: TC-15394

Issue Date: 31/01/2025 Valid Until: 30/01/2029

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.  
(To see the scope of accreditation of this laboratory, you may also visit NABL website [www.nabl-india.org](http://www.nabl-india.org))

Name of Legal Entity: Rashmi Metaliks Limited

Signed for and on behalf of NABL.

Anuja Anand  
Director

N. Venkateswaran  
Chief Executive Officer

**BUREAU VERITAS**  
Certification

**Certificate of Conformity**  
Awarded to:

**RASHMI METALIKS LIMITED**

HEAD OFFICE:  
Premiata Building, 39, Shakespeare Sarani, Kolkata, West Bengal, PIN – 700017 INDIA

PRODUCTION PLANT  
Gokulpur, P.O. Shyamraipur, Khargapur, West Medinipur, West Bengal – 721304 INDIA

Bureau Veritas Italia S.p.A. certify that the following products:

**Ductile iron pipes for water and sewerage applications**  
from DN 80 to DN 1200 Push-On  
from DN 40 to DN 1000 Restrained Flexible Joint  
from DN 80 to DN 1000 Flanged Joint  
(welding flanged operation is carried out at: Gopinathpur, Mauza Changua plant)

**Commercial Brand**  
RASHMI AQUA, RASHMI SEWA

Designed and produced by Rashmi Metaliks Limited  
have been evaluated and found in conformity against the requirements of the following standard:

**EN 545:2010**  
**ISO 2531:2009**  
Ductile iron pipes, fittings, accessories and their joints for water application

**EN 598:2007+A1:2009**  
**ISO 7186:2011**  
Ductile iron pipes, fittings, accessories and their joints for sewerage application

Certification according requirements stated in:  
**QHSE-REG-02-TOR Bureau Veritas**  
**IND-REP-48-CP Bureau Veritas**

This certificate has not to be intended as related to Notify Body activity according to UE Construction Products Regulation CPR 305/2011 neither can be used for the CE marking

Original Expiration Date: 20/04/2016  
Last Expiration Date: 14/04/2025  
Expiration Date: 17/04/2028

Subject to the continued satisfactory operation, to check this certificate validity please refer to website: [www.bureauveritas.it](http://www.bureauveritas.it)  
Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained by consulting the organization.

Scheme Technical Manager  
Date: 14/04/2025  
Certificate N°: 975/001 Rev.8

Bureau Veritas Italia S.p.A. – Viale Monza, 347 – 20126 MILAN - ITALY

**BUREAU VERITAS**  
Certification

**Certificate of Conformity**  
Awarded to:

**RASHMI METALIKS LIMITED**

HEAD OFFICE:  
Premiata Building, 39, Shakespeare Sarani, Kolkata, West Bengal, PIN – 700017 INDIA

PRODUCTION PLANT  
Gokulpur, P.O. Shyamraipur, Khargapur, West Medinipur, West Bengal – 721304 INDIA

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from DN 80 to DN 1000 Flanged Joint  
(welding flanged operation is carried out at: Gopinathpur, Mauza Changua plant)

**Commercial Brand**  
RASHMI AQUA, RASHMI SEWA

Designed and produced by Rashmi Metaliks Limited  
have been evaluated and found in conformity against the requirements of the following standard:

**EN 545:2006**  
**ISO 2531:1998**  
Ductile iron pipes, fittings, accessories and their joints for water application

**EN 598:1994**  
**ISO 7186:1996**  
Ductile iron pipes, fittings, accessories and their joints for sewerage application

Certification according requirements stated in:  
**QHSE-REG-02-TOR Bureau Veritas**  
**IND-REP-48-CP Bureau Veritas**

This certificate has not to be intended as related to Notify Body activity according to UE Construction Products Regulation CPR 305/2011 neither can be used for the CE marking

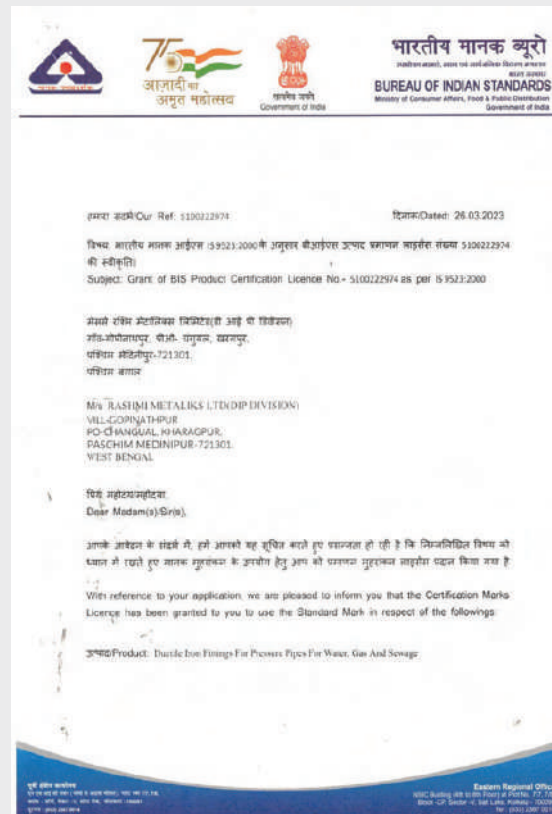
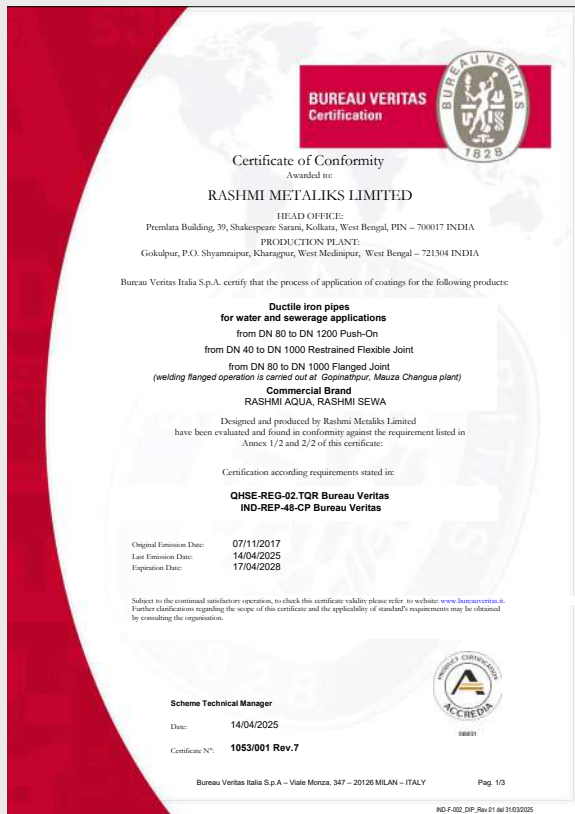
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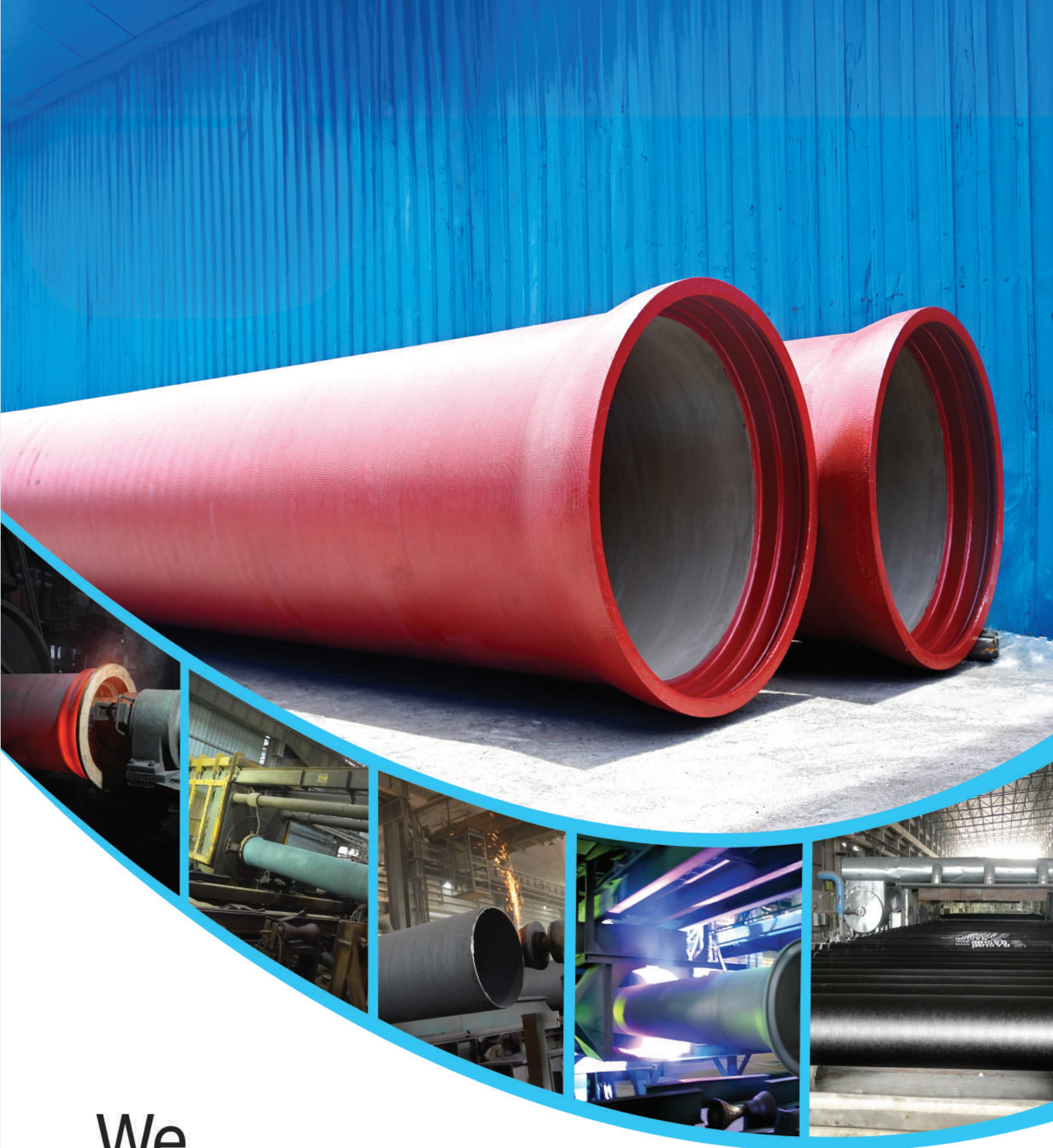
Subject to the continued satisfactory operation, to check this certificate validity please refer to website: [www.bureauveritas.it](http://www.bureauveritas.it)  
Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained by consulting the organization.

Scheme Technical Manager  
Date: 14/04/2025  
Certificate N°: 975/002 Rev.8

Bureau Veritas Italia S.p.A. – Viale Monza, 347 – 20126 MILAN - ITALY

# Rashmi Metaliks Quality Certificates





We  
Transport **Water**  
With Responsibility &  
**Safety**

# Rashmi Metaliks

## Global Presence



We recognize the significance of embracing a global outlook in an interconnected world. This has driven Rashmi Metaliks to bolster its global footprint through strategic ventures across the world.



Operating in 25 countries and comprising a diverse team representing many nationalities, our global footprint is expanding, particularly in established regions such as India, and more recently, in China and Vietnam.

# Delivering Every Drop With Efficiency



**Contact Us**

## Offices

### Registered Office

Premlata Building, 39, Shakespeare Sarani, 6th Floor,  
Kolkata - 700017 West Bengal, India.

### Corporate Office

9, AJC Bose Road, Ideal Center, First Floor, Kolkata - 700017  
West Bengal, India.

## Factory

### Plant 1

Gokulpur, P.O.: Shyamraipur,  
Dist.: West Midnapur, West Bengal, India.

### Plant 2

Gopinathpur and Jethia A.D.S.R., Khatranga,  
Changual, NH - 60, Kharagpur, West Bengal, India.

## International Sales Offices

### UNITED ARAB EMIRATES

#### RASHMI PIPE & FITTING FZCO

United Arab Emirates, Dubai, First Al  
Khail Street, Jumeirah Lakes Towers,  
Mazaya Business Avenue BB1 - 24th  
Floor, Offices: 2405 - 2406

### UNITED KINGDOM

#### RASHMI METALIKS UK LTD.

3rd Floor, 5 Lloyd's Avenue,  
EC3N 3AE London, UK

### SINGAPORE

#### RASHMI AQUA PTE LTD.

137 Telok Ayer Street, #05-02  
Singapore (068602)



+91 33 40237200



[www.rashmimetaliks.com](http://www.rashmimetaliks.com)



[sales.enquiry@rashmigroup.com](mailto:sales.enquiry@rashmigroup.com)