Study on DI Pipes

Prepared by **Institute for Steel Development and Growth (INSDAG)**

Ispat Pragati Bhawan, 793, Anandapur, Kolkata 700107

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- Major Technological and product innovation /change in Demand and offerings of Manufacturers.
- Threat of Substitution
- Dynamics of Sales and Logistics of DI pipes in India

3. Key Drivers for Demand

Ductile iron pipes are commonly used in public water and wastewater infrastructure, including:

- Piped distribution of Potable water to rural / urban households
- Wastewater transportation in Sewage systems
- Bulk Water transport for Irrigation systems

Following is the Flagship Government Schemes that drive the demand for DI Pipes,

Jal Jeevan Mission (JJM), under Ministry of Jal Shakti [1]

- Launched in 2019 to provide **Functional Household Tap Connections (FHTCs)** to every rural household by 2024.
- Major demand driver for **DI pipes** in rural water supply infrastructure.
- Over **12 crore households** targeted; 80.5% coverage achieved as on April 24, 2025 (*JJM Dashboard*).
- Focus on **sustainable water sources** and **pipe distribution networks**.
- Significant **budget allocation** (~₹3.6 lakh crore), boosting pipe industry.

AMRUT (Atal Mission for Rejuvenation and Urban Transformation) 2.0 under Ministry of Housing and Urban Affairs (MoHUA) [2]

- Focused on improving **urban infrastructure**, including water supply and sewerage.
- Targets **500+ cities**; AMRUT 2.0 launched in 2021 with ₹2.87 lakh crore outlay till 2026.
- Promotes **universal water supply coverage** and efficient distribution.
- Drives **DI pipe demand in Urban Areas**, in order to reduce **non-revenue water (NRW), i.e. losses**.

Namami Gange Programme under Ministry of Jal Shakti. [3]

- Integrated Ganga conservation program launched in 2014.

[1] JJM Website
[2] PIB
[3] NMCG Website

- Focus on **sewage infrastructure**, **industrial effluent treatment**, and **riverfront development**.
- Over ₹30,000 crore sanctioned; DI pipes used in **sewage and drainage networks**.
- Major projects in **Uttar Pradesh, Bihar, West Bengal**, etc., driving regional DI pipe demand.

3.1 Factors driving the Growth of the Ductile Iron Pipes Market

- Urbanization
- Government Schemes such as Smart City Mission
- The market for ductile iron pipes is well-established in India, with major manufacturers ensuring consistent availability and pre and post-sales support.[4]
- Governments across the globe are taking major steps to improve water quality, and currently, the only viable option (cheap, sustainable, corrosion-free, over 50 years expected lifetime) to impact the masses is DI pipes. [5]
  - Africa – growing – implementation of new infrastructure.
  - European - overhauling existing infrastructure.

4. Current and future market trends: Available Information

4.1 Current Market - Overview

By application, water and wastewater hold a significant market share due to several government initiatives.

Governmental initiatives, such as the Atal Mission for Rejuvenation and Urban Transformation, Jal Jeevan Mission, National Mission for Clean Ganga, and Community Drinking Water Schemes, contribute to the growth of the water and wastewater treatment market.

4.2 Current Market Size of DI Pipes in India

The India ductile iron pipes market reached approximately USD 3.19 Billion in 2024. The market is estimated to grow at a CAGR of 12.50% in the forecast period of 2025-2034, reaching a value of around USD 10.36 Billion by 2034.[6]

India's economic growth is driving the rise in smart cities and development projects, including:

- **Bharatmala Pariyojana:** A ₹10 lakh crore project targeting 65,000 km of highway development, with

[4] India Ductile Iron Pipes Market Report
[5] World Health Organization (WHO) and UNICEF, *Progress on Drinking Water, Sanitation and Hygiene* (2023 Report)
[6] Expert Market Research Report

over 20,000 km completed so far. [7]

- **Gati Shakti:** A ₹100 lakh crore integrated infrastructure master plan coordinating 16 ministries for faster project delivery. [8]
- **Pradhan Mantri Awas Yojana (PMAY)**: Aiming to deliver nearly 3 crore affordable houses by 2024, with over 2 crores already completed. [9]
- **Metro Rail Projects** (expansion in cities like Mumbai, Delhi, Bengaluru, Ahmedabad, etc.)
- **Industrial Corridors** (like Delhi-Mumbai Industrial Corridor — DMIC, Chennai-Bengaluru Industrial Corridor — CBIC)
- **National Infrastructure Pipeline (NIP):** A ₹111 lakh crore plan covering 9,000+ projects across sectors to boost India's infrastructure by 2025, with 39% Centre, 40% State, and 21% private funding [10]

Key Ductile Iron Pipe Manufacturers Capacity (in Million Tonnes - MT) in India [11]

Company	Plant Location	Production Capacity (MT)
Jindal Saw Ltd.	Kutch, Gujarat	0.6
Welspun Corp Limited		0.4
Electrotherm		0.2
Srikalahasthi Pipes Limited (Subsidiary of Electrosteel)	Chitoor, AP	0.3
ESL Steel Limited	Bokaro, Jharkhand	0.35
TATA Metalliks (TATA Ductura)	Kharagpur, WB	0.4
Rashmi Group	West Bengal	0.75
Electrosteel Castings Limited	Khardah, WB	0.7
Jai Balaji Group	Dhurgapur, WB	0.24
Kejriwal Castings Limited		0.06
Sathavahana lspat Limited	Anantapuramu, AP	0.21
Rungta Pipes	Chaibasa, Jharkhand	0.5
	Total (MT)	***4.7***
	Factored Production Capacity (MT)	***5.18***

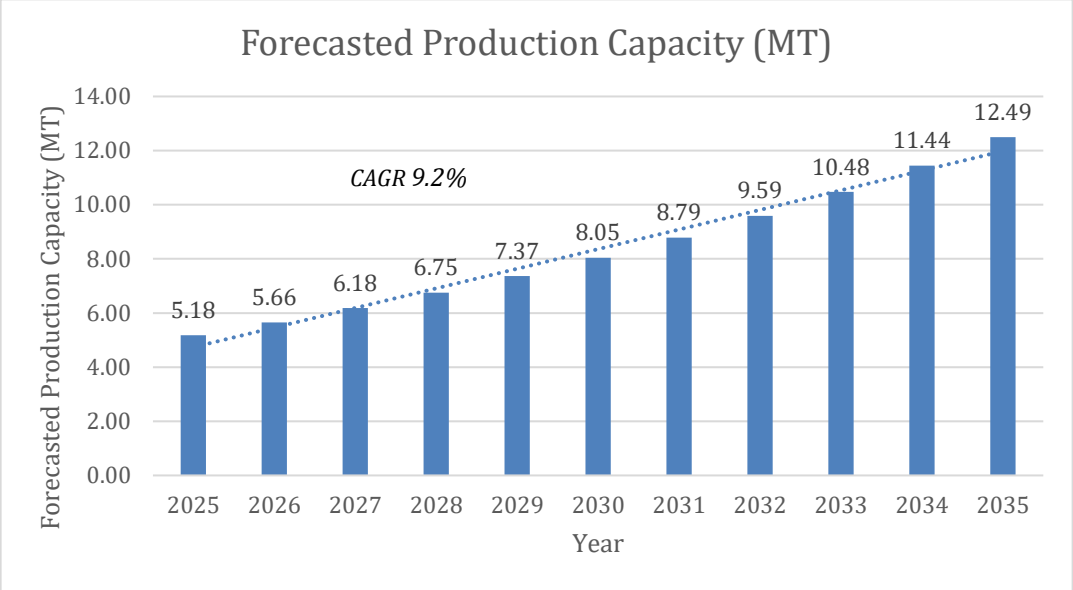
Total Capacity as of the latest annual reports combined is at **4.7 MT** for major producers. To account for non-availability/ backdated data of some producers, a multiplying factor of 1.10 (10% more) is taken implying the total capacity to be at **5.18 MT** [12]

[7] MoRTH

[8] GATI Shakti Report
[9] MoHUA Data
[10] Ministry of Finance
[11] Annual reports of companies
[12] Industry Analysis and Inputs

4.3 Future Market Size of DI Pipes in India (2025-35)

In the reports available in the public domain, the CAGR for the period 2025-35 is estimated at **12.50%.** Based on our market research feedback and insights from the industry, the CAGR for the said period should be at **10.1%.** However, the industry outlook also suggests that there might be a slowdown of growth in the sector owing to combination of sectoral demand saturation and cyclical nature of infrastructure investments. To account for the same, a CAGR of **9.2%** is proposed for the study period of 2025-35.



Forecasted Production Capacity - insights from available reports and industry

5. Current Technological Trends

5.1 Technical attributes of DI pipes [13]

- Ductile iron pipes are renowned for their high tensile strength, durability, and impact resistance, making them ideal for water and sewage systems.
- Protective coatings, such as cement mortar lining and zinc coating, enhance the lifespan of DI pipes and can increase India ductile iron pipes market value.
- DI pipes are also less prone to corrosion than steel pipes.
- Ductile iron pipes can handle high pressure, making them suitable for long-distance and large-diameter pipeline systems.
- If properly installed and maintained, Ductile Iron (DI) pipes can last between 80 to 100 years. Their high strength, corrosion resistance, and ability to withstand pressure fluctuations make them ideal for long-term infrastructure use.

[13] Insights from Industry

5.2 Applicable Standards and Codes

DI pipes in India are manufactured and used in accordance with several national and international codes:

- **Indian Code**: IS 8329:2000
- **ISO Code**: ISO 2531:2009
- **European Code**: BS EN 545:2010

These standards govern manufacturing, pressure ratings, and testing requirements, ensuring quality and reliability.

5.3 Technical Parameters for available DI pipes in India: [14]

Parameter	*Availability*	*Remarks*
Nominal Diameter (DN) (mm)	80, 100 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900, 1000, 1100, 1200	A few also supply upto 2200
Class	C20, C25, C30, C40, C50, C64, C100 K7, K9, K12	K Class is generally being used nowadays for water supply
Standard Length (m)	5.5	A few also supply 6 m pipes

Some of the commonly used Internal Linings are:

- Cement Mortar Lining of OPC / BFSC / SRC / HAC
- Cement Lining with Epoxy Seal Coat
- Cement Lining with Bituminous Seal Coat
- PU Lining

Some of the commonly used External Coatings are:

- Zinc Coating
- Alloy of Zinc & Aluminium
- PU Coating/ PE Coating
- Bitumen Coating
- Blue Epoxy
- Red Epoxy

[14] Jindal SAW, Electrosteel, Rungta etc DI Product Brochures

5.4 Software Tools [15]

WaterGEMS and SewerGEMS are commonly used tools for designing water distribution and sewer systems

5.5 Comparative Analysis of Various Substitutes for DI Pipes [16]

Parameter	DI Pipes [17]	PVC / CPVC Pipes [18]	HDPE Pipes[19]	Steel Pipes [20]	PCCP (Prestressed Concrete Cylinder Pipes) [21]
Typical Applications	Water distribution, sewage, industrial pipelines	Plumbing, cold/hot water supply, irrigation	Water mains, gas pipelines, sewerage	Transmission pipelines (oil, gas, water), fire-fighting	Large-diameter water transmission mains
Material Type	Ferrous	Thermoplastic	Thermoplastic	Ferrous metal (Carbon or Mild Steel)	Composite (Concrete core with steel cylinder and prestressing wire)
Strength	Very high mechanical and pressure strength	Moderate (higher in CPVC)	High flexibility, moderate tensile strength	Very high strength and pressure capacity	Very high structural and pressure strength
Corrosion Resistance	Moderate – requires internal lining (e.g., cement mortar) and external coatings (e.g., bitumen or PE wrap)	Excellent (non-metallic)	Excellent (non-metallic)	Poor (unless coated/galvanized)	Good (internally lined, externally protected)
Repair and Maintenance	Moderate – repair clamps or replacement needed	Easy	Easy to moderate	Difficult and costly	Complex and expensive
Cost	Moderate	Low to moderate	Moderate	High	High
Lifespan	75–100 years (with proper coatings)	30–50 years	50–100 years	25–50 years (varies with corrosion protection)	75–100 years
Environmental Impact	Recyclable, durable; energy-intensive to produce	Recyclable, but plastic-based	Recyclable, plastic-based	Recyclable, but energy-intensive to produce	Concrete and steel – both recyclable but energy-intensive

[15] Industry insights
[16] CPHEEO Manual on Water Supply and Treatment (Ministry of Housing and Urban Affairs, Govt. of India)
[17] IS 8329
[18] IS 4985
[19] IS 14333
[20] IS 3589
[21] IS 784

6. Competition Landscape

6.1 Focus Areas of Major Firms

The following chart depicts a clear picture of focus areas for major DI producers

Producers	*Water Supply*	*Wastewater Disposal*	*Irrigation*	*Industrial*	*Export*
Rashmi Metaliks Ltd	✓	✓			✓
Jindal SAW Ltd.	✓	✓		✓	
Electrosteel Castings Limited	✓	✓			✓
TATA Metalliks (TATA Ductura)	✓	✓		✓	✓
Electrotherm (India) Limited	✓	✓		✓	
Welspun Corp Limited	✓	✓	✓	✓	✓
Jai Balaji Industries Ltd.	✓				
ESL Steel Limited	✓			✓	
Rungta Pipes	✓	✓		✓	

6.2 Key Differentiators Among Suppliers [22]

- Competitive Pricing
    - Manufacturers such as Tata Metaliks, Rungta Mines who have the captive iron ore mines enjoy the price advantage
- Pre-Procurement Engineering Assistance (Designs & Drawings) / Pre-Sales Support
- Proven Experience in Execution
- Quality Assurance and Quality Control (QA/QC) Mechanisms
- Availability of Appurtenances (e.g., valves, joints)
- Strong Post-Sales Support

7. Major Users of DI Pipes [23]

Since Govt is the major source of supply for such DI Pipes, the following authorities are major implementers for DI Pipes

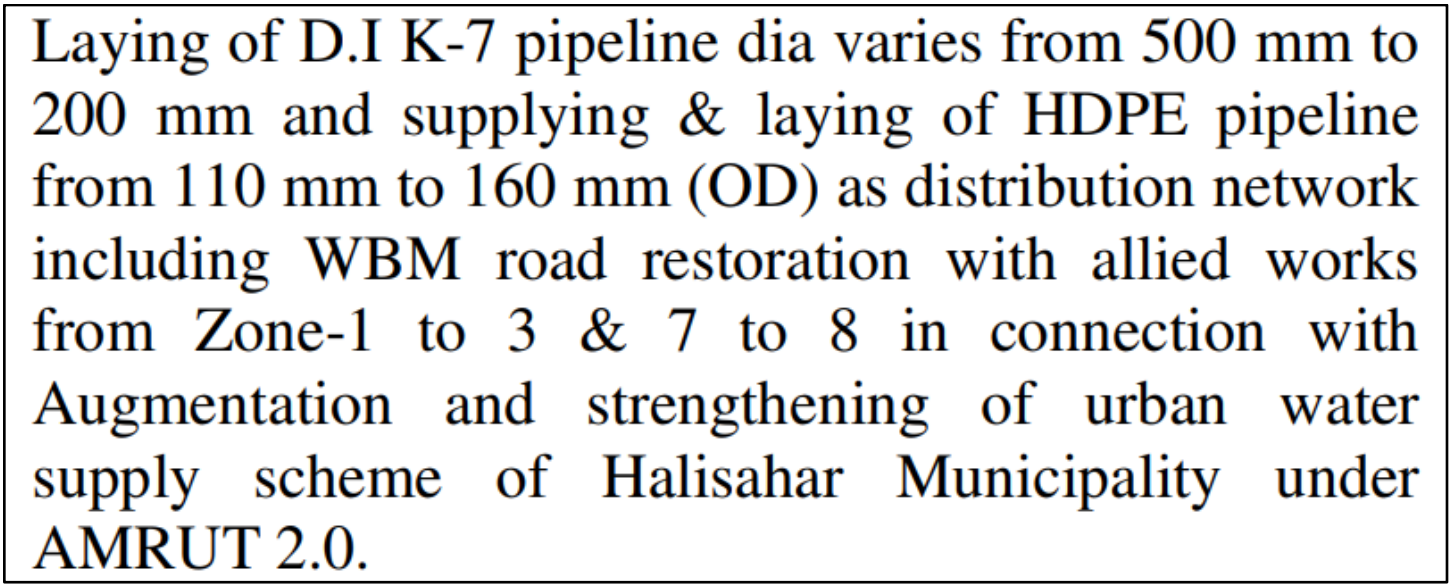
- Development authorities
- PHEs of states
- Irrigation departments

[22] Industry Insights
[23] Client Base of Major DI Pipe Firms

- Road Departments (limited use)

However, nowadays, Governments prefer to execute such water/ wastewater infrastructure projects in turnkey mode to avoid any possible conflict of interest.

Snapshot of a typical NIT is as below

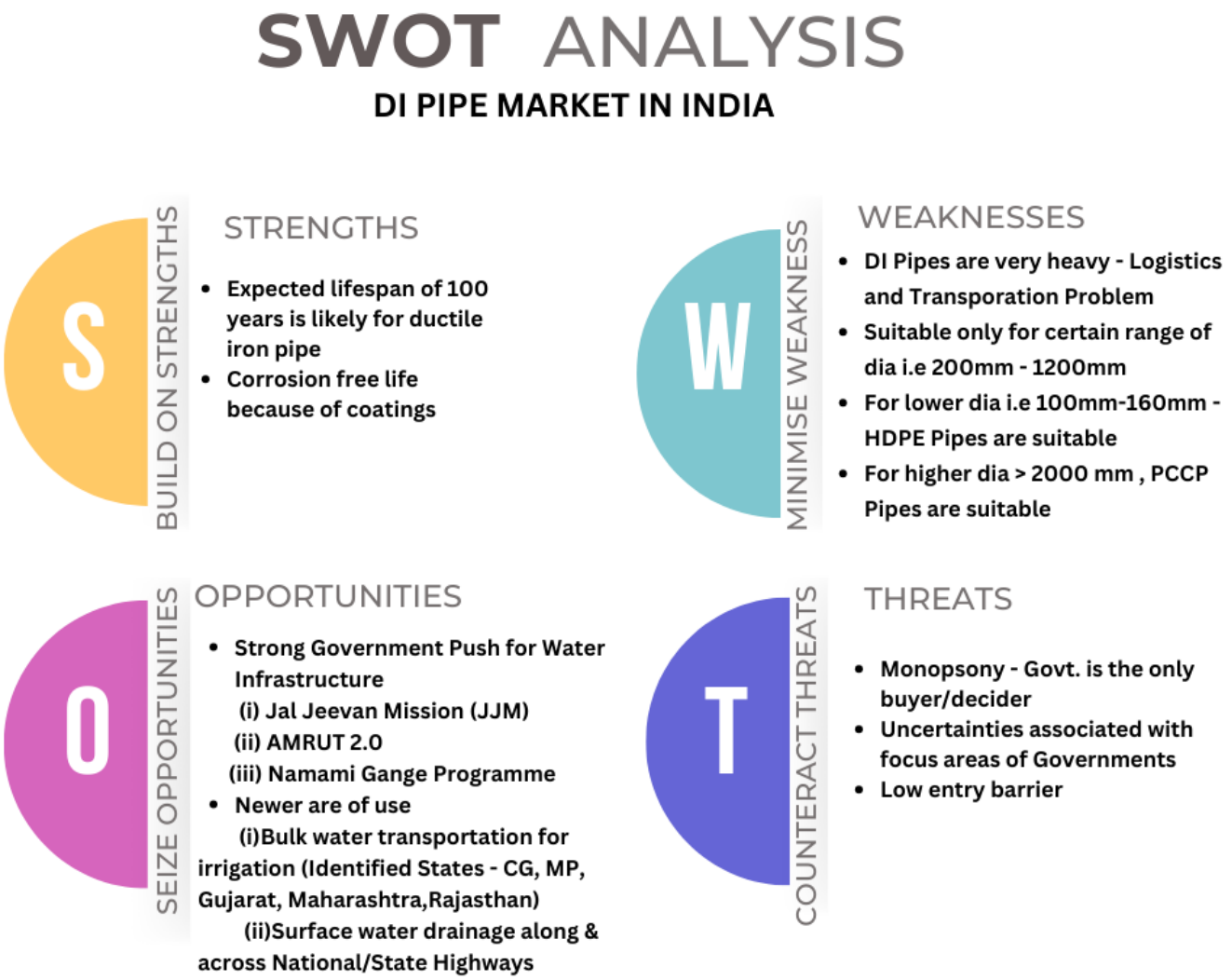


This necessitates the private infrastructure turnkey contractors to participate in such bids. Some of the major parties involved in executing water infrastructure projects in Urban Local Bodies (ULB's) are

- L&T
- KEC Infrastructure
- Shree Hari Infraprojects Pvt Ltd
- Shriram EPC Limited
- SPML Infra Ltd
- Megha Engineering and Infrastructure Limited
- Aquatreat engineering Pvt. Ltd
- Indian Hume Pipe

As a result, **private sector procurement now constitutes the majority (approx. 70-75%)**, reducing the share of direct government buying.

8. SWOT analysis of DI Pipe Market in India [24]



8.1 Opportunities in the India DI Pipes Market

- As per India ductile iron pipes market dynamics and trends, India's ongoing infrastructure development projects, including the Smart Cities Mission and various water supply and sanitation projects, aid the market.
- Rapid urbanization necessitates the expansion and upgrading of water and sewage infrastructure, increasing the demand for durable DI pipes.

[24] INSDAG Analysis with industry feedback

- Innovations in production processes and materials can lead to improved performance and cost efficiency, enhancing the competitiveness of ductile iron pipes.
- India can capitalize on its manufacturing capabilities to export ductile iron pipes to other developing countries with similar infrastructure needs.

8.2 Challenges that are impacting the Indian DI Pipes Market [25]

- Ductile iron pipes are heavy and bulky, leading to high transportation and installation costs that can affect DI pipes' demand forecast.
- These pipes require regular maintenance to ensure longevity and performance, adding to lifecycle costs.
- Prestressed Concrete Cylinder Pipe (PCCP) is an alternative which is commonly preferred by the clients in case of large-diameter applications.
- In addition to PCCP, Polyvinyl chloride (PVC) and [26]High-Density Polyethylene (HDPE) pipes, which are lighter and often cheaper, poses a significant threat to the market.
- Economic downturns and fluctuations in raw material prices, particularly iron and steel, can impact the profitability and cost-effectiveness of ductile iron pipe manufacturers.
- Advancements in alternative piping technologies and materials could lead to a shift in market preferences.
- The environmental impact of iron mining and production processes can lead to increased scrutiny and regulatory pressures, potentially affecting the industry.
- The demand for DI pipes has nearly reached its utilization capacity, with the growth curve gradually flattening as projects near completion.
- Infrastructure investments in India are cyclical, driven by government budgets and economic conditions, leading to fluctuating demand for DI pipes.

8.3 Threat - Potential Substitutes for DI Pipes

A. PVC (Polyvinyl Chloride) and CPVC (Chlorinated Polyvinyl Chloride) Pipes

- **Advantages:** Lightweight, lower cost, easy to install, and corrosion-resistant.
- **Limitations:** Lower strength, unsuitability for high-pressure applications, and environmental concerns related to plastic degradation.
- **Threat Level:** Moderate to High, particularly in low-pressure applications such as household water supply and drainage.

B. HDPE (High-Density Polyethylene) Pipes [27]

- **Advantages:** Flexibility, resistance to corrosion and chemicals, ease of handling, and lower transportation costs.

[25] Industry Insights
[26] Industry Insights
[27] DIPRA Website

- **Limitations:** Susceptible to deformation under high pressure and limited availability in large diameters. It is also vulnerable to deterioration from sunlight exposure and is prone to cracking
- **Threat Level:** High, especially in irrigation, sewage, and gas distribution applications.

C. Steel Pipes

- **Advantages:** High strength, suitability for high-pressure applications, and reliability in industrial environments.
- **Limitations:** Prone to corrosion, requires higher maintenance, and has a more complex installation process.
- **Threat Level:** Low to Moderate, mainly in industrial and high-pressure transmission applications.

D. Prestressed Concrete Cylinder Pipe (PCCP)

- **Advantages:** High durability, availability, and cost-effectiveness in drainage and sewage applications – suitable for larger diameter
- **Limitations:** Heavyweight, difficult handling, and potential leakage issues.
- **Threat Level:** Moderate, particularly in gravity-flow sewage applications

9. Joints & Fittings

In ductile iron (DI) pipeline systems, joints and fittings are essential components that enable secure connections, adaptability to alignment changes, and overall structural integrity. Various types of joints and fittings are used depending on installation requirements, pressure conditions, and service environment.

9.1 Types of Joints

1. Push-On Joints [28]

- A flexible joint where the spigot end of the pipe is pushed into a socket fitted with a rubber gasket, creating a pressure-tight seal.
- Two widely used configurations: FASTITE® and TYTON® joints.
- Allows for angular deflection of up to 5°, facilitating curves in pipeline alignment.
- Quick and easy installation even under wet-trench or underwater conditions.
- Tested to withstand over 1,000 psi internal pressure and 430 psi external pressure without leakage.
- Commonly used in underground water and sewer pipelines.

[28] DIPRA Joints Document

Push on Joint (*Electrosteel*)

2. Mechanical Joints[29]

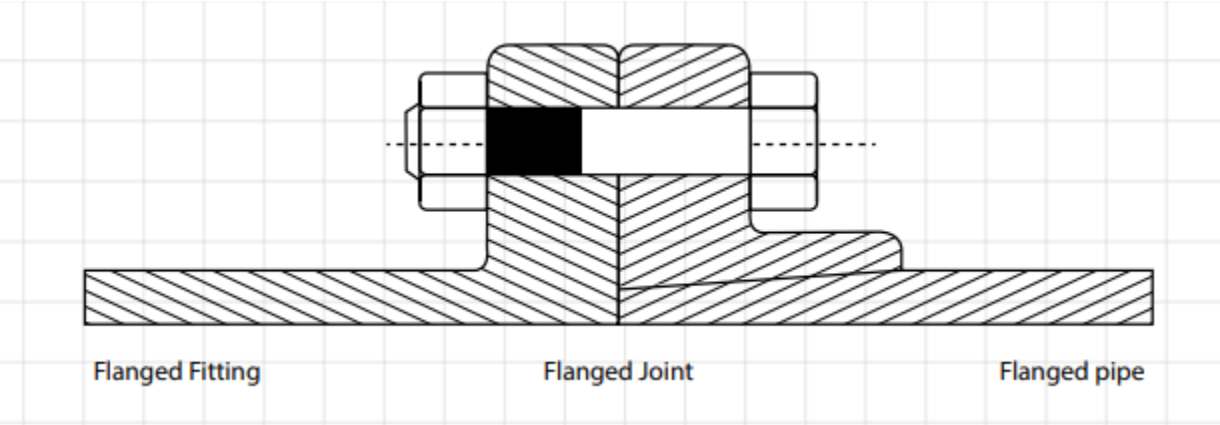
- A restrained joint system using a bolted gland and rubber gasket to secure the spigot and socket together.
- Provides moderate flexibility, allowing deflection based on pipe size (up to 8° for smaller diameters).
- Assembly requires only basic tools, making it simple but labor-intensive compared to push-on joints.
- Particularly useful for fittings where disassembly or reassembly may be needed.

Mechanical Joint (*Electrosteel*)

[29] Electrosteel and DIPRA

3. Flanged Joint: [30]

- Pipes and fittings are connected via matching flanges bolted together with a gasket between them.
- Designed for above-ground installations, pump stations, and treatment plants requiring rigid connections.
- Standard working pressure of 250 psi, with an option to achieve 350 psi for ≤24" pipes using special gaskets.
- Not recommended for buried applications due to rigidity.

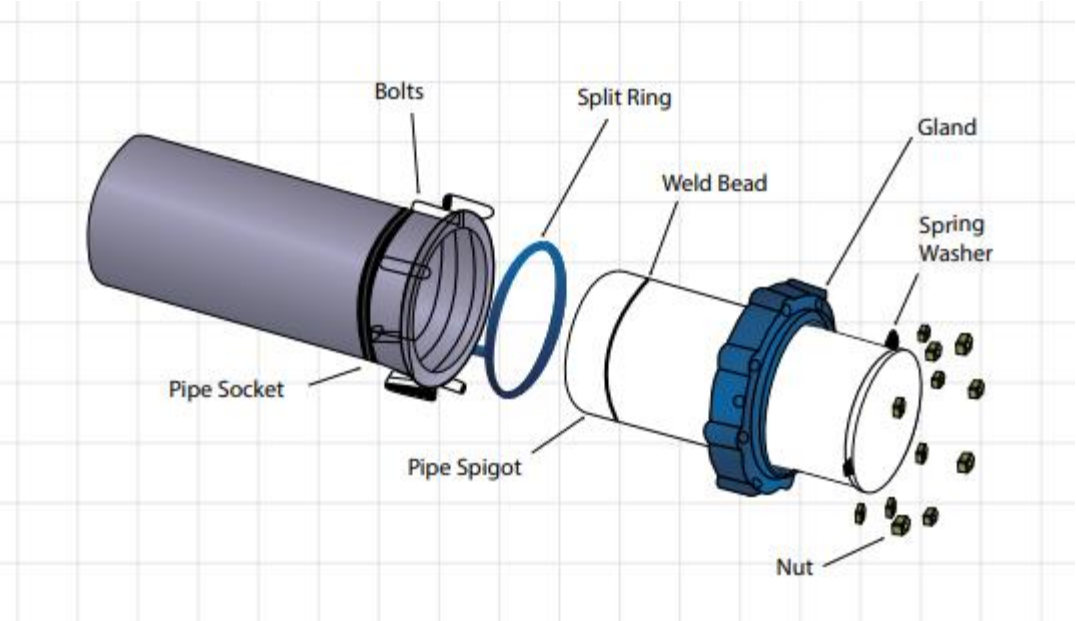


Flanged Joint (*Jindal SAW*)

4. Restrained Joints[31]

- Designed to arrest axial movement without requiring concrete thrust blocks.
- Critical for installations in loose soil, marshy areas, and hilly terrains.
- Available in various types:
    - Restrained Push-On Gaskets (with stainless steel elements for gripping action).
    - Specially Designed Push-On Restrained Joints (incorporating locking mechanisms).
    - Mechanical Restrained Joints (adapted from standard mechanical joints).
    - Field-Welded Restrained Joints (where retainer rings are welded onto spigots in the field).
- Suitable for high-pressure water transmission, rated up to 350 psi.

[30] Jindal SAW and DIPRA
[31] Jindal SAW and DIPRA

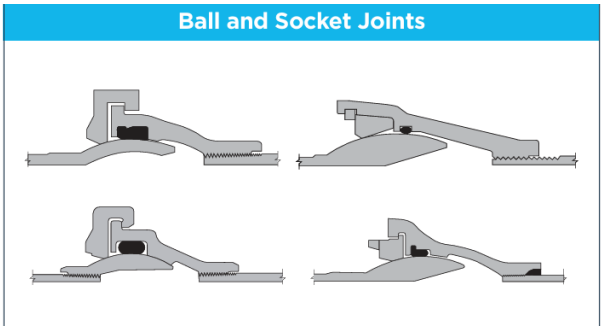


Restrained Joint (*Jindal SAW*)

Fittings in ductile iron pipelines allow changes in direction, branching, diameter adjustment, or closure.

5. **Ball and Socket Joint**[32]

- Ideal for subaqueous crossings (e.g., river or lake installations).
- Provides high flexibility, with deflection up to **15° per joint.**
- Boltless assembly featuring a machined ball-and-socket design, offering strength and leak-free performance even when deflected.

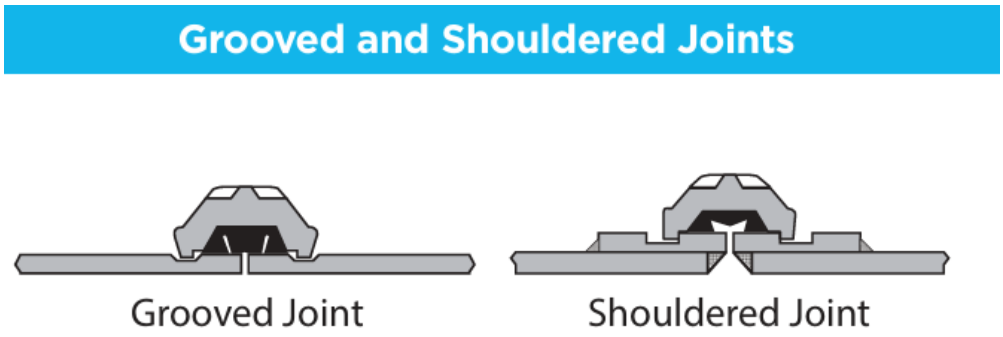


Ball and Socket Joint (*DIPRA*)

6. **Grooved and Shouldered Joint** [33]

- Mechanical couplings lock pipes with an external U-shaped gasket compressed between grooved or shouldered ends.
- Available in rigid or flexible types.
- Primarily used for above-ground piping and mechanical systems.

[32] DIPRA
[33] DIPRA



Grooved and Shouldered Joint (*DIPRA*)

9.2. Salient Points

- Companies that produce both pipes and fittings offer streamlined supply chain management, reducing complexity and ensuring compatibility between components as it acts as a single source of procurement. Additionally, buyers benefit from consistent quality, reliable after-sales support, and a single point of accountability for the entire pipeline system.
- **Fittings** account for **approximately 3% of the total pipe weight**
- Presently, Electrosteel, Jindal SAW and Rashmi Metaliks have the facilities for joints & fittings.
- **Key Hubs for Fittings**:
    - Ludhiana (Punjab)
    - Coimbatore (Tamil Nadu)

10. Probable future entrants in the DI Pipe Industry [34]

Apart from the companies mentioned earlier, the following companies are contemplating entering the DI pipe market and accordingly carrying out the Due Dilligence process.

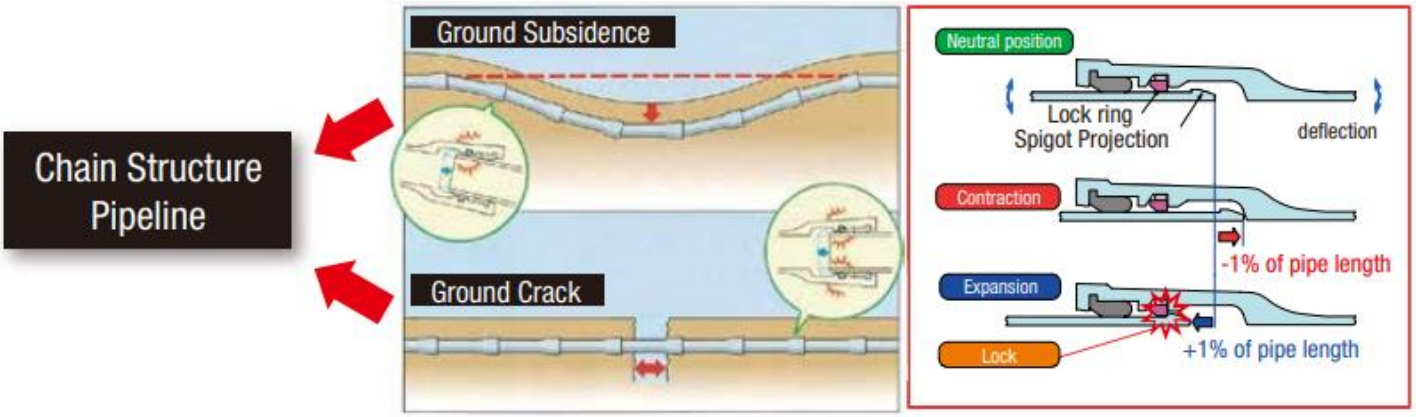
- Shyam Metalics
- Shyam Steel
- Vishvaraj Environment Pvt Ltd
- Sesa Goa Iron Ore Pvt Ltds
- Adhunik Metaliks Limited

[34] Industry Insights

11. Major Technological and product innovation /Change in Demand and offerings of Manufacturers [35]

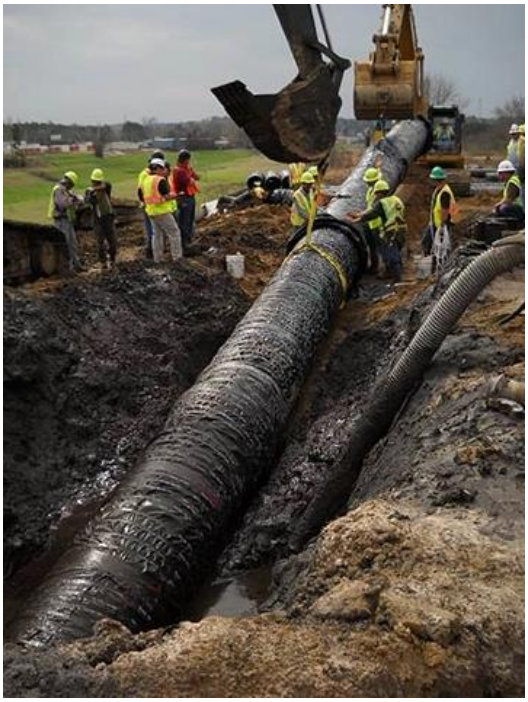
Seismic-Resistant DI Pipes: The Earthquake Resistant Ductile Iron Pipe (ERDIP) absorbs the large ground displacement such as ground subsidence and crack by joints extension/contraction, deflection, and anti-pull out structure.

When one joint fully extends at the event of large earthquakes, the joint can pull the next pipes one after another like a buried chain. Therefore, this pipeline is called chain structure pipeline.



[35] Industry Insights

Trenchless Installation Techniques: Rising use of DI pipes for horizontal directional drilling (HDD) and micro-tunneling to reduce excavation costs.



12. Procurement and Logistics [36]

- **Procurement** is largely decentralized and handled at the state level.
- The use and procurement of **Ductile Iron (DI)** pipes are managed by state governments and local bodies, as water and sanitation fall under the State List. However, central government policies and schemes like Jal Jeevan Mission and AMRUT significantly drive the demand.
- **Logistics** pose no significant challenge as nesting in of smaller dia pipes within larger dia pipes for transportation is generally adopted.
- Since the typical length of pipes ranges between **5.5 to 6.0 m**, transportation through standard available trucks is feasible and poses no significant **impediment** towards road **maneuverability.**
- However, **local manufacturers have an advantage** due to reduced freight costs.

[36] INSDAG Analysis with industry insights

13. Export Market Overview

Key Export Markets:

- **Europe** – Primarily for maintenance and rehabilitation
- **Middle East & Africa** – For new infrastructure development

Requirements

- Prior Approvals to enter export markets
- **Water Regulations Advisory Scheme (WRAS) Certifications** - *WRAS certification for DI (Ductile Iron) pipe means the pipe and its components have been approved by the Water Regulations Advisory Scheme in the UK as meeting the requirements for water safety and quality. This certification confirms that the pipe materials, fittings, and other components do not contaminate the drinking water supply when used in plumbing systems.*
- Sustainability credentials for the producer are being insisted increasingly
- Sustainability is a crucial aspect for companies which are exporting to Europe. The Carbon Border Adjustment Mechanism (CBAM) will be fully applicable to Indian companies exporting to the EU starting **January 1, 2026**