From the finest steel to the finest pipes
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Essar Steel

Essar Steel is a global integrated steel producer with an annual capacity of 14 million tonnes with a strong presence in intensive steel consuming markets of Asia and North America. It has operations in four countries:

- A 10 MTPA integrated facilities in India
- A 4 MTPA steel plant in Canada
- A 7 MTPA Taconite plant under execution in USA
- A 0.4 MTPA downstream complex in Indonesia

Essar Steel India is an integrated steel producer with an annual production capacity of 10 million tonnes. Essar Steel’s manufacturing facility comprises ore beneficiation, pellet making, iron making, steel making, and downstream facilities including cold rolling mill, galvanising, pre-coated facility, steel processing facility, extra wide plate mill and a pipe mill. The steel plant located at Hazira has modern infrastructure like a power plant and a port that can handle 30 million tonne cargo annually.

With a focus on value added products, it produces over 300 grades of steel conforming to quality standards of international certification agencies like API, ABS, NACE, Lloyd’s Register to name a few. Essar Steel uses information technology extensively for its operations thereby ensuring consistent quality of its products.

Essar Steel has set up a 1.5 MTPA plate mill and a 0.6 MTPA pipe mill at Hazira to add further value to its product portfolio. With one of India’s largest steel processing and distribution network with a capacity of 4 MTPA located at several industrial hubs, Essar Steel manufactures customised products catering to a variety of industry segments.

Sustainability has been given due importance in design and operations and the company has become a zero waste company. It has received many accolades and recognitions from reputed institutions like Centre for Science and Environment, Water Digest, World Steel Association, Golden peacock, Green Tech foundation, CII, CII-ITC Sustainable Development Center, Carbon Disclosure Project to name a few.
Essar Steel Pipes

From the finest steel to the finest pipes

The growing demand for oil and gas across the world and in India have created a huge demand for pipes. Reasons being increasing E&P budgets, huge gas discoveries and a large number of old oil and gas pipelines that need to be replaced.

Recognising the potential of the pipe market in India and the world, Essar Steel started operations of a state-of-the-art pipe mill at Hazira. The 0.6 MTPA pipe mill includes top-line Helical Submerged Arc Welded (HSAW) and Longitudinal Submerged Arc Welded (LSAW) mills, and internal and external coating units with a capacity of up to 2 million square metres annually; that manufacture world-class pipes.

Being a fully-integrated steel manufacturer with quick access to raw material gives Essar Steel a direct advantage. The pipes are manufactured using heavy plates produced in one of the world’s widest plate mills, and hot rolled coils, both of whose manufacturing facilities are located within the Hazira complex itself. Their proximity ensures a steady supply of raw material, and the port location of the plant provides Essar Steel with a logistical advantage ensuring timely execution and delivery of orders across the world.

Essar Steel is one of the few manufacturers globally, capable of producing API (American Petroleum Institute) grade steel, with a supply track record of over 3.2 million tonnes. The Essar Steel pipe mill is API certified to make pipes of low sulphur that finds wide acceptance and approval from international oil and gas majors.

Supported by the best technology and the latest testing equipment including plate ultrasonic testing, real time radiography (fluoroscopy), hydrostatic testing and final ultrasonic testing (automatic weld cut), Essar Steel pipes ensure adherence to international standards and a high degree of precision, consistency and quality.
Water Line

Essar Steel Pipe Mill has a two – step technology (offline SAW Welding) which ensures quality with high productivity and is also economically beneficial. With vast experience in the water pipe line segment, Essar has provided services to various EPC contractors and Government bodies such as -

- Karnataka Urban Water Supply & Drainage Board
- Gujarat Water board (Narmada Canal, Dhanki – Navda & Navda-Bhudel project)
- Surat Municipal Corporation
- Mysore Water Supply board, Irrigation Department,
- JMC projects India Ltd.,
- Karnataka Nirvari Nigam Limited,
- GVPR Engineering Ltd.,
- Mahan Power plant,
- MIDC Chindwada project,
- Subhash Projects and Marketing Limited.

**Salient Features**

- Tight tolerance in straightness, roundness and accuracy of diameter even without cold expansion.
- External and Internal Lining (Food Grade Epoxy) to endure corrosion.
- High Pipe forming speed by continuous tack welding.
- Implementation of process automation technology for high quality.

**Steel Used for Pipe production**

- IS 10748, IS 2062, API GR-B - API X80

### Dimension

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>16 Inch – 110 Inch</td>
</tr>
<tr>
<td>Thickness</td>
<td>6.4 mm – 25.4 mm</td>
</tr>
<tr>
<td>Length</td>
<td>12.50 Meter Maximum</td>
</tr>
<tr>
<td>Grade</td>
<td>Up to API 5L X80</td>
</tr>
<tr>
<td>External Coating</td>
<td>4 Inch – 100 Inch Diameter</td>
</tr>
<tr>
<td>Internal Coating</td>
<td>8 Inch – 100 Inch Diameter</td>
</tr>
</tbody>
</table>
Essar Steel Pipe mill has State-of-the-art HSAW & LSAW technology and the latest testing equipment which ensures high quality and adherence to international standards. Having been audited by Technip, Dubai Petroleum, Occidental Petroleum, EIL, GAIL, IOCL, SHELL, SAIPEM, ENI, SOCAR, and CHEVRON, the audit results and approvals with well-known End Users, EPC contractors and Third Party Inspection Agencies showcases our proven capabilities in Pipe manufacturing. With vast experience in the API segment. Essar Steel has provided its services to many well known agencies such as -

- Essar offshore Subsea Ltd.
- Mundra port SEZ India
- Gas Authority of India Limited (GAIL),
- Dubai Petroleum Establishment
- Occidental petroleum Corporation Qatar

**General Requirements**
- Tight and uniform control on pipe dimension throughout the pipe length suitable for critical services like offshore applications.
- Close Dimension Tolerance (Project Specific Size spread between Diameters 16” – 60”).
- External Coating and Internal Lining to endure corrosion.
- High quality weld, resistant to cracking and restriction to repair.
- Flexibility of thickness and grade, capacity to form pipes upto 65 mm thickness with close diameter-thickness ratio.
- Adherence to international standards and specific requirements such as requirement for sour gas service, offshore application etc.
- Process automation technology for high quality

**Steel Used for Pipe production**
- API 5L Gr B to API 5L X80 in sweet services and upto X65 in sour services (specially offshore applications)
- ASTM, BS and other international standards applicable for Oil & Gas pipes

**Dimension**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>16 Inch – 60 Inch</td>
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<tr>
<td>Thickness</td>
<td>6.4 mm – 65 mm</td>
</tr>
<tr>
<td>Length</td>
<td>12.5 Meter Maximum</td>
</tr>
<tr>
<td>Grade</td>
<td>Up to API 5L X80</td>
</tr>
<tr>
<td>External Coating</td>
<td>4 Inch – 100 Inch Diameter</td>
</tr>
<tr>
<td>Internal Coating</td>
<td>8 Inch – 100 Inch Diameter</td>
</tr>
</tbody>
</table>

**Service Condition**
- Sour and Non Sour (Sweet)
- Offshore and Onshore
Coil Opening
Coil End Welding
Ultrasonic Testing of Coils covering Full Width
Ultrasonic Testing of Weld, HAZ and Ends
Magnetic Particle Inspection of Ends
Hydrotester

HSAW Process Flow
Helical Submerged Arc Welded (HSAW) Pipes

The Essar Steel HSAW mill has a capacity of 275,000 TPA producing consistent-quality HSAW pipes conforming to international quality standards. The pipes are manufactured using a two-step process that involves continuous tack welding as well as internal and external submerged arc welding at separate welding stations.

One of the unique features of the HSAW mill is that it is a mirror-image mill which can manufacture pipes of the same size or two different sizes simultaneously at high speed, thereby reducing delivery time.

Salient Features of the HSAW Mill

- High forming speed by continuous tack welding, laser seam tracking system and advanced flux management
- Tight tolerance even without cold expansion with respect to straightness, roundness and accuracy of diameter
- Main drive feed motor with 500,000 Nm torque enabling pipe formation of 25.4 mm wall thickness
- Excellent mechanical properties (high strength and toughness) attained through fine microstructure
- Offline SAW welding to avoid any hindrance in weld quality due to forming process

State-of-the-art Technology, World-renowned Suppliers

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube mill 1</td>
<td>Byard, Malaysia</td>
</tr>
<tr>
<td>Tube mill 2</td>
<td>Phamitech, China</td>
</tr>
<tr>
<td>ID/OD forming line – 3 sets each mill</td>
<td>Uhrhan &amp; Schwill, Germany</td>
</tr>
<tr>
<td>Final ultrasonic testing machine</td>
<td>GE, Germany</td>
</tr>
<tr>
<td>X-ray machine</td>
<td>YXlone, Germany</td>
</tr>
<tr>
<td>Coil ultrasonic machine, intermediate UT machine</td>
<td>RD-Tech, Canada</td>
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Capability

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<tr>
<td>Capacity</td>
<td>275,000 TPA</td>
</tr>
<tr>
<td>Diameter</td>
<td>406 – 2,540 mm</td>
</tr>
<tr>
<td>Thickness</td>
<td>6 – 25.40 mm</td>
</tr>
<tr>
<td>Grade</td>
<td>Up to API 5L- X-80, PSL-2</td>
</tr>
<tr>
<td>Pipe length (max)</td>
<td>12,500 mm</td>
</tr>
<tr>
<td>Coil width range</td>
<td>900 – 2,000 mm</td>
</tr>
<tr>
<td>Coil weight</td>
<td>30 MT (max)</td>
</tr>
<tr>
<td>Forming speed</td>
<td>4 – 8 m / min</td>
</tr>
</tbody>
</table>

Applications

- Onshore and offshore oil and gas pipelines
- Refineries
- Project / Terminal piping water and sewage distribution and transmission lines
- Irrigation systems
- Power plants
- Pipes for potable water
LSAW Process Flow

1. Plate Ultrasonic Testing
2. Plate Edge Milling
3. Plate Edge Crimping
4. End Bevelling
5. Mechanical Expander
6. Real Time Radiography
7. Hydrotester
8. Ultrasonic Testing
9. Radiography Testing
Longitudinal Submerged Arc Welded (LSAW) Pipes

The Essar Steel LSAW mill, with an installed capacity of 325,000 TPA, produces high-quality pipes by incorporating the world-renowned hybrid JCO technology, which gives flexibility to the manufacturing process in terms of thickness and grade. The mill possesses the latest inspection and testing equipment to meet specific requirements.

Salient Features of the LSAW Mill

- Pipe production with very close diameter-thickness ratio
- Ultrasonic testing capable of scanning 100% area of up to 5 metres to check internal soundness prior to pipe forming
- 5,600 MT JCO press having a capacity to form pipes of 65 mm WT
- Fully-automated size and data-controlled cold expander (13 m)

State-of-the-art Technology, World-renowned Suppliers

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCO forming machine and pre-bender, tack welder</td>
<td>YSD, China</td>
</tr>
<tr>
<td>End beveling</td>
<td>Linsinger, Germany</td>
</tr>
<tr>
<td>ID/OD and cross seam welding machine</td>
<td>Uhrhan &amp; Schwill, Germany</td>
</tr>
<tr>
<td>Plate UT, Final ultrasonic testing machine</td>
<td>GE, Germany</td>
</tr>
<tr>
<td>Hydrotester, expander, edge milling</td>
<td>Iprolam, Romania</td>
</tr>
</tbody>
</table>

Capability

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>325,000 TPA</td>
</tr>
<tr>
<td>Diameter</td>
<td>406 – 1,524 mm</td>
</tr>
<tr>
<td>Thickness</td>
<td>6 – 65 mm</td>
</tr>
<tr>
<td>Grade</td>
<td>Up to API 5L – X-80</td>
</tr>
<tr>
<td>Pipe length (max)</td>
<td>12,500 mm</td>
</tr>
</tbody>
</table>

Applications

- Onshore and offshore oil and gas pipelines
- Pipes for potable water
- Refineries
- Power plants
- Structural pipes for offshore structures and piles

Equipment Supplier

- JCO forming machine and pre-bender, tack welder: YSD, China
- End beveling: Linsinger, Germany
- ID/OD and cross seam welding machine: Uhrhan & Schwill, Germany
- Plate UT, Final ultrasonic testing machine: GE, Germany
- Hydrotester, expander, edge milling: Iprolam, Romania
Essar Steel Pipe Mill
World-class Processes, Ultra-modern Facilities

Continuous Tack Welding

<table>
<thead>
<tr>
<th>Power source</th>
<th>1,500 amps</th>
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</thead>
<tbody>
<tr>
<td>Gas</td>
<td>Argon and CO₂ / O₂ mixture or CO₂ gas</td>
</tr>
</tbody>
</table>

Salient Features

- Pipe forming and continuous tack welding by gas metal arc welding (GMAW)
- Laser seam tracking system to keep the wire always in the centre of the weld groove even at higher welding speeds of up to 6 m / min

Inside Welding and Outside Welding

The pipe is welded from inside and outside by automatic SAW as per ASME Sec. IX or other customer specification.

<table>
<thead>
<tr>
<th>Wire arrangement</th>
<th>5 wire tandem welding system (1 DC &amp; 4 AC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>6 mm – 65 mm</td>
</tr>
<tr>
<td>Diameter</td>
<td>406 – 2,540 mm</td>
</tr>
<tr>
<td>Grade</td>
<td>Up to API 5L – X-80</td>
</tr>
<tr>
<td>Welding speed</td>
<td>0.5 to 2.5 m / min</td>
</tr>
<tr>
<td>Current</td>
<td>2,000 Amp DC, 1,500 Amp AC and 1500 Amp AC</td>
</tr>
</tbody>
</table>

Inside Diameter Welding

Salient Features

- Automatic flux heating, feeding and recycling system to avoid contamination of flux
- Precise measurement of curves of the welding process with the true-RMS (root-mean-square) converters for each arc
- Pre-programmed welding, crater fill and burn back procedure
- Data record and long-time storing mechanism for referencing actual welding parameters of each pipe
- Automatic Laser Seam Tracking and stick-out control system for accurate tracking in the horizontal and vertical direction

Outside Diameter Welding

Power source 1,500 amps
Gas Argon and CO₂ / O₂ mixture or CO₂ gas
Pipe Forming and Continuous Mig Welding

Inside and Outside SAW Welding: Real Time Radiography of Weld and Visual Inspection of Weld and Pipe Body

End Bevelling

At end bevelling, the pipes ends are machined and prepared for field welding.

<table>
<thead>
<tr>
<th></th>
<th>HSAW</th>
<th>LSAW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>406 – 2,540 mm</td>
<td>406 – 1,524 mm</td>
</tr>
<tr>
<td>Thickness</td>
<td>6 – 25.4 mm</td>
<td>6 – 65 mm</td>
</tr>
<tr>
<td>Cutting speed</td>
<td>70 rpm</td>
<td>110 rpm</td>
</tr>
<tr>
<td>Number of tool holder</td>
<td>2 tool post / head</td>
<td>2 tool post / head</td>
</tr>
</tbody>
</table>

**Expander**

The expander is a fully-automatic CNC machine that minimises residual stresses and improves mechanical properties. It is used to achieve roundness, straightness and accuracy of diameter.

**Salient Features**

- High speed PLC enabling excellent controls of operation
- Automatic seam detection and positioning
- 13 m single boom expander to achieve uniform dimensional tolerance throughout the length

**End Bevelling**

At end bevelling, the pipes ends are machined and prepared for field welding.

**Salient Features**

- Fully-automatic CNC machine to control parameters such as bevel angle and root face with customer requirements
- Automatic pipe length measurement after chamfering of the edges

**Hydrostatic Tester**

The hydrostatic test involves filling the vessel or pipe system to aid in leak detection, and pressurization of the vessel to the specified test pressure.

<table>
<thead>
<tr>
<th></th>
<th>HSAW</th>
<th>LSAW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>406 – 2540 mm</td>
<td>406 – 1524 mm</td>
</tr>
<tr>
<td>Thickness</td>
<td>6 – 25.4 mm</td>
<td>6 – 65 mm</td>
</tr>
<tr>
<td>Test Pressure</td>
<td>300 Bar Maximum</td>
<td>350 Bar Maximum</td>
</tr>
</tbody>
</table>

**Salient Features**

- PLC control with a digital data recording system.
- Auto Centering of pipe.
- Chart recorder to record the test pressure and holding time.
- Automatic shield barrier to ensure safety.
Coating Process Flow

Bare Pipe Entry

Pre-heating and Shot Blasting

Visual Inspection

Shot Blasting

Internal Epoxy Coating

Stock Yard or Dispatch

Final Visual Inspection and Marking

Coating Inspection with High Voltage Flaw Detector
Coating Facility

Oil and gas exploration and production companies face significant technical challenges – protecting carbon steel pipelines from corrosion and addressing significant insulation requirements as lines are installed at larger lengths and at greater sea-bed depths. Onshore oil and gas transportation pipelines require adequate protection against corrosion to ensure reliable service over a long period of time.

The Essar Steel pipe mill coating unit has an annual external coating capacity of 2 million square metres and an annual internal coating capacity of 1 million square metres. It deploys external coating like Fusion Bonded Epoxy (FBE), dual layer FBE, 3 LPE, 3 LPP and Polyurethane to prevent corrosion, and liquid epoxy solvent base and solvent-free internal coating to improve product flow.

Salient Features of the Coating Facility

- Deploys buggy system which facilitates pipe specification and eliminates air entrapment
- Pipe curing system for higher productivity
- Dust-free atmosphere by separating shot-blasting and coating

State-of-the-art Technology, World-renowned Suppliers

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBE coating system, adhesive and PE coating extruders, fume exhaust system</td>
<td>Socotherm, Italy</td>
</tr>
<tr>
<td>Blasting system, induction heaters, internal coating plant</td>
<td>Nanjing, China</td>
</tr>
</tbody>
</table>

Capability

<table>
<thead>
<tr>
<th>External Coating</th>
<th>Capacity</th>
<th>Diameter</th>
<th>Type of coating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 mill sq m / annum</td>
<td>101.6 – 2,540 mm</td>
<td>FBE, 3LPE, 3LPP, DFBE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal coating</th>
<th>Capacity</th>
<th>Diameter</th>
<th>Type of coating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 mill sq m / annum liquid epoxy</td>
<td>203.2 – 2,540 mm</td>
<td>Liquid epoxy solvent base and solvent free</td>
</tr>
</tbody>
</table>

Phosphate and Chromate Treatment → Pipe Heating → FBE Application → Adhesive and Polyethylene / Propylene Application

Removal of Coating from Ends (Cut Back) → Water Quenching → Curing → Final Visual Inspection and Marking
Testing Equipment

The Essar Steel pipe mill has full-fledged facilities for inspection and testing to ensure production of high-quality pipes through the implementation of best practices and quality control initiatives. A highly experienced, qualified and trained manpower maintains efficiencies in terms of processes and training, continuous technological advancements and upgradations.

Quality checks start right from the receipt of raw material till the final completion of the product. Sophisticated quality monitoring systems like plate ultrasonic testing, real time radiography (fluoroscopy), hydrostatic testing and final ultrasonic testing (automatic weld cut) ensure adherence to international standards. The mill also has a well-equipped laboratory for testing pipes for its strength, toughness, macro and microstructure.

State-of-the-art Technology, World-renowned Suppliers

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate ultrasonic testing</td>
<td>GE Inspection Technology, Germany</td>
</tr>
<tr>
<td>Real time radiography (fluoroscopy)</td>
<td>YXlone, Germany</td>
</tr>
<tr>
<td>Hydrotester</td>
<td>Iprolem, Romania</td>
</tr>
<tr>
<td>Final ultrasonic testing (automatic weld cut)</td>
<td>GE Inspection Technology, Germany</td>
</tr>
</tbody>
</table>

Plate Ultrasonic Testing

The equipment used in the testing of LSAW pipes uses probes and provides online A-scan and C-scan presentation of flaws associated. The system is very flexible – the number of probes and the location of each probe along the plate can be modified easily. An audio-visual alarm and automatic spray marker will be operated whenever a flaw is detected.

Real time radiography (fluoroscopy)

This process is used to inspect the pipe weld seam continuously for any welding defect with the help of an industrial x-ray.

Hydrotester

The hydrotester is PLC controlled and equipped with a digital data recording system and requires minimal operator intervention. It is capable to test the pipe up to 350 bar with an automatic shield barrier and can auto centre the pipe.

Final Ultrasonic Testing (automatic weld cut)

This process is used to inspect the pipe weld seam continuously for any welding defect. The system consists of an automatic device for lifting and lowering of individual test levels. It is a self-sufficient transverse shift device for each guiding block for correction of the probe symmetry with weld deviations.
NACE Laboratory

The plant is equipped with latest generation NACE testing facility to evaluate corrosion resistance in pipes. Corrosion resistance is evaluated using testing for Stress Corrosion Cracking, Chloride Corrosion, Hydrogen Induced Cracking, Pitting corrosion & Crevice corrosion. The testing facility and procedures are in compliance with all the major technical specifications as per NACE, OTIS and customer standards namely NACE TM-0284, NACE TM-0177 etc. The testing facility maintains a very high level of safety. The facility is quarantined and equipped with advance safety features including the gas sensing device with visual & audio alarm, safety gadgets and emergency exit.

Hydrogen Induced Cracking Test

Sulphide Stress Corrosion Cracking Test – Method A (Tensile Method)

Health, Safety and Environment

Essar Steel has always remained committed to achieving excellence in health, safety and environment by providing and maintaining safe and healthy working conditions and following operating practices that protect the environment.

Environmental Awareness and Training

A continuous environmental awareness drive and environmental training is being implemented through in-house and external training sessions that is a mandate for all employees including senior management. All Essar employees are covered under the Environmental Awareness Programme. The training network is comprehensive and aims and trains each individual at a particular site.

Development Projects

- Eco-restoration by greenbelt development, mangrove plantation, creation of eco-life and marine life
- Implementation of a vigorous Environment Management System
- Tracking of emissions and discharges through online monitors
- Robust oil consumption and recovery tracking system
- Installation of two Online Ambient Air Quality Monitoring stations and 15 online stack analysers

Essar Steel is marching towards a green drive, richer biodiversity and zero discharge as an assurance to the ever-growing and sustained efforts towards environmental protection. The company is the first Indian steel company to receive ISO-14001 certification. Essar Steel is recognised by the World Steel Association for actively participating in CO₂ emission data collection – testimony to the fact that Essar Steel is the best-in-class and sets industry benchmarks.
Certifications and Approvals

- API 5L, API 2B by American Petroleum Institute
- ISO / TS 29001 by API
- ISO 9001: 2008 by DNV
- BIS Certificate
- OHSAS 18001:2007
- ISO 14001:2004
Marking and Ordering

**Marking**
- Pipe number, heat number and ASL number
- Pipe size, steel grade, product specification level, type of pipe
- Hydro test pressure
- API monogram
- Month and year of manufacture
- Length and weight of pipe

**Ordering**
- Outer diameter
- Wall thickness
- Grade
- Product specification level
- Quantity
- Type of pipe
## HSAW & LSAW Dimensions

Unmatched Properties, Infinite Possibilities

### HSAW

<table>
<thead>
<tr>
<th>Pipe diameter (mm)</th>
<th>Wall thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4</td>
<td>8.7</td>
</tr>
<tr>
<td>12.7</td>
<td>14.3</td>
</tr>
<tr>
<td>15.9</td>
<td>19.1</td>
</tr>
<tr>
<td>20.6</td>
<td>22.2</td>
</tr>
<tr>
<td>23.8</td>
<td>25.4</td>
</tr>
</tbody>
</table>

Grade: API 5L
<table>
<thead>
<tr>
<th>Pipe diameter (mm)</th>
<th>Wall thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
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- X-80
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