



JFE SAWL PIPE



JFE Steel Corporation

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Introduction

JFE Steel Corporation takes full advantage of advanced technologies, a wealth of experience acquired over many years, and state-of-the-art facilities to meet customer needs for high grade, high quality pipes. We produce a complete line of tubular products in a wide size range, and have an ample production capacity.

Among the many pipe and tubular products which JFE Steel produces, this catalog features large diameter welded pipes manufactured by SAWL methods, i.e. the UOE process and press bending (NEO Press™) process. SAWL means Longitudinal submerged arc-welding.

We produce pipes with following features ;

- odd size pipe in addition to standard outside diameter pipe,
- heavy wall thickness pipe,
- high grade pipe up to grade X100.

All JFE Steel products are manufactured by an integrated production system under strict quality control. JFE SAWL pipes including UOE pipes and NEO Press™ pipes meet even your most specialized requirements in a variety of applications, including high tensile strength line pipe for gas and petroleum transportation, pipes for power plants and chemical plants, pipes for waterworks/sewerage, structural pipe for offshore platform and building, and steel pipe piles. These products are used in Japan and overseas, and have earned an outstanding reputation for quality, economy, and service.

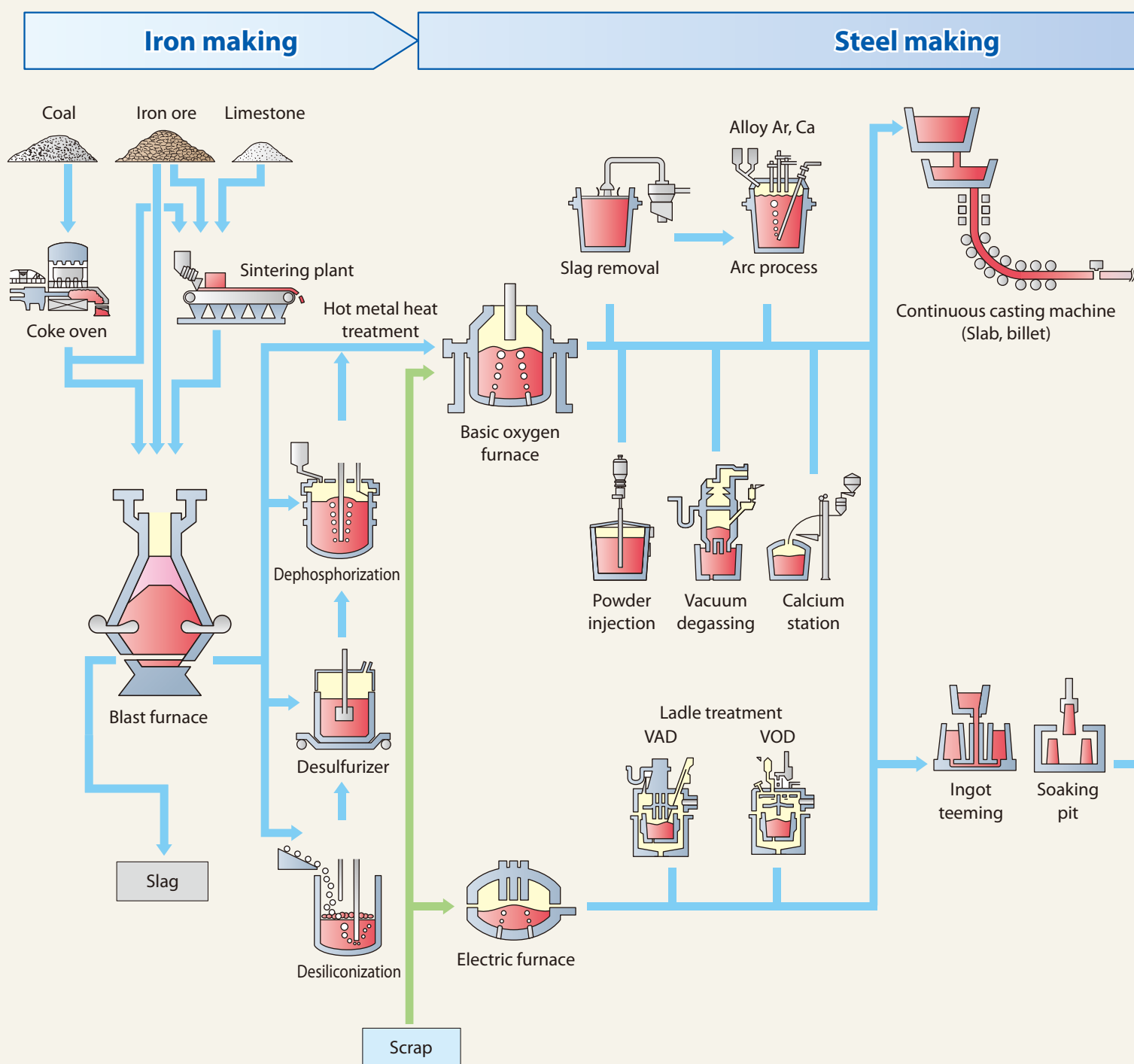


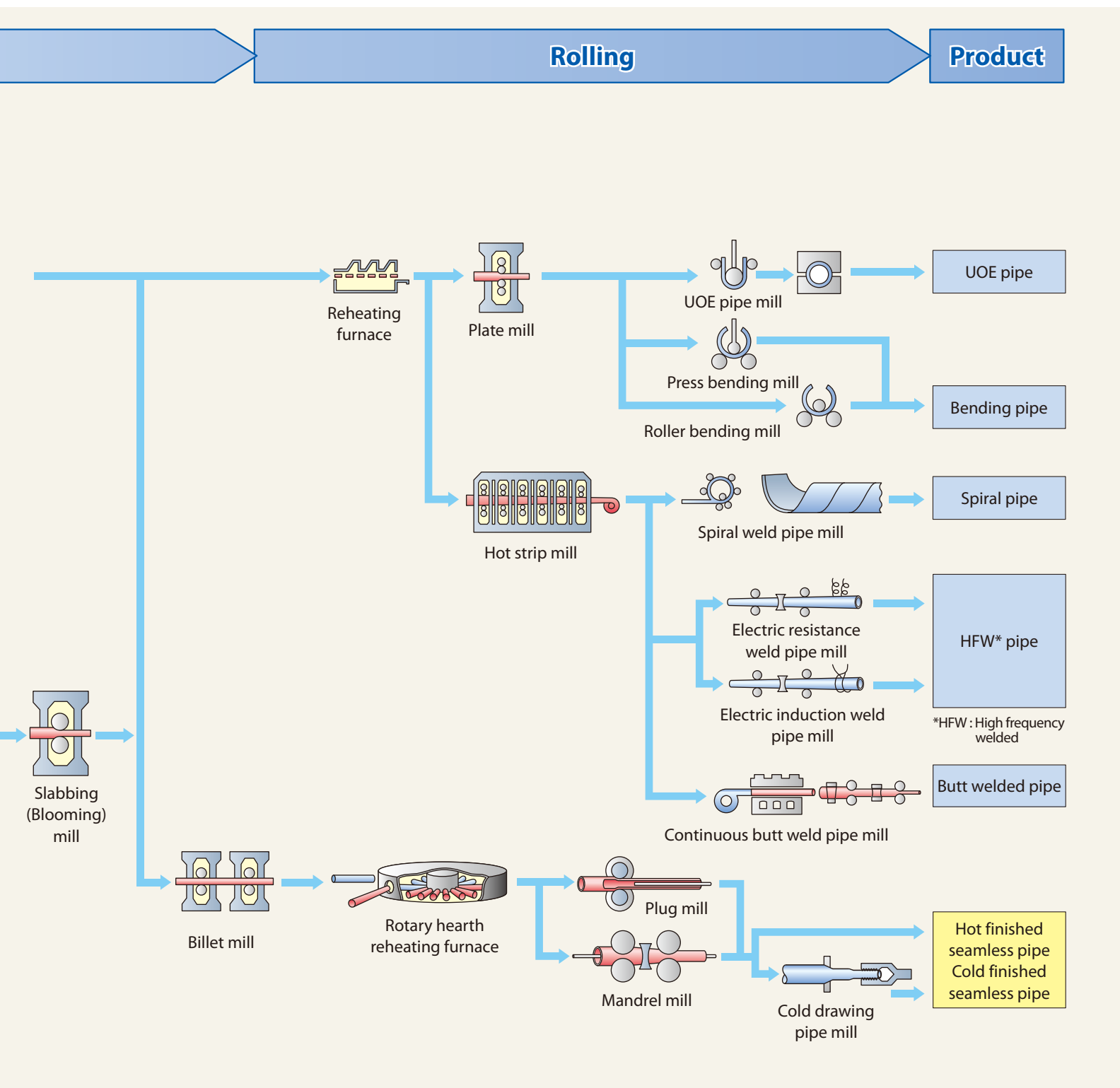
Pipe Manufacturing Process

Overview of the manufacturing process

JFE Steel is one of the world's preeminent integrated steel makers, and manufactures and supplies virtually all types of steel products. JFE Steel's East Japan Works includes two integrated production sites, Chiba and Keihin, both located near Tokyo. West Japan Works, in western Japan, also consists of two large

integrated production sites, Kurashiki and Fukuyama. JFE Steel also has a specialty pipe mill at Chita Works. Pipe manufacturing is performed under totally controlled conditions from the starting material through the finished product, using outstanding technology and state-of-the-art equipment, as shown below.





West Japan Works (Fukuyama) Pipe Mill



History

February 1965	Nippon Kokan Fukuyama Works established
February 1968	Started operations of plate mill
February 1970	Started operations of UOE mill
May 1971	Obtained JIS G 3457 (STPY), and JIS G 3444 (STK) certifications
September 1971	Started operations of internal coating mill
August 1977	Started operations of external coating mill
April 1990	Obtained API 5L certification (shifted from API 5LX)
April 1991	Obtained API 2B certification
November 1993	Obtained ISO9001 certification
July 1997	Started operations of column fabrication shop
September 1997	Obtained ISO14000 certification
November 2000	Reached cumulative production of 9million tons
April 2003	JFE Steel Corporation established
October 2003	Reached cumulative production of 10 million tons
January 2007	Reached cumulative production of 11 million tons
August 2009	Stopped operations of column fabrication shop
July 2010	Reached cumulative production of 12 million tons
July 2011	Stopped operations of Chiba UOE Mill
October 2011	Started operations of Press Bending (NEO Press™) process
October 2013	Reached cumulative production of 13 million tons
April 2018	Reached cumulative production of 14 million tons

Manufacturing process of SAWL pipe

Pipes are manufactured at the Fukuyama SAWL pipe mill by the following series of processes, as shown in the flow chart at the right:

- 1** Preparatory processes for pipemaking (edge preparation, crimping press)
- 2** Pipemaking process (U-ing, O-ing)
 - U-ing, O-ing
 - Press Bending (NEO Press™)
- 3** Welding process (inside/outside welding)
- 4** Pipe expansion and product finishing process
- 5** Inspection process (hydrostatic test, various nondestructive inspections, appearance and dimensional inspection)

Size Availability

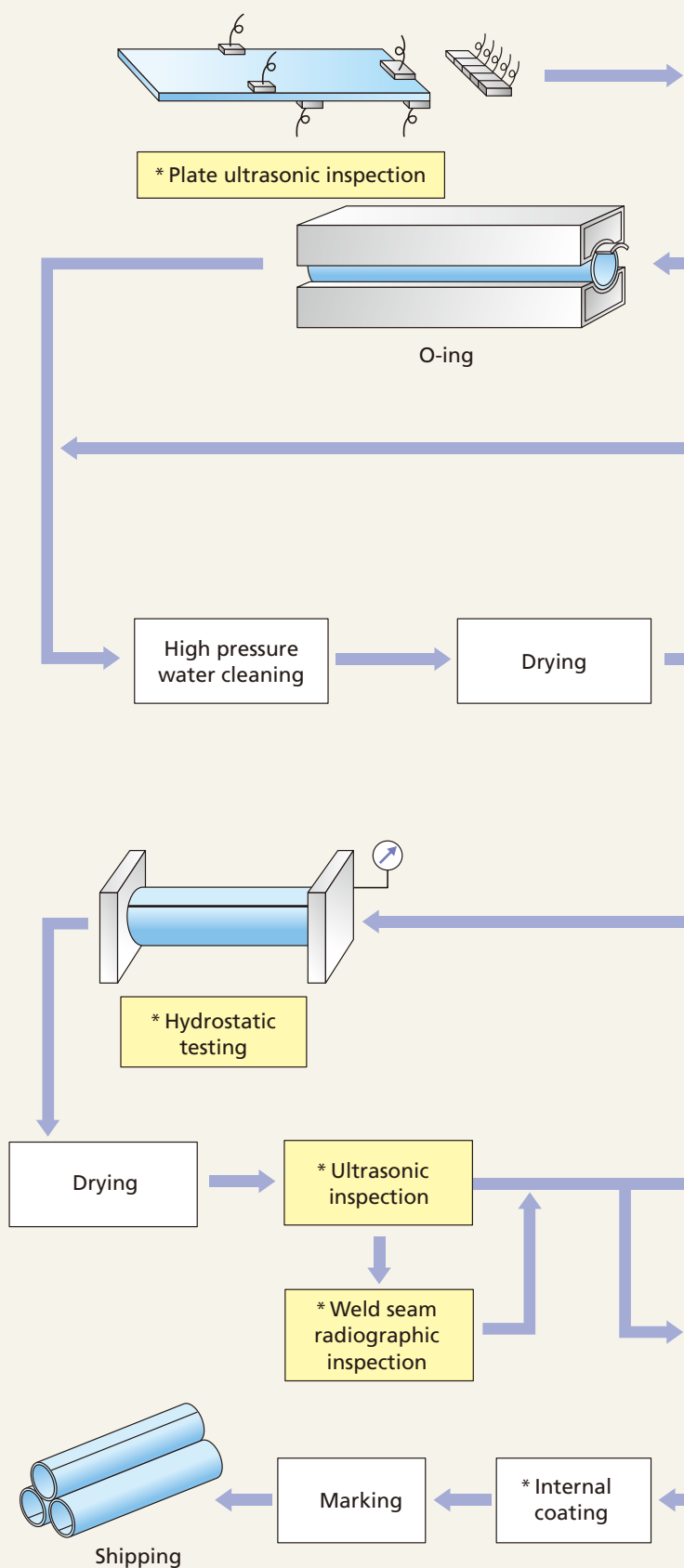
Forming Process	Outer diameter mm (in.)	Thickness mm (in.)	Length mm (ft)
UOE	Min. 400.0 (15.7) Max. 1422.4 (56)	Min. 6.0 (0.236) Max. 50.8 (2.000)	Max. 18 300 (60)
NEO Press™	Min. 500.0 (19.7) Max. 1422.4 (56)	Min. 6.0 (0.236) Max. 50.8 (2.000)	Max. 12 700 (41.7)

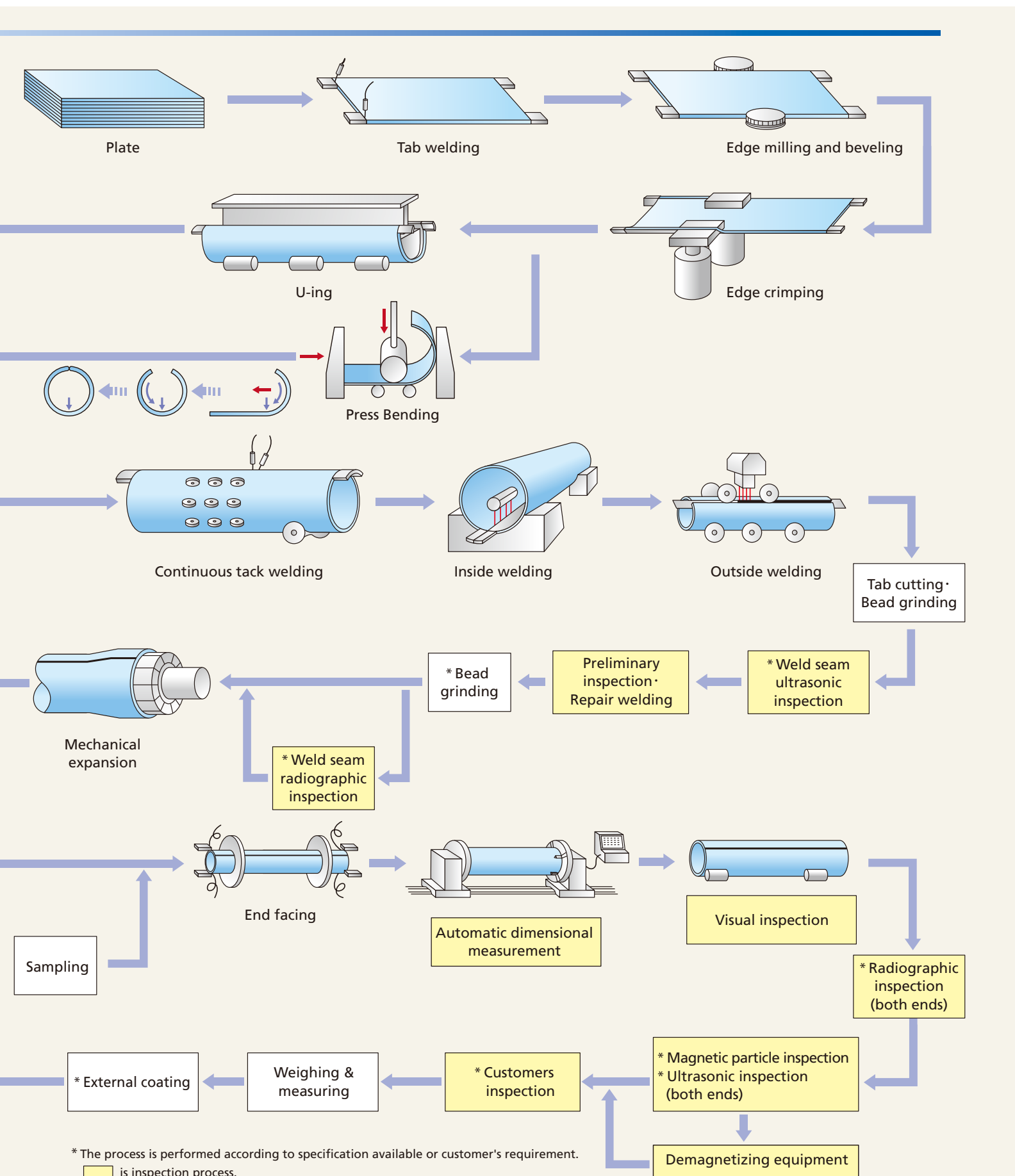
Fukuyama SAWL pipe mill can produce;

- odd size pipe,
- heavy wall thickness pipe,
- high grade pipe up to grade X100.



Fukuyama SAWL Production Flow





SAWL Pipe Production Equipment



● Crimping press



● O-ing press



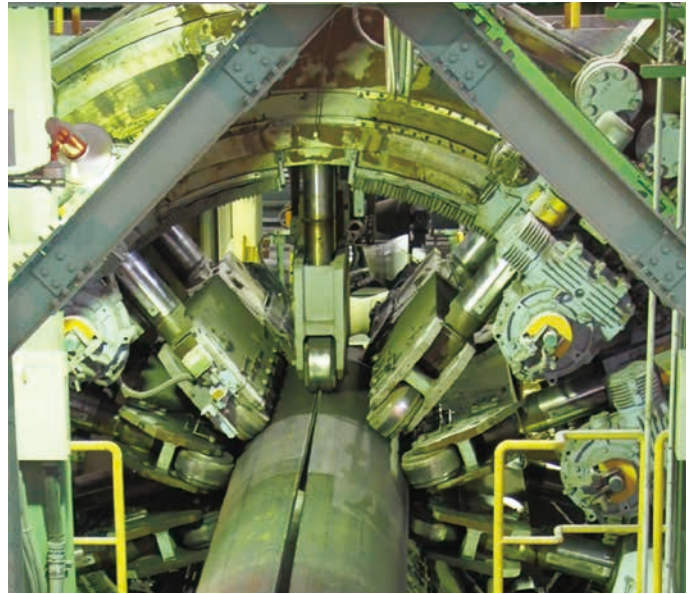
● U-ing press



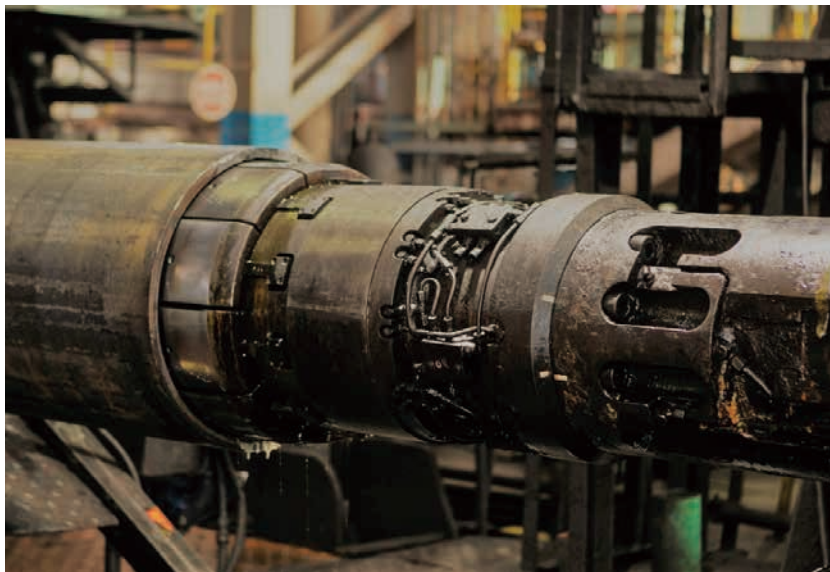
● Press bending (NEO Press™)



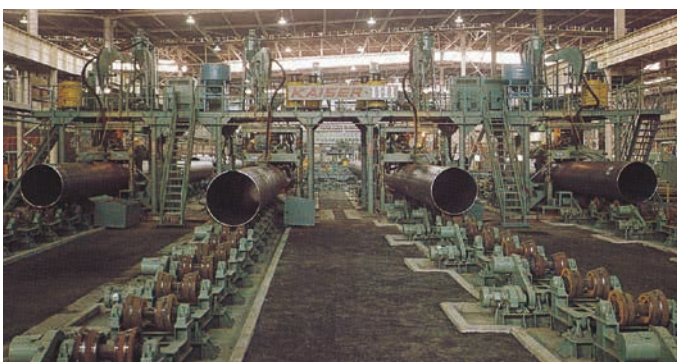
● Automatic inside submerged arc welder



● Automatic continuous tack welder



● Mechanical expander



● Automatic outside submerged arc welder

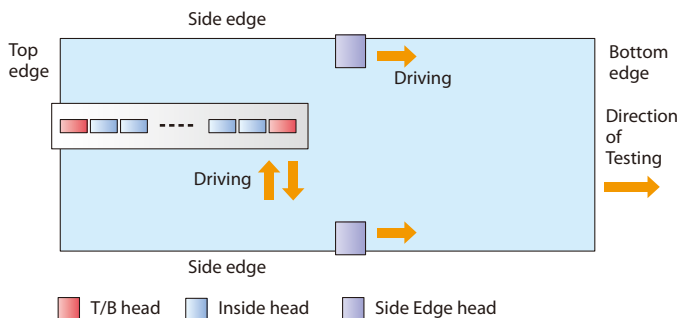


● Shipping yard

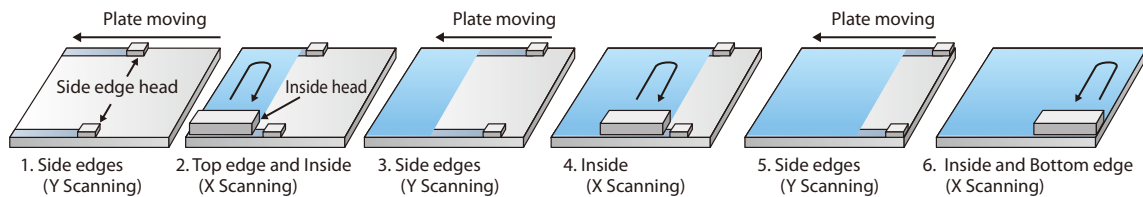
Inspection and Test of SAWL Pipe

Ultrasonic inspection of plates

Ultrasonic inspection of steel plates used as material for pipemaking is performed as necessary. Inspection is performed by the pulse echo method using a probe arrangement which provides 100% coverage of the center and surrounding areas. Flaw detection results are recorded automatically for each plate.

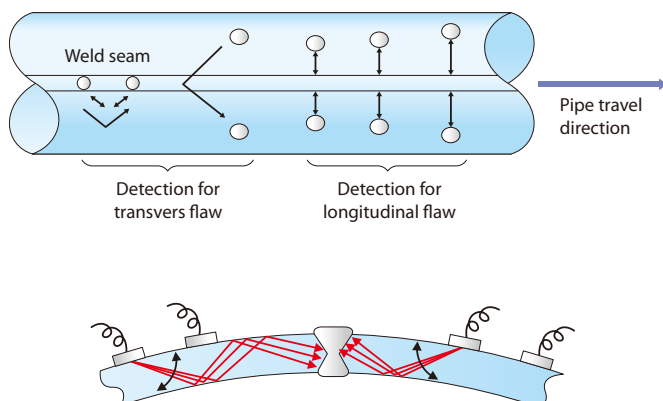


● Ultrasonic tester for plate



Ultrasonic inspection of welds

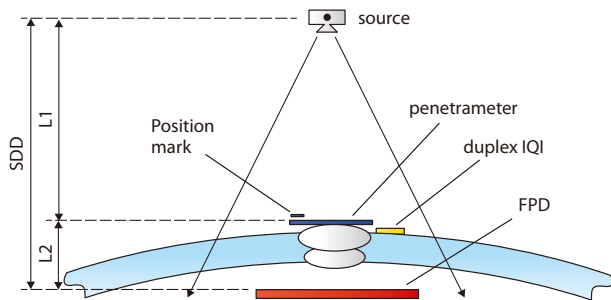
Introduction of the full phased array system has made it possible to perform extremely accurate automatic flaw detection covering the entire pipe thickness. Probes are arranged to enable inspection of welds in the longitudinal and circumferential direction, providing improved detection accuracy. Results are recorded automatically and marking is performed on the product at the instructed location.



● Ultrasonic tester for pipe welds

X-ray inspection (Radiographic inspection)

X-ray inspection of welds are performed as necessary. Digital radiography method is applied for the inspection of welds at pipe ends and middle portion. An example of X-ray inspection is shown below.



● X-Ray equipment for pipe ends



● Digital radiography test

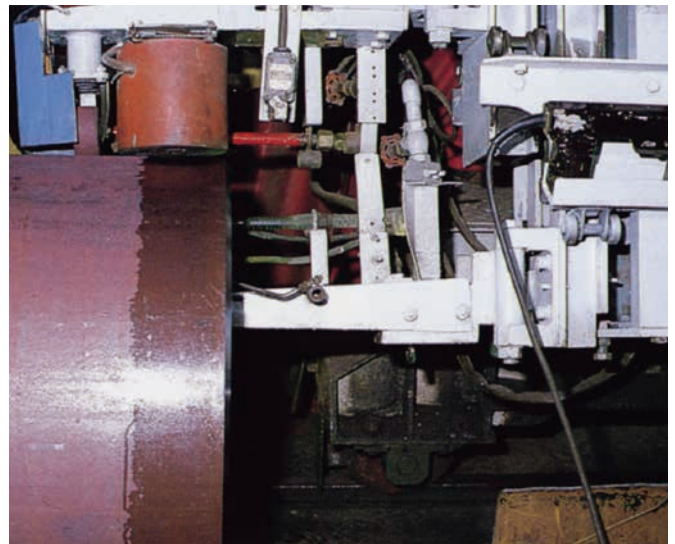


● X-Ray equipment for middle portion

Pipe end magnetic particle inspection

Pipe ends (bevel surface and weld seam) are inspected by magnetic-field (magnaflux) flaw detection as necessary.

Inspections of the bevel surface and weld seam are performed by positioning magnetic yokes inside and outside the pipe end.



● Magnetic particle inspection equipment for pipe ends

Hydrostatic test

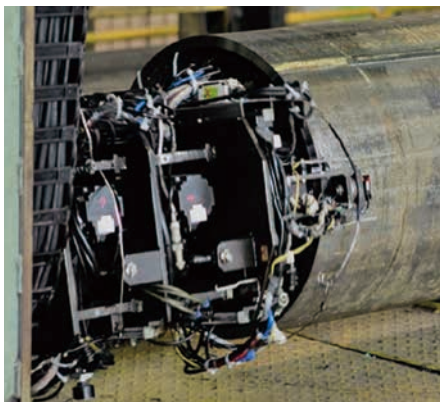
After pipes have been finished to the specified outer diameter by the pipe-expanding machine, a hydrostatic test is performed by filling the pipe with water, applying the specified hydraulic pressure for the specified holding time, and checking for leaks. Conventionally, pass / fail judgments in the hydrostatic test were made manually. However, in November 2018, an automatic judgment system was introduced, reducing the QA risks of judgment errors and falsification of data.



● Hydrostatic tester

Dimensional inspections

Length, outer diameter, inner diameter, roundness, and wall thickness are measured accurately by automatic dimensional measuring equipment, and the measured results and pass/fail judgment are displayed immediately on the CRT. At the same time, these results are input to the computer. These data are used as shipping data and in quality control.



● Automatic size measurement equipment for pipe ends



● Automatic size measurement equipment for pipe body

Mechanical test



● Tensile tester



● Charpy impact tester



● 39kJ class DWTT tester

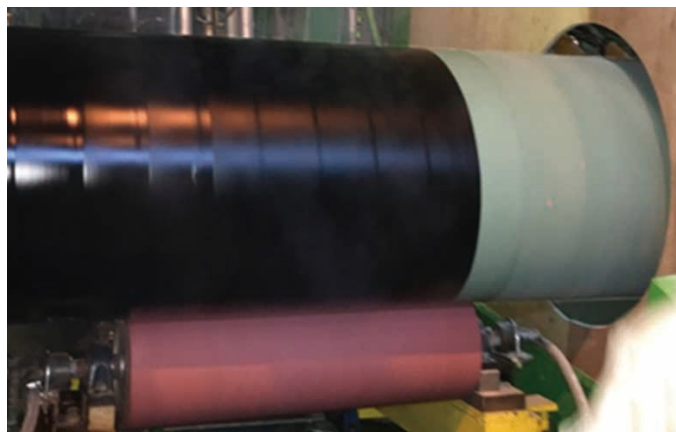


● 120kJ class DWTT tester

Coating

External Coating

External coating of SAWL pipe can be applied to FBE, Three-layer polyethylene, Three-layer polypropylene. These coatings protect SAWL pipes from corrosion in various environments, such as on land, in the soil, and in the sea.



Available size

Outside diameter	Length
406.4 - 1422.4 mm	9.0 - 18.3 m

Internal Coating

Internal coating of SAWL pipe can be applied to epoxy coating. Internal coating provides high corrosion resistance and transport efficiency of fluids.



Available size

Outside diameter	Length
406.4 - 1422.4 mm	9.0 - 18.3 m

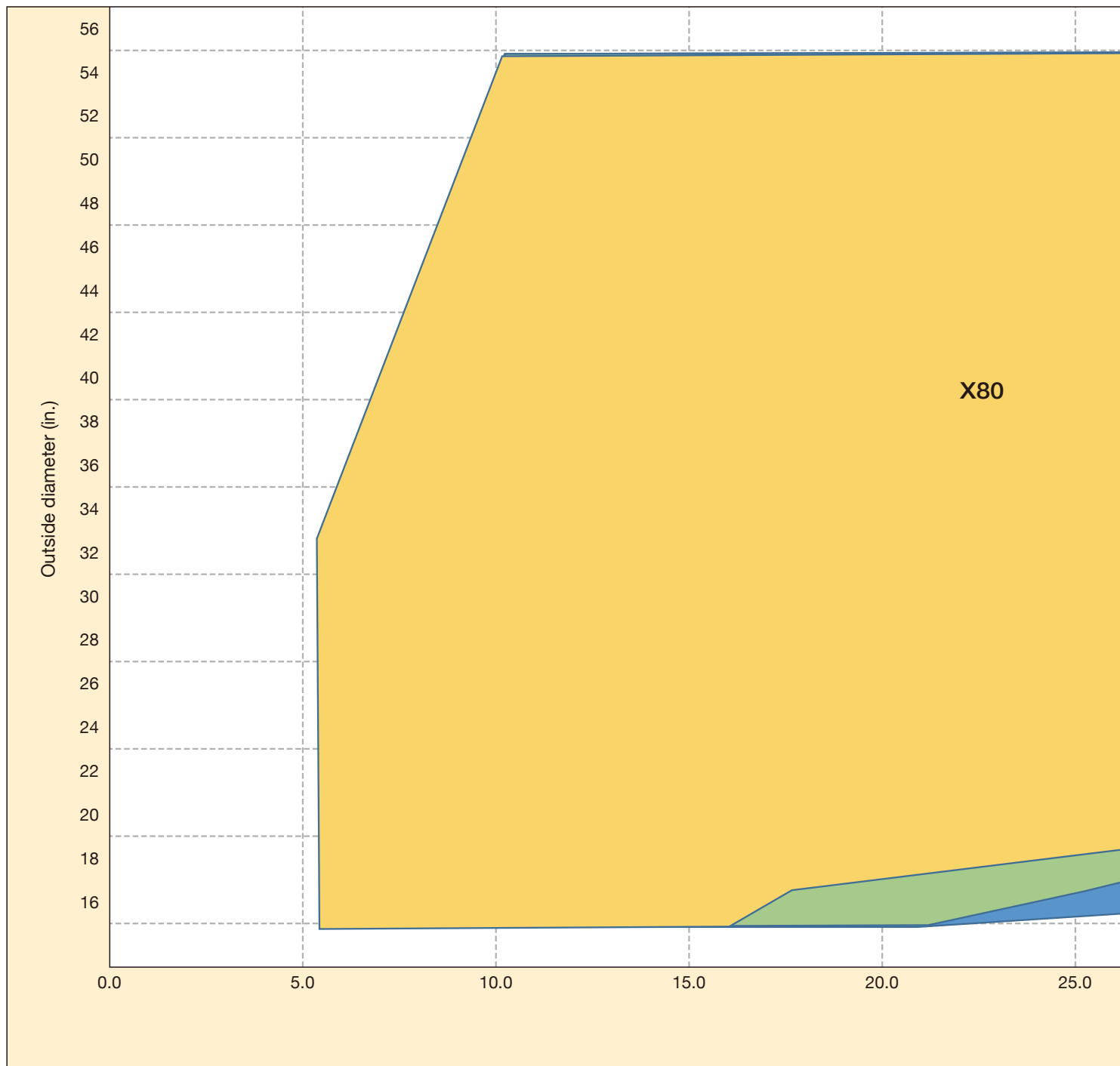
Specifications

Applicable specifications

JFE Steel Corporation produces tubular products to the specifications listed below.
Other specifications can be also supplied.

Specification		Title
API	5L	Line pipe
	2B	Specification for the Fabrication of Structural Steel Pipe
ASTM	A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
	A134	Pipe, Steel, Electric-Fusion (Arc)-Welded
	A139	Electric-Fusion (Arc)-Welded Steel Pipe
	A252	Welded and Seamless Steel Pipe Piles
	A671	Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures
	A672	Electric-Fusion-Welded Steel Pipe for High Pressure Service at Moderate Temperatures
	A691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures
JIS	G 3444	Carbon Steel Tubes for General Structural Purposes
	G 3457	Electric-Arc-Welded Carbon Steel Pipe
	G 3475	Carbon Steel Tubes for Building Structure
CSA	Z245.1	Steel Pipe
ISO	3183	Petroleum and natural gas industries - Steel pipe for pipeline transportation systems
DNV GL	ST-F101	Submarine Pipeline Systems

Available Size Range

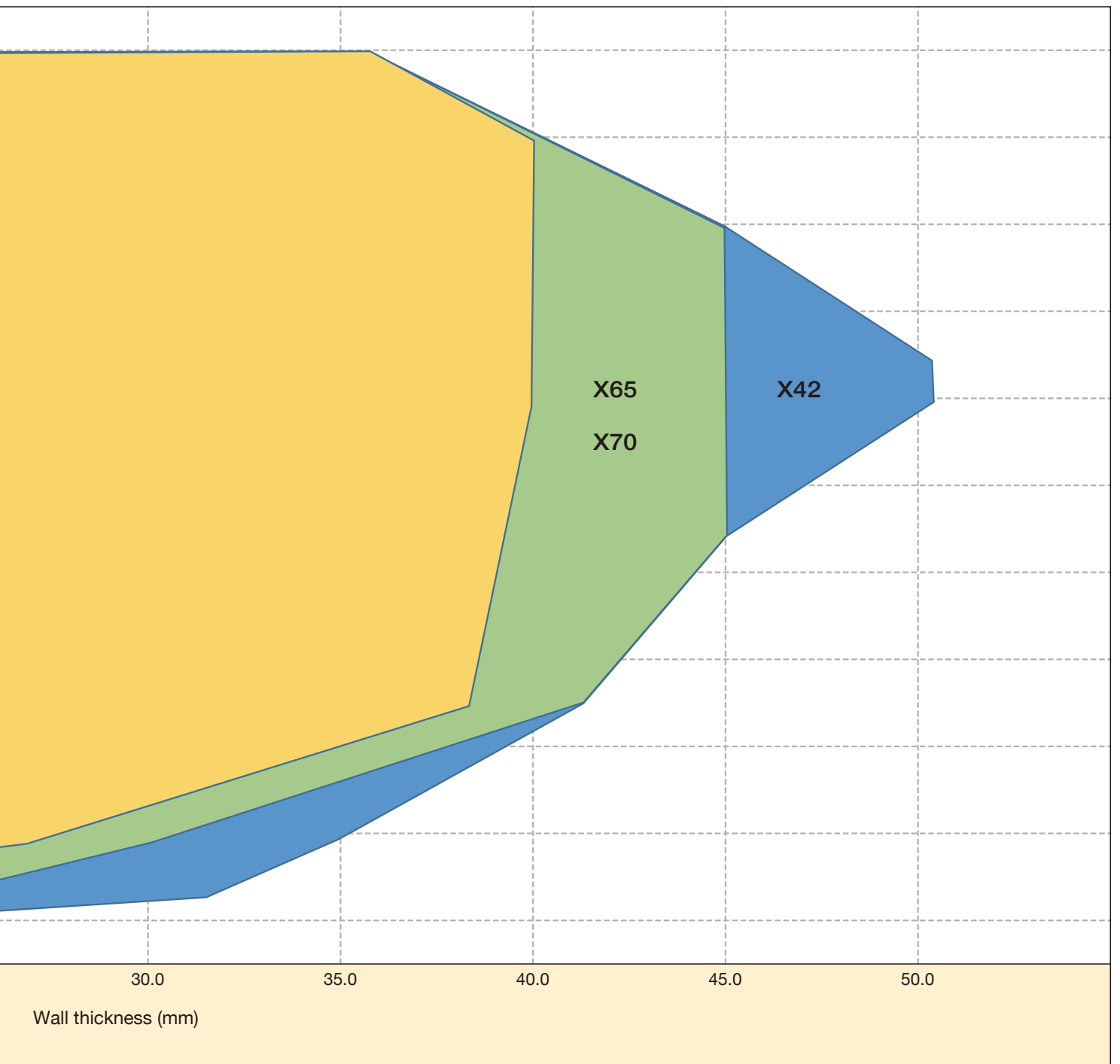


*Please contact us for the grade not indicated above.

Steel Solution for Energy

JFE Steel provides reliable steel solution for energy industry challenging harsher environments.

URL : <http://www.jfe-steel.co.jp/ENERGY>



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