



# JFE SAWL PIPE



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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.

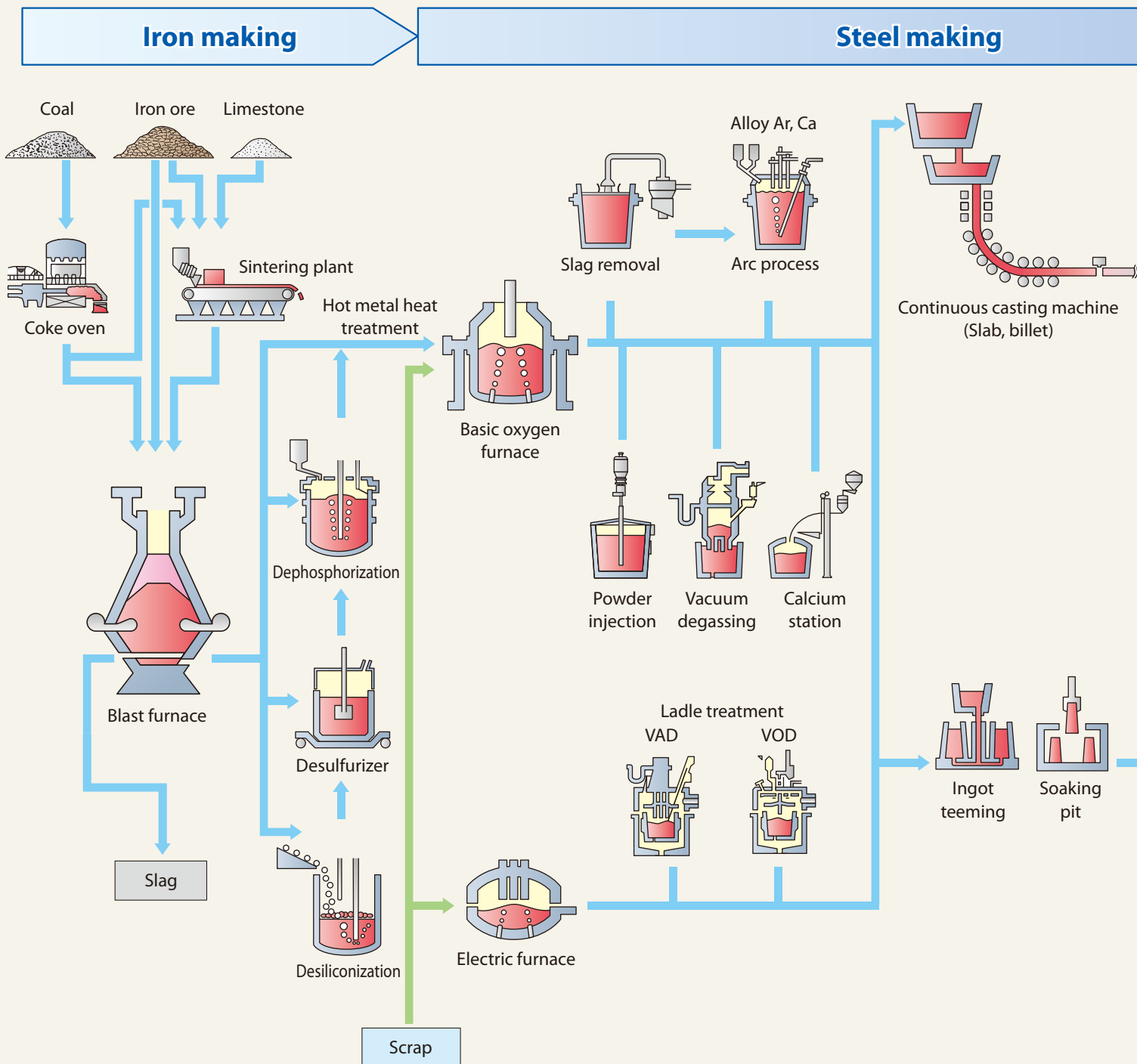


# Pipe Manufacturing Process

## Overview of the manufacturing process

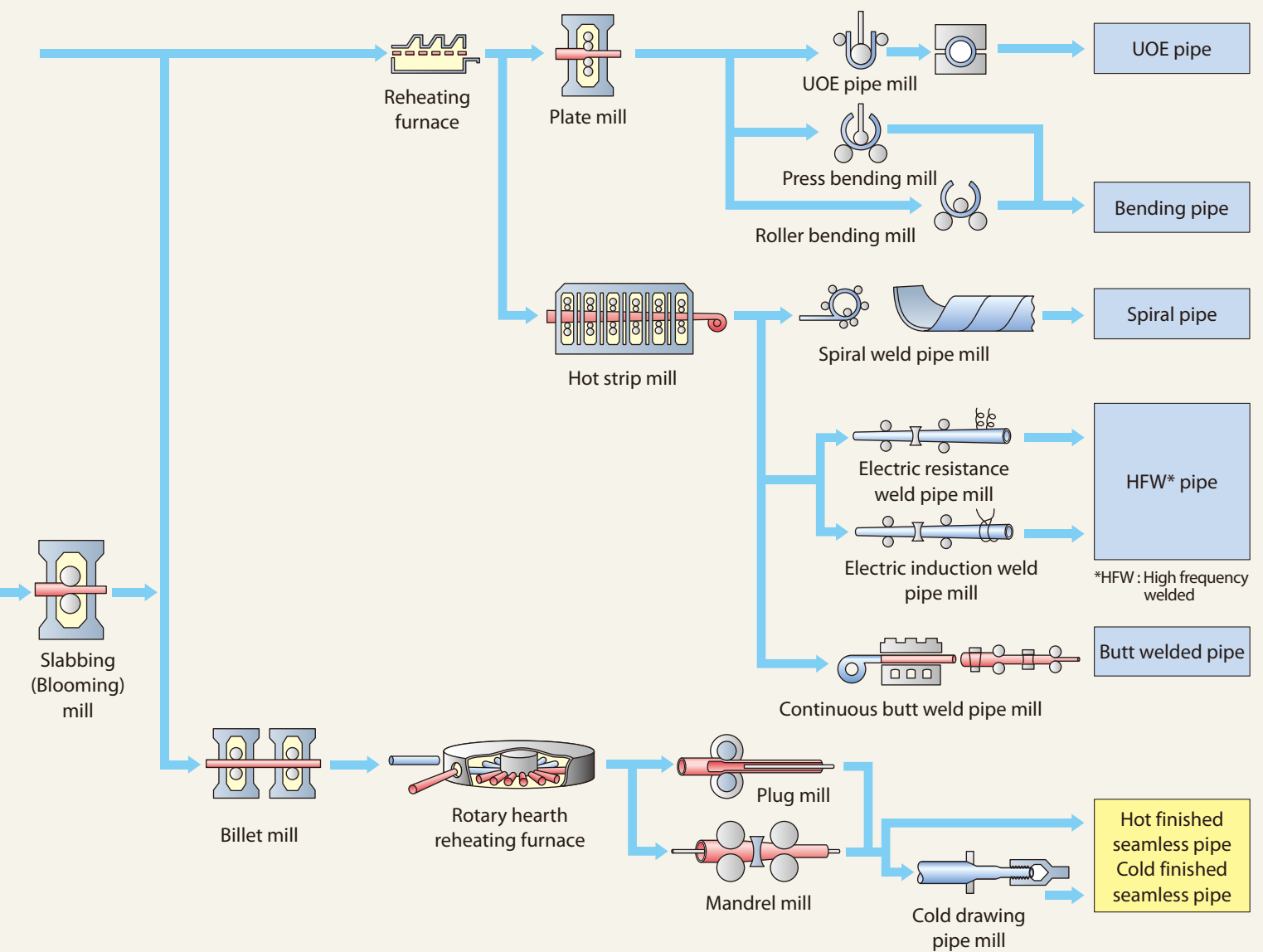
JFE Steel is one of the world's preeminent integrated steel makers, and manufactures and supplies virtually all types of steel products. JFE Steel's East Japan Works includes two integrated production sites, Chiba and Keihin, both located near Tokyo. West Japan Works, in western Japan, also consists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

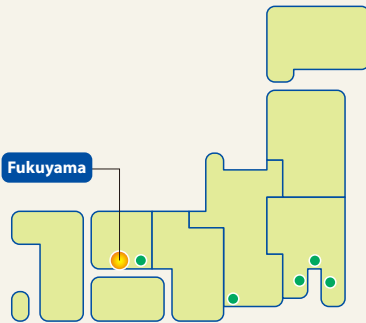
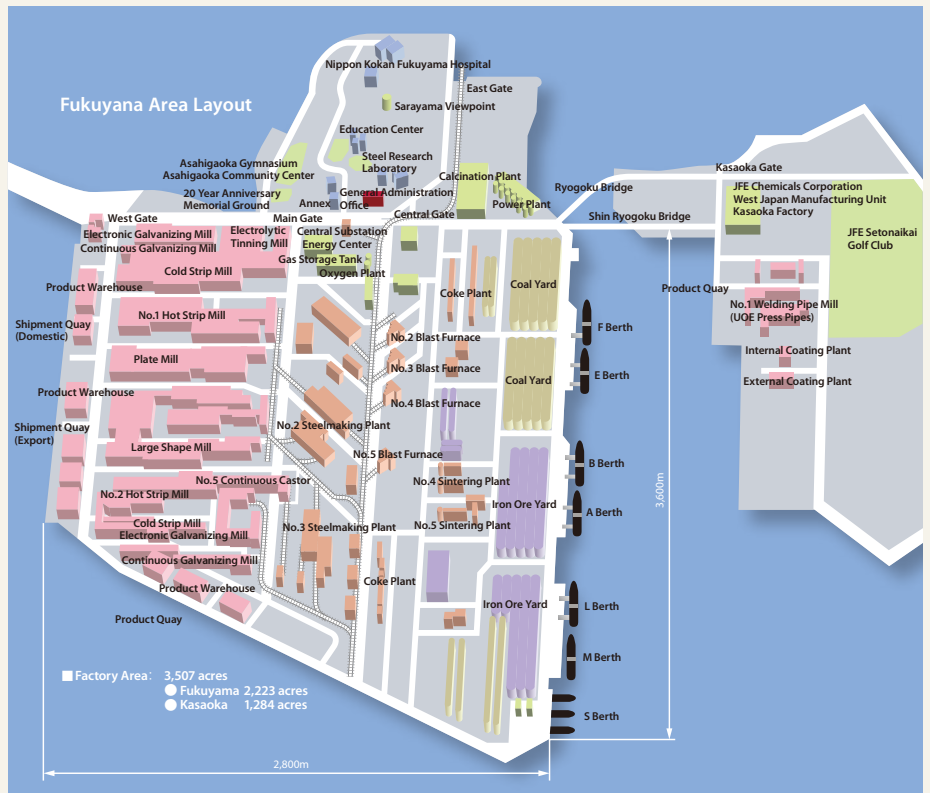


# Rolling

# Product



# 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

## 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:

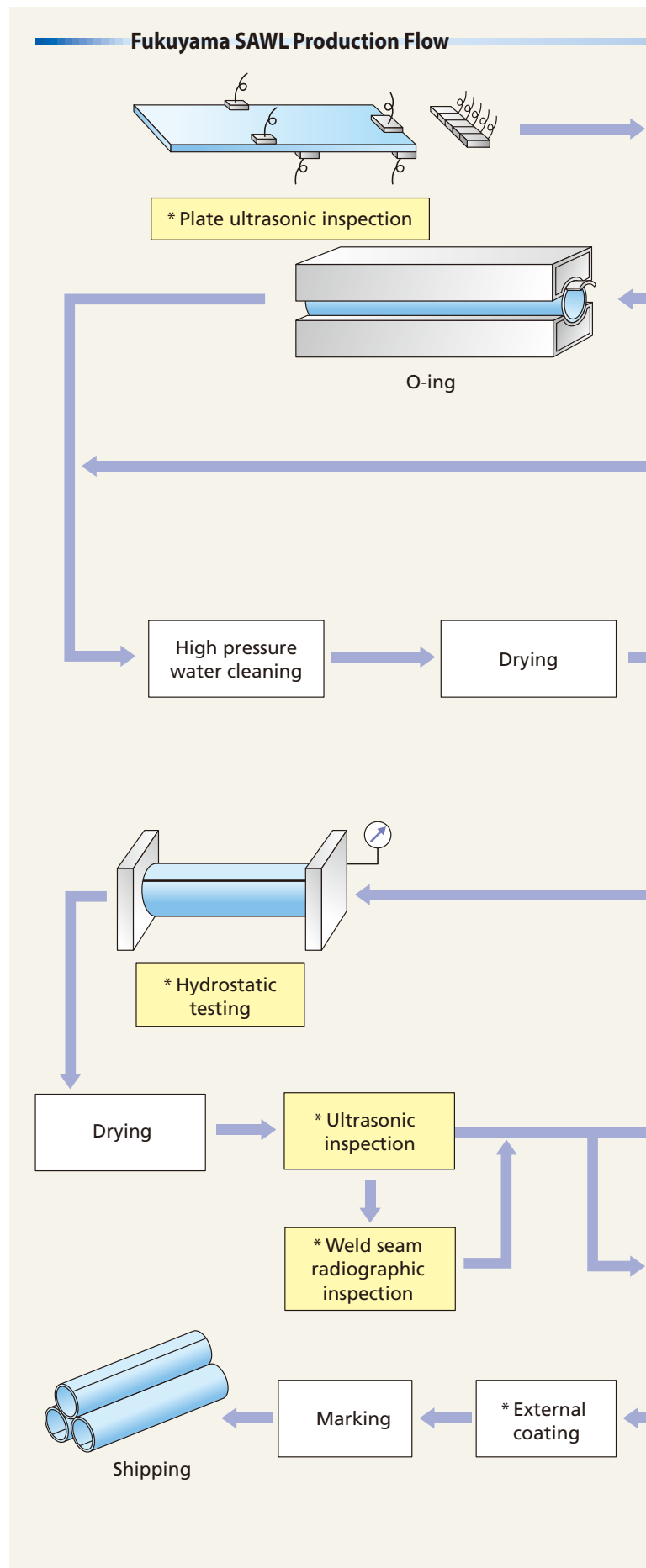
- 1 Preparatory processes for pipemaking (edge preparation, crimping press)
- 2 Pipemaking process (U-ing, O-ing)
  - U-ing, O-ing
  - Press Bending (NEO Press™)
- 3 Welding process (inside/outside welding)
- 4 Pipe expansion and product finishing process
- 5 Inspection process (hydrostatic test, various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

### Size Availability

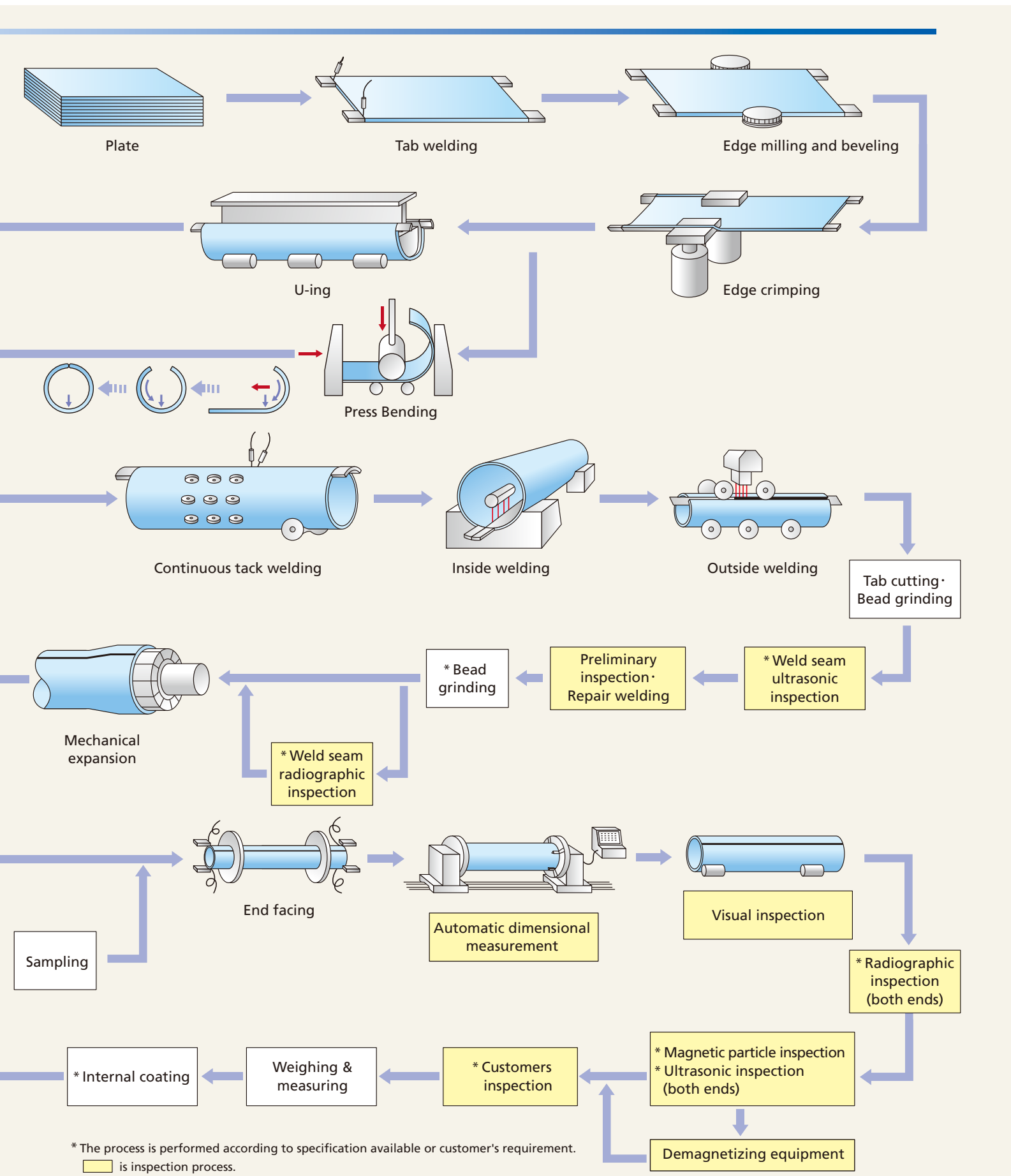
Forming Process	Outer diameter mm (in.)	Thickness mm (in.)	Length mm (ft)
UOE	Min. 400.0 (15.7) Max. 1422.4 (56)	Min. 6.0 (0.236) Max. 50.8 (2.000)	Max. 18 300 (60)
NEO Press™	Min. 500.0 (19.7) Max. 1422.4 (56)	Min. 6.0 (0.236) Max. 50.8 (2.000)	Max. 12 700 (41.7)

Fukuyama SAWL pipe mill can produce;

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







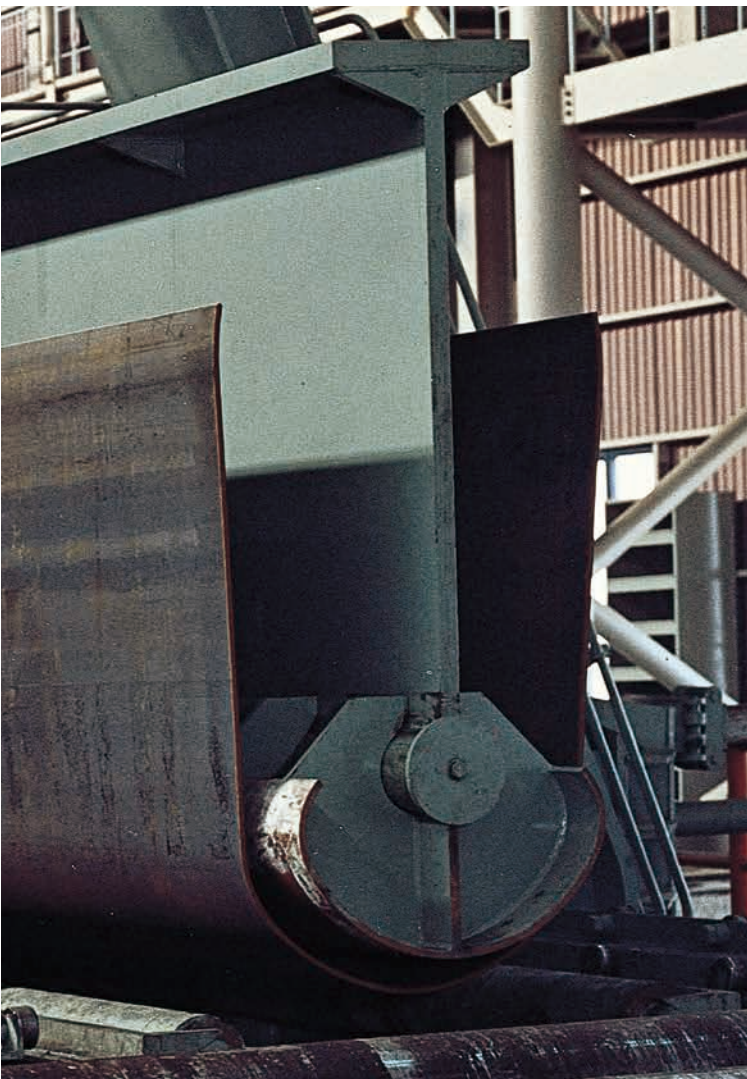
## SAWL Pipe Production Equipment



● Crimping press



● O-ing press



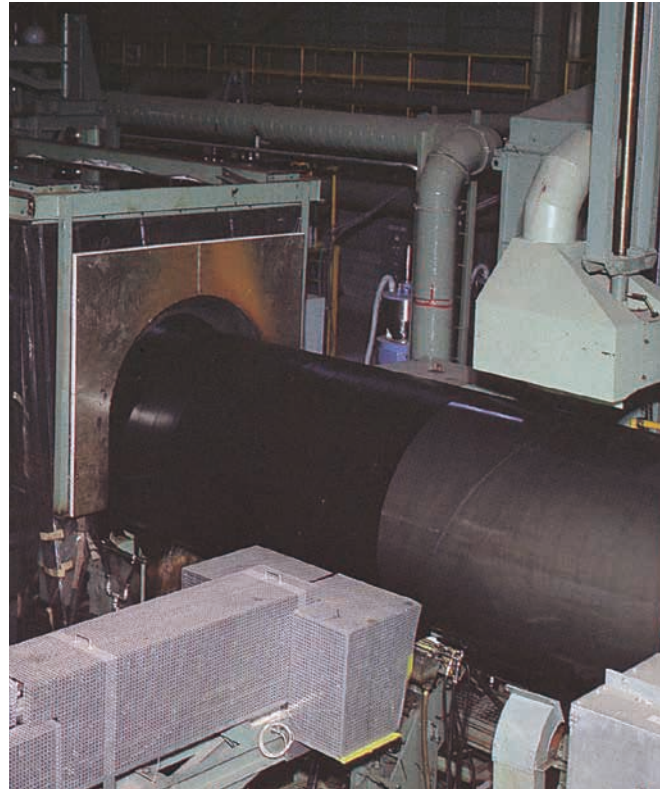
● U-ing press



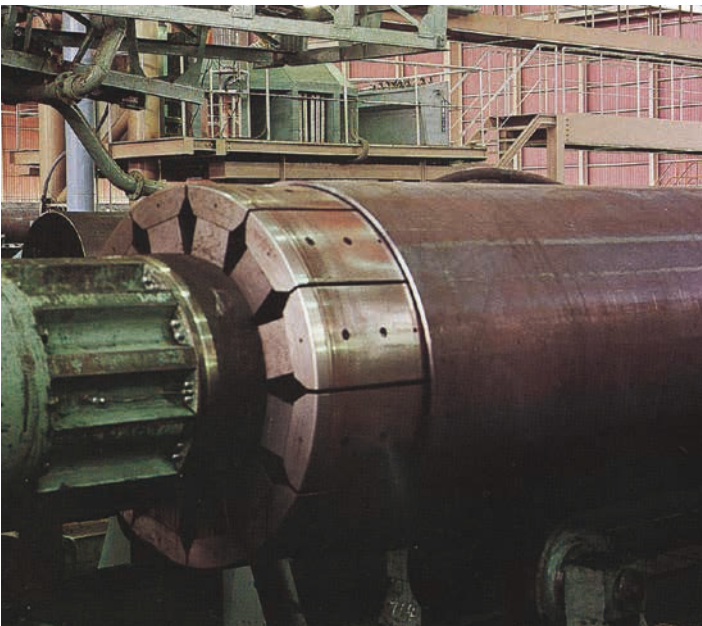
● Press bending (NEO Press™)



● Automatic inside submerged arc welder



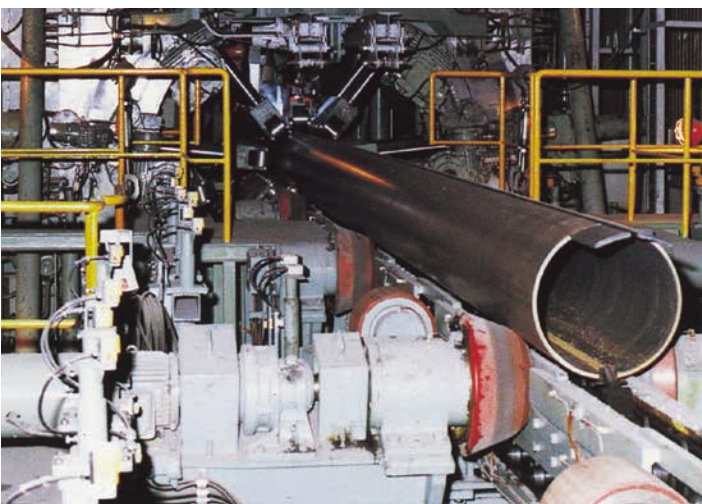
● External plastic coating



● Mechanical expander



● Automatic outside submerged arc welder



● Automatic continuous tack welder

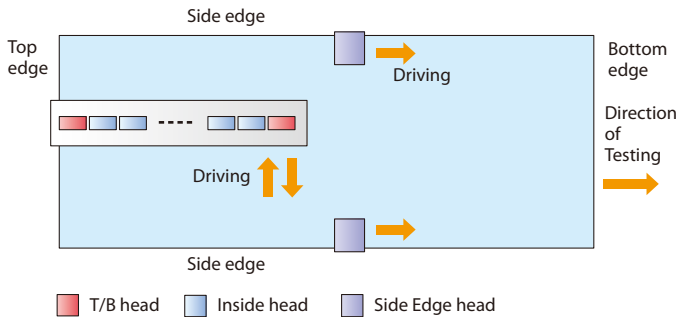


● Shipping yard

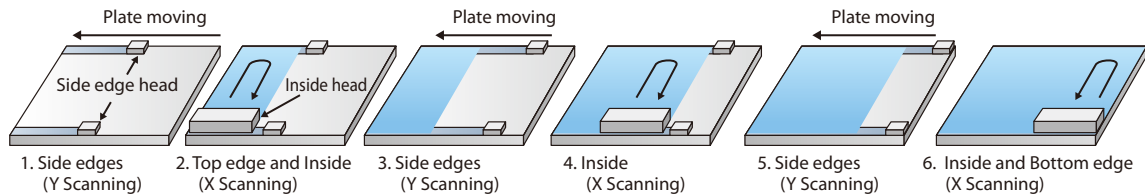
# Inspection and Test of SAWL Pipe

## 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.

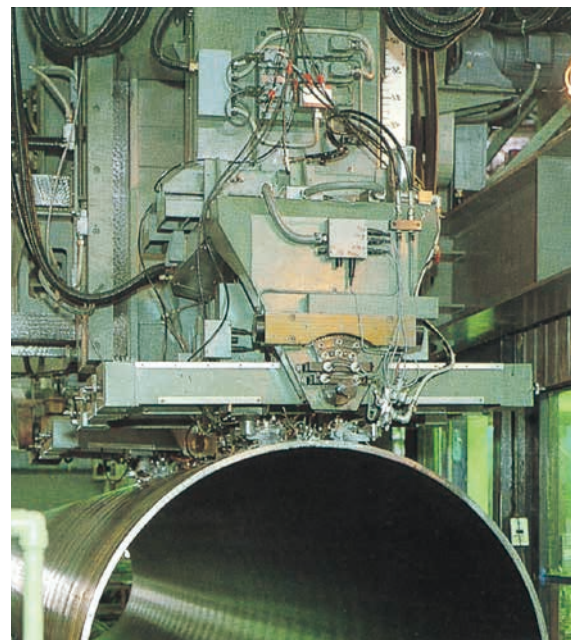
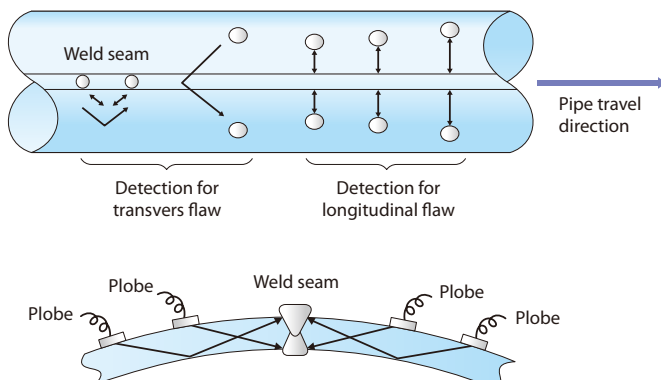


● Ultrasonic tester for plate



## Ultrasonic inspection of welds

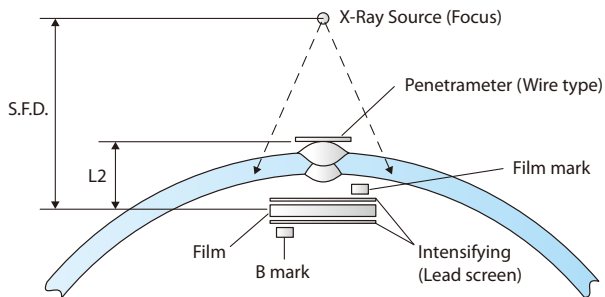
Welds in SAWL pipes are inspected by angle beam UT by the pulse echo method as necessary. Probes are arranged to enable inspection of welds in the longitudinal and circumferential direction, providing improved detection accuracy. Results are recorded automatically and marking is performed on the product at the instructed location.



● Ultrasonic tester for pipe welds

## ***X-ray inspection (radiographic inspection)***

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



● Digital radiography test



● X-Ray equipment for pipe ends

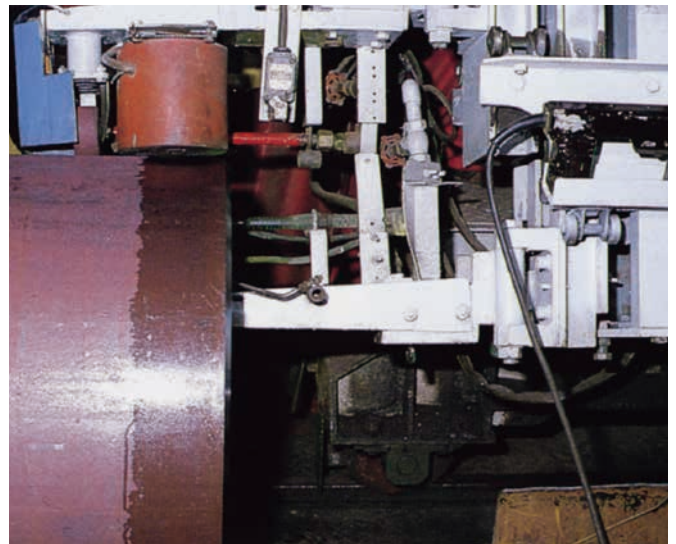


● X-Ray equipment for middle portion

## ***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 at a specified pressure, holding in a specified test time, and checking for leaks.



● 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

## Mechanical test



● Tensile tester



● Charpy impact tester



● 39kJ class DWTT tester



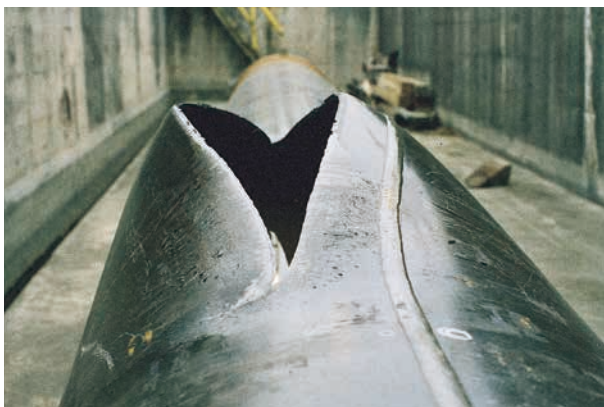
● 120kJ class DWTT tester



● Large diameter pipe bending tester



● Ring expansion tester



● Burst tester



# 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	Welded and Seamless Steel Pipe
A134	Electric-Fusion (Arc)-Welded Steel Plate Pipe
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
BS 3601	Steel Pipes and Tubes for Pressure Purpose Carbon Steel: Ordinary Duties
3602	Steel Pipes and Tubes for Pressure Purpose Carbon Steel High Duties
3604	Steel Pipes and Tubes for Pressure Purpose Low and Medium-alloy Steel
DIN 1626	Welded Circular Unalloyed Steel Tubes Subject to special requirement
1628	High performance Welded Circular Unalloyed Steel Tube
17172	Steel Pipes for Pipe lines for the Transport of Combustible Fluids and Gases Technical Conditions of Delivery
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	General Requirements for Plain-End Welded and Seamless Steel Line Pipe
AWWA C200	Steel Water Pipe 6 Inches and Larger
GOST 10704	Electric-Welded Steel Tubes
ISO 3183	Petroleum and natural gas industries - Steel pipe for pipeline transportation systems
DNV OS-F101	Submarine Pipeline Systems
EN EN10210	Hot finished structural hollow sections of non-alloy and fine grain steels
EN10225	Weldable structural steels for fixed offshore structures

# Available Size Range

O.D. (in.)	Wall thickness (in.)	O.D. (mm)													
		6.0	6.4	7.9	9.5	11.1	12.7	14.3	15.9	17.5	19.1	20.6	22.2	23.8	25.4
16	406.4	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○			
18	457.2	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○	□	△
20	508.0	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎	◎	○	○	○
22	558.8	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎	◎	◎	◎	◎
24	609.6	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎	◎	◎
26	660.4	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎	◎	◎
28	711.2	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎	◎	◎
30	762.0	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎
32	812.8	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎
34	863.6		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎
36	914.4			☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎
38	965.2			☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	◎	◎
40	1016.0			☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
42	1066.8			☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
44	1117.6			☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
46	1168.4				☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
48	1219.2				☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
50	1270.0														
52	1320.8				☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
54	1371.6														
56	1422.4					☆	☆	☆	☆	☆	☆	☆	☆	☆	☆

note1 ☆ : Gr X100 ◎ : Gr X80 ○ : Gr X70 □ : Gr X65 △ : Gr X60 ▽ : Gr X52 ◇ : Gr X42  
 note2 ◇ Need to confirm customer's specification before order placement.

## Steel Solution for Energy

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

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

	1.062	1.125	1.189	1.250	1.312	1.375	1.438	1.500	1.563	1.626	1.689	1.750	1.878	2.000	Wall thickness (in.)	
	27.0	28.6	30.2	31.8	33.3	34.9	36.5	38.1	39.7	41.3	42.9	44.5	47.7	50.8	(mm) (mm)	O.D. (in.)
															406.4	16
	▽	▽	◇	◇											457.2	18
	□	△	▽	▽	▽	◇									508.0	20
	○	□	△	△	▽	◇	◇	◇							558.8	22
	○	□	△	△	▽	▽	◇	◇	◇						609.6	24
	○	□	△	△	▽	▽	◇	◇	◇						660.4	26
	○	○	□	△	▽	▽	◇	◇	◇						711.2	28
	◎	◎	◎	○	○	△	▽	◇	◇	◇	◇				762.0	30
	◎	◎	◎	○	○	□	▽	▽	▽	◇	◇	◇			812.8	32
	◎	◎	◎	○	○	○	▽	▽	▽	◇	◇	◇			863.6	34
	◎	◎	◎	○	○	○	○	○	▽	◇	◇	◇	◇		914.4	36
	◎	◎	◎	○	○	○	○	○	○	◇	◇	◇	◇		965.2	38
	☆	☆	◎	◎	◎	◎	◎	◎	◎	◇	◇	◇	◇		1016.0	40
	☆	☆	◎	◎	◎	◎	◎	◎	◎	○	◇	◇	◇		1066.8	42
	☆	☆	◎	◎	◎	◎	◎	◎	◎	○	◇	◇			1117.6	44
	☆	☆	◎	◎	◎	◎	◎	◎	◎	○	◇	◇			1168.4	46
	☆	☆	◎	◎	◎	◎	◎	◎	◎	○					1219.2	48
															1270.0	50
	☆	☆	◎	◎	◎	◎									1320.8	52
															1371.6	54
	☆	☆	◎	◎	◎	◎									1422.4	56

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