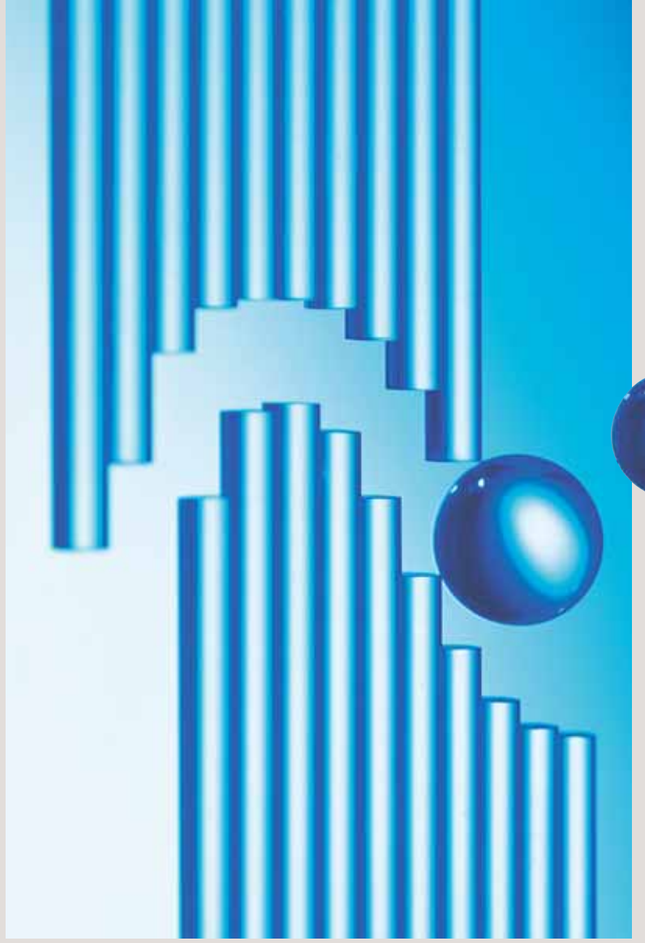

KOBELCO
KOBE STEEL GROUP

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KOBELCO STEEL TUBE CO.,LTD.

A Leader in High-Grade Seamless Steel Tubular Products

KOBELCO STEEL TUBE CO., LTD. is located in the historic Chofu area of Shimonoseki City which is in the westernmost part of Honshu Island. Our history as a manufacturer of seamless steel tubular products goes back to 1956, when we introduced the Ugine Sejournet hot extrusion process to Japan. Since then we have continued to supply the international market with top-quality products, adding Titanium Welded Tube, and Precision Tube in the 1980's. To maintain top quality, we have continually improved our production technology and have sustained a firm commitment to strict quality standards.

Rapid changes in the energy, electronics and aerospace fields have led to corresponding developments in seamless tube production in recent years. There is an unprecedented demand for seamless tubular products with ultra-smooth surfaces, precise dimensions, and high levels of corrosion resistance and cleanliness. This trend has been accompanied by a diversification of product shapes and stricter quality standards. Kobelco Steel Tube is ready to meet today's technological challenges with an integrated management system that effectively utilizes the expertise we have gained through many years of production experience.

Major Products

Stainless Steel Tube and Pipe	●Piping use for nuclear power plants, Chemical industry, Petrochemical industry, etc. ●Heat exchanger use for power plants, Petrochemical industry, etc. ●Mother tubes for redrawing ●Industrial machinery use
Precision Tube	●Fuel Cladding Tubes for FBR, Control rods for PWR, Clean pipe for the semiconductor industry
Specialty Tube	●Wrapper tubes for FBR ●Ultra-Thin Tube
Titanium Welded Tube	●Condenser tubes for thermal and nuclear power plants, Tubes for desalination plants

CONTENTS

Production Process of Seamless Stainless Steel Tubes and Pipe

Kobelco Steel Tube's seamless stainless tubes and pipe are made with a variety of sophisticated equipment. Our high-quality ingots are produced utilizing electric arc melting and vacuum-oxygen decarburization (VOD). Our vacuum induction melting process (VIM), electroslag remelting process (ESR), and vacuum arc remelting process (VAR) are applicable for special use. These ingots are rolled or forged into blooms that are then further processed using the Ugine Sejournet hot extrusion process and turned into high-quality seamless stainless tubes and pipe. Small-diameter and precision tubes and pipe are manufactured by a drawing and reducing process.

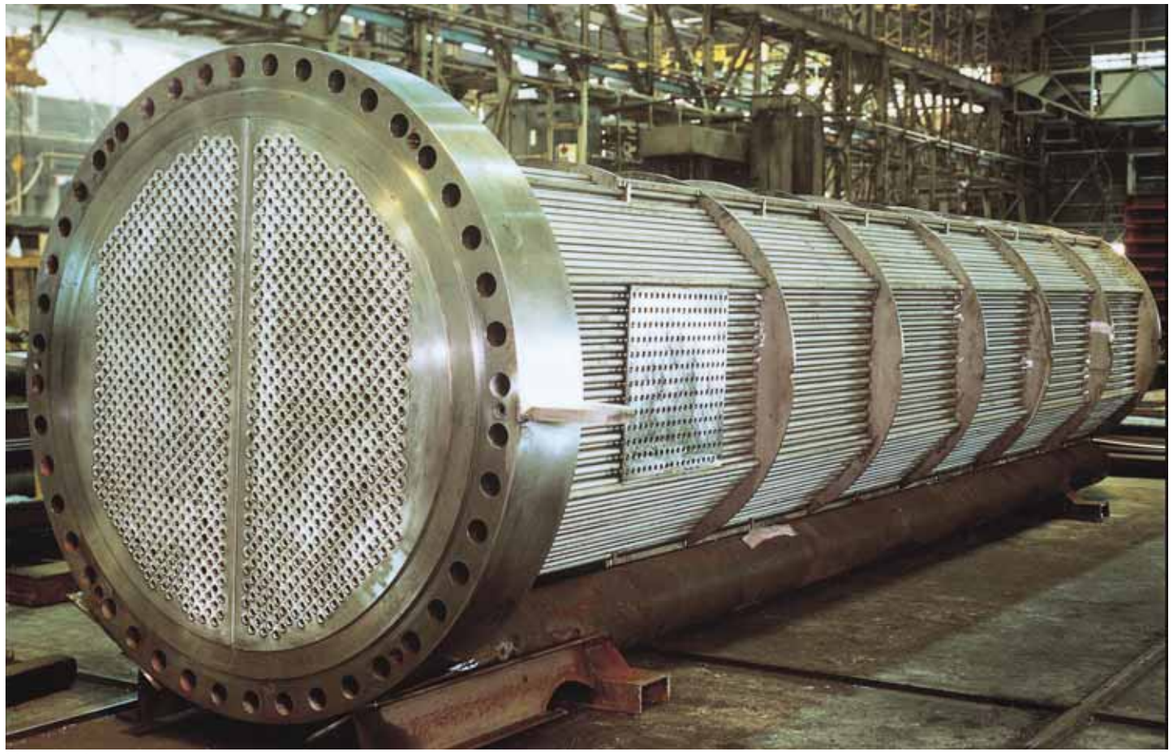
Vacuum oxygen decarburization process(VOD)

Through-type annealing furnace

2,000 ton extrusion press

Widely Applicable
Seamless Stainless Steel Tubes and Pipe

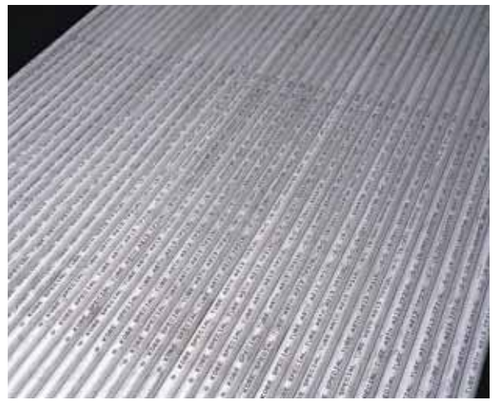
Seamless stainless steel tubular products are used extensively in such fields as power generation, petrochemicals, food processing, and industrial machinery manufacturing. Kobelco Steel Tube offers a wide variety of tubes and pipe for industrial applications, including tubes with excellent machinability for machine parts. Kobelco Steel Tube's products were the first in Japan to receive approval for use in the Stamicarbon and Snamprogretti urea plant processes.
Recent years have witnessed increased demand for stainless tube material with greater resistance to heat and corrosion, including seawater corrosion. Kobelco Steel Tube provides austenitic, ferritic, and dual-phase stainless steels for such applications as heat exchangers, boilers, and general piping systems. Nonferrous tubular products include those made from pure nickel, high nickel alloy, and titanium.



Heat exchanger

U-shaped heat exchanger tubes

Petrochemical plant



Stainless steel pipe

Urea fertilizer plant

Nuclear power plant

Precision Tube

Esteemed for High Technology
Precision Tube

Kobelco Steel Tube has realized a high-quality, small diameter tube with excellent dimensional accuracy and surface quality. It is used for such applications as stainless steel fuel cladding tubes for fast breeder reactors, medical equipment, and electric parts. Since 1987, the product has been manufactured in a new air-conditioned and clean factory.

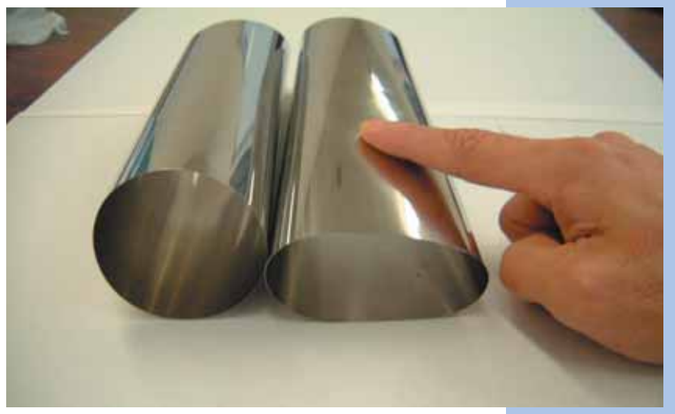
Stainless steel fuel cladding tubes for fast breeder reactors

Work space for precision tube

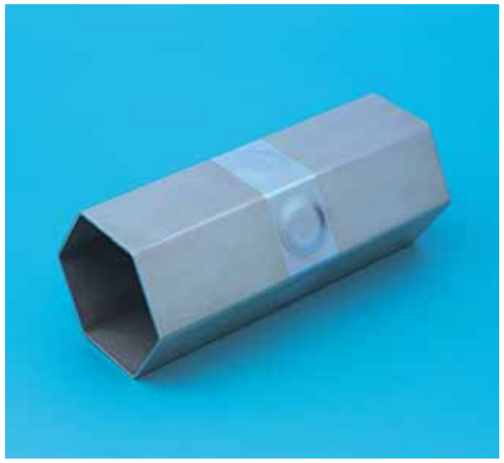
Specialty Tube

Challenging the Future
Specialty Tube

Kobelco Steel Tube developed seamless tubes for use in the MONJU fast breeder reactor built in Japan. Made of modified TP316 stainless steel, these tubes feature excellent creep strength and resistance to swell. New facilities for the mass production of these tubes were completed in 1987. In addition to these products, new ferritic steels, including one strengthened by oxide dispersion, are also being developed.



Ultra Thin Tube



Wrapper tube with pad

Low-finned tubes

Titanium Welded Tube

Efficient Tube for an Advanced New Age

Titanium Welded Tube

Thanks to its salient features of high resistance to corrosion and heat, light weight, and high strength, titanium is being used more and more in the aerospace field, the chemical industry, thermal and nuclear power generation, seawater desalination, and the construction of deep-sea survey submarines. Finding expanding applications in aerospace, on land, and in the ocean, titanium is attracting much attention as a new basic metal for coming generations. Kobelco Steel Tube produces such titanium welded tubes as condenser tubes for thermal and nuclear power generation and tubes for desalination plants, chemical plants, wheelchairs, bicycles, and motorcycle mufflers.

Manufacturing room

Titanium welded tube

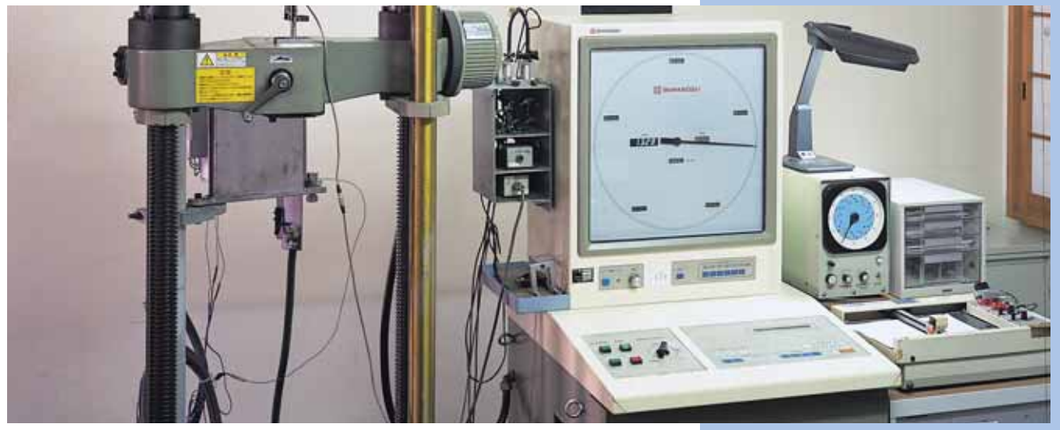
Quality Control and Inspection System

Quality Control

Kobelco Steel Tube has estabilised a strict quality control system to ensure customer satisfaction. In accordance with the system, we carefully manufacture and inspect our products at every stage of production. Before shipment, all products are inspected to ensure that they meet their intended uses and specifications. Due in part to this commitment to quality control, Kobelco Steel Tube has been approved by a number of organizations, including ISO 9001, JIS, LR, NV, and TUV.

Corrosion tesing equipment

Combined ultrasonic and eddy current tester



100 ton tensile test machine

Production Control

In all aspects of production control we adopt a computer system so that high-quality products can be made with the shortest possible lead time. Every stage of the production process, from acceptance of orders to shipment, is controlled in detail by our online-real-time system. This system forges an organic connection with management of accounting, purchasing, and handling, a connection we call the "Integrated Management System". We can precisely and rapidly meet all requirements of our customers.

Environment Control

The Plant, which overlooks the beautiful marine vista of Setouchi, places a high priority on protecting the environment. From the aspect of clean air, we have five facilities to eliminate acid gas. We cope with water preservation with total waste water treatment facilities for all waste water in the plant. In addition, our automatic monitoring system works continuously to keep the environment clean.

Material Grades

Austenitic Stainless Steel Tube and Pipe

Code	Material Grade	Chemical Composition (%)												Applicable Standards			Main Uses
		C,max	Si,max	Mn,max	P,max	S,max	Ni	Cr	Mo	Cu	Ti	N	Others	JIS	ASTM／ASME	EN	
KES303	18Cr-8Ni-S	0.15	1.00	2.00	0.20	0.15min.	8.00~10.00	17.00~19.00						SUS303		1.4305	Machined parts
KES303Se	18Cr-8Ni-Se	0.15	1.00	2.00	0.20	0.060	8.00~10.00	17.00~19.00					Se 0.15min.	SUS303Se			
KES304	18Cr-8Ni	0.08	0.75	2.00	0.040	0.030	8.00~11.00	18.00~20.00						SUS304TP／SUS304TB SUS304TK／SUS304TF	TP304／MT304 UNS S30400	1.4301	Corrosion-resistant heat exchangers, tubes, and pipes
KES304H	HC-18Cr-8Ni	0.04~0.10	0.75	2.00	0.040	0.030	8.00~11.00	18.00~20.00						SUS304HTP／SUS304HTB SUS304HTF	TP304H UNS S30409		Boiler tubes and pipes that must be resistant to high temperature
KES304L	LC-18Cr-9Ni	0.030	0.75	2.00	0.040	0.030	9.00~13.00	18.00~20.00						SUS304LTP SUS304LTB	TP304L／MT304L UNS S30403	1.4306	Heat exchangers and pipes that require corrosion-resistant welds
KES304N	18Cr-8Ni-N	0.08	0.75	2.00	0.040	0.030	8.00~11.00	18.00~20.00				0.10~0.16		SUS304N1	TP304N UNS S30451		High-strength, corrosion-resistant heat exchangers, tubes, and pipes
KES304LN	LC-18Cr-8Ni-N	0.030	0.75	2.00	0.040	0.030	8.00~11.00	18.00~20.00				0.10~0.16		SUS304LN	TP304LN UNS S30453		Boiler tubes and pipes that must be resistant to high temperature
KES304ELC	ELC-18Cr-9Ni-N	0.020	0.75	2.00	0.040	0.030	9.00~13.00	18.00~20.00									Equipment that must be especially corrosion-resistant, nuclear fuel reprocessing equipment
KES304ELN	ELC-18Cr-9Ni-N	0.020	0.75	2.00	0.040	0.030	9.00~11.00	18.00~20.00				0.12max.					Equipment that must be especially corrosion-resistant, nuclear plant
KES316	18Cr-12Ni-2.5Mo	0.08	0.75	2.00	0.040	0.030	11.00~14.00	16.00~18.00	2.00~3.00					SUS316TP／SUS316TB SUS316TK／SUS316TF	TP316／MT316 UNS S31600	1.4401 1.4436	Corrosion-resistant heat exchangers, tubes, and pipes Nuclear fuel cladding tubes and wrapper tubes for fast breeder reactors
KES316H	HC-18Cr-12Ni-2.5Mo	0.04~0.10	0.75	2.00	0.030	0.030	11.00~14.00	16.00~18.00	2.00~3.00					SUS316HTP／SUS316HTB SUS316HTF	TP316H UNS S31609		Boiler tubes and pipes that must be resistant to high temperature
KES316L	LC-18Cr-12Ni-2.5Mo	0.030	0.75	2.00	0.040	0.030	12.00~16.00	16.00~18.00	2.00~3.00					SUS316LTP SUS316LTB	TP316L／MT316L UNS S31603	1.4404 1.4435	Heat exchangers and pipes that require corrosion-resistant welds
KES316L-A	LC-18Cr-10Ni-2.5Mo	0.030	0.75	2.00	0.040	0.030	10.00~14.00	16.00~18.00	2.00~3.00						TP316L／MT316L UNS S31603	1.4404 1.4435	
KES316L-S1	LC-18Cr-10Ni-2.5Mo-1.50Mn-HS(VOD)	0.030	0.75	1.50	0.040	0.005~0.010	10.00~14.00	16.00~18.00	2.00~3.00						TP316L UNS S31603	1.4404 1.4435	Semiconductor manufacturing equipment
KES316L-S2	LC-18Cr-12Ni-2.5Mo-0.80Mn-LS(VOD)	0.030	0.75	0.80	0.040	0.002	12.00~16.00	16.00~18.00	2.00~3.00					SUS316LTP SUS316LTB	TP316L UNS S31603	1.4404 1.4435	
KES316L-S3	ULC-18Cr-12Ni-2.5Mo-0.05Mn-LS(VIM／VAR)	0.010	0.75	0.05	0.040	0.002	12.00~16.00	16.00~18.00	2.00~3.00					SUS316LTP SUS316LTB	TP316L UNS S31603	1.4404 1.4435	
KES316N	18Cr-12Ni-2.5Mo-N	0.08	0.75	2.00	0.040	0.030	11.00~14.00	16.00~18.00	2.00~3.00			0.10~0.16		SUS316N	TP316N UNS S31651		High-strength, corrosion-resistant heat exchangers, tubes, and pipes
KES316LN	LC-18Cr-12Ni-2.5Mo-N	0.030	0.75	2.00	0.040	0.030	11.00~14.00	16.00~18.00	2.00~3.00			0.10~0.16		SUS316LN	TP316LN UNS S31653		Boiler tubes and pipes that must be resistant to high temperature
KES316ELN	ELC-18Cr-12Ni-2.5Mo-N	0.020	0.75	2.00	0.040	0.030	12.00~14.00	16.00~18.00	2.00~3.00			0.12max.				1.4429	Nuclear plant, boiler tubes, and other equipment that must possess excellent corrosion resistance and creep strength
KES316B	18Cr-12Ni-2.5Mo-Ti	0.10	1.00	2.00	0.040	0.030	10.50~13.50	16.50~18.50	2.00~2.50		5×Cmin.				TP316Ti UNS S31635	1.4571	Heat exchangers and pipes that must be resistant to phosphoric and sulfuric acids
KES316J1	18Cr-12Ni-2Mo-2Cu	0.08	1.00	2.00	0.045	0.030	10.00~14.00	17.00~19.00	1.20~2.75	1.00~2.50				SUS316J1			
KES316J1L	LC-18Cr-12Ni-2Mo-2Cu	0.030	1.00	2.00	0.045	0.030	12.00~16.00	17.00~19.00	1.20~2.75	1.00~2.50				SUS316J1L			
KES317	19Cr-12Ni-3.5Mo	0.08	0.75	2.00	0.040	0.030	11.00~15.00	18.00~20.00	3.00~4.00					SUS317TP SUS317TB	TP317／MT317 UNS S31700		
KES317L	LC-18Cr-12Ni-3.5Mo	0.030	0.75	2.00	0.040	0.030	11.00~15.00	18.00~20.00	3.00~4.00					SUS317LTP SUS317LTB	TP317L UNS S31703	1.4438	
KES321	18Cr-9Ni-Ti	0.08	0.75	2.00	0.040	0.030	9.00~13.00	17.00~19.00			5×Cmin.			SUS321TP／SUS321TB SUS321TK／SUS321TF	TP321／MT321 UNS S32100	1.4541	Corrosion-resistant heat exchangers, tubes, and pipes
KES321H	HC-18Cr-9Ni-Ti	0.04~0.10	0.75	2.00	0.030	0.030	9.00~13.00	17.00~20.00			4×C~0.60			SUS321HTP／SUS321HTB SUS321HTF	TP321H UNS S32109		Boiler tubes and pipes that must be resistant to high temperature
KES347	18Cr-9Ni-Nb	0.08	0.75	2.00	0.040	0.030	9.00~13.00	17.00~19.00						SUS347TP／SUS347TB SUS347TK／SUS347TF	TP347／MT347 UNS 34700	1.4550	Corrosion-resistant heat exchangers, tubes, and pipes

Austenitic Stainless Steel Tube and Pipe

Code	Material Grade	Chemical Composition (%)												Applicable Standards			Main Uses
		C,max	Si,max	Mn,max	P,max	S,max	Ni	Cr	Mo	Cu	Ti	N	Others	JIS	ASTM／ASME	EN	
KES347H	HC-18Cr-9Ni-Nb	0.04~0.10	0.75	2.00	0.030	0.030	9.00~13.00	17.00~20.00						SUS347HTP／SUS347HTB SUS347HTF	TP347H UNS S34709		Boiler tubes and pipes that must be resistant to high temperature
KES348	18Cr-9Ni-Nb-(Ta)	0.08	0.75	2.00	0.040	0.030	9.00~13.00	17.00~20.00					Nb+Ta 10×C~1.00 Ta 0.10max.		TP348 UNS S34800		Corrosion-resistant heat exchangers, tubes, and pipes
KES348H	HC-18Cr-9Ni-Nb-(Ta)	0.04~0.10	0.75	2.00	0.040	0.030	9.00~13.00	17.00~20.00					Nb+Ta 8×C~1.00 Ta 0.10max.		TP348H UNS S34809		Boiler tubes and pipes that must be resistant to high temperature
KES309	22Cr-12Ni	0.15	0.75	2.00	0.040	0.030	12.00~15.00	22.00~24.00						SUS309TP SUS309TB	TP309／MT309 UNS S30900		Heat exchangers and pipes that must be resistant to oxidation and corrosion at high temperature
KES309S	22Cr-12Ni	0.08	1.00	2.00	0.040	0.030	12.00~15.00	22.00~24.00						SUS309STP SUS309STB	TP309S／MT309S UNS S30908		
KES310	25Cr-20Ni	0.15	1.50	2.00	0.035	0.010	19.00~22.00	24.00~26.00						SUS310TP／SUS310TB SUS310TF	TP310／MT310 UNS S31000		
KES310S	25Cr-20Ni	0.08	1.50	2.00	0.035	0.010	19.00~22.00	24.00~26.00						SUS310STP SUS310STB	TP310S(UNS S31008) MT310S		
KES310C	ELC-25Cr-20Ni	0.025	1.50	2.00	0.035	0.010	19.00~22.00	24.00~26.00						SUS310STP SUS310STB	TP310S(UNS S31008) MT310S		
KES310ELC	ELC-25Cr-20Ni	0.020	0.30	2.00	0.030	0.030	19.50~21.50	23.50~25.50						SUS310STP SUS310STB	TP310S(UNS S31008) MT310S		
KES310J1	25Cr-20Ni-0.3Nb-0.25N	0.10	1.50	2.00	0.030	0.030	17.00~23.00	23.00~27.00				0.15~0.35	Nb 0.20-0.60 Ta 0.25-0.60	KA-SUS310J1TB	A213 UNS S31042		Boiler tubes and pipes that must be resistant to oxidation at high temperature
KESU1	ELC-18Cr-15Ni-2Mo	0.015	0.75	1.55~1.95	0.028	0.010	13.50~15.00	17.20~18.00	2.20~2.60	0.25max.					TP316L UNS S31603	1.4435	Urea plants, heat exchangers and pipes that must be especially resistant to corrosion
KESU2	ELC-25Cr-22Ni-2Mo	0.015	0.40	1.55~1.95	0.020	0.010	21.50~22.50	24.50~25.50	2.00~2.30	0.47max.					TP310MoLN UNS S31050	1.4466	
KES4449	17Cr-16Ni-5Mo	0.07	1.00	2.00	0.045	0.030	12.50~14.50	16.00~18.00	4.00~5.00							1.4449	Heat exchangers and pipes that must be resistant to phosphoric and sulfuric acids
KESC20A	20Cr-29Ni-2.5Mo-3.5Cu	0.07	1.00	2.00	0.035	0.010	24.00~38.00	19.00~21.00	2.00~5.00	1.00~4.00			Nb 8×C~1.00				
KESC20	20Cr-34Ni-2.5Mo-3.5Cu	0.07	1.00	2.00	0.035	0.010	32.00~38.00	19.00~21.00	2.00~3.00	3.00~4.00			Nb+Ta 8×C~1.00		B729 UNS N08020		
KES28	27Cr-31Ni-3.5Mo-1.0Cu	0.030	1.00	2.50	0.030	0.010	30.00~34.00	26.00~28.00	3.00~4.00	0.60~1.40					B668 UNS N08028		
KES904L	ELC-20Cr-25Ni-4.5Mo-1.5Cu	0.020	1.00	2.00	0.020	0.015	24.00~26.00	19.20~20.50	4.00~5.00	1.00~2.00				SUS890LTP SUS890LTB	A213／A269／A312 UNS N08904	1.4539	
KESC25A	22Cr-26Ni-5Mo-Ti	0.05	1.00	2.50	0.025	0.010	25.00~27.00	21.00~23.00	4.00~6.00		5×Cmin.				B622 UNS N08320		
KESC25T	21Cr-25Ni-4.5Mo-1.5Cu-Ti	0.06	0.17~1.00	1.20~2.00	0.035	0.030	24.00~26.00	20.00~22.00	4.00~5.00	1.20~1.80	5×Cmin.						
KESC28T	24Cr-28Ni-3Mo-3Cu-Ti	0.06	0.80	2.00	0.030	0.010	26.00~29.00	22.00~25.00	2.50~3.50	2.50~3.50	0.50~0.90						
KES836L	LC-20Cr-25Ni-5.5Mo	0.030	1.00	2.00	0.035	0.015	24.00~25.00	19.00~24.00	5.00~7.00			0.25max.		SUS836LTP SUS836LTB			Heat exchangers and pipes that must be resistant to chloride solution
KES254	ELC-20Cr-18Ni-6Mo-N	0.020	0.80	1.00	0.030	0.010	17.50~18.50	19.50~20.50	6.00~6.50	0.50~1.00		0.18~0.22		SUS312LTB	A213／A269／A312 UNS S31254		
KESA1	ELC-25Cr-19Ni-3Mo-2.5Mn-N	0.020	0.50	2.00~4.00	0.035	0.015	18.00~22.00	24.00~26.00	2.00~4.00			0.20~0.40	V 0.10~0.40		B720 UNS N08310		
KES825M1	20Cr-22Ni-5Mo-1.5Cu-N	0.050	1.00	3.00~4.00	0.035	0.010	22.00~24.00	20.00~21.00	5.00~6.00	1.00~2.00		0.15~0.25					
KES800AT	20Cr-32Ni-Al-Ti	0.10	1.00	1.50	0.030	0.015	30.00~35.00	19.00~23.00		0.75max.	0.15~0.60		Al 0.15~0.60	NCF800TP／NCF800TB NCF800TF	B163／B407／A213 UNS N08800	1.4876	Heat exchangers and pipes that must be resistant to oxidation and corrosion at high temperature
KES800LC	LC-20Cr-32Ni-Al-Ti	0.030	1.00	1.50	0.030	0.010	30.00~35.00	19.00~23.00		0.75max.	0.15~0.60		Al 0.15~0.60	NCF800TP／NCF800TB NCF800TF	B163／B407／A213 UNS N08800	1.4876	
KES800N	LC-20Cr-32Ni-Al-Ti	0.030	0.30~0.70	0.40~1.00	0.020	0.015	32.00~35.00	20.00~23.00			12×C~0.60		Al 0.15~0.45, Co 0.10max.	NCF800TP／NCF800TB NCF800TF	B163／B407／A213 UNS N08800	1.4876	Heat exchangers for nuclear applications
KES800H	HC-20Cr-32Ni-Al-Ti	0.06~0.10	1.00	1.50	0.030	0.015	30.00~35.00	19.00~23.00		0.75max.	0.15~0.60		Al 0.15~0.60	NCF800TP／NCF800TB NCF800TF	B163／B407／A213 UNS N08810 UNS N08811	1.4958 1.4959	Heat exchangers and pipes that must be resistant to oxidation and corrosion at high temperature
KESA286	15Cr-26Ni-2Ti-1.3Mo	0.08	1.00	2.00	0.020	0.020	24.00~27.00	13.50~16.00	1.00~1.50		1.90~2.35		V 0.10~0.50 Al 0.35max.	SUH660	A453	AMS5731／AMS5732 AMS5734	Rocket engines

Nickel Alloy and Nickel Tube and Pipe

Code	Material Grade	Chemical Composition (%)												Applicable Standards			Main Uses
		C,max	Si,max	Mn,max	P,max	S,max	Ni	Cr	Mo	Cu	Ti	N	Others	JIS	ASTM／ASME	EN	
KES825	40Ni-21Cr-3Mo-2Cu-Ti	0.05	0.50	1.00	0.030	0.015	38.0~46.0	19.50~23.50	2.50~3.50	1.50~3.00	0.60~1.20		Al 0.20max.	NCF825TP NCF825TB	B163／B423 UNS N08825	2.4858	Heat exchangers and pipes that must be resistant to chloride solution, seawater Pipes that must be resistant to sulfuric and phosphoric acids, and SCC
KES825M2	40Ni-25Cr-5Mo-1.5Cu-Ti	0.05	1.00	2.00	0.040	0.010	40.0~42.0	24.00~26.00	5.00~6.00	1.00~2.00	0.80~1.20						
KES HX	48Ni-22Cr-9Mo-Fe, Co, W	0.05~0.15	1.00	1.00	0.040	0.030	Bal.	20.50~23.00	8.00~10.00				Co 0.5~2.5, Fe 17.0~20.0 W 0.2~1.0		B622 UNS N06002		Heat-resistant protective pipe
KES718	53Ni-19Cr-3Mo-Al, Ti	0.08	0.35	0.35	0.015	0.015	50.0~55.0	17.00~21.00	2.80~3.30	0.30max.	0.65~1.15		Co 1.0max., Al 0.2~0.8				Rocket engines, nuclear plant
KES HB	66Ni-27Mo-5Fe	0.05	1.00	1.00	0.020	0.010	Bal.	1.00max.	26.00~28.00				Co 2.5max., Fe 4.0~6.0 V 0.2~0.4	NW0001	B622 UNS N10001		Chemical plant
KES HC	60Ni-16Cr-16Mo-4W-Fe	0.08	1.00	1.00	0.040	0.030	Bal.	14.50~16.50	15.00~17.00				Co 2.5max., Fe 4.0~7.0 V 0.35max., W 3.0~4.0				Tubes and pipes for the chemical plant, that must be resistant to seawater
KESC276	ULC-60Ni-16Cr-16Mo-4W-Fe	0.010	0.08	1.00	0.030	0.010	Bal.	14.50~16.50	15.00~17.00				Co 2.5max., Fe 4.0~7.0 V 0.35max., W 3.0~4.5	NW0276	B622 UNS N10276	2.4819	Heat exchangers and pipes that must be resistant to chloride solution, seawater
KESC22	ELC-56Ni-21Cr-13Mo-3W-Fe	0.015	0.08	0.50	0.010	0.010	Bal.	20.00~22.50	12.50~14.50				Co 2.5max., Fe 2.0~6.0 V 0.35max., W 2.5~3.5	NW6022	B622 UNS N06022	2.4602	
KES625	58Ni-22Cr-9Mo-Nb	0.10	0.50	0.50	0.015	0.015	58.0min.	20.00~23.00	8.00~10.00		0.40min.		Nb+Ta 3.15~4.15, Co 1.00max. Al 0.40max., Fe 5.00max.	NCF625TP NCF625TB	B444 UNS N06625	2.4856	Tubes and pipes for the chemical plant and nuclear plant that must be resistant to SCC
KES601	58Ni-23Cr	0.10	0.50	1.00	0.020	0.010	58.0~63.0	21.00~25.00					Al 1.00~1.70 Cu 1.00max.		B163／B167 UNS N06601	2.4851	Heat exchangers and pipes that must be resistant to oxidation and corrosion at high temperature
KES690	58Ni-29Cr	0.05	0.50	0.50	0.030	0.010	58.0min.	27.00~31.00		0.50max.			Fe 7.00~11.00		B163／B167 UNS N06690		
KES600	72Ni-15Cr	0.15	0.50	1.00	0.030	0.015	72.0min.	14.00~17.00		0.50max.			Fe 6.00~10.00	NCF600TP NCF600TB	B163／B167 UNS N06600	2.4816	
KES80-20	77Ni-20Cr	0.15	0.75~1.50	2.50			77.0min.	19.00~21.00					Fe 1.00max.				Heat-resistant protective pipe
KESNi	Ni	0.15	0.35	0.35		0.01	99.0min.			0.25max.			Fe 0.40max.	NW2200	B163 UNS N02200	2.4066	Heat exchanger for cheminal plant Rocket engines
KESNiLC	ELC-Ni	0.020	0.35	0.35		0.01	99.0min.			0.25max.			Fe 0.40max.	NW2201	B163 UNS N02201	2.4068	

Duplex Stainless Steel Tube and Pipe

Code	Material Grade	Chemical Composition (%)												Applicable Standards			Main Uses
		C,max	Si,max	Mn,max	P,max	S,max	Ni	Cr	Mo	Cu	Ti	N	Others	JIS	ASTM／ASME	EN	
KES329	25Cr-4Ni-1.5Mo	0.080	0.75	1.00	0.030	0.020	2.50~5.00	23.00~28.00	1.00~2.00					SUS329J1TP SUS329J1TB	A789／A790 UNS S32900		Heat exchangers that must be resistant to SCC(Stress Corrosion Cracking) Heat exchangers and pipes that must be resistant to crevice corrosion
KES329LR	ELC-22Cr-6Ni-Ti	0.020	0.80	0.80	0.035	0.025	5.30~6.30	21.00~23.00			5×C~0.65						
KES329LA	LC-19Cr-5Ni-2.7Mo-1.5Si	0.030	1.40~2.00	1.20~2.00	0.030	0.030	4.30~5.20	18.00~19.00	2.50~3.00			0.05~0.10			A789／A790 UNS S31500	1.4424	
KES329LS	ELC-21Cr-6Ni-2Mo-Ti	0.020	0.80	0.80	0.035	0.025	5.50~6.50	20.00~22.00	1.80~2.50		0.20~0.40						
KES329G	LC-22Cr-4Ni-0.3Mo-N	0.030	1.00	2.50	0.030	0.020	3.00~5.50	21.50~24.50	0.05~0.60	0.05~0.60		0.05~0.20			A789／A790 UNS S32304		
KES329W	LC-22Cr-6Ni-3Mo-N	0.030	1.00	2.00	0.025	0.010	4.50~6.50	22.00~23.00	3.00~3.50			0.14~0.20			A789／A790 UNS S31803 UNS S32205	1.4462	Heat exchangers that must be resistant to SCC(Stress Corrosion Cracking) Heat exchangers and pipes that must be resistant to crevice corrosion Heat exchangers and pipes that must be resistant to chloride solution Tubing for deep sour well environment
KES329J3L	LC-22Cr-5Ni-3Mo-N	0.030	1.00	1.50	0.030	0.020	4.50~6.50	21.00~24.00	2.50~3.50			0.08~0.20		SUS329J3LTP SUS329J3LTB	A789／A790 UNS S31803	1.4462	
KES329X	22Cr-6.5Ni-3.5Mo-Cu-N	0.040~0.080	1.00	2.50~3.50	0.030	0.010	6.00~7.00	21.50~22.50	3.00~4.00	0.30~0.70		0.10~0.20					
KES329J4L	LC-25Cr-6Ni-3Mo-N	0.030	1.00	1.50	0.030	0.020	5.50~7.50	24.00~26.00	2.50~3.50			0.08~0.20		SUS329J4LTP SUS329J4LTB			
KES329C	LC-25Cr-6Ni-3Mo-Cu-N-W	0.030	0.75	1.00	0.030	0.030	5.50~7.50	24.00~26.00	2.50~3.50	0.20~0.80		0.10~0.30	W 0.1~0.5	SUS329J4LTP SUS329J4LTB	A789／A790 UNS S31260		
KES329Y	25Cr-7.5Ni-3.5Mo-Cu-N	0.040~0.080	1.00	2.50~3.50	0.030	0.010	7.00~8.00	24.50~25.50	3.00~4.00	0.30~0.70		0.10~0.20					
KES329YM	LC-25Cr-7Ni-3.5Mo-Cu-N	0.030	1.00	1.50	0.040	0.030	4.50~7.50	21.00~26.00	2.50~4.00	0.40~0.60		0.08~0.30					
KES329LN	LC-25Cr-7Ni-4Mo-Cu-N	0.030	0.80	1.20	0.030	0.010	6.00~8.00	24.00~26.00	3.00~5.00	0.50max.		0.24~0.32			A789／A790 UNS S32750		

Ferritic Stainless Steel Tube and Pipe

Code	Material Grade	Chemical Composition (%)											Applicable Standards			Main Uses
		C,max	Si,max	Mn,max	P,max	S,max	Ni	Cr	Mo	Cu	Ti	N	Others	JIS	ASTM／ASME	EN	
KES403	13Cr-LSi	0.15	0.50	1.00	0.040	0.030	0.50	11.50~13.00						SUS403			Heat exchangers
KES405	13Cr-0.2Al	0.08	1.00	1.00	0.040	0.030	0.50	11.50~14.50						SUS405TB	TP405／MT405 UNS S40500	1.4002	
KES409	11Cr-Ti	0.08	1.00	1.00	0.040	0.030	0.50	10.50~11.75			6×C~0.75			SUS409TB	TP409 UNS S40900		
KES409L	LC-11Cr-Ti	0.03	1.00	1.00	0.040	0.030	0.50	10.50~11.75			6×C~0.75			SUS409LTP SUS409LTB			
KES410	13Cr	0.15	0.75	1.00	0.040	0.030	0.50	11.50~13.50						SUS410TB SUS410TK	TP410／MT410 UNS S41000	1.4000 1.4006	
KES410Ti	13Cr-Ti	0.08	1.00	1.00	0.040	0.030	0.50	11.50~13.50			6×C~0.75			SUS410TiTB	UNS S40800		
KES430	18Cr	0.12	0.75	1.00	0.040	0.030	0.50	16.00~18.00						SUS430TB SUS430TK	TP430／MT430 UNS S43000	1.4016	
KES430Ti	18Cr-Ti	0.10	1.00	1.00	0.040	0.030	0.75	16.00~18.00			7×Cmin.				TP430Ti UNS S43036	1.4510	
KES436L	ELC-18Cr-1Mo-Ti	0.025	1.00	1.00	0.040	0.030	0.50	16.00~19.00	0.75~1.25		8×(C+N)~0.80	0.025max.		SUS436LTP SUS436LTB			
KESXM-8	18Cr-Ti	0.07	1.00	1.00	0.040	0.030	0.50	17.00~19.00			12×C~1.10	0.04max.	Al 0.15max.	SUSXM8TB	TP439 UNS S43035		Moisture separator heaters
KES18-2	ELC-19Cr-2Mo-Nb	0.015	0.40	0.40	0.035	0.025	0.50	18.50~19.30	1.80~2.30			0.025max.	Nb 8(C+N)~0.80	SUS444TP SUS444TB	18Cr-2Mo UNS S44400	1.4521(Ti) 1.4522(Nb)	Chemical reactors, heat exchangers
KES443	22Cr-1Cu	0.20	0.75	1.00	0.040	0.030	0.50	18.00~23.00		0.90~1.25					TP443／MT443 UNS S44300		Soot blowers
KES446	25Cr	0.20	0.75	1.50	0.040	0.030	0.50	23.00~30.00				0.01~0.25			TP446／MT446 UNS S44600		Chemical reactors, heat-resistant protective pipe
KESXM-27	ULC-28Cr-1Mo	0.010	0.40	0.40	0.020	0.020	0.50	25.00~27.50	0.75~1.50	0.20max.		0.015max.	Ni+Cu 0.50max. Nb 0.05~0.20	SUSXM27TB	TPXM-27 UNS S44627		Heat exchangers and pipes that must be resistant to crevice corrosion
SHOMAC302	ULC-30Cr-2Mo	0.005	0.20	0.10	0.020	0.015	0.20	29.00~31.00	1.70~2.00			0.010max.					
RECLOY10	ELC-18Cr-1Si-1Al-Nb	0.020	0.70~1.20	1.00	0.040	0.025		17.00~19.00					Al 0.70~1.20 Nb+Ta 10×(C+N)~0.4			1.4742	Chemical reactors, heat exchangers, and heat-resistant protective pipe for such uses as recuperators in limestone roaster furnaces
RECLOY12	ELC-24Cr-1.5Si-1.5Al-Nb	0.020	1.10~1.60	1.00	0.040	0.025		23.00~25.00					Al 1.20~1.70 Nb+Ta 10×(C+N)~0.4			1.4762	

Precipitation hardening Stainless Steel Tube and Pipe

Code	Material Grade	Chemical Composition (%)											Applicable Standards			Main Uses
		C,max	Si,max	Mn,max	P,max	S,max	Ni	Cr	Mo	Cu	Ti	N	Others	JIS	ASTM／ASME	EN	
KES630	17Cr-4Ni-4Cu-Nb	0.07	1.00	1.00	0.035	0.025	3.50~4.50	15.50~17.00		3.50~4.50			Nb 0.15~0.45	SUS630			Mechanical parts with high strength
KES17-4	17Cr-4Ni-4Cu-Nb	0.07	1.00	1.00	0.035	0.025	3.50~4.50	15.50~17.00	0.50	3.50~4.50			Nb+Ta 5.5×C~0.43			AMS5643	Hydraulic piping and parts for aerospace vehicles, airplane
KES15-5	15Cr-5Ni-3Cu-Nb	0.07	1.00	1.00	0.030	0.015	3.50~5.50	14.00~15.50		2.50~4.50			Nb 0.15~0.45			AMS5659	

Titanium and Titanium Alloy Tube and Pipe (Welded)

Code	Chemical Composition (%)							Applicable Standards		Main Uses
	N,max	C,max	H,max	Fe,max	O,max	Others	Ti	JIS	ASTM	
KS40	0.03	0.08	0.010	0.10	0.10		remains	TTP270,TTH270	Grade1 (B337,B338)	Chemical machinery and equipment which require corrosion resistance Urea plants Thermal, nuclear power plants heat exchangers
KS50	0.03	0.08	0.010	0.15	0.15		remains	TTP340,TTH340	Grade2 (B337,B338)	
KS70	0.05	0.08	0.010	0.30	0.30		remains	TTP480,TTH480	Grade3 (B337,B338)	
KS50-Pd	0.03	0.08	0.010	0.05	0.15	Pd 0.12~0.20	remains	TTP340Pd,TTH340Pd	Grade7 (B337,B338)	Same applications as above, but with higher resistance to non-oxidizing acids
KS50-Ta	0.03		0.010	0.15	0.15	Ta 4.0~6.0	remains			

Standard Manufacturing Range

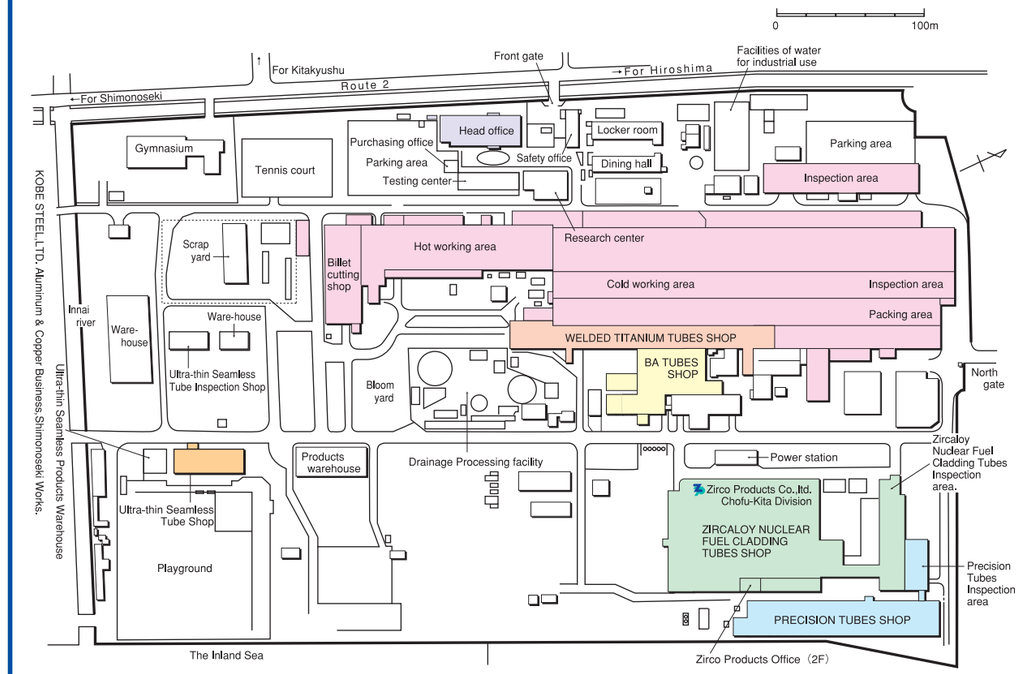
Cold finished | Hot or Cold finished | Hot finished

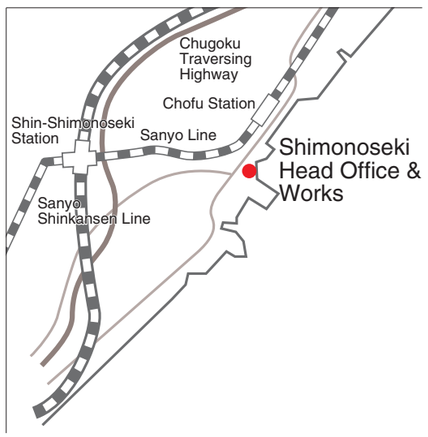
Outside diameter (in)	Outside diameter (mm) \ Wall thickness (mm)	1.0	1.2	1.6	1.8	2.0	2.3	2.6	2.9	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0
	6.0	0.125	0.143	0.175																								
	8.0	0.174	0.203	0.255	0.278	0.299																						
	10.0	0.224	0.263	0.335	0.368	0.399	0.441																					
	12.7	0.291	0.344	0.442	0.489	0.533	0.596																					
1/4	13.8	0.319	0.377	0.486	0.538	0.588	0.659	0.725																				
	15.0	0.349	0.413	0.534	0.592	0.648	0.728	0.803																				
3/8	17.3	0.406	0.481	0.626	0.695	0.762	0.859	0.952	1.040	1.069																		
	20.0	0.473	0.562	0.733	0.816	0.897	1.014	1.127	1.235	1.270																		
1/2	21.7	0.516	0.613	0.801	0.892	0.981	1.111	1.237	1.358	1.397	1.587	1.764																
	25.4	0.608	0.723	0.949	1.058	1.166	1.323	1.477	1.625	1.674	1.909	2.132	2.343															
	27.2	0.653	0.777	1.020	1.139	1.255	1.427	1.593	1.755	1.808	2.066	2.312	2.545	2.765	2.973													
	29.0	0.697	0.831	1.092	1.220	1.345	1.530	1.710	1.885	1.943	2.223	2.491	2.746	2.989	3.220													
	30.0	0.722	0.861	1.132	1.264	1.395	1.587	1.775	1.958	2.018	2.310	2.591	2.858	3.114	3.357	3.587												
	32.0	0.772	0.921	1.212	1.354	1.495	1.702	1.904	2.102	2.167	2.485	2.790	3.083	3.363	3.631	3.886	4.359											
1	34.0	0.822	0.980	1.291	1.444	1.594	1.816	2.034	2.247	2.317	2.659	2.989	3.307	3.612	3.905	4.185	4.708											
	38.0	0.922	1.100	1.451	1.623	1.794	2.045	2.293	2.536	2.616	3.008	3.388	3.755	4.110	4.453	4.783	5.405	5.978										
	38.1	0.924	1.103	1.455	1.628	1.799	2.051	2.299	2.543	2.623	3.017	3.398	3.766	4.123	4.466	4.798	5.423	5.998										
	40.0	0.971	1.160	1.530	1.713	1.893	2.160	2.422	2.680	2.765	3.182	3.587	3.979	4.359	4.727	5.082	5.754	6.377										
1-1/4	42.7		1.241	1.638	1.834	2.028	2.315	2.597	2.875	2.967	3.418	3.856	4.282	4.696	5.097	5.485	6.225	6.915	7.555									
	45.0		1.309	1.730	1.937	2.142	2.446	2.746	3.041	3.139	3.618	4.085	4.540	4.982	5.412	5.829	6.626	7.373	8.071	8.719								
1-1/2	48.6		1.417	1.873	2.098	2.322	2.653	2.979	3.301	3.408	3.932	4.444	4.943	5.430	5.905	6.367	7.254	8.091	8.878	9.615	10.303	10.940						
	50.0			1.929	2.161	2.391	2.733	3.070	3.402	3.512	4.054	4.583	5.100	5.605	6.097	6.576	7.498	8.370	9.192	9.964	10.656	11.359	11.982					
	50.8			1.961	2.197	2.431	2.779	3.122	3.460	3.572	4.124	4.663	5.190	5.704	6.206	6.696	7.637	8.529	9.371	10.163	10.906	11.598	12.241					
	51.0			1.969	2.206	2.441	2.790	3.135	3.475	3.587	4.141	4.683	5.212	5.729	6.234	6.726	7.672	8.569	9.416	10.213	10.960	11.658	12.306					
	54.0			2.088	2.341	2.591	2.962	3.329	3.691	3.811	4.403	4.982	5.549	6.103	6.645	7.174	8.195	9.167	10.089	10.960	11.782	12.555	13.277	13.950	14.572			
	57.0			2.208	2.475	2.740	3.134	3.523	3.908	4.035	4.664	5.281	5.885	6.477	7.056	7.622	8.719	9.765	10.761	11.708	12.604	13.451	14.249	14.996	15.693	16.341		
	60.3			2.340	2.623	2.905	3.323	3.737	4.147	4.282	4.952	5.610	6.255	6.888	7.508	8.116	9.294	10.442	11.501	12.530	13.509	14.438	15.317	16.147	16.926	17.656	18.336	18.996
2	60.5			2.348	2.632	2.914	3.334	3.750	4.161	4.297	4.970	5.630	6.277	6.913	7.535	8.146	9.329	10.462	11.546	12.580	13.563	14.498	15.382	16.216	17.001	17.736	18.421	19.056
	63.5			2.467	2.767	3.064	3.506	3.944	4.378	4.521	5.231	5.929	6.614	7.286	7.946	8.594	9.852	11.060	12.218	13.327	14.386	15.394	16.353	17.263	18.122	18.932	19.691	20.401
	65.0				2.834	3.139	3.592	4.041	4.486	4.633	5.362	6.078	6.782	7.473	8.152	8.818	10.113	11.359	12.555	13.701	14.797	15.843	16.839	17.786	18.683	19.529	20.327	21.074
	70.0				3.058	3.388	3.879	4.365	4.847	5.007	5.798	6.576	7.342	8.096	8.837	9.565	10.985	12.355	13.676	14.946	16.167	17.337	18.458	19.529	20.551	21.522	22.444	23.316
	73.0					3.537	4.051	4.560	5.064	5.231	6.059	6.875	7.679	8.469	9.248	10.014	11.508	12.953	14.348	15.693	16.989	18.234	19.430	20.576	21.672	22.718	23.714	24.661
	75.0					3.637	4.165	4.689	5.208	5.381	6.234	7.074	7.903	8.719	9.522	10.313	11.857	13.352	14.797	16.192	17.537	18.832	20.077	21.273	22.419	23.515	24.561	25.558
	76.2					3.697	4.234	4.767	5.295	5.470	6.338	7.194	8.037	8.868	9.686	10.492	12.066	13.591	15.066	16.490	17.865	19.191	20.466	21.692	22.867	23.993	25.069	26.096
2-1/2	76.3					3.702	4.240	4.773	5.302	5.478	6.347	7.204	8.048	8.880	9.700	10.507	12.084	13.611	15.088	16.515	17.893	19.221	20.498	21.727	22.905	24.033	25.112	26.141
	80.0					3.886	4.452	5.013	5.570	5.754	6.670	7.573	8.463	9.341	10.207	11.060	12.729	14.348	15.917	17.437	18.907	20.327	21.697	23.017	24.287	25.508	26.679	27.800
	82.6						4.601	5.181	5.757	5.949	6.896	7.832	8.755	9.665	10.563	11.449	13.182	14.866	16.500	18.085	19.619	21.104	22.539	23.924	25.259	26.544	27.780	28.965
	88.9						4.962	5.589	6.213	6.419	7.446	8.459	9.461	10.450	11.426	12.390	14.281	16.122	17.913	19.654	21.345	22.987	24.579	26.121	27.613	29.055	30.447	31.790
3	89.1						4.973	5.602	6.227	6.434	7.463	8.479	9.483	10.475	11.454	12.420	14.316	16.162	17.958	19.704	21.400	23.047	24.643	26.190	27.687	29.135	30.532	31.880
	90.0						5.025	5.661	6.292	6.502	7.542	8.569	9.584	10.587	11.577	12.555	14.473	16.341	18.159	19.928	21.647	23.316	24.935	26.504	28.024	29.493	30.913	32.283
	100.0							6.308	7.014	7.249	8.413	9.565	10.705	11.832	12.947	14.049	16.216	18.334	20.401	22.419	24.387	26.305	28.173	29.992	31.760	33.479		
3-1/2	101.6							6.412	7.130	7.368	8.553	9.725	10.884	12.032	13.166	14.288	16.495	18.653	20.760	22.818	24.825	26.783	28.691	30.550	32.358			
	110.0								7.737	7.996	9.285	10.562	11.826	13.078	14.317	15.544	17.960	20.327	22.643	24.910	27.127	29.294						
4	114.3								8.047	8.317	9.660	10.990	12.308	13.613	14.906	16.187	18.710	21.183	23.607	25.981	28.305							
	120.0										10.157	11.558	12.947	14.323	15.687	17.038	19.704	22.319	24.885	27.401	29.867	32.283	34.650	36.966	39.233	41.450	43.617	45.735
	125.0										10.593	12.056	13.507	14.946	16.372	17.786	20.576	23.316	26.006	28.647	31.237	33.778	36.269	38.710	41.102	43.443	45.735	47.977
	130.0										11.029	12.555	14.068	15.569	17.057	18.533	21.448	24.312	27.127	29.892	32.607	35.273	37.888	40.454	42.970	45.436	47.852	50.219
	135.0										11.465	13.053	14.628	16.192	17.742	19.280	22.319	25.309	28.248	31.138	33.977	36.767	39.507	42.198	44.838	47.429	49.969	52.460
5	139.8										11.883	13.531	15.166	16.789	18.400	19.998	23.156	26.265	29.324	32.333	35.292	38.202	41.062	43.871	46.632	49.342	52.002	
	145.0										12.337	14.049	15.749	17.437	19.112	20.775	24.063	27.301	30.490	33.629	36.717	39.756	42.746	45.685	48.575			
	150.0										12.773	14.547	16.310	18.060	19.797	21.522	24.935	28.298	31.611	33.874	38.087	41.251	44.365	47.429				
	155.0										13.209	15.046	16.870	18.683	20.482	22.270	25.807	29.294	32.732	36.120	39.457	42.746						
	160.0										13.644	15.544	17.431	19.305	21.167	23.017	26.679	30.291	33.853	37.365	40.827							
6	165.2										14.098	16.062	18.014	19.953	21.880	23.794	27.585	31.327	35.018	38.660								

(Unit:kg/m)

The manufacturing range of Type 304 Stainless Steel Tubes and Pipe is above-mentioned.
Please consult Kobe Special Tube about dimensions not listed here.

KOBELCO STEEL TUBE CO.,LTD. SHIMONOSEKI WORKS





Outline

1. Location

Tokyo Head Office
9-12, Kitashinagawa, 5-chome, Shinagawa-ku,
TOKYO, 141-8688 JAPAN
Tel.03-5739-5050 Fax.03-5739-5055

Shimonoseki Head Office & Works
13-1, Chofuminato-machi, Shimonoseki-City,
Yamaguchi, 752-0953 JAPAN
Tel.083-246-3781 Fax.083-245-1092

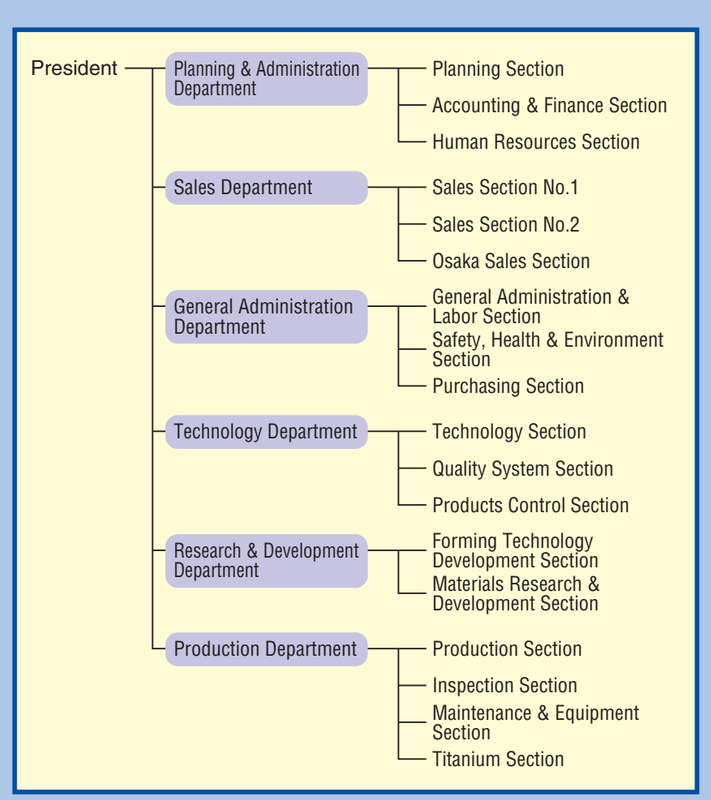
Osaka Office
Midosuji Mitsui Bldg., 1-3, Bingomachi 4-chome,
Chuo-ku, Osaka, 541-8536 JAPAN
Tel.06-6206-6305 Fax.06-6206-6471

2. Site and Building of Shimonoseki Head Head Office & Works

Site area 214,607m²
Factory area 67,155m²

3. Employees

about 400



The 1950's

'56 Technical Agreement with CEFILAC
'58 Hot Extrusion Shop
'59 Cold Working Shop
'59 Began to Operate as Chofu-Kita Plant of Kobe Steel, Ltd.

The 1960's

'60 Use of JIS Mark on Product Approved
'60 Authorization of Lloyd's
'65 Authorization of TUV
'67 Authorization of NV
'67 Introduction of QC Activity

The 1970's

'70 Reinforcement of Fuel Cladding Tube Shop
'72 Technical Agreement with GE
'73 U-Tube Inspection and Packing Shop
'75 Long-Tubing Facilities
'79 Award by Minister of MITI

The 1980's

'81 New Shop for Nuclear Fuel Cladding Tube
'82 Introduction of TQC
'87 Precision Tube Shop
'88 Titanium Welded Tube Shop
'89 EP Pipe Shop
'89 Awarded the Deming Prize

The 1990's

'90 Introduction of TPM
'91 Reinforcement of Nuclear Fuel Cladding Tube Shop
'92 Authorization of ISO9002
'94 Expanded Extrusion press Capacity
'96 Established Kobe Special Tube

The 2000's

'00 Zircaloy Fuel Cladding tube section separated and established Zirco Products Co.,Ltd.
'02 Renewed as ISO9001 Company (Version 2000)
'05 Authorization of ISO14001 (Version 2004)
'07 Authorization of OSHMS
'08 Expand Modernization of Cold Working Shop
'16 Renamed to Kobelco Steel Tube Co.,Ltd.