

SeAH Changwon
Integrated Special Steel



SeAH CSS



**STAINLESS STEEL
BAR**



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SeAH CSS’s constant mission:
Creating new value from steel
for the world

Our constant mission is to open a door to the future of the global special steel industry.

From high-tech industries including power generation, petrochemicals and semiconductors to futuristic industries such as nuclear power and aerospace, SeAH CSS is growing into a leader in Stainless steel, Tool steel, and Ni-alloys.

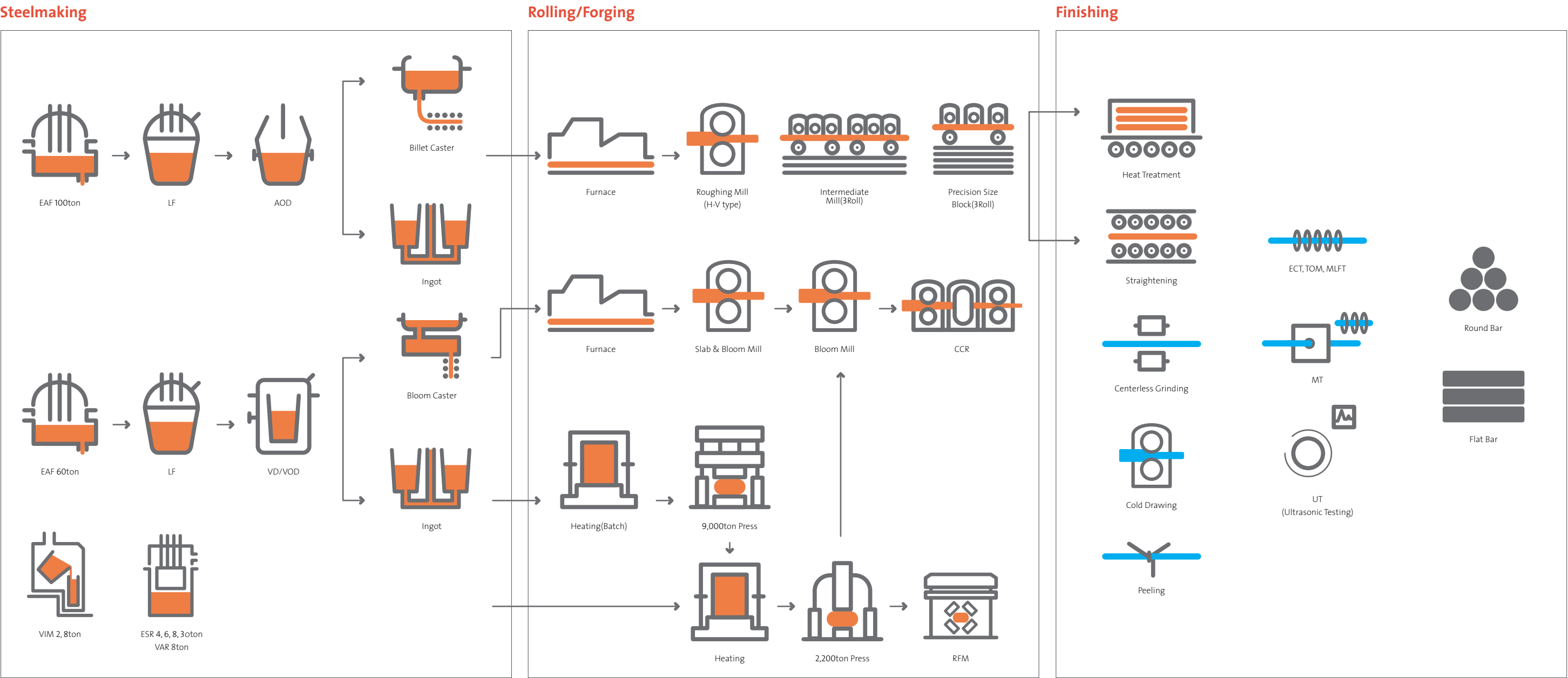
With our products, we aim to raise the level of customer satisfaction and set up the new industry standard by constantly challenging ourselves.



History

04/1966	Founded as Samyang Special Steel Co., Ltd.
12/1977	Completed a general special steel plant as Korea Specialty Steel Co., Ltd (for round bars, steel pipes and plates)
06/1982	Changed its name to SAMMI General Special Steel Co., Ltd
04/1991	Opened its second special steel plant (for steelmaking, rolling, processing)
02/1997	Annexed to POSCO Group (for round bars and pipe business)
10/2006	Completed the 1st phase of its facility rationalization (AOD, HV Mill, Second acid cleaning plant and more)
02/2007	Renamed Changed its name to POSCO Specialty Steel Co., Ltd
04/2012	Completed the 2nd phase of its facility rationalization (6oton EAF, Bloom Caster, SBM and more)
03/2015	Acquired by SeAH Group and changed its name to SeAH Changwon Integrated Special Steel Co., Ltd

Manufacturing Process



EAF



AOD



Bloom Caster



Billet Caster



SBM



CCR



RFM

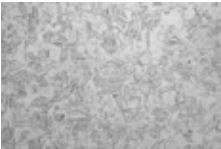


UT/MT



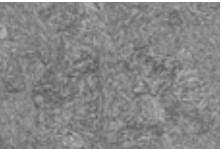
Classification of Stainless Steel

Austenitic



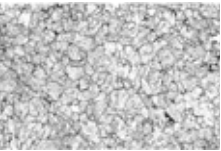
304 18Cr-8Ni C≤0.08 Mo Annexation (High Pitting Potential)	Cutting (S Annexation)	303 17Cr-8Ni-0.15S	S↓	303F 17Cr-8Ni-0.3S	Cu↓ (Freshness)	303C 17Cr-8Ni-0.15S-1.5Cu
	(N Annexation)	304N 18Cr-8Ni-0.08N	N↓	304N1 18Cr-7Ni-0.1N	N↓	304N2 18Cr-7.5Ni-0.15N
	Corrosiveness (Low C)	304L 18Cr-9Ni / ≤0.03	Ti Annexation	321 17Cr-9Ni-Ti	Nb Annexation	347 17Cr-9Ni-Nb
	Heat-resistant/Antioxidant (Cr, Ni ↓)	310S 24Cr-19Ni	Si↓	314 23Cr-19Ni-1.5S		
316 16Cr-10Ni-2Mo C≤0.08	Corrosiveness (C ↓)	316L 16Cr-12Ni-2Mo C≤0.03	C↓	316UL 16Cr-12Ni-2Mo ≤0.02		
	(Ti Annexation)	316Ti 16Cr-10Ni-2Mo-Ti				
	Cutting (S Annexation)	316F 16Cr-10Ni-2Mo S≥0.1	C↓	316LF 16Cr-10Ni-2Mo C≤0.03, S≥0.1		
	Strength (N Annexation)	316N 16Cr-10Ni-2Mo N≥0.1				
	Pitting Potential (Mo ↑)	317 18Cr-11Ni-3Mo				

Martensitic



410 11.5Cr C≤0.15, Si≤1.0	Tension (Si Decrease)	403 11.5Cr / Si≤0.5			
	Cutting (S Annexation)	416 12Cr-0.15S	High Strength (C ↑)	420F 0.26C_12Cr_0.26S	
	Strength (C Increase)	420J1 0.16C-12Cr	C↑	420J2 0.26C-12Cr	
	Strength/Tension (Cr ↓, Ni Annexation)	431 15Cr-1.25Ni			
	Strength (Cr, C Annexation)	440A 0.6C-16Cr	C↑	440B 0.75C-16Cr	C↑ 440C 0.95C-16Cr

Precipitation Hardened



630 15Cr-4Ni-3Cu	Al Annexation	631 16Cr-6.5Ni-0.75Al
		631J1 16Cr-7.0Ni-0.75Al
660 14Cr-24Ni-1Mo-2Ti-V,B		

Duplex



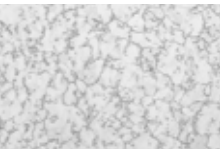
F51 / F60 21Cr-5Ni-3Mo-0.1N	Strength/Corrosiveness (Cr, Ni, Mo, N↑)	F53 24Cr-7Ni-4Mo-0.25N	W Annexation	F55 25Cr-7Ni-3Mo-0.5W
SUS329J1 23Cr-4Ni-2Mo		SUS329J3L 22Cr-5Ni-3Mo-0.18N		SUS329J4L 25Cr-7Ni-3Mo-0.2N
SAD2505 23Cr-5Ni-2Mo-0.1N				

Ferritic



430 16Cr C≤0.12	(Cr, C ↓, Al Annexation)	405 11.5Cr-0.1Al C≤0.08		
	(Cr, C ↓)	410L 0.03C-11.5Cr		
	Cutting (S Annexation)	430F 16Cr / S≥0.15		
	Corrosiveness (Mo Annexation)	434 16Cr-0.75Mo	Corrosiveness (Cu Annexation)	434A 16Cr-0.75Cu

Heat Resistant



STR35 21Cr-4Ni-0.4N	N ↓	21-2N 21Cr-2Ni-0.4N		
STR1 0.4C-8Cr-3Si	C↑, Si ↓	STR11 0.5C-8Cr-1.5Si	Si ↑, Mo Addition	STR3 0.4C-11Cr-2Si-1Mo
SNCRW 18Cr-9Ni-1Si-1.8W				
(Ni ↑, W Annexation)				

304

Commonly used austenitic stainless steel.
Mainly used as parts for machinery,vacuum gauge,and etc that require high corrosion resistance.

Mechanical Properties

Grade	Heat treatment (°C)	Strength(N/mm²)		Elongation(%)	RA(%)	Hardness(HB)
		Tensile	Yield			
304	Solution (1,010-1,150°C) water cooling	520 ↑	205 ↑	40 ↑	60 ↑	187 ↓
304L		480 ↑	175 ↑	40 ↑	60 ↑	187 ↓

Physical Properties

Grade	Density	Specific Heat(0-100°C)	CTE(20-100°C)	TC(100°C)	Machinability (relative to AISI1212)
304	8.0 g/cm³	502 J/Kg K	17.3 μm/m K	16.3 W/m K	60%

* CTE:Coefficient of Thermal Expansion / TC:Thermal Conductivity

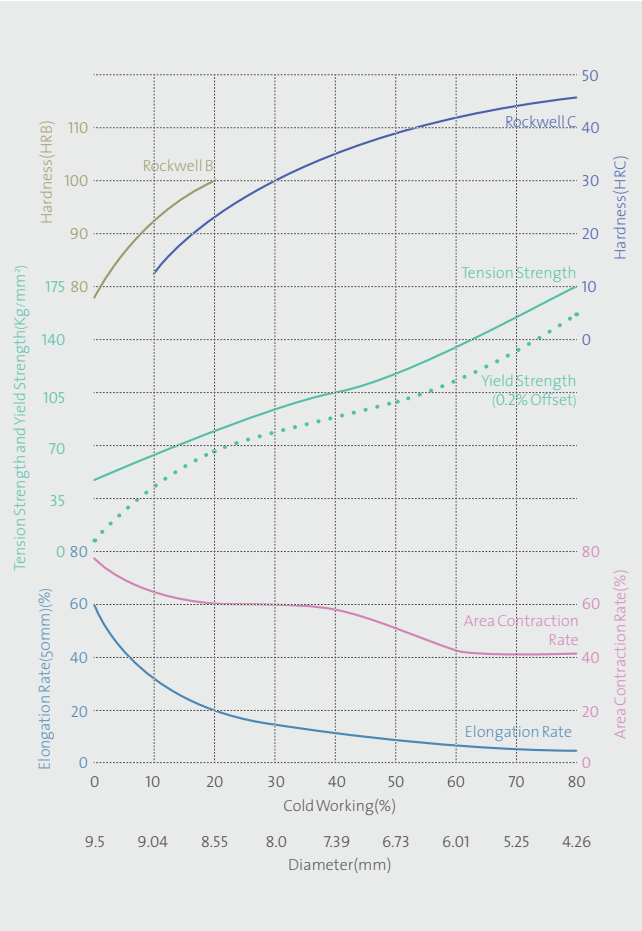
Applications

Parts of industrial machinery:Shafts,etc
Vacuum parts:Flanges,etc
Pump parts:Valves,etc



Parts for vacuum Gauge and Semiconductors

Cold workability – mechanical properties



316

Increased corrosion resistance and high temperature strength by adding Molybdenum to 304 grade.
Mainly used as parts for seawater, petrochemical, and etc that require higher corrosion resistance.

Mechanical Properties

Grade	Heattreatment(°C)	Strength(N/mm²)		Elongation(%)	RA(%)	Hardness(HB)
		Tensile	Yield			
316	Solution (1,010-1,150°C) water cooling	520 ↑	205 ↑	40 ↑	60 ↑	187 ↓
316L		480 ↑	175 ↑	40 ↑	60 ↑	187 ↓

Physical Properties

Grade	Density	Specific Heat(0-100°C)	CTE(20-100°C)	TC(100°C)	Machinability (relative to AISI1212)
316	8.0 g/cm³	500 J/Kg K	15.9 μm/m K	16.3 W/m K	55%

* CTE:Coefficient of Thermal Expansion / TC:Thermal Conductivity

Applications

Seawater pump parts:Shafts and valves
Parts for chemical,oil refinery,and etc

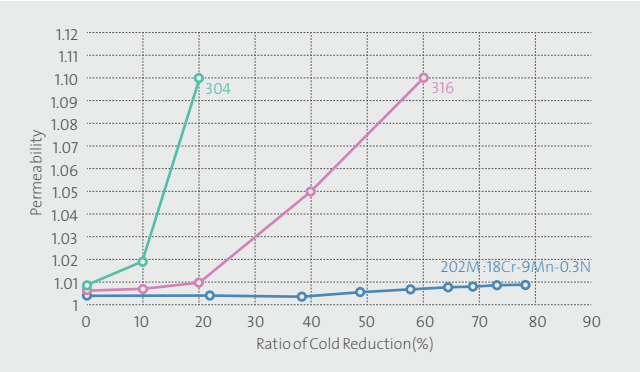


High corrosion resistant parts

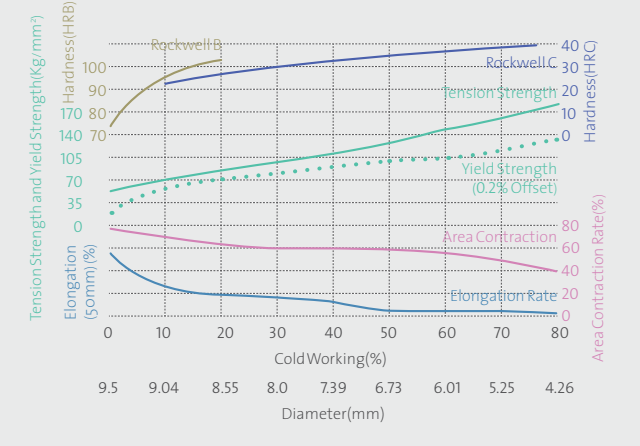


Stainless valve

Cold Working – Investment Rate



Mechanical Properties



303,303F

Increased machinability by adding Sulfur to 304.

Mechanical Properties

Grade	Heat treatment(°C)	Strength(N/mm²)		Elongation(%)	RA(%)	Hardness(HB)
		Tensile	Yield			
303,303F	Solution (1,010-1,150°C) water cooling	520 ↑	205 ↑	40 ↑	50 ↑	187 ↓

Physical Properties

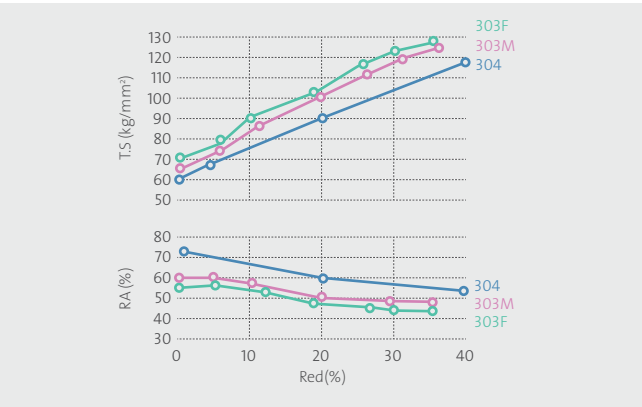
Grade	Density	Specific heat(0-100°C)	CTE(20-100°C)	TC(100°C)	Machinability (relative to AISI1212)
303,303F	8.0 g/cm³	502 J/Kg K	17.3 μm/m K	16.3 W/m K	80%

* CTE: Coefficient of Thermal Expansion / TC: Thermal Conductivity

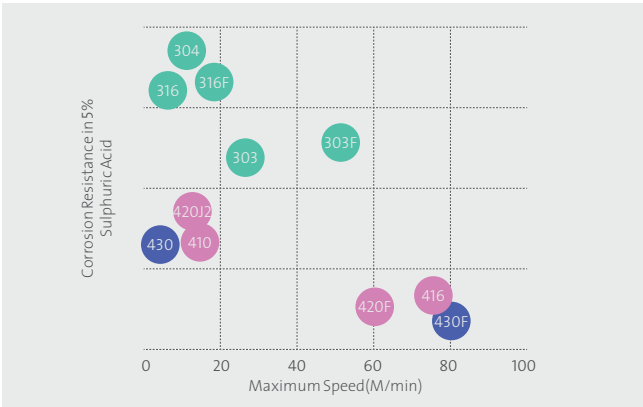
Applications



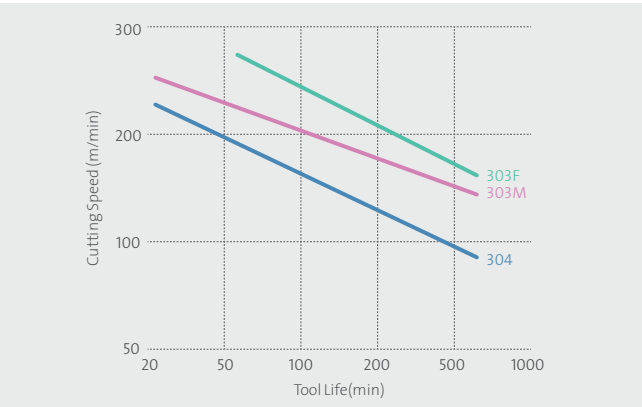
Cold Workability – Mechanical Properties



High Corrosion Resistance – Machinability



Tool Life



410,403

410,403 are basic martensitic steels. They have a lack of corrosion resistance and magnetism when compared to 300s, however, their strength can be secured by having hardening heat treatment.

Mechanical Properties

ASTMA276	Heat treatment(°C)	Finish	Strength(N/mm²)		Elongation(%)	RA(%)
			Tensile	Yield		
410,403	QT(Condition T)	Cold-finished	480 ↑	275 ↑	16 ↑	45 ↑
	Annealed	Hot-finished	480 ↑	275 ↑	20 ↑	45 ↑

Heat Treatment Method

Grade	Annealing	Quenching	Tempering
410,403	800 - 900°C, furnace cooling	850 - 1000°C, oil cooling	700 - 750°C, water cooling

* CTE: Coefficient of Thermal Expansion / TC: Thermal Conductivity

Physical Properties

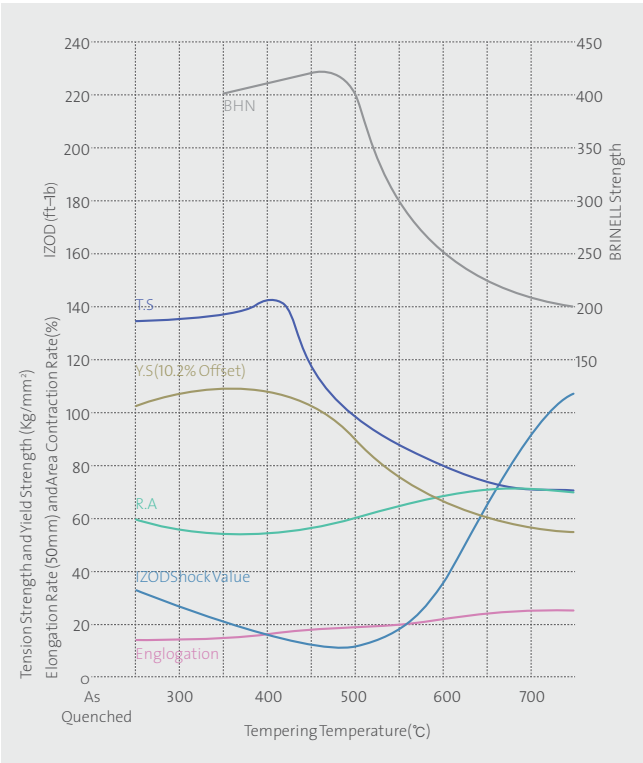
Grade	Density	Specific heat(0-100°C)	CTE(20-100°C)	TC(100°C)	Machinability (relative to AISI1212)
410,403	7.8 g/cm³	460 J/Kg K	9.9 μm/m K	24.9 W/m K	55%

Applications

High strength shafts
Turbine parts for power generation: buckets and blades
Pump parts: shafts and valves
Parts for petrochemicals



Mechanical Properties



SUS420J2

Mainly used for high strength shafts and molds that require extra strength.

Mechanical Properties

Grade	Heat treatment(°C)	Strength(N/mm²)		Elongation(%)	RA(%)	Hardness(HB)	Impact(J/cm²)
		Tensile	Yield				
SUS420J2	QT	740 ↑	540 ↑	12 ↑	40 ↑	217 ↑	29 ↑
	Annealed	-	-	-	-	235 ↓	-

* Based on JIS specifications

Heat Treatment Method

Grade	Annealing	Quenching	Tempering
SUS420J2	800 - 900℃, furnace cooling	820 - 980℃, oil cooling	600 - 750℃, water cooling

Physical Properties

Grade	Density	Specific heat (0-100 °C)	CTE (20-100℃)	TC (100℃)	Machinability (relative to AISI1212)
SUS420J2	7.75 g/cm³	0.46 J/Kg K	10.3 μm/m K	23.8 W/m K	40%

* CTE: Coefficient of Thermal Expansion / TC: Thermal Conductivity

Applications

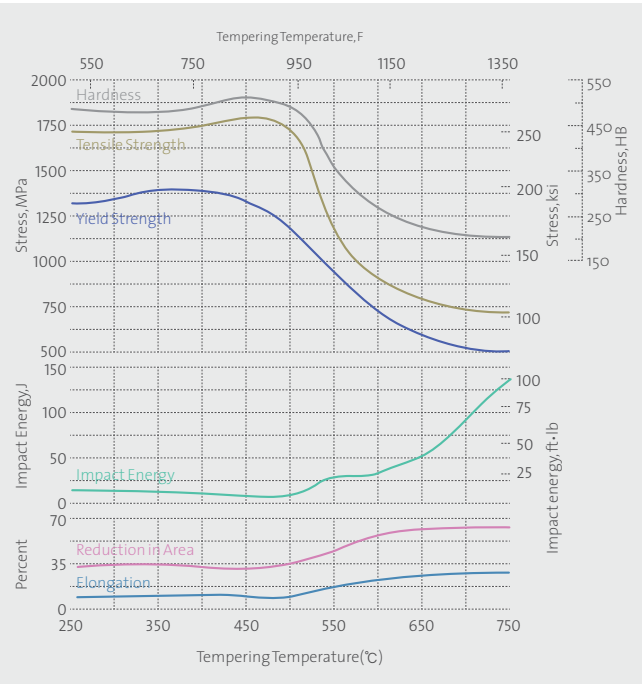


Injection Molding



High-Strength Shaft

Mechanical Properties



431, 440C

Martensitic stainless steels that gain high strength and toughness through hardening heat treatment.

Mainly used as parts for shafts, molds, and bearings.

Mechanical Properties

Grade	Heat treatment(°C)	Strength(N/mm²)		Elongation(%)	RA(%)	Hardness(HB)	Impact(J/cm²)
		Tensile	Yield				
431	QT	780 ↑	590 ↑	15 ↑	40 ↑	229 ↑	39
	Annealed	-	-	-	-	302 ↓	-
440C	QT	-	-	-	-	HRC 58 ↑	-
	Annealed	-	-	-	-	269 ↓	-

* Based on JIS specifications

Heat Treatment Method

Grade	Annealing	Quenching	Tempering
431	First 750℃, fan cooling Second 650℃, fan cooling	1000-1050℃, oil cooling	630-700℃, water cooling
440C	800 - 920℃, furnace cooling	1010 - 1070℃, oil cooling	100 - 180℃, air cooling

Physical Properties

Grade	Density	Specific heat (0-100 °C)	CTE (20-100℃)	TC (100℃)	Machinability (relative to AISI1212)
431	7.8 g/cm³	460 J/Kg K	10.1 μm/m K	20.2 W/m K	45%
440C	7.8 g/cm³	460 J/Kg K	10.3 μm/m K	24.2 W/m K	40%

* CTE: Coefficient of Thermal Expansion / TC: Thermal Conductivity

Applications

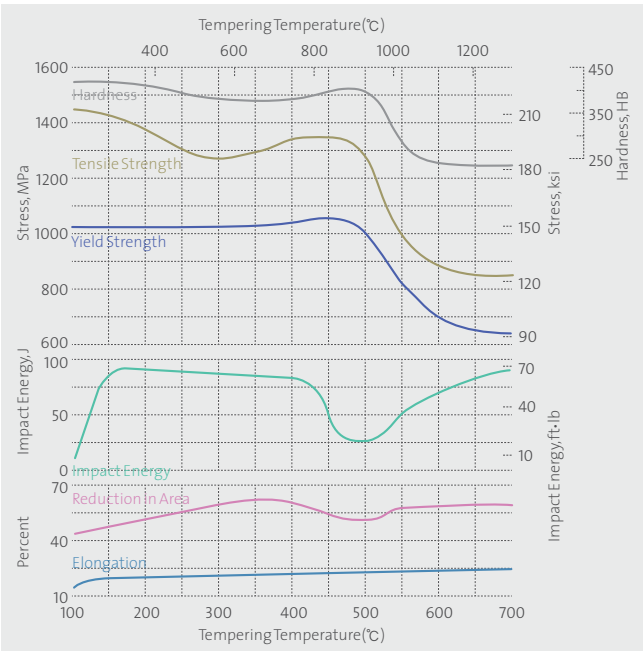
Shaft parts with high strength and toughness

Bearings, bushes, sleeves, etc



High Strength and Corrosion Resistant Shaft Parts

Mechanical Properties (431)



630, 660

Boast high strength through precipitation hardening heat treatment.
Mainly used for parts with high temperatures and high strengths.

Mechanical Properties

Grade	Heat treatment/Cond.	Strength(N/mm²)		Elongation (%)	RA(%)	Hardness (HRC)
		Tensile	Yield			
630	Solution	-	-	-	-	38 ↓
	Aging	H1025	1070 ↑	1000 ↑	12 ↑	45 ↑
		H1075	1000 ↑	860 ↑	13 ↑	45 ↑
		H1100	965 ↑	795 ↑	14 ↑	45 ↑
		H1150	930 ↑	725 ↑	16 ↑	50 ↑
660	Solution	-	-	-	-	-
	Aging	A, B, C	585 ↑	895 ↑	15 ↑	24~37
		D	725 ↑	895 ↑	15 ↑	24~35

Physical Properties

Grade	Density	Specific heat (0-100 °c)	CTE (20-100 °c)	TC (100 °c)
630	7.81g/cm³	460 J/KgK	10.4 μm/m K	17.8 W/m K
660	7.92 g/cm³	460 J/KgK	10.4 μm/m K	12.6 W/m K

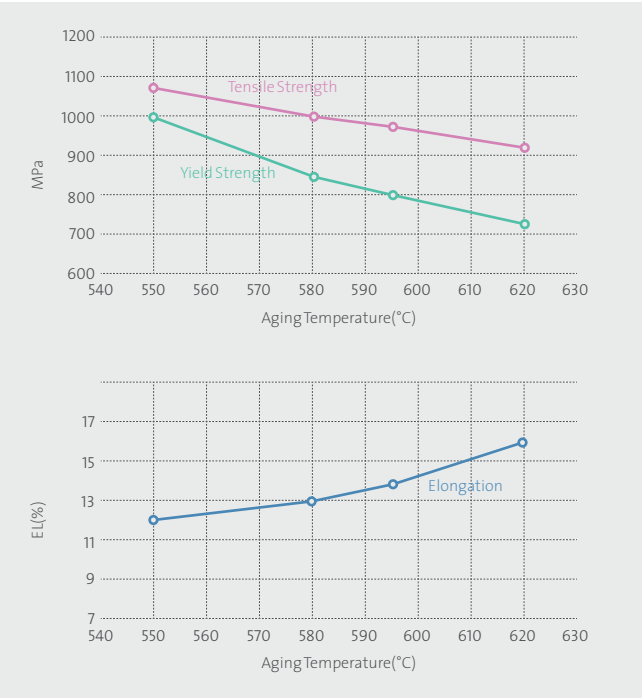
* CTE: Coefficient of Thermal Expansion / TC: Thermal Conductivity

Applications



Propeller Shaft for Ship

Mechanical Properties (630)



Duplex(F51,F60,F53,F55)

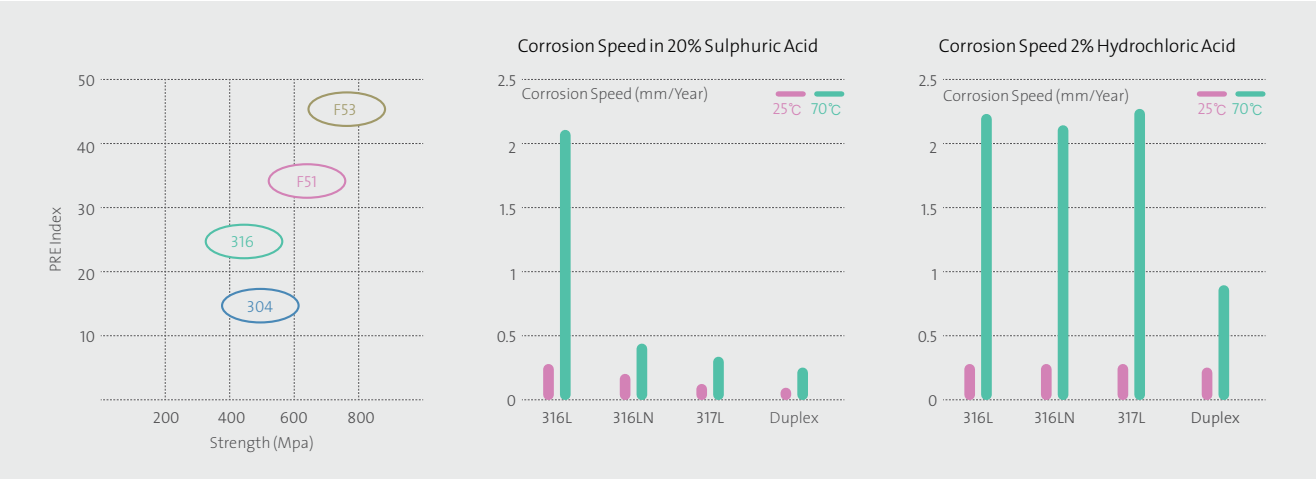
Duplex stainless steels that mainly used for on/offshore plants due to its high PRE when compared to 304 and 316 products.

Chemical Composition & Mechanical Properties

Grade	UNS No	Chemical composition (%)					PRE	Yield strength (N/mm²)	Tensile strength(N/mm²)	Elongation(%)
		C	N	Cr	Ni	Mo				
304	S30400	0.08	-	18	8	-	18	205	515	40
316L	S31603	0.03	-	18	12	2	25	170	485	40
F51	S31803	0.02	0.15	22	5	3	34	450	620	25
F60	S32205	0.02	0.15	22	5	3	34	450	655	25
F53	S32750	0.02	0.25	25	7	4	41	550	800	15
F55	S32760	0.02	0.25	25	7	4	41	550	750	25

* PRE: Cr+3.3(Mo+W)+16N

Strength-Corrosion Resistance



Applications

Applied to parts for on/offshore plants. High corrosion resistance with high strengths guaranteed.



Offshore rig

Turbine Blades (B50A365B, 10705BU, and etc.)

Produced with high strength, heat, and wear resistance.
Mainly used for turbine blades utilized in a field of thermal and nuclear power plant industry.

Chemical Composition

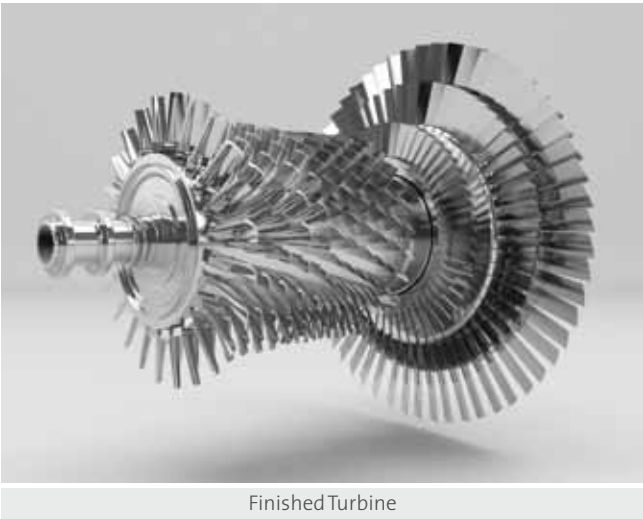
* GE : General Electronic, MHI : Mitsubishi Heavy Industries

Specification	Grade	Chemical composition (%)	
		Cr	Ni
GE	B50A365B	10.4	0.40
	B50A947A4	11.6	0.45
MHI	10705BU	11.7	0.70
	10705BA	11.8	0.45
SKODA-power	WNR1.4938MOD	11.2	2.20

Mechanical Properties

Grade	Heat treatment (°C)	Strength(N/mm²)		EL(%)	RA(%)	Hardness(HB)
		Yield	Tensile			
B50A365B	QT	680 ↑	960 ↑	15 ↑	45 ↑	321 ↓
B50A947A4	QT	550 ↑	750 ↑	18 ↑	50 ↑	223~269
10705BU	QT	760 ↑	930 ↑	14 ↑	32 ↑	277~331
10705BA	QT	550 ↑	690 ↑	20 ↑	60 ↑	201~241
WNR1.4938MOD	QT	800 ↑	950 ↑	14 ↑	-	292~330

Applications



Heat Resisting Steel (STR11, STR1, STR35, and etc.)

Have outstanding temperature strength, acid resistance, wear resistance, and fatigue stress.
Mainly used for ship-building and automotive engine valves.

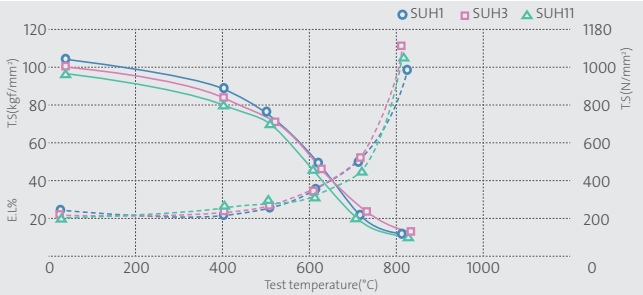
Chemical Composition & Mechanical Properties

Grade	Chemical Composition (%)					Mechanical properties				
	C	Si	Cr	Ni	N	YS	TS	EL.(%)	RA(%)	Hardness(HB)
STR11	0.5	1.5	8	-	-	685 ↑	880 ↑	15 ↑	35 ↑	262 ↑
STR1	0.4	3	8	-	-	685 ↑	930 ↑	15 ↑	35 ↑	269 ↑
STR3	0.4	2	11	-	-	685 ↑	930 ↑	15 ↑	35 ↑	269 ↑
STR35	0.5	0.1	21	4	0.4	560 ↑	880 ↑	8 ↑	-	302 ↑
SNCRW	0.2	1	18	9	0.05	350 ↑	700 ↑	20 ↑	45 ↑	190 ↑

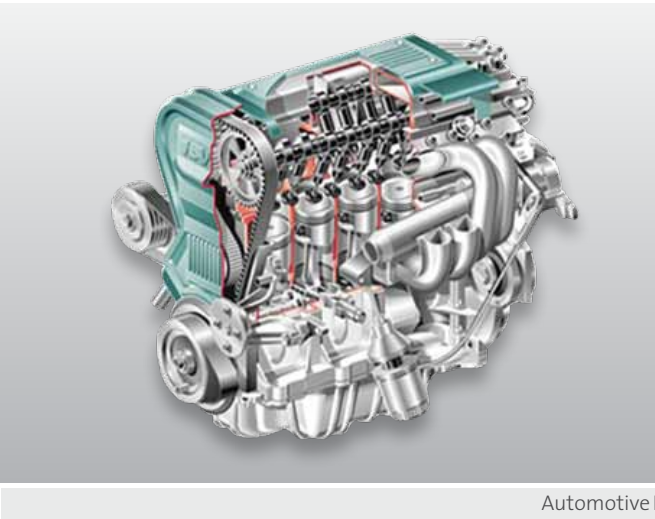
Mechanical Properties

Grade	Density	CTE(X10 ⁻⁶ /°C)	TC (20°C)	EC (20°C)
STR1	7.70 g/cm³	20~600°C 12.5	16.7 W/m K	79 μΩ·cm
STR3	7.65 g/cm³	20~800°C 12.2	15.2 W/m K	84 μΩ·cm
STR11	7.70 g/cm³	20~600°C 13.4	25.0 W/m K	73 μΩ·cm
STR35	7.75 g/cm³	20~760°C 18.4	18.0 W/m K	75 μΩ·cm
SNCRW	7.90 g/cm³	20-500°C 18.2	12.5 W/m K	-

Physical Properties at High Temperatures



Applications



Specifications

Austenitic Stainless Steel

Type	KS/JIS (STS/SUS)	ASTM / AISI	EN(DIN)	UNS CODE	Others	Chemical composition(wt,%)											Mechanical properties					Applications	
						C	Si	Mn	P	S	Ni	Cr	Mo	Cu	N	Others	Y.S(N/mm²)	T.S(N/mm²)	EL.(%)	RA(%)	HB		
	303	303	(1.4305)	S30300						0.15	8.0	17.0				1.4305 : C≤0.1, P≤0.045, CU≤0.1	205	520	40	50		Machinery/shaft	
						0.15	1.0	2.0	0.2		10.0	19.0	0.6										187
	303F	303F								0.30	8.0	17.0											
						0.15	1.0	3.5	0.2	0.35	10.0	19.0	0.6		0.08								
	304	304	(1.4301)	S30400							8.0	18.0				1.4301: C≤0.07, CR 17.5~19.5	205	520	40	60			
						0.08	1.0	2.0	0.045	0.03	10.5	20.0											187
	304LN										8.5	17.0			0.12			245	550	40	50		
						0.03	1.0	2.0	0.045	0.03	11.5	19.0			0.22							217	
304 / 304L											8.0	18.0											
						0.03	1.0	2.0	0.045	0.03	12.0	20.0											
	F304H			S30409							8.0	18.0					205	515	30	50		Machinery/fitting/valve/ shaft for power plant/ shipbuilding	
						0.10	1.0	2.0	0.045	0.03	11.0	20.0											
304L	304L	(1.4306)	S30403								9.0	18.0				304L(ASTM / AISI) : Ni 8~12	175	480	40	60			
						0.03	1.0	2.0	0.045	0.03	13.0	20.0										187	
	304N1	F304N		S30451							7.0	18.0				304N1 : N 0.10~0.25 F304N : N 0.10~0.16, Ni 8~10.5	275	550	35	50			
						0.08	1.0	2.5	0.045	0.03	10.5	20.0											217
	304N2										7.5	18.0			0.15			345	690	35	50		
						0.08	1.0	2.5	0.045	0.03	10.5	20.0			0.30	NB≤0.15						250	
	F304LN			S30453							8.0	18.0			0.10		205	515	30	50			
						0.03	1.0	2.0	0.045	0.03	10.5	20.0			0.16								
	310S	310S	(1.4845)	S31008							19.0	24.0					205	520	40	50		Heat exchanger part, heat resisting bolt/nut	
						0.08	1.5	2.0	0.045	0.03	22.0	26.0									187		
	316	316	(1.4401)	S31600							10.0	16.0	2.0				205	520	40	60			
						0.08	1.0	2.0	0.045	0.03	14.0	18.0	3.0									187	
1.4401											10.0	16.5	2.0										
						0.07	1.0	2.0	0.045	0.03	13.0	18.5	2.5										
316 / 316L											10.0	16.0	2.0										
						0.03	1.0	2.0	0.045	0.03	14.0	18.0	3.0										
	316L	316L	(1.4404)	S31603							12.0	16.0	2.0			316L(ASTM / AISI) : Ni 10~14	175	480	40	60			
						0.03	1.0	2.0	0.045	0.03	15.0	18.0	3.0										187
											10.0	16.5	2.0										
1.4404						0.03	1.0	2.0	0.045	0.03	13.0	18.5	2.5		0.11								
	F316H			S31609		0.04					10.0	16.0	2.0				205	515	30	50		Machinery,fitting, valve, shaft for power/petrochemical plants/ semiconductors	
						0.10	1.0	2.0	0.045	0.03	14.0	18.0	3.0										
316F										0.10	10.0	16.0	2.0				205	520	40	50			
						0.08	1.0	2.0	0.045		14.0	18.0	3.0									187	
316LF										0.10	11.0	16.0	1.75										
						0.03	1.0	2.0	0.2		14.0	18.0	2.50										
	316Ti	316Ti	(1.4571)	S31635							10.0	16.0	2.0			SUS316Ti : Ti≥5XC AISI316Ti : Ti 5X(C+N)~0.7	205	520	40	50			
						0.08	1.0	2.0	0.045	0.03	14.0	18.0	3.0										187
											10.5	16.5	2.0										
1.4571						0.08	1.0	2.0	0.045	0.03	13.5	18.5	3.0			Ti 5XC~0.70							
						0.032	0.4	1.4		0.02	12.0	17.5	2.0	0.3		Ti 0.005~0.05,							
						0.052	0.7	2.0	0.04	0.03	13.0	18.0	3.0	0.5	0.05	NB 0.04~0.06							
	317	317		S31700							11.0	18.0	3.0				205	520	40	60	187	Machinery/fitting/valve/ shaft	
						0.08	1.0	2.0	0.045	0.03	15.0	20.0	4.0										
	317L		(1.4435)								11.0	18.0	3.0				175	480	40	60			
						0.03	1.0	2.0	0.045	0.03	15.0	20.0	4.0									187	

Specifications

*HB:Max.Value																										
Type	KS/JIS (STS/SUS)	ASTM / AISI	EN(DIN)	UNS CODE	Others	Chemical composition(wt,%)											Mechanical properties					Applications				
						C	Si	Mn	P	S	Ni	Cr	Mo	Cu	N	Others	Y.S(N/mm²)	T.S(N/mm²)	EL.(%)	RA(%)	HB					
Feritic Stainless Steel	430	430	(1.4016)								16.0					430(ASTM/AISI):Si≤1.0	205	450	22	50		Screw/bolt				
						0.12	0.75	1.0	0.04	0.03		18.0									183					
	430F	430F	(1.4104)							0.15		16.0				205	450	22	50		Shafts for machinery					
						0.12	1.0	1.25	0.06		18.0	0.6							183							
				1.4104						0.10		15.5	0.2													
						0.17	1.0	1.5	0.04	0.35		17.5	0.6				730			220						
	434									16.0	0.75				205	450	22	60			Car brake pads					
						0.12	1.0	1.0	0.04	0.03		18.0	1.25						183							
Precipitation	630	630		S17400	(17-4PH)					3.0	15.0		3.0		SUS630:Nb 0.15~0.45 AISI630:Nb+Ta 0.15~0.45							High end mold/shaft for automobile/shipbuilding				
						0.07	1.0	1.0	0.04	0.03	5.0	17.5		5.0				HRC 38								
	SUH660	660	(1.4944)	S66286					24.0	13.5	1.0			V 0.10~0.50,Ti 1.90~2.35, Al≤0.35,B 0.001~0.010							Machinery (fitting/valve/bolt/nut)for offshore plant					
Duplex		F51		S31803						4.5	21.0	2.5		0.08		450	620	25	45		Machinery(fitting/valve/bolt/nut)for offshore plant					
						0.03	1.0	2.0	0.03	0.02	6.5	23.0	3.5		0.20											
		F60		S32205						4.5	22.0	3.0		0.14		450	655	25	45							
						0.03	1.0	2.0	0.03	0.02	6.5	23.0	3.5		0.20											
	329J1									3.0	23.0	1.0			390	590	18	40								
						0.08	1.00	1.5	0.04	0.03	6.0	28.0	3.0						277							
		F53		S32750						6.0	24.0	3.0		0.24		550	800	15								
						0.03	0.8	1.2	0.035	0.02	8.0	26.0	5.0	0.5	0.32				310							
		F55		S32760						6.0	24.0	3.0	0.5	0.20		550	750	25	45							
						0.03	1.0	1.0	0.03	0.01	8.0	26.0	4.0	1.0	0.30	W 0.5-1.0		895								
			SAD2505						4.5	22.0	1.0		0.08		310	430	20									
0.03					1.0	2.0	0.04	0.03	6.5	26.0	3.5	1.0	0.20													
0.40					3.0					7.5				1.4718:Si 2.7~3.3 Cr 8~10				269								
Heat Resisting Steel	SUH1		(1.4718)							0.50	3.5	0.6	0.03	0.03	0.6	9.5		0.3				Intake engine valvesfor automobile/ship-building				
						0.35	1.8					10.0	0.70							269						
	SUH3		(1.4731)							0.45	2.5	0.6	0.03	0.03	0.6	12.0	1.30	0.3								
						0.45	1.00					7.50														
	SUH11									0.55	2.00	0.6	0.03	0.03	0.6	9.50		0.3			269					
						0.48		8.00			3.25	20.0		0.35							Exhaust engine valves for Automobile/ship-buiding					
	SUH35		(1.4871)	(21-4N)						0.58	0.35	10.0	0.04	0.03	4.50	22.0		0.50								
						0.20	0.20	0.5			0.5	11.0	0.9		V 0.2~0.3,W 0.9~1.25, Al≤0.05,Ti≤0.05						Power plant machinery(bolt/nut)					
		B4B								0.25	0.50	1.0	0.025	0.025	1.0	12.5	1.25									
						0.2	1.0	0.75			9.0	18.0		0.04		W 1.6~2.5,Nb≤1.0, B 0.001~0.003						Engine valves for ship-building				
							0.3	2.0	1.35	0.04	0.015	11.0	22.0		0.10											
Turbines					B50A365B					0.15	0.20	0.50			0.3	10.0	0.8		0.04	V 0.15~0.25, Nb 0.35~0.55	680	960	15	45		Power turbine blades
						0.20	0.60	0.80	0.020	0.010	0.6	11.0	1.1		0.08					321						
				B50A947A4					0.06		0.25			11.2			550	750	18	50	223					
					0.15	0.50	0.80	0.025	0.010	0.6	13.0	0.3	0.5					269								
					10705BU					0.20		0.50			0.5	11.0	0.9		V 0.2~0.3,W 0.9~1.25	760	930	14	32	277		
						0.25	0.50	1.00	0.025	0.025	1.0	12.5	1.2	0.5					331							
					10705BA					0.10		0.30			11.5			550	690	20	60	201				
						0.15	0.50	0.60	0.025	0.025	0.6	13.0	0.6	0.5					241							
					WNR14938 MOD					0.08		0.50			2.0	11.0	1.5		V 0.25~0.40	800	950	14		292		
						0.15	0.35	0.90	0.020	0.015	3.0	12.5	2.0				1070			330						

Product Size

Category		Surface	Non ESR material	Remark
Rolled round bars	Black surface	BS	13 ~ 350Ø	
		CG	5.7 ~ 80Ø	
	White surface	CD	5.8 ~ 30Ø	
		ST	8.0 ~ 80Ø	
		RT	81 ~ 340Ø	
Forged round bars	Black surface		216 ~ 850Ø	Should be discussed separately (for OD over 400 Ø)
	White surface		206 ~ 850Ø	
Rolled billet			70-160SQ (At interval of 5mm²) 131,160,170,190,250,300,350	Should be discussed separately (for under 90SQ, And over 150SQ)

* The table shows various sizes of re-melted(ESR) steels: Same as above, but their maximum size is 600 Ø or lower (for surface RT).

Dimension Tolerance, Variations, and Length

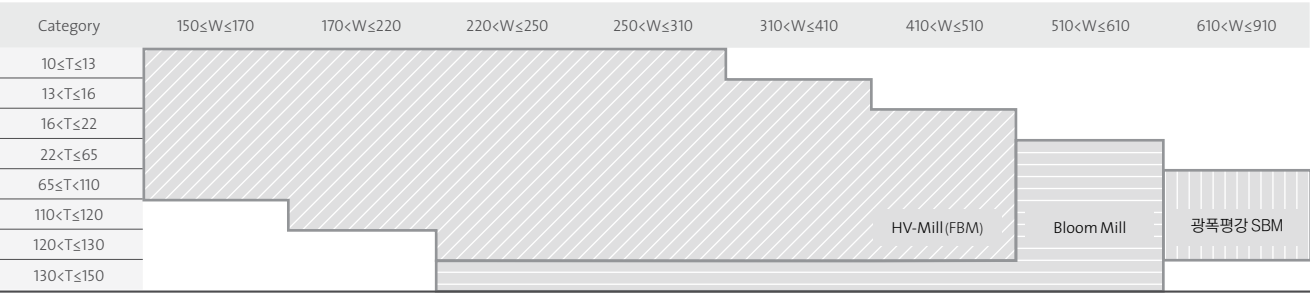
Category	Surface	Size tolerance(mm)		Diametrical variation	Lengths for orders
Rolled products	BS	•13~35 :±0.20mm •50.1~80 :±0.30mm	•35.1~50 :±0.25mm •80.1~350 :±1.5% of Dia.	Within 70% of the size tolerance	• Up to Ø28: 3.2-12.0 m • Up to Ø29: 3.2-8.0m
	CG	H9 or K9		Within 30% of the size tolerance	3.0~7.0m
	CD	H9, K9, or ASTM A484			
	ST	H11, K11, or ASTM A484			
	RT	• Ø≤125: +0.50, -0 • 125 < Ø: +0.6% of Dia, -0		Within 70% of the size tolerance	4.0~7.5m
Forged products	BS	• Up to 130: +10, -0 • 130.1- 350: +15, -0 • 350.1- 400: +18, -0 • 400.1-600: +20, -0 • 600.1-800: +25, -0 • 800.1-850: +30, -0		Within 70% of the size tolerance	2.0~6.0m
	RT	• Up to 400: +2.0, -0 • 400.1-850: +1% of Dia, -0		Within 70% of the size tolerance	2.0~6.0m

* Length tolerance: +40, -0 (for fixed length, as per JIS standard) / Others: need to be discussed separately.

* Others not mentioned above need aseparate discussion (for forged products).

* Size tolerance for 220mm BS(Black Surface), round bars-need aseparate discussion.

Rolled Flat Steel



* Under 22T of 400 series of stainless steel-should be discussed separately.

Forged Square Bars

Forged Size: 150.1-350T, 200-505W

Other Sizes: need to be discussed separately

Order Standards

Weight Tolerance

Category	Tolerance range (%)			
	T ≤ 3	3 < T ≤ 10	11 < T ≤ 50	50 < T
Domestic	±30	±20	±10	±5
Export, local	±30	±20	±10	±5

*PO Tolerance for Export/Local: -/+10%

Minimum Order Quantity and Order Multiple by Size (in tons)

Round bars
(black surface)

OD (mm)	ESR material		Non ESR material			
	All grades		STS (400 series) / heat resisting steel		STS (300 series)	
	Minimum order	Order multiple	Minimum order	Order multiple	Minimum order	Order multiple
~70.1	1.1	1.1	1.3	1.3	1.4	1.4
70.2 ~ 250.1	1.1	1.1	1.3	1.3	2.6	2.6
250.2 ~ 311.1	10.0	10.0	2.0	2.0	2.6	2.6
311.2 ~ 350.1	10.0	10.0	3.0	3.0	2.6	2.6
350.2 ~ 500.1	10.0	10.0	6.0	6.0	6.0	6.0
500.2 ~	10.0	10.0	12.0	12.0	12.0	12.0

Round bars
(white surface)

OD (mm)	ESR material		Non ESR material			
	All grades		STS (400 series) / heat resisting steel		STS (300 series)	
	Minimum order	Order multiple	Minimum order	Order multiple	Minimum order	Order multiple
~70.1	1.0	1.0	1.2	1.2	1.3	1.3
70.2 ~ 250.1	1.0	1.0	1.2	1.2	2.3	2.3
250.2 ~ 311.1	10.0	10.0	2.0	2.0	2.3	2.3
311.2 ~ 350.1	10.0	10.0	2.8	2.8	2.3	2.3
350.2 ~ 500.1	10.0	10.0	5.0	5.0	5.0	5.0
500.2 ~	10.0	10.0	10.0	10.0	10.0	10.0

Flat bars

OD (mm)	Type	Black surface				White surface(MD)			
		Dimension		Weight		Dimension		Weight	
		OD(T)	Width(W)	Minimum	Multiple	OD(T)	Width (W)	Minimum	Multiple
Non ESR material	Rolled	10 ≤ T ≤ 75	150 ≤ W ≤ 210	1.3	1.3	10 ≤ T ≤ 70	150 ≤ W ≤ 203	1.6	1.6
		75 < T ≤ 150	310 < W ≤ 517	2.0	2.0	70 < T ≤ 150	303 < W ≤ 510	1.6	1.6
		22 < T ≤ 150	520 < W ≤ 610	2.0	2.0	14 < T ≤ 150	513 < W ≤ 610	1.6	1.6
		Others than the sizes above		1.3	1.3	Others than the sizes above		1.6	1.6
	Forged	All dimensions		3.0	3.0	All dimensions		2.7	2.7
ESR material	All	All dimensions		1.2	1.2	All dimensions		1.0	1.0

Rolled billets

OD(mm)	STS(300series)		STS(400series)	
	Minimum order	Order multiple	Minimum order	Order multiple
All	2.4	2.4	1.2	1.2

Dimension Tolerance Table

Dimension	H8	H9	H10	H11
6.1~10.0mmØ	+0,-0.022	+0,-0.036	+0,-0.058	+0,-0.090
10.1~18.0mmØ	+0,-0.027	+0,-0.043	+0,-0.070	+0,-0.11
18.1~30.0mmØ	+0,-0.033	+0,-0.052	+0,-0.084	+0,-0.13
30.1~50.0mmØ	+0,-0.039	+0,-0.062	+0,-0.100	+0,-0.16
50.1~80.0mmØ	+0,-0.046	+0,-0.074	+0,-0.120	+0,-0.19
80.1~120mmØ	+0,-0.054	+0,-0.087	+0,-0.14	+0,-0.22

*For class K,"+" to be applied for tolerance h.

Round Bar Specifications

Specification		Details of Specification
KS	D3706	Stainless Steel Bar
	D3692	Cold Finished Stainless Steel Bar
JIS	G4303	Stainless Steel Bar
	G4318	Cold Finished Stainless Steel Bar
ASTM	A479	Standards Specification for Free-Machining Stainless Steel Bars for Use in Boilers and Other Pressure Vessels
	A182	Standards Specification for Forged or Rolled Alloy Steel Pipe Flange, Forged Fittings and Valve and Parts for High-Temperature Service
	A276	Standards Specification for Stainless Steel Bars and Shapes
	A582	Standards Specification for Free-Machining Stainless Steel Bars
	A564	Standards Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
AISI	A193	Standards Specification for Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
	-	American Iron and Steel Institute
EN	10088-3	Stainless Steels. Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes.
MDF	A479	Kepic Standards
	A182	
	A276	

Packing Types



Bare

1. 5point Banding



Hessian

1. 5point Banding
2. Vinyl+Hessian Packing
3. 5point Banding



Wooden Slate

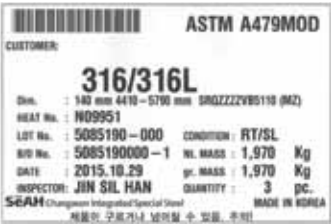
1. 5point Banding
2. Vinyl+Hessian Packing
3. Wooden Slate Packing



Wooden Box

1. 5point Banding
2. Vinyl+Hessian Packing
3. Wooden Box Packing

Tag



Tag

Certificates of Approval



ISO 9001:2008
ISO QUALITY
MANAGEMENT
SYSTEM



LLOYD'S
REGISTER OF
SHIPPING



ISO/TS
16949:2009
ISO QUALITY
MANAGEMENT
SYSTEM



BUREAU
VERITAS



ISO 14001:2004
ISO
ENVIRONMENT
AL
MANAGEMENT
SYSTEM



DNV-GL
NORWAY &
GERMANY
REGISTER



KOSHA18001
KOSHA SAFE
AND HEALTH
MANAGEMENT
SYSTEM



KOREAN
INDUSTRIAL
STANDARDS



JAPANESE
INDUSTRIAL
STANDARDS



AD 2000-
MERKBLATT Wo
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DIRECTIVE
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KOREA
ELECTRIC
POWER
INDUSTRY
CODE

Order Requirements

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¹⁾Applicable standards:ASTM,JIS,DIN,etc. ²⁾Steel grade,surface heat treatment,dimension ³⁾Quantity and delivery

⁴⁾Applications,method of processing ⁵⁾Special requirements (if applicable)