

Special Notes For Concrete Floor Slabs And Pavements Of The Ground

BMC Fabric is ideal for use as reinforcement in concrete slabs on the ground. Care is needed in the design of these slabs. The following factors must be considered.

1. Load size and frequency.
2. Soil type under the slabs, both as regards bearing capacity and stability.
3. The presence of any ground water.
4. Provision for drainage of surface water.
5. Concrete strength and provision for concrete curing.
4. Grade the surrounding area away from the slab so the surface water will not penetrate the base below the slab.
5. Concrete should reach a minimum compressive strength of 20 MPa after 28 days. This strength can usually be obtained by mixing cement, sand and crushed rock aggregate in the proportion by volume of 1:2:4.
6. The concrete should be cured by keeping it wet for 7 days after pouring. The slab should not be fully loaded until the concrete is 21 days old.

Design Guidelines

The following guidelines will be useful in the design of slabs provided they are followed carefully. If any of the guidelines cannot be met, the assistance of an experienced structural engineer should be obtained.

1. All top soil containing any plant matter, roots or similar material must be removed.
2. The base should be firm and dry. Slabs on soft soil need special attention.
3. Provide under the slab a layer of hard granular material equal in thickness to the slab thickness. This material should be sand, crushed rock or similar material. Compact this layer well by rolling.
7. Where in Table 4 it is shown that fabric is required in the top of the slab, this means that the fabric should be placed 30mm below the top surface of the concrete. Bottom means place fabric 30mm up from the bottom of the slab.
8. Slabs should be poured in areas no larger than 30 square metres, with joints no further apart than 6 metres in any direction, unless conditions are checked by an experienced structural engineer.
9. For heavily loaded trucks and for highway pavements, the structural engineer should design a suitable slab. Similarly, for warehouses where loads are not uniform or loads are unusually heavy, specialist advice is needed.

WELDED MESH FABRIC IN TYPICAL SLABS ON THE GROUND

Application	Soil	Slab Thickness mm	Location And BMC Fabric
Domestic-cars and foot traffic	dry and stable	100	top BMC A6
	needs compaction of base	110	top BMC A7
Light industrial and commercial -small trucks	dry and stable	125	top BMC A7
	needs compaction of base	150	top BMC A8
Ware houses and pavements for trucks	dry and stable	150	top BMC A9
	needs compaction of base	200	top BMC A9 bottom BMC A7

Stainless Steel Products

GENERAL INFORMATION OF STAINLESS STEELS

RESISTANT TO CORROSION

Addition of the element chromium to steel enhances its resistance to corrosion and staining. Steels that contain a comparatively large amount of chromium are therefore called stainless steels.

Stainless steels have many areas of application, including household articles, building materials, rolling stock as well as chemical and petrochemical equipment. They are produced in a wide variety of types to suit specific end-uses.

ATTRACTIVENESS EXPANDS APPLICATION

Needless to say, the bulk of stainless steels are used where corrosion resistance is a basic requirement. Recently, however, their unique, attractive appearance has come to be widely appreciated, causing a sharp increase in their architectural applications.

HEAT AND LOW-TEMPERATURE RESISTANCE

Stainless steels retain high strength in elevated temperature service; the austenitic grades, in particular, have superior ductility at low temperatures.

SHEETS IN GREATEST DEMAND

While stainless steels are produced in various product forms such as sheets, shapes, rods, bars and tubes, those in sheet form presently register by far the fastest gain in market demand. This is because they have come to be used in large quantities as exterior and interior building materials, thus expanding a new market.

THREE BASIC CLASSES

There are many types of stainless steel. Although different in both mechanical properties and chemical composition, they may be generally grouped into three basic classes.

13 Cr CLASS(MARTENSITIC)

Generally, a group of steels with the carbon content of up to 0.2%, and the chromium content ranging between 11.5% and 15.0%. These steels become martensitic in structure when heat treated. Since they are hardenable by heat treatment, steels of this class can be produced in many different degrees of hardness by varying heating conditions. Martensitic stainless steels are hardly corroded in air and are outstanding in hardness, although in weldability and workability they are inferior to the other two classes. Steels of this class are primarily used for the manufacture of cutlery.

18 Cr CLASS(FERRITIC)

Generally, steels having carbon up to 0.2% and chromium between 16.0% and 20.0%. Not hardenable by heat treatment, they are basically used in the annealed condition. These steels are more workable, more weldable, and more corrosion-resistant than martensitic steels. Ferritic steels have good mechanical and physical properties and effectively resist both atmospheric corrosion and strong oxidizing solutions. They are widely used in nitric acid-base chemical processing equipment as well as in buildings, kitchen sinks, and appliances.

18 Cr-8 Ni CLASS(AUSTENITIC)

Generally, steels containing a maximum of 0.15% carbon, a minimum of 16.0% chromium and a minimum of 6.0% nickel. In plain carbon steel, an austenitic structure is formed only at high temperatures. However, stainless steels of this class, because they retain a stable austenitic form even at room temperature, are called austenitic stainless steels.

Of the three classes, this has the highest corrosion resistance. Steels of this class combine low yield point with high tensile strength and good elongation, thus offering the best cold-working properties. While it is not possible to change their mechanical properties by heat treatment, their tensile strength and hardness can be greatly enhanced by work hardening. Because of these characteristics, these steels are most extensively used in chemical plants and equipment.

Main Uses

JIS Designation	AIISI Designation	Characteristics And Main Uses
SUS 410	410	The most common grade of economical 13 Cr steels. In the annealed condition, this grade may be drawn or formed. Used for machine structures, home appliances, etc.
SUS 403	403	Suited for steam turbine blades, jet engines, compressor blades and other applications involving high stresses.
SUS 405	405	Possesses corrosion resistance equivalent to that of 13 Cr steel. Used in applications involving welding. Machine structures, food-processing machinery, chemical equipment, etc.
SUS 420 J2	420	High carbon content results in high abrasion resistance. Greater hardness may be obtained by heat treatment. Used for cutlery, machine parts, etc.
SUS 434	434	Designed to resist atmospheric corrosion especially for use as automotive trim. Used for wheel covers, hub caps, grilles, mouldings, etc.
SUS 430	430	The most common and widely used of the ferritic grades. This steel may be drawn or formed and has high corrosion resistance. Used for office and kitchen equipment, buildings, automobiles, etc.
SUS 301	301	This grade can be cold worked to very high strength levels. Corrosion resistance is somewhat inferior to SUS 304. Used for rolling stock, automobiles, home appliances, etc.
SUS 302	302	More resistant to corrosion than SUS 301. Suited for oil, chemical, paper and food-processing machinery, dairy installations, buildings, kitchen equipment and utensils, etc.
SUS 304	304	Slightly more resistant to general corrosion than SUS 302. Suited for the same range of applications as SUS 302.
SUS 304L	304L	A special SUS 304 grade for use where carbide precipitation after welding is undesirable. Used for chemical and petrochemical equipment, nuclear reactor equipment, oil-refining equipment, etc.
SUS 321	321	Suited for use in a 500° to 850°C temperature range in which carbides tend to precipitate and in applications where stress relieving(or annealing) is not feasible. Used in the chemical industry, etc.
SUS 316	316	High resistant to such reducing acids as sulphuric, sulphurous, acetic and hydrochloric acids. Also, high creep strength at elevated temperatures. Used in applications in the paper, textile, and chemical industries.
SUS 316L	316L	A special SUS 316 grade intended for use where carbide precipitation after welding is undesirable. Suited for the same applications as SUS 321. Widely used for the construction of manufacturing equipment involving welding.
SUS 347	347	

Sheets & Plates

SPECIFICATIONS: CHEMICAL COMPOSITION OF STAINLESS STEEL SHEETS

Type Of Structure	Type Of Composition	Corresponding Designation		Chemical Composition, %											Other Elements
		JIS	AINI	DIN	C	Si max.	Mn	P max.	S max.	Ni	Cr	Mo			
Austenite	17Cr-5Ni-7Mn	SUS 201	201	4002	0.15 max.	1.00	5.5-7.5	0.06	0.03	3.5-5.5	16.0-18.0	—	N:0.25 max.		
	18Cr-6Ni-10Mn	SUS 202	202	4009	0.15 max.	1.00	7.5-10.0	0.06	0.03	4.0-5.5	16.0-18.0	—	N:0.25 max.		
	17Cr-7Ni	SUS 301	301	4310	0.15 max.	1.00	2.00	0.04	0.03	6.0-8.0	16.0-18.0	—	—		
	18Cr-8Ni-high C	SUS 302	302	4300	0.15 max.	1.00	2.00	0.04	0.03	8.0-10.0	17.0-19.0	—	—		
	18Cr-8Ni	SUS 304	304	4301	0.08 max.	1.00	2.00	0.04	0.03	8.0-10.5	18.0-20.0	—	—		
	18Cr-8Ni-extra-low C	SUS 304L	304L	4306	0.03 max.	1.00	2.00	0.04	0.03	9.0-13.0	18.0-20.0	—	—		
	18Cr-12Ni	SUS 305	305	3955	0.12 max.	1.00	2.00	0.04	0.03	10.5-13.0	17.0-19.0	—	—		
	23Cr-12Ni	SUS 309S	309S	4845	0.03 max.	1.00	2.00	0.04	0.03	12.0-15.0	22.0-24.0	—	—		
	25Cr-20Ni	SUS 310S	310S	4401	0.08 max.	1.50	2.00	0.04	0.03	19.0-22.0	24.0-26.0	—	—		
	18Cr-12Ni-2.5Mo	SUS 316	316	4401	0.08 max.	1.00	2.00	0.04	0.03	10.0-14.0	16.0-18.0	2.0-3.0	—		
18Cr-12Ni-7.5Mo-extra-low C	SUS 316L	316L	4404	0.03 max.	1.00	2.00	0.04	0.03	12.0-15.0	16.0-18.0	2.0-3.0	—			
18Cr-12Ni-2Mo-2Cu	SUS 316L1	316L1	4505	0.03 max.	1.00	2.00	0.04	0.03	10.0-14.0	17.0-19.0	1.2-2.75	Cu: 1.0-2.5			
18Cr-13Ni-3.5Mo	SUS 317	317	4402	0.03 max.	1.00	2.00	0.04	0.03	18.0-19.0	20.0-4.0	—	—			
18Cr-13Ni-3.5Mo-extra-low C	SUS 317L	317L	4541	0.03 max.	1.00	2.00	0.04	0.03	11.0-15.0	18.0-20.0	3.0-4.0	—			
18Cr-8Ni-Ti	SUS 321	321	4541	0.03 max.	1.00	2.00	0.04	0.03	9.0-13.0	17.0-19.0	—	Ti: 5xC% min			
18Cr-9Ni-Nb	SUS 347	347	4550	0.03 max.	1.00	2.00	0.04	0.03	9.0-13.0	17.0-19.0	—	Nb+Ti:10xC% min			
Ferrite	13Cr-Al	SUS 405	405	4002	0.03 max.	1.00	1.00	0.04	0.03	0.60-1.50	11.5-16.0	—	Al:0.1-0.3		
	16Cr	SUS 429	429	4009	0.12 max.	1.00	1.00	0.04	0.03	—	14.0-16.0	—	—		
	18Cr	SUS 430	430	4016	0.12 max.	0.75	1.00	0.04	0.03	0.60-1.80	16.0-18.0	—	—		
Martensite	13Cr-low Si	SUS 403	403	4024	0.15 max.	0.50	1.00	0.04	0.03	0.06-1.30	11.5-13.0	—	—		
	13Cr	SUS 410	410	4000	0.15 max.	1.00	1.00	0.04	0.03	0.06-11.5	11.5-13.5	—	—		
	13Cr-high C	SUS 420/2	420	4021	0.26-0.40	1.00	1.00	0.04	0.03	—	12.0-14.0	—	—		
Precipitation Hardened	18Cr-high c	SUS 440A	440A	—	0.6-0.75	1.00	1.00	0.04	0.03	—	16.0-18.0	0.75 max.	—		
	17Cr-7Ni-1Al	SUS 631	631	—	0.09 max.	1.00	1.00	0.04	0.03	6.5-7.75	16.0-18.0	—	Al:0.75-1.5		

Sheets & Plates

SPECIFICATIONS: MECHANICAL PROPERTIES OF STAINLESS STEEL SHEETS

Type Of Structure	Type Of Composition	Corresponding Designation		Mechanical Properties					Hardness Test	Bond Test (t, mm)		
		JIS	AINI	DIN	Tensile Strength kgf/mm ² / psi	Yield Strength kgf/mm ² / psi	Elongation %, min.	Rockwell B scale Max.			Vickers Hardness Max.	
Austenite	17Cr-5Ni-7Mn	SUS 201	201	4002	65	93,000	25	35,800	40	100	253	—
	18Cr-6Ni-10Mn	SUS 202	202	4009	60	85,500	25	35,800	40	95	218	—
	17Cr-7Ni	SUS 301	301	4310	53	75,800	21	30,000	40	90	200	—
	18Cr-8Ni-high C	SUS 302	302	4300	53	75,800	21	30,000	40	90	200	—
	18Cr-8Ni	SUS 304	304	4301	53	75,800	21	30,000	40	90	200	—
	18Cr-8Ni-extra-low C	SUS 304L	304L	4306	49	69,500	18	25,500	40	90	200	—
	18Cr-12Ni	SUS 305	305	3955	49	69,500	18	25,500	40	90	200	—
	23Cr-12Ni	SUS 309S	309S	4845	53	75,800	21	30,000	40	90	200	—
	25Cr-20Ni	SUS 310S	310S	4401	53	75,800	21	30,000	40	90	200	—
	18Cr-12Ni-2.5Mo	SUS 316	316	4401	53	75,800	21	30,000	40	90	200	—
18Cr-12Ni-7.5Mo-extra-low C	SUS 316L	316L	4404	49	69,800	18	25,500	40	90	200	—	
18Cr-12Ni-2Mo-2Cu	SUS 316L1	316L1	4505	53	75,800	21	30,000	40	90	200	—	
18Cr-13Ni-3.5Mo	SUS 317	317	4402	53	75,800	21	30,000	40	90	200	—	
18Cr-13Ni-3.5Mo-extra-low C	SUS 317L	317L	4541	49	69,500	18	25,800	40	90	200	—	
18Cr-8Ni-Ti	SUS 321	321	4541	53	75,800	21	30,000	40	90	200	—	
18Cr-9Ni-Nb	SUS 347	347	4550	53	75,800	21	30,000	40	90	200	—	
Ferrite	13Cr-Al	SUS 405	405	4002	42	60,000	18	25,500	20	88	200	1<8.05t
	16Cr	SUS 429	429	4009	46	65,800	21	30,000	22	88	200	1.0t
	18Cr	SUS 430	430	4016	46	65,800	21	30,000	22	88	200	1.0t
Martensite	13Cr-low Si	SUS 403	403	4024	45	64,000	21	30,000	20	88	200	1.0t
	13Cr	SUS 410	410	4000	45	64,000	21	30,000	20	88	200	1.0t
	13Cr-high C	SUS 420/2	420	4021	55	78,500	23	32,750	18	93	210	—
Precipitation Hardened	18Cr-high c	SUS 440A	440A	—	60	85,500	25	35,800	15	97	230	—
	17Cr-7Ni-1Al	SUS 631	631	—	105	148,000	39	55,500	20	92	200	—

FINISHES

Finish Designation	Finishing Method And Degree Of Finish
No.1	Hot-rolled, annealed and descaled. Generally used in industrial applications, where heat or corrosion resistance is required but surface smoothness is not particularly important.
No.2D	Dull, smooth finish produced by cold rolling, annealing and pickling. Steel is soft and has a silver white surface, suited for deep drawing as well as general uses.
No.2B	Bright, smooth cold-rolled finish obtained by skippass rolling of No.2D. Specified for general use.
No.3	Intermediate polished finish obtained with rather coarse abrasives (#100 to #120 mesh). A higher luster can be attained by further polishing after fabrication.
No.4	A standard polished finish produced with finer abrasives (#150 to #180 mesh). Widely specified for restaurant and kitchen equipment and dairy processing equipment.
#240	Polish finish of about #240. Used when finer finish than No.4 finish is desired such as equipment for restaurants and household kitchens.
#320	Polishing finish of about #320.
#400	High luster finish produced by polishing NO.2B first with #400 buffing iron and then with buffing cloth. Suited for general use.
H.L.	Special polished finish having continuous lines produced with abrasives of an appropriate grain size. Mainly used in architectural applications.
BA	Highly reflective finish produced by cold rolling, bright annealing and temper rolling. Used where a lustrous surface is specially required.

Note: Upon request, slip surface protection is provided such as bonding of vinyl sheets or vinyl coating.

STAINLESS STEEL PRODUCTS
Sheets & Plates

SIZE	1219 x 2438 (4' x 8')				1524 x 3048 (5' x 10')				
	Type 304, 304L		Type 316, 316L		Type 304, 304L		Type 316, 316L		
AIISI	TN/Wgt.	kg/pc	pcs/mt	kg/pc	pcs/mt	kg/pc	pcs/mt	kg/pc	pcs/mt
0.3	7.07	141.4	7.11	140.70	11.06	90.42	11.13	89.85	
0.4	9.42	106.2	9.48	105.50	14.75	67.80	14.84	67.39	
0.45	10.60	94.34	10.67	93.72	16.59	60.28	16.70	59.88	
0.5	11.78	84.89	11.85	84.39	18.44	54.23	18.56	53.88	
0.55	12.95	77.22	13.04	76.69	20.28	49.31	20.41	49.00	
0.6	14.13	70.77	14.22	70.32	22.12	45.21	22.27	44.90	
0.7	16.49	60.64	16.59	60.28	25.81	38.74	25.98	38.49	
0.8	18.84	53.08	18.96	52.74	29.50	33.90	29.69	33.68	
0.9	21.20	47.17	21.33	46.88	33.18	30.14	33.40	29.94	
1	23.55	42.46	23.70	42.19	36.87	27.12	37.11	26.95	
1.2	28.26	35.39	28.44	35.16	44.24	22.60	44.53	22.46	
1.5	35.33	28.30	35.55	28.13	55.31	18.08	55.67	17.96	
2	47.10	21.23	47.40	21.10	73.74	13.56	74.22	13.47	
2.3	54.17	18.46	54.51	18.35	84.80	11.79	85.35	11.72	
2.5	58.88	16.98	59.25	16.88	92.18	10.85	92.78	10.78	
3	70.65	14.15	71.10	14.06	110.6	9.04	111.33	8.98	
4	94.20	10.62	94.80	10.55	147.5	6.78	148.4	6.74	
4.5	106.0	9.44	106.7	9.38	165.9	6.03	167.0	5.99	
5	117.8	8.49	118.5	8.44	184.4	5.42	185.6	5.39	
6	141.3	7.08	142.2	7.03	221.2	4.52	222.7	4.49	
7.5	176.6	5.66	177.8	5.63	276.5	3.62	278.3	3.59	
8	188.4	5.31	189.6	5.27	295.0	3.39	296.9	3.37	
9	212.0	4.72	213.3	4.69	331.9	3.01	334.0	2.99	
10	235.5	4.25	237.0	4.22	368.7	2.71	371.1	2.69	
12	282.6	3.54	284.4	3.52	442.4	2.26	445.3	2.25	
15	353.3	2.83	355.5	2.81	553.1	1.81	556.7	1.80	
18	423.9	2.36	426.6	2.34	663.7	1.51	668.0	1.50	
20	471.0	2.12	474.0	2.11	737.4	1.36	742.2	1.35	
22	518.1	1.93	521.4	1.92	811.2	1.23	816.4	1.22	
25	588.8	1.70	592.5	1.69	921.8	1.08	927.8	1.08	
30	706.5	1.42	711.0	1.41	1,106.0	0.90	1,113.0	0.90	
32	753.6	1.33	758.4	1.32	1,180.0	0.85	1,188.0	0.84	
38	894.9	1.12	900.6	1.11	1,401.0	0.71	1,410.0	0.71	
40	942.0	1.06	948.0	1.05	1,475.0	0.68	1,484.0	0.67	
44	1,036.0	0.97	1,043.0	0.96	1,622.0	0.62	1,633.0	0.61	
50	1,178.0	0.85	1,185.0	0.84	1,844.0	0.54	1,855.0	0.54	
65	1,531.0	0.65	1,541.0	0.65	2,397.0	0.42	2,412.0	0.41	
75	1,766.0	0.57	1,778.0	0.56	2,765.0	0.36	2,783.0	0.36	

Angles & Flats**Stainless Steel Angles and Flats are produced by hot-rolling.**

After fully annealed, they are subjected to special chemical treatment for descaling, which gives the products the following advantages:

1. Clean and silverly coloured surface.
2. Smooth and tight skinned surface by this descaling process, which enables to achieve fine surface finish by polishing.
3. Excellent corrosion resistance and bending quality by full annealing.

Hot rolled stainless steel angles and flats are superior to cold formed products with regard to minimum internal stress, better corrosion resistance and lower cost.

For applications where the corrosion resistance after welding is essential, Extra Low Carbon Stainless Steel Angles and Flats (Ex: AISI 304 L, 316 L) is particularly recommended.

CHEMICAL COMPOSITION AISI, ASTM A276-78

Type	C max.	Mn max.	P max.	S max.	Si max.	Cr	Ni	Mo	Ti
302	0.15	2.0	0.045	0.03	1.0	17.0-19.0	8.0-10.0	--	
304	0.08	2.0	0.045	0.03	1.0	18.0-20.0	8.0-10.5	--	
304L	0.03	2.0	0.045	0.03	1.0	18.0-20.0	8.0-12.0	--	
316	0.08	2.0	0.045	0.03	1.0	16.0-18.0	10.0-14.0	2.0-3.0	
316L	0.03	2.0	0.045	0.03	1.0	16.0-18.0	10.0-14.0	2.0-3.0	
321	0.08	2.0	0.045	0.03	1.0	17.0-19.0	9.0-12.0	--	5 x C min.
430	0.12	1.0	0.045	0.03	1.0	16.0-18.0	--	--	

Angles & Flats**TYPICAL CHARACTERISTICS FOR CHEMICAL COMPOSITION**

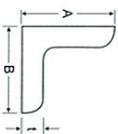
AISI	Typical Characteristics
302	Basic, general purpose type of non-magnetic, austenite stainless steel with good corrosion resistance and mechanical properties Retains ductility and impact strength at low temperature. Good cold workability.
304	Low carbon variation of TYPE 302. Superior corrosion resistance and weldability to TYPE 302. Widely used for general purposes as well as parts fabricated by welding.
304L	Extra low carbon eliminates the harmful carbide precipitation due to welding. Suitable for applications where post-weld annealing is unpracticable.
316	Additional of Molybdenum strengthens corrosion resistance to reducing acids such as sulphuric, acetic, phosphoric and chloric acid. Improved pitting resistance and superior creep strength at high temperature to TYPE 302, 304. Used for various chemical industries such as pulp-, photograph-, dye-, textile-, fertilizer industry.
316L	Extra low carbon eliminates the harmful carbide precipitation due to welding. Suitable for applications where post-weld annealing is unpracticable and which are used in severely corrosive atmosphere.
321	Addition of Titanium prevents intergranular corrosion due to welding. Strong creep strength at high temperature. Can be used at high temperature(800-1500°F).
430	Typical ferritic stainless steel, magnetic. Superior corrosion resistance to TYPE 410. Suitable for applications used in weak corrosive atmosphere, kitchen equipment and utensils.

MECHANICAL PROPERTIES ASTM A276-78

Type	Condition	Size	Tension Test			
			Y.S (0.2%) p.s.i.	T.S p.s.i.	EL. (2 In.) %	R.A %
302	annealed	all	min. 30,000	min. 75,000	min. 40	min. 50
304	annealed	all	30,000	75,000	40	40
304L	annealed	all	25,000	70,000	40	50
316	annealed	all	30,000	75,000	40	50
316L	annealed	all	25,000	70,000	40	50
321	annealed	all	30,000	75,000	40	50
430	annealed	all	40,000	70,000	40	45

Angle

Sizes And Unit Weights



IMPERIAL UNITS: APPROX. WT. LBS/FT

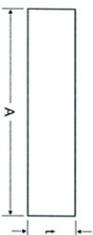
Legs (A x B) In.	Thickness (t) In.												
	1/8	3/16	1/4	5/16	3/8	1/2							
3/4 x 3/4	0.599	0.856											
1 x 1	0.814	1.18	1.52										
1 1/2 x 1 1/2	1.03	1.51	1.96										
2 x 2	1.25	1.83	2.39										
2 1/2 x 2 1/2	1.68	2.49	3.26										
3 x 3			3.13	4.14	5.08	6.02							
3 1/2 x 3 1/2				5.01	6.19	7.34	8.63	9.95					
4 x 4				5.88	7.27	8.63	9.95	11.30	13.00				

METRIC UNITS: APPROX. WT. KG/M

Legs (A x B) In.	Thickness (t) In.												
	3	4	5	6	7	8	9	10	11	12	13		
20x20	0.908	1.16	1.41										
25x25	1.15	1.48	1.81	2.12									
30x30	1.39	1.80	2.21	2.58									
35x35	1.64	2.13	2.62	3.00									
40x40	1.88	2.45	3.03	3.56									
50x50		2.41	3.14	3.87	4.55		6.60	7.26					
60x60			4.68	5.53	6.39								
65x65			5.13	6.07	6.98	7.87	8.78	9.67					
70x70				6.55	7.54	8.51	9.50	10.5					
75x75				7.03	8.11	9.16	10.2	11.3	12.3	13.3	14.3		
80x80				7.52	8.67	9.80	11.0	12.0	13.2	14.3	15.4		
90x90				8.53	9.85	11.1	12.5	13.7	15.0	16.2	17.5		
100x100				9.50	11.0	12.4	13.9	15.3	16.7	18.2	19.5		

Flat

Sizes And Unit Weights



IMPERIAL UNITS: APPROX. WT. LBS/FT

Width (A) In.	Thickness (t) In.												
	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1				
1/2	0.217	0.326											
5/8	0.272	0.408	0.543										
1	0.326	0.489	0.652	0.816	0.979	1.30							
1 1/4	0.435	0.652	0.87	1.09	1.30	1.74	2.18	2.61					
1 1/2	0.544	0.816	1.09	1.36	1.63	2.18	2.72	3.26					
1 3/4	0.653	0.979	1.30	1.63	1.96	2.61	3.26	3.92	5.22				
2	0.761	1.14	1.52	1.90	2.28	3.04	3.48	4.35	6.09				
2 1/2	0.87	1.30	1.74	2.18	2.61	3.48	4.35	5.22	7.33				
3	1.09	1.63	2.18	2.72	3.26	3.91	5.22	6.52	8.70	10.40			
3 1/2		1.96	2.61	3.26	3.91	5.22	6.52	7.83	10.40	12.20			
4			3.04	3.81	4.57	6.09	7.61	9.14	12.20	13.90			

METRIC UNITS: APPROX. WT. KG/M

Width (A) mm	Thickness (t) In.												
	3	4	5	6	8	9	10	12	13	15	20	25	
12	0.29			0.58									
13	0.314	0.419		0.667									
14	0.339	0.451	0.564										
15	0.363	0.484	0.604										
16	0.387	0.516	0.645	0.774									
20	0.484	0.645	0.806	0.967	1.29	1.45	1.61	1.93					
25	0.604	0.806	1.01	1.21	1.61	1.81	2.02	2.42	3.02	4.03			
30	0.725	0.967	1.21	1.45	1.93	2.18	2.42	2.90	3.14	4.84			
35	0.846	1.13	1.41	1.69	2.26	2.54	2.82	3.39	3.67	4.23	5.64		
40	0.967	1.29	1.61	1.93	2.58	2.90	3.22	3.87	4.19	4.84	8.06		
45	1.09	1.45	1.81	2.18	2.90	3.26	3.63	4.35	4.72	5.44	9.07		
50	1.21	1.61	2.02	2.42	3.22	3.63	4.03	4.84	5.24	6.04	10.1		
60			2.42	2.90	3.87	4.35	4.84	5.80	6.29	7.25	12.1		
65			2.62	3.14	4.19	4.72	5.24	6.29	6.81	7.86	13.1		
70			2.82	3.39	4.51	5.08	5.64	6.72	7.33	8.46	14.1		
75				3.63	4.85	5.44	6.04	7.25	7.86	9.07	15.1		
80				3.87	5.16	5.80	6.45	7.74	8.38	9.67	16.1		
90				4.35	5.80	6.52	7.25	8.70	9.43	10.9	18.1		
100				4.84	6.45	7.25	8.06	9.67	10.5	12.1	20.2		

Round Bars

Type Number	UNS Number	Equivalent To			Chemical Composition, %								Other Elements
		JIS	BS	DIN	C	Mn	P	S	Si	Cr	Ni	Mo	
201	(S20100)	SUS 201	--	--	0.15	5.50~7.50	0.06	0.03	1.00	16.00~18.00	3.50~5.50	--	N 0.25
202	(S20200)	SUS 202	2B4S16	--	0.15	7.50~10.00	0.06	0.03	1.00	17.00~19.00	4.00~6.00	--	N 0.25
205	(S20500)	--	--	--	0.12~0.25	14.0~15.50	0.06	0.03	1.00	16.50~18.00	1.00~1.75	--	N 0.32/0.40
301	(S30100)	SUS 301	301S21	4310	0.15	2.00	0.045	0.03	1.00	16.00~18.00	6.00~8.00	--	
302	(S30200)	SUS 302	302S25	4300	0.15	2.00	0.045	0.03	1.00	17.00~19.00	8.00~10.00	--	
302B	(S30215)	SUS 302B	--	--	0.15	2.00	0.045	0.03	2.00~3.00*	17.00~19.00	8.00~10.00	--	
303	(S30300)	SUS 303	303S21	4305	0.15	2.00	0.20	0.15	1.00	17.00~19.00	8.00~10.00	0.60	
303Se	(S30323)	SUS 303Se	303S41	--	0.15	2.00	0.20	0.06	1.00	17.00~19.00	8.00~10.00	--	Se 0.15min.
304	(S30400)	SUS 304	304S15	4301	0.08	2.00	0.045	0.03	1.00	18.00~20.00	8.00~10.50	--	
304L	(S30403)	SUS 304L	304S12	4306	0.03	2.00	0.045	0.03	1.00	18.00~20.00	8.00~12.00	--	
	(S30430)	--	--	--	0.08	2.00	0.045	0.03	1.00	17.00~19.00	8.00~10.00	--	Cu 3.00/4.00
304N	(S30451)	SUS 304N1	--	--	0.08	2.00	0.045	0.03	1.00	18.00~20.00	8.00~10.00	--	N 0.10/0.16
305	(S30500)	SUS 305	305S19	--	0.12	2.00	0.045	0.03	1.00	17.00~19.00	10.50~13.00	--	
308	(S30800)	SUS 308	305S19	--	0.08	2.00	0.045	0.03	1.00	19.00~21.00	10.00~12.00	--	
309	(S30900)	SUS 309	309S24	--	0.20	2.00	0.045	0.03	1.00	22.00~24.00	12.00~15.00	--	
309S	(S30908)	SUS 309S	309S24	--	0.08	2.00	0.045	0.03	1.00	22.00~24.00	12.00~15.00	--	
310	(S31000)	SUS 310	310S24	--	0.25	2.00	0.045	0.03	1.50	24.00~26.00	19.00~22.00	--	
310S	(S31008)	SUS 310S	310S24	4845	0.08	2.00	0.045	0.03	1.50	26.00~28.00	22.00	--	
314	(S31400)	--	--	--	0.25	2.00	0.045	0.03	1.50~2.00	23.00~26.00	19.00~22.00	--	
316	(S31600)	SUS 316	316S16	4401	0.08	2.00	0.045	0.03	1.00	16.00~18.00	10.00~14.00	2.00~3.00	
316F	(S31620)	--	--	--	0.08	2.00	0.02	0.10	1.00	16.00~18.00	10.00~14.00	1.75~2.50	
316L	(S31603)	SUS 316L	316S16	4402	0.03	2.00	0.045	0.03	1.00	16.00~18.00	10.00~14.00	2.00~3.00	

Note: 1. * May be added at the manufacturer's discretion.

2. Products excluded from the above table are also available upon request.

Round Bars

Type Number	UNS Number	Equivalent To			Chemical Composition, %								Other Elements
		JIS	BS	DIN	C	Mn	P	S	Si	Cr	Ni	Mo	
316N	(S31651)	SUS316N	--	--	0.08	2.00	0.045	0.03	1.00	16.00~18.00	10.00~14.00	2.30~3.00	N 0.10/0.16
317	(S31700)	SUS317	316S12	--	0.08	2.00	0.045	0.03	1.00	18.00~20.00	11.00~15.00	3.00~4.00	
317L	(S31703)	SUS317L	--	4438	0.03	2.00	0.045	0.03	1.00	18.00~20.00	11.00~15.00	3.00~4.00	
321	(S32100)	SUS321	317S16	4541	0.08	2.00	0.045	0.03	1.00	17.00~19.00	9.00~12.00	--	Ti 5xC min.
329	(S32900)	SUS327J1	317S12	--	0.10	2.00	0.04	0.03	1.00	25.00~30.00	3.00~6.00	1.00~2.00	
330	(N08330)	SUH330	321S12 321S20	--	0.08	2.00	0.04	0.03	0.75~1.50	17.00~20.00	34.00~37.00	--	
347	(S34700)	SUS347	347S17	4450	0.08	2.00	0.045	0.03	1.00	17.00~19.00	9.00~13.00	--	Cb+Ta 10xC min.
348	(S34800)	--	--	--	0.08	2.00	0.045	0.03	1.00	17.00~19.00	9.00~13.00	--	Cb+Ta 10xC min. Ta0.10 max Cb0.2 max.
384	(S38400)	SUS384	--	--	0.08	2.00	0.045	0.03	1.00	11.00~17.00	17.00~19.00	--	
403	(S40300)	SUS403	403S17	--	0.15	1.00	0.04	0.03	0.50	11.50~13.00	--	--	
405	(S40500)	SUS405	405S17	4002	0.08	1.00	0.04	0.03	1.00	14.50	--	--	Al 0.10/0.30
409	(S40900)	SUS409	--	--	0.08	1.00	0.045	0.045	1.00	10.50~11.72	--	--	Ti6Cmin/0.75 max
410	(S41000)	SUS410	410S21	4006	0.15	1.00	0.04	0.03	1.00	13.50	--	--	
414	(S41400)	--	--	--	0.15	1.00	0.04	0.03	1.00	11.50~13.50	1.25~2.50	--	
416	(S41600)	SUS416	416S21	--	0.15	1.25	0.06	0.15	1.00	12.00~14.00	--	0.60*	
416Se	(S41623)	--	--	--	0.15	1.25	0.06	0.06	1.00	12.00~14.00	--	--	Se 0.15 min.
420	(S42000)	SUS420J1 SUS420J2	420S37 420S45	4021	0.15	1.00	0.04	0.03	1.00	12.00~14.00	--	--	
420F	(S42020)	SUS420F	--	--	0.15	1.25	0.06	0.15	1.00	12.00~14.00	--	0.60*	
422	(S42200)	SUH416	--	--	0.20~0.25	1.00	0.025	0.025	0.75	11.00~13.00	0.50~1.00	0.75~1.25	V 0.15/0.30 W 0.75/1.25
429	(S42900)	SUS429	--	--	0.12	1.00	0.04	0.04	1.00	14.00~16.00	--	--	
430	(S43000)	SUS430	430S15	4016	0.12	1.00	0.04	0.04	1.00	16.00~18.00	--	--	

Note: 1. * May be added at the manufacturer's discretion.

2. Products excluded from the above table are also available upon request.

Round Bars

Type Number	UNS Number	Equivalent To				Chemical Composition, %										Other Elements
		JIS	BS	DIN	C	Mn	P	S	Si	Cr	Ni	Mo				
430F	(S43020)	SUS430F	--	4104	0.12	1.25	0.06	0.15	1.00	16.00-18.00	--	0.60*				
430FSe	(S43023)	--	--	--	0.12	1.25	0.06	0.06	1.00	16.00-18.00	--	--	Se 0.15 max.			
431	(S43100)	SUS431	431S29	4037	0.20	1.00	0.04	0.03	1.00	15.00-17.00	1.25-2.50	--				
434	(S43400)	SUS434	434S19	4113	0.12	1.00	0.04	0.03	1.00	16.00-18.00		0.75-1.25				
436	(S43600)	--	--	--	0.12	1.00	0.04	0.03	1.00	16.00-18.00		0.75-1.25	Cb+Ta 5xC min.			
440A	(S44002)	SUS440A	--	--	0.50-0.75	1.00	0.04	0.03	1.00	16.00-18.00		0.75				
440B	(S44003)	SUS440B	--	--	0.75-0.95	1.00	0.04	0.03	1.00	16.00-18.00		0.75				
440C	(S44004)	SUS440C	--	--	0.95-1.20	1.00	0.04	0.03	1.00	16.00-18.00		0.75				
442	(S44200)	--	--	--	0.20	1.00	0.04	0.03	1.00	18.00-23.00						
446	(S44600)	SUH446	--	--	0.20	1.50	0.04	0.03	1.00	23.00-27.00			N 0.25			
501	(S50100)	--	--	--	0.10	1.00	0.04	0.03	1.00	4.00-6.00		0.40-0.65				
502	(S50200)	--	--	--	0.10	1.00	0.04	0.03	1.00	4.00-6.00		0.40-0.65				
	(S13800)	--	--	--	0.05	0.10	0.01	0.008	1.00	12.25-13.25	7.50-8.50	2.00-2.30	Al 0.091, 3.5			
	(S15600)	--	--	--	0.07	1.00	0.04	0.03	1.00	14.00-15.00	3.50-5.50	--	Cu 3.00/5.00 Cb+Ta 0.15/0.45			
	(S17400)	SUS630	--	--	0.07	1.00	0.04	0.03	1.00	15.50-17.50	3.00-5.00	--	Cu 3.00/5.00 Cb+Ta 0.15/0.45			
	(S17700)	SUS631	--	--	0.09	1.00	0.04	0.04	1.00	16.00-18.00	6.50-7.75	--	Al 0.75/1.50			
	(K66286)	SUH660	--	--	0.08	2.00	0.04	0.03	1.00	13.50-16.00	24.00-17.00	1.00-1.50	Ti 1.90/2.35, Al 0.35 V 0.1/0.5 B 0.001/0.01			

Note: 1. * May be added at the manufacturer's discretion.
2. Products excluded from the above table are also available upon request.

Round Bars

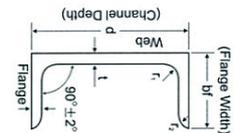
Sizes And Unit Weights

Size	lb/ft	kg/ft	Size	lb/ft	kg/ft
1/8"	0.042	0.019	2 1/4"	13.673	6.202
4.50 mm	0.085	0.039	2 1/2"	16.88	7.657
3/16"	0.096	0.044	2 3/4"	20.425	9.265
6.00 mm	0.150	0.068	3"	24.307	11.026
1/4"	0.169	0.077	3 1/4"	28.526	12.94
7.50 mm	0.235	0.107	3 1/2"	33.084	15.007
9/16"	0.285	0.120	3 3/4"	37.978	17.227
9.00 mm	0.339	0.154	4"	43.211	19.601
3/8"	0.380	0.172	4 1/2"	54.689	24.807
12.00 mm	0.603	0.274	5"	67.516	30.626
1/2"	0.675	0.306	5 1/2"	81.695	37.057
5/8"	1.055	0.479	6"	97.224	44.101
3/4"	1.519	0.689	6 1/2"	114.10	51.757
7/8"	2.067	0.938	7"	132.33	60.026
1"	2.701	1.225	7 1/2"	151.91	68.907
1 1/8"	3.418	1.550	8"	172.84	78.401
1 1/4"	4.220	1.914	9"	218.75	99.226
1 3/8"	5.107	2.317	10"	270.07	122.50
1 1/2"	6.076	2.756	11"	326.78	148.23
1 5/8"	7.132	3.235	12"	388.89	176.40
1 3/4"	8.271	3.752	13"	456.41	207.03
1 7/8"	9.495	4.307	14"	529.33	240.10

Welded Channels AISI 304

Sizes, Tolerances & Weights

Size (in.)	Tolerance		AISI 304, 304L	AISI 316, 316L
	d	bf	Unit Weight (lb/ft)	Unit Weight (lb/ft)
3 x 1 1/2 x 3/16	±1/8	±1/8	3.70	3.70
4 x 2 x 3/16	±1/8	±1/8	5.03	5.03
4 x 2 x 1/4	±1/8	±1/8	6.58	6.58
5 x 2 1/2 x 1/4	±3/16	±1/8	8.40	8.40
6 x 3 x 1/4	±3/16	±1/8	10.14	10.14
6 x 3 x 3/16	±3/16	±1/8	14.77	14.77
8 x 4 x 3/16	±3/16	±3/16 - 1/8	20.02	20.02



Size (mm)	Tolerance		AISI 304, 304L	AISI 316, 316L
	d	bf	Unit Weight (kg/m)	Unit Weight (kg/m)
80 x 40 x 5	±2.00	±2.00	6.08	6.08
100 x 50 x 4	±2.00	±2.00	6.28	6.28
100 x 50 x 6	±2.00	±2.00	9.16	9.16
130 x 65 x 6	±3.00	±3.00	12.20	12.20
150 x 75 x 6	±3.00	±3.00	14.13	14.13
150 x 75 x 9	±3.00	±3.00	20.53	20.53
200 x 100 x 10	±4.00	±4.00	30.80	30.80

MECHANICAL PROPERTIES OF AISI 304 BUTT WELDED JOINT

Joint Thickness (Inch)	Tension Test		Bend Test (180°)		
	Y.S. 0.2% P.S.I.	T.S. P.S.I.	EL. %	Face	Root
3/16	50200	95800	57.7	Good	Good
1/4	48800	93100	57.2	Good	Good
3/8	41200	85200	43.2	Good	Good

Joint Thickness (mm)	Tension Test			Bend Test (180°)	
	Y.S. 0.2% (kg/mm ²)	T.S. (kg/mm ²)	EL. %	Face	Root
5	34	62	57.7	Good	Good
6	35	62	57.2	Good	Good
10	37	60	43.2	Good	Good

Welded Stainless Steel Tubing

MECHANICAL PROPERTIES

Type	Round And Square			Round	
	Yield Strength Kg/mm ²	Tensile Strength Kg/mm ²	Elongation (Longitudinal)%	Bending No.1	Flaring No.2
AISI 430	>25	>42	>20	180°4D	<1/2D
AISI 304	>21	>53	>35	180°3D	<1/2D
AISI 316	>21	>53	>35	180°3D	<1/2D

Notes:

- Yield strength test shall not be conducted unless requested. Other mechanical property values are available on request.
- For the tension test of round tubing, test piece No.11 or 12 specified in JIS Z 2201 (Tension Test Pieces for Materials) shall be used. Test piece No. 12 shall be taken from an unwelded portion.
- For the tension test of square tubing, test piece No.5 specified in JIS Z 2201 shall be used. However, for a side length of less than 25 mm, the test shall be conducted on a test piece with a width equivalent to its side length. The test piece shall be taken from an unwelded portion.
- Unless otherwise specified, the values of No. 1 shall be used.

TYPES OF MANUFACTURES

Surface Finish	Finish	Nisshin Code	Description
Round Tubing	Unpolished	S2	As welded
	120 GRIT	S 240	Polished by #120 belt
	120 GRIT	SB 240	Buffed after polishing by #180 belt
	180 GRIT	SB 400	Buffed after polishing by #180 belt
Square & Rectangular Tubing	180 GRIT	GL	Half-line finished after polishing by #180 belt
	320 GRIT	SB 600	Buffed after polishing by #320 belt
	400 GRIT	BL 400	Buffed after polishing by #400 belt
	MIRROR	MIR	Buffed after polishing by #600 belt
Square & Rectangular Tubing	Unpolished	S2	As welded
	180 GRIT	HL 180	Half-line finished after polishing by #180 belt

CHEMICAL COMPOSITION

Type	Chemical Composition (%)									
	C	SI	Mn	P	S	NI	Cr	Mo		
AISI 430	<0.12	<1.00	<1.00	<0.04	<0.03	--	16-18	--		
AISI 304	<0.08	<1.00	<2.00	<0.04	<0.03	8-11	18-20	--		
AISI 316	<0.08	<1.00	<2.00	<0.04	<0.03	11-14	16-18	200-300		

Round Tubing

TABLE OF UNIT WEIGHT

Outside Diameter In mm	Type	Wall Thickness (mm)																			
		0.5	0.6	0.7	0.8	1.0	1.2	1.5	2.0	2.5	3.0	0.5	0.6	0.7	0.8	1.0	1.2	1.5	2.0	2.5	3.0
12.7	ANSI 304	0.152	0.197	0.242	0.287	0.332	0.377	0.422	0.467	0.512	0.557	0.602	0.647	0.692	0.737	0.782	0.827	0.872	0.917	0.962	1.007
15.9	ANSI 304	0.192	0.247	0.292	0.337	0.382	0.427	0.472	0.517	0.562	0.607	0.652	0.697	0.742	0.787	0.832	0.877	0.922	0.967	1.012	1.057
16	ANSI 304	0.193	0.248	0.293	0.338	0.383	0.428	0.473	0.518	0.563	0.608	0.653	0.698	0.743	0.788	0.833	0.878	0.923	0.968	1.013	1.058
19.1	ANSI 304	0.232	0.287	0.332	0.377	0.422	0.467	0.512	0.557	0.602	0.647	0.692	0.737	0.782	0.827	0.872	0.917	0.962	1.007	1.052	1.097
22.2	ANSI 304	0.323	0.378	0.423	0.468	0.513	0.558	0.603	0.648	0.693	0.738	0.783	0.828	0.873	0.918	0.963	1.008	1.053	1.098	1.143	1.188
25	ANSI 304	0.365	0.420	0.465	0.510	0.555	0.600	0.645	0.690	0.735	0.780	0.825	0.870	0.915	0.960	1.005	1.050	1.095	1.140	1.185	1.230
25.4	ANSI 304	0.371	0.426	0.471	0.516	0.561	0.606	0.651	0.696	0.741	0.786	0.831	0.876	0.921	0.966	1.011	1.056	1.101	1.146	1.191	1.236
28.6	ANSI 304	0.418	0.473	0.518	0.563	0.608	0.653	0.698	0.743	0.788	0.833	0.878	0.923	0.968	1.013	1.058	1.103	1.148	1.193	1.238	1.283
31.8	ANSI 304	0.462	0.517	0.562	0.607	0.652	0.697	0.742	0.787	0.832	0.877	0.922	0.967	1.012	1.057	1.102	1.147	1.192	1.237	1.282	1.327
32	ANSI 304	0.546	0.601	0.646	0.691	0.736	0.781	0.826	0.871	0.916	0.961	1.006	1.051	1.096	1.141	1.186	1.231	1.276	1.321	1.366	1.411
38.1	ANSI 304	0.652	0.707	0.752	0.797	0.842	0.887	0.932	0.977	1.022	1.067	1.112	1.157	1.202	1.247	1.292	1.337	1.382	1.427	1.472	1.517
41.3	ANSI 304	0.807	0.862	0.907	0.952	0.997	1.042	1.087	1.132	1.177	1.222	1.267	1.312	1.357	1.402	1.447	1.492	1.537	1.582	1.627	1.672
44.5	ANSI 304	0.871	0.926	0.971	1.016	1.061	1.106	1.151	1.196	1.241	1.286	1.331	1.376	1.421	1.466	1.511	1.556	1.601	1.646	1.691	1.736
45	ANSI 304	0.881	0.936	0.981	1.026	1.071	1.116	1.161	1.206	1.251	1.296	1.341	1.386	1.431	1.476	1.521	1.566	1.611	1.656	1.701	1.746
48.3	ANSI 304	0.947	1.002	1.047	1.092	1.137	1.182	1.227	1.272	1.317	1.362	1.407	1.452	1.497	1.542	1.587	1.632	1.677	1.722	1.767	1.812
50	ANSI 304	1.22	1.275	1.32	1.365	1.408	1.451	1.494	1.537	1.58	1.623	1.666	1.709	1.752	1.795	1.838	1.881	1.924	1.967	2.01	2.053
60.8	ANSI 304	1.77	1.823	1.868	1.913	1.958	2.003	2.048	2.093	2.138	2.183	2.228	2.273	2.318	2.363	2.408	2.453	2.498	2.543	2.588	2.633
63.5	ANSI 304	1.86	1.916	1.961	2.006	2.051	2.096	2.141	2.186	2.231	2.276	2.321	2.366	2.411	2.456	2.501	2.546	2.591	2.636	2.681	2.726
76.2	ANSI 304	2.24	2.299	2.344	2.389	2.434	2.479	2.524	2.569	2.614	2.659	2.704	2.749	2.794	2.839	2.884	2.929	2.974	3.019	3.064	3.109
	ANSI 430	2.18	2.235	2.28	2.325	2.37	2.415	2.46	2.505	2.55	2.595	2.64	2.685	2.73	2.775	2.82	2.865	2.91	2.955	3.0	3.045

Square Tubing

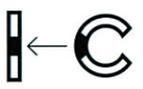
TABLE OF UNIT WEIGHT

Side Length mm (inch)	Type	Wall Thickness (mm), BWG (inch)														
		1.0	1.2	1.5	2.0	3.0	BWG18 (0.49)	BWG16 (0.65)								
12 x 12	ANSI 304	0.347	0.409	0.497	0.612	0.831	1.077	1.412	1.831	2.344	0.128	0.157				
12.7 x 12.7	ANSI 304	0.369	0.431	0.519	0.634	0.853	1.099	1.434	1.853	2.366	0.137	0.166				
14x14	ANSI 304	0.411	0.473	0.561	0.676	0.895	1.141	1.476	1.895	2.396	0.152	0.181				
15.9 x 15.9	ANSI 304	0.471	0.533	0.621	0.736	0.955	1.201	1.536	1.955	2.466	0.148	0.177				
16 x 16	ANSI 304	0.474	0.536	0.624	0.739	0.958	1.204	1.539	1.958	2.469	0.176	0.205				
19 x 19	ANSI 304	0.569	0.631	0.719	0.834	1.053	1.300	1.635	2.054	2.573	0.212	0.241				
19.1 x 19.1	ANSI 304	0.572	0.634	0.722	0.837	1.056	1.303	1.638	2.057	2.576	0.206	0.235				
20 x 20	ANSI 304	0.556	0.618	0.706	0.821	1.040	1.287	1.622	2.041	2.560	0.207	0.236				
21 x 21	ANSI 304	0.584	0.646	0.734	0.849	1.068	1.315	1.650	2.069	2.588	0.218	0.247				
22.2 x 22.2	ANSI 304	0.671	0.733	0.821	0.936	1.155	1.402	1.737	2.156	2.675	0.251	0.280				
25 x 25	ANSI 304	0.76	0.822	0.910	1.025	1.244	1.491	1.826	2.245	2.764	0.284	0.313				
25.4 x 25.4	ANSI 304	0.772	0.834	0.922	1.037	1.256	1.503	1.838	2.257	2.776	0.276	0.305				
28 x 28	ANSI 304	0.855	0.917	1.005	1.120	1.339	1.586	1.921	2.340	2.859	0.32	0.349				
30 x 30	ANSI 304	0.918	0.980	1.068	1.183	1.402	1.649	1.984	2.403	2.922	0.311	0.340				
31.8 x 31.8	ANSI 304	0.892	0.954	1.042	1.157	1.376	1.623	1.958	2.381	2.901	0.335	0.364				
31.8 x 31.8 (1 1/4 x 1 1/4)	ANSI 304	0.947	1.009	1.097	1.212	1.431	1.678	2.013	2.432	2.951	0.357	0.386				
32 x 32	ANSI 304	0.953	1.015	1.103	1.218	1.437	1.684	2.019	2.438	2.957	0.369	0.398				
34 x 34	ANSI 304	1.05	1.112	1.200	1.315	1.534	1.781	2.116	2.535	3.054	0.383	0.412				
35 x 35	ANSI 304	1.01	1.072	1.160	1.275	1.494	1.741	2.076	2.495	3.014	0.405	0.434				
38 x 38	ANSI 304	1.05	1.112	1.200	1.315	1.534	1.781	2.116	2.535	3.054	0.393	0.422				
38.1 x 38.1 (1 1/2 x 1 1/2)	ANSI 304	1.14	1.206	1.294	1.409	1.628	1.875	2.210	2.629	3.148	0.427	0.456				
40 x 40	ANSI 304	1.24	1.306	1.394	1.509	1.728	1.975	2.310	2.729	3.248	0.443	0.472				
46 x 46	ANSI 304	1.38	1.446	1.534	1.649	1.868	2.115	2.450	2.869	3.388	0.481	0.510				
50 x 50	ANSI 304	1.86	1.924	2.012	2.127	2.346	2.593	2.928	3.347	3.866	0.551	0.580				
50.8 x 50.8 (2 x 2)	ANSI 304	1.89	1.952	2.040	2.155	2.374	2.621	2.956	3.375	3.894	0.584	0.613				
60 x 60	ANSI 304	2.24	2.306	2.394	2.509	2.728	2.975	3.310	3.729	4.248	0.683	0.712				
	ANSI 430	2.17	2.232	2.320	2.435	2.654	2.901	3.236	3.655	4.174	0.663	0.692				

Pipes

All stainless steel pipes and tubes for piping, boilers and heat exchangers subjected to solution heat treatment as follows.

Symbol	Solution Heat Treatment		
	For Piping	For Boilers And Heat Exchangers	Cooling Method
SUS 304 TP	SUS 304 TB	1010 °C min.	Rapid cooling
SUS 304L TP	SUS 304L TB	1010 °C min.	Rapid cooling
SUS 321 TP	SUS 321 TB	920 °C min.	Rapid cooling
SUS 316 TP	SUS 316 TB	1010 °C min.	Rapid cooling
SUS 316L TP	SUS 316L TB	1010 °C min.	Rapid cooling
SUS 309S TP	SUS 309S TB	1030 °C min.	Rapid cooling
SUS 310S TP	SUS 310S TB	1030 °C min.	Rapid cooling
SUS 321H TP	SUS 321H TB	1095 °C min.	Rapid cooling
TP 304		1040 °C min.	Rapid cooling
TP 304L		1040 °C min.	Rapid cooling
TP 321		1040 °C min.	Rapid cooling
TP 316		1040 °C min.	Rapid cooling
TP 316L		1040 °C min.	Rapid cooling
TP 309		1040 °C min.	Rapid cooling
TP 310		1040 °C min.	Rapid cooling
TP 321H		1095 °C min.	Rapid cooling

Symbol	Tension Test				Flattening test	Flaring test	Reverse Flattening Test
	Tensile Strength (kg/mm ²)	Yield Strength (kg/mm ²)	Elongation(%) Longitudinal	Transverse			
SUS 304TP/TB	53 min.	21 min.	35 min.	25 min.	$H = \frac{(1+e)l}{D}$ Where, H = Distance between flattening plates (mm) l = Wall thickness (mm) D = Outside diameter (mm) e = 0.09 (constant) Note: Welded section shall be affixed at an angle 90° to the direction of compression.	1.2 D (D)=Outside diameter (mm)	 <p>When flattened reversely, no cracks or breaks shall occur on its welded section.</p>
TP 304	49 min.	18 min.	35 min.	25 min.			
SUS 304LTP/LTB	49 min.	18 min.	35 min.	25 min.			
SUS 321TP/TB	53 min.	21 min.	35 min.	25 min.			
TP 321	53 min.	21 min.	35 min.	25 min.			
SUS 316TP/TB	53 min.	21 min.	35 min.	25 min.			
TP 316	49 min.	28 min.	35 min.	25 min.			
SUS 316LTP/LTB	49 min.	28 min.	35 min.	25 min.			
TP 316L	49 min.	28 min.	35 min.	25 min.			
SUS 309S TP/STB	53 min.	21 min.	35 min.	25 min.			
TP 309	53 min.	21 min.	35 min.	25 min.			
SUS 310S TP/STB	53 min.	21 min.	35 min.	25 min.			
TP310S	53 min.	21 min.	35 min.	25 min.			
SUS 321HTP/HTB	53 min.	21 min.	35 min.	25 min.			
TP 321H	53 min.	21 min.	35 min.	25 min.			

Notes:

1. Tensile strength shall not be measured unless specifically requested.
2. Flaring test and reverse flattening test shall be conducted only on tubes for boilers and heat exchanger.

Pipes

JIS	ANSI	CHARACTERISTICS	USES
SUS 304	TP 304	Most widely used stainless steel. Because of its nickel content, it has excellent corrosion and heat resistance, strength under low temperature and improved mechanical properties. It has work hardening characteristic, and hardening by heat treatment is impossible. Has no magnetism.	Home appliances and kitchen utensils, architectural ornaments, vehicles, auto parts medical equipment, and various applications in the food, chemical, and textile industries.
SUS 304L	TP 304L	Ni-Cr steel with extremely low carbon content. Although its degree of corrosion resistance under normal conditions is similar to that of SUS 304, it has greater resistance against intergranular corrosion after welding or stress-relief heat treatment. Has no magnetism.	Parts and structures in the chemical, Petroleum, coal and pharmaceutical industries to which heat treatment is difficult to apply. Normally used at temperatures below 400°C.
SUS 321	TP 321	Excellent corrosion resistance. Other properties are similar to those of SUS 304. The resistance to intergranular corrosion is improved by addition of 18-8 type. It has no magnetism, and it is especially suited for use at temperatures between 430°C-900°C. Though having no magnetism in annealed state, it becomes slightly magnetized by cold working.	Exhaust pipes of aircraft engines, boilers, jet engine parts, heating furnace parts, and other parts used in the chemical industry to which heat treatment after welding is difficult to apply.
SUS 316	TP 316	Substantial amounts of nickel and chromium content greatly improve heat and corrosion resistance. Work-hardening characteristic but not magnetism.	Various uses in the chemical, food, photographic, textile, paper and pulp industries. Especially suited for exterior of structures located near coastal areas.
SUS 316L	TP 316L	Nickel-chromium steel containing molybdenum and an extremely small amount of carbon. Physical properties are similar to those of SUS 316. Excellent resistance against intergranular corrosion after welding or stress-relief heat treatment. Has no magnetism.	Typical applications similar to those of SUS 316. For machine parts and equipment which are not easily subjected to heat treatment after welding. Especially suited for use at temperatures below 420°C.
SUS 309S SUS 310S	TP 309 TP310	Substantial amount of nickel and chromium content greatly improve heat and corrosion resistance.	Jet engine parts, tanks for chemicals, combustion apparatus parts, boilers, and gas turbine parts.