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MATERIALS FOR FABRICATION OF HEAT EXCHANGERS
MATERIALI PER LA FABBRICAZIONE DI SCAMBIATORI DI CALORE
MATERIAUX POUR LA FABRICATION D' ECHANGEURS DE CHALEUR
MATERIALES PARA FABRICACION DE INTERCAMBIADORES DE CALOR
MATERIALIEN FÜR DIE HERSTELLUNG VON WÄRMEAUSTAUSCHER

Titanium Tubes



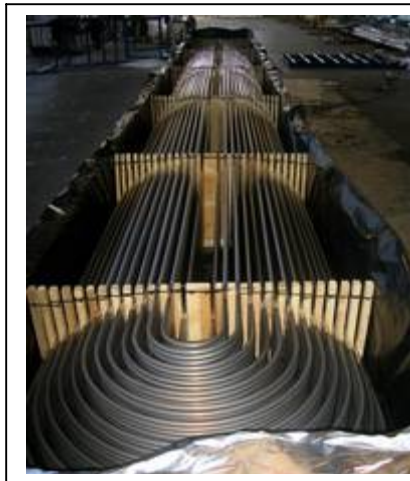
Copper Alloy Tubes



Stainless Steel Tubes



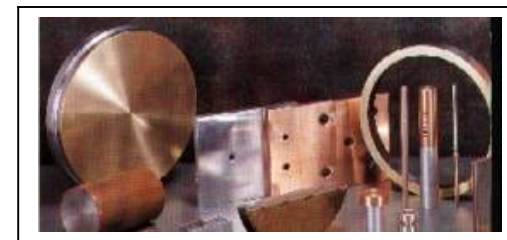
U-bent tubes



Low fin tubes



Explosion clad plates





MATERIAL SUPPLY LIST TUBES STRAIGHT & U-BENT

Materials for Heat Exchangers	ASTM	Grade	Diameter mm	Thickness mm	Length mm	Origin
Welded Titanium	B-338	1-2-3-7-11-12	12.7-50.80	0.4-2.00	35,000	Korea/China
Seamless Titanium	B-338	1-2-3-7-9-12	6.00-159.00	0.5-15.00	18,000	China
Seamless Copper Alloy	B-111	C687-443-608-704 706-715-71640	12.00-60.00	0.7-3.00	25,000	China/Japan/ Korea/Europe /Mexico
Cu-Ni 90/10 LWC/Straight	B-111	C70600	5.00-19.05	0.5-1.65	Coil	China
Seamless Stainless Steel	A-213	300-400 Series	6.00-159.00	0.7-5.00	35,000	Korea/China
Welded Stainless Steel	A-249	300-400 Series	12.75-60.00	0.5-2.11	35,000	Korea/China
Seamless Duplex & Super Duplex	A-789	S31803-S32205- S32750	6.00-159.00	0.7-5.00	35,000	Korea/China
Welded Duplex & Super Duplex	A-789	S31803-S32205- S32750	12.70-60.00	0.5-2.11	35,000	Korea/China
Seamless Alloys Steel	A-179/ A-213	Low carbon steel T5/11/9/12/22 etc.	6.00-170.00 6.00-170.00	0.7-5.00 0.7-5.00	20,000 20,000	Korea/China
Seamless Nickel & Nickel Alloy	B-161/3/ 5	N02200-2210-4400 N6625-8825-8800	12.7-50.00	0.7-5.00	12,000	Korea/China
Welded Nickel & Nickel Alloy	B-705/ 725	N06625-8825 N02200-2201-4400	12.7-50.00	0.5-2.11	20,000	Korea
Seamless Low Fin & Bi-Metal		Upon request				Korea



MATERIAL SUPPLY LIST PLATES & DISCS

Material for Heat Exchangers	ASTM	Grade	Width-Diam mm	Thickness mm	Length mm	Origin
Rolled Titanium	B-265	1-2-3-12	1,000-3,600	5.00-80.00	6,000	Japan/ China
Titanium Coils	B-265	1-2	1,000/1,200	0.5-3.00	COIL	Korea/China
Titanium Forgings (Flanges/Disc/Ring)		Upon request				China
Rolled Copper Alloy	B-171	C443-464-630-614-365-706-715	1,250-2,500	3.00-90.00	5,000	Germany
Rolled Nickel & Nickel Alloy	B-127/ 162	N0220-221-400	1,150mm max.	3.00-30.00	3,000	China
Explosion Clad	B264 B265 B432 B898	Carbon Steel + Titanium/Stainless/ Duplex/Cu Alloy / Nickel Alloy	Plate:3,000 max Disc:3,500 max	20.00-270.00	5,000	Europe/ China/korea
Rolled Clad (Plate only)	B264 B265 B898	Carbon Steel + Titanium/Stainless/ Nickel Alloy	Max. 3,600	Max. 40.00 (total)	10,000	Japan
Steel/Stainless Steel Forged Plates/Discs/Rings/Flanges		Upon request				Korea
Steel/Stainless steel solid hot rolled plates	A240	300 series	1,000-2,000 1,000-2,500	8 9-130	12,000	Japan

All our above products of Korean origin are free import tax, according to UE - South Korea Free Trade Agreement (FTA) in force



SPECIFIC GRAVITY OF OUR SUPPLYING MATERIALS

Material	S-G	Material	S-G	Material	S-G	Material	S-G
Titanium	4.51	Copper	8.89	Al Brass	8.34	Admiralty	8.53
Cu-Ni 90/10	8.94	Cu-Ni 70/30	8.94	66/30/2/2	8.94	Al-Bronze	7.89
304-304L-321-305	7.93	301-302- 201-202	7.93	316-316L-347-309S-310S	7.98	405-410-420	7.75
409-430-434	7.7	SS Duplex	8.03	Nickel 200	8.90	Nickel 201	8.90
Inconel 625	8.44	Inconel 825	8.14	Inconel 601	8.11	Monel	8.80
Hastelloy C276	8.89	Hastelloy C22	8.69				

- **CALCULATION FORMULA OF UNIT WEIGHT**

1) Tube : $\frac{(\text{OD}-\text{Thickness}) \times \pi \times \text{Thickness} \times \text{Specific Weight}}{1,000 \text{ kg}}$ = kg/meter x Length/meter = kg/pc ($\pi=3,1416$)

Example : Titanium tubes. $\frac{19,05\text{mm} \times 0,5\text{mm} \times 6069\text{mm}}{1,000 \text{ kg}} = (19,05 - 0,5) \times 3,1416 \times 0,5 \times 4,51 = 0,130 \text{ kg/meter} \times 6.096 \text{ meters} = 0,79 \text{ kg/pc}$

2) Rectangular or Square plate : (Width/meter x Length/meter x Thickness) x Specific Weight = kg/pc

Example : Cupronickel 90/10 Plates, 2000mm x 3000mm x 30mm x Specific Weight = 2meter x 3meter x 30mm x 8,94 = 1,602 kg/pc

3) Titanium Disc : (Radius/meter x Radius/meter x π x thickness/mm) = kg/pc ($\pi = 3,1416$)

Example : OD 3000mm x 40mm thick = (1,50meter x 1,50meter x 3,1416 x 40mm x Specific weight = 1,175 kg/pc

n. b. 1 inch = 25,4mm 1ft = 0,3048 meter



**STANDARDS OF OUR SUPPLYING MATERIALS
SEAMLESS STAINLESS, DUPLEX & SUPER DUPLEX TUBES**

SEAMLESS: ASTM A213/A269/A312/A450/A530			SEAMLESS: A789		
Ferritic Steel			Ferritic Steel		
ASTM	EN	Application	ASTM	EN	Application
403	1.4024	Heat-Exchangers	410S/410	1.4000/1.4006	Heat-Exchangers
420	1.4021/1.4028	Heat-Exchangers	430	1.4016	Heat-Exchangers
405	1.4002	Heat-Exchangers	409	1.4512	Heat-Exchangers
446	1.4749	Heat-Exchangers	444	1.4521	Heat-Exchangers
439	1.4509	Heat-Exchangers	430F	1.4104	Heat-Exchangers
Duplex & Super Duplex			Duplex & Super Duplex		
ASTM	DIN	Application	ASTM	DIN	Application
S31803	1.4462	Heat-Exchangers & Piping	S32205	1.4462	Heat-Exchangers & Piping
S32304	1.4362	Heat-Exchangers & Piping	S32750	1.4410	Heat-Exchangers & Piping
S.32760	1.4501	Heat- Exchangers & Piping			
Austenitic Steel			Austenitic Steel		
ASTM	EN	Application	ASTM	EN	Application
303	1.4305	Machined parts	310S	1.4845	Heat Exchangers
314	1.4841	Heat Exchangers	310	1.4841	Heat Exchangers
321	1.4541	Heat-Exchangers & Piping	904L	1.4539	Heat Exchangers
304	1.4301	Heat- Exchangers & Piping	321H	1.4878	Heat-Exchangers & Piping
304N	1.4315	Heat-Exchangers & Piping	304H	1.4948	Boiler & Piping
304L	1.4306	Heat-Exchangers & Piping	316L	1.4404	Heat-Exchangers & Piping
316	1.4401	Heat-Exchangers & Piping	304LN	1.4311	Boiler & Piping
316LN	1.4406	Boiler & Piping	316H	1.4436	Boiler & Piping
316Ti	1.45371	Heat Exchangers & Piping	316LN	1.4406	Boiler & Piping
317L	1.4438	Heat Exchangers & Piping	317	1.4438	Heat-Exchangers & Piping
S30815	1.4835	Heat Exchangers	S31254	1.4547	Heat Exchangers
316H	1.4436	Boiler & Piping	316LN	1.4406	Boiler & Piping



WELDED STAINLESS, DUPLEX & SUPER DUPLEX TUBES

Welded A249 & A789			Welded A249 & A789		
Austenitic Steel			Austenitic Steel		
ASTM	EN	APPLICATION	ASTM	EN	APPLICATION
254Mo	1.4547	Heat Exchangers	S31803	1.4462	Heat Exchangers
53458	1.4565	Heat Exchangers	S32205	1.4462	Heat Exchangers
904L	1.4539	Heat Exchangers	S32750	1.4410	Heat Exchangers

Welded A249 & A789			Welded A249 & A789		
Austenitic Steel			Austenitic Steel		
ASTM	EN	APPLICATION	ASTM	EN	APPLICATION
316L	1.4404	Heat Exchangers	316	1.4401	Heat Exchangers
309	1.4828	Heat Exchangers	321	1.4541	Heat Exchangers
310S	1.4845	Heat Exchangers	309S	1.4833	Heat Exchangers
316T	1.4571	Heat Exchangers	316L	1.4332	Heat Exchangers
304LN	1.4311	Heat Exchangers			



BIRMINGHAM WIRE GAUGE & STANDARD WIRE GAUGE

Birmingham Wire Gauge				Standard Wire Gauge			
B.W.G.	MM	B.W.G.	MM	S.W.G.	MM	S.W.G.	MM
0	8.636	13	2.413	0	8.230	13	2.337
1	7.620	14	2.108	1	7.620	14	2.032
2	7.214	15	1.829	2	7.010	15	1.829
3	6.579	16	1.651	3	6.401	16	1.626
4	6.045	17	1.473	4	5.893	17	1.422
5	5.588	18	1.245	5	5.385	18	1.219
6	5.156	19	1.067	6	4.877	19	1.016
7	4.572	20	0.889	7	4.470	20	0.914
8	4.191	21	0.813	8	4.064	21	0.813
9	3.759	22	0.711	9	3.658	22	0.711
10	3.404	23	0.635	10	3.251	23	0.610
11	3.048	24	0.559	11	2.946	24	0.559
12	2.769	25	0.508	12	2.642	25	0.508
13	2.413	26	0.457	13	2.337	26	0.457