Cu + Ag 99.9%

ASTM B280

JIS H3300

REFRIGERATION

AIR CONDITIONING

MEGA TUBE

ANNEALED COIL

STARIGHT HARD DRAWN PIPE

REFRIGERATION & AIR CONDITIONING TUBES

Megaatube are supply a wide range of refrigeration and air conditioning tubes. These tubes are supplied in hard drawn straight length and annealed coils. Megaatube provide with a comprehensive range of copper tube products to comply with a variety of applications and International Standards.

Standard & Chemicals Components

Standard	Alloy No.	Composition	
		Cu + Ag (%)	P (%)
ASTM B280	C12200	Over 99.9	0.015 ~ 0.040
JIS H3300	C1220	Over 99.9	0.015 ~ 0.040

Cleanness Requirements

All tubes are cleaned and sample tested to meet the residual requirements as specified by the codes at 0.038/m2(0.035g/ft2).

Tube Integrity

All tubes are electronically tested by Eddy Current method, to the requirements of ASTM E 243.

Thickness Tolerances

The standard thickness at any point tolerance for tube either coiled or in straight length is ±10% of the specified thickness.

Temper

Product under this specification shall be furnished in either O60 (soft annealed) or H58 (drawn general purpose) temper, as specified in the contract or purchase order and defined in Practice B 601.

Coils are normally furnished in O60 temper and straight lengths in H58 temper.

REFRIGERATION & AIR CONDITIONING PANCAKE COIL

Mechanical Properties of Phosphorus Deoxidized Copper

Temper	Annealed - O
Tensile Strength (Mpa)	Over 205
Elongation (%)	Over 40 (50mm)
Rockwell Hardness	HR15T: Below 60
Grain Size (mm)	0.025 ~ 0.060
Nondestructive (All: size of drill hole)	Ø 4 - 10 : 0.9 mm
	Ø 10 - 20 : 1.0 mm
	Ø 20 - 30 : 1.1 mm

Standard Dimension of Annealed Coil (15 meters length)

Outside Diameter		Wall Thickness		Weight	Safety Working Pressure PSW			
(Inch)	(mm)	(mm)	(SWG)	(Kg/m)	kPa(50°C)	kPa(75°C)	Psi(50°C)	Psi(75°C)
1/4	6.35	0.51	25	0.083	6389	5298	926	768
		0.56	24	0.091	7069	5862	1025	850
		0.61	23	0.098	7760	6435	1125	933
		0.71	22	0.112	9175	7608	1330	1103
3/8	9.52	0.51	25	0.129	4152	3443	602	499
		0.56	24	0.141	4581	3799	664	551
		0.61	23	0.152	5015	4159	727	603
		0.71	22	0.175	5897	4890	855	709
1/2	12.70	0.51	25	0.147	3075	2550	446	370
		0.56	24	0.190	3389	2810	491	407
		0.61	23	0.206	3705	3072	537	445
		0.71	22	0.238	4344	3603	630	522
		0.81	21	0.270	4994	4141	724	600
5/8	15.88	0.56	24	0.240	2689	2230	390	323
		0.61	23	0.261	2937	2436	426	353
		0.71	22	0.302	3439	2852	499	414
		0.81	21	0.342	3947	3273	572	475
3/4	19.05	0.61	23	0.315	2433	2018	353	293
		0.71	22	0.365	2846	2360	413	342
		0.81	21	0.414	3263	2706	473	392

REFRIGERATION & AIR CONDITIONING STRAIGHT PIPE

Standard Dimension of Straight Hard Drawn Pipe (5.8 meters length)

Outside Diameter (Inch)	Outside Diameter (mm)	Wall Thickness (mm)	Wall Thickness (SWG)	Weight (Kg/m)	Safety Working Pressure PSW kPa(50°C)	Safety Working Pressure PSW kPa(75°C)	Safety Working Pressure PSW Psi(50°C)	Safety Working Pressure PSW Psi(75°C)
1/4	6.35	0.71	22	0.113	9175	7608	1330	1130
		0.81	21	0.125	10635	8819	1542	1279
		0.91	20	0.139	12142	10069	1761	1460
		1.22	18	0.175	17143	14216	2486	2061
3/8	9.53	0.71	22	0.175	5897	4890	855	709
		0.81	21	0.197	6796	5636	985	817
		0.91	20	0.220	7714	6397	1119	928
		1.22	18	0.283	10684	8860	1549	1285
1/2	12.7	0.71	22	0.239	4344	3603	630	522
		0.81	21	0.269	4994	4141	724	600
		0.91	20	0.302	5653	4687	820	680
		1.22	18	0.392	7760	6435	1125	933
5/8	15.88	0.71	22	0.303	3439	2852	499	414
		0.81	21	0.341	3947	3273	572	475
		0.91	20	0.383	4461	3699	647	536
		1.22	18	0.500	6093	5053	883	733
3/4	19.05	0.71	22	0.366	2846	2360	413	342
		0.81	21	0.413	3263	2706	473	392
		0.91	20	0.464	3684	3055	534	443
		1.22	18	0.609	5015	4159	727	603
7/8	22.23	0.71	22	0.427	2427	2013	352	292
		0.81	21	0.485	2781	2306	403	334
		0.91	20	0.545	3137	2602	455	377
		1.22	18	0.717	4260	3533	617	512
1 1/8	28.58	0.71	22	0.554	1876	1555	272	226
		0.81	21	0.629	2147	1780	311	258
		0.91	20	0.708	2420	2006	351	291
		1.22	18	0.934	3277	2717	475	394
1 3/8	34.93	0.71	22	0.680	1528	2368	222	184
		0.81	21	0.775	1728	1450	253	210
		0.91	20	0.870	1969	1633	286	237
		1.22	18	1.157	2662	2208	386	320
1 5/8	41.28	0.81	21	0.917	1474	1222	213	177
		0.91	20	1.029	1660	1377	241	200
		1.22	18	1.369	2279	1880	330	274
2 1/8	53.98	1.02	19	1.517	1419	1177	206	171
		1.22	18	1.803	1709	1412	247	205
2 5/8	66.68	1.22	18	2.236	1371	1139	199	165
3 1/8	79.38	1.22	18	2.680	1150	954	167	138

Note: ***1kPa = 0.145 psi***
100kPa = 1 bar

SAFE WORKING PRESSURE CALCULATION FOR COPPER TUBES

The safe working pressures for copper tubes at temperatures up to 50°C and 75°C are shown on pages 2 to 3. Values for the safe working pressure (kPa) may be calculated by the following formula. Calculations are based on annealed tube to allow for softening at brazed joint.

Safe Working Pressure Calculation

SD = Maximum Allowable Design Stress for Annealed Copper In Mega Pascal
t_{min} = Minimum Thickness Any Point, mm
D_{max} = Maximum Mean Outside Diameter, mm

$$PSW = \frac{1800 \times SD \times t_{min}}{D_{max} - 0.9t_{min}}$$

Value for SD for various temperature ranges were taken from AS 4041, Pressure Piping Code. Design strength at intermediate temperatures may be obtained by linear interpolation.

Temperature Range (°C)	Maximum Allowable Design Tensile Stress (SD) (MPa)
Up to 50	41
Over 50-75	34
Over 75-125	33
Over 125-150	32
Over 150-175	28
Over 175-200	21

The following information is to be read in conjunction with safe working pressure details for copper tube

Safe working pressures have been base on tube minimum thickness and annealed temper design tensile stress values specified in the Australian standard AS 4041 'Pressure Piping'.
The calculation allow for softening when tubes are brazed or heated. The test pressure for copper piping installations shall not exceed 1.5 times the safe working pressure of the copper tube.
Tubes with increased wall thickness have been included in the table to address high working pressures associated with new generation refrigerants. Additions to the tube range will be considered in response to market demand and the future introduction of refrigerants with different pressure requirement.

R410A refrigerant has been selected as a replacement for R22 refrigerant that has been commonly used in light commercial and residential air-conditioning. R410A has a 60% higher operating pressure than R22 thus requiring a thicker wall copper tube and significantly stronger copper fittings. 15% silver solder is recommended when brazing tube for use with R410A or other high-pressure refrigerants.

TEMPERATURE vs. REFRIGERANT GAS PRESSURE

The table below gives value of saturated vapor pressures of some of the most common refrigerants. This table is supplied for guidance purposes only. Operating pressures for specific refrigerants should be obtained from your refrigerant supplier.

Temp / Gas	°C °F	45 °C 113 °F	50 °C 122 °F	55 °C 131 °F	60 °C 140 °F	65 °C 149 °F	70 °C 158 °F
R11	kPa psig	105.0 15.2	140.0 20.3	176.0 25.5	212.0 30.7	252.0 36.5	307.0 44.5
R12	kPa psig	981.0 142.2	1120.0 162.4	1268.0 183.9	1428.0 207.1	1586.0 230.0	1784.0 258.7
R123	kPa psig	78.0 11.3	114.0 16.5	147.0 21.3	182.0 26.4	228.0 33.1	276.0 40.0
R134A	kPa psig	1054.0 152.8	1234.0 178.9	1383.0 200.5	1571.0 227.8	1789.0 259.4	2016.0 292.3
R22	kPa psig	1649.0 239.1	1855.0 269.0	2095.0 303.8	2345.0 340.0	2592.0 375.8	2895.0 419.8
R404A	kPa psig	1967.0 285.2	2224.0 322.5	2503.0 362.9	2805.0 406.7	3093.0 448.5	3292.0 477.3
R407C	kPa psig	1735.0 251.6	1970.0 285.7	2235.0 324.1	2520.0 365.4	2933.0 425.3	3262.0 473.0
R408A	kPa psig	1822.0 264.2	2060.0 298.7	2319.0 336.3	2600.0 377.0	2842.0 412.1	3160.0 458.2
R409A	kPa psig	1037.0 150.4	1191.0 172.7	1363.0 197.6	1550.0 224.8	1990.0 288.6	2217.0 321.5
R410A	kPa psig	2609.0 378.3	2945.0 427.0	3308.0 479.7	3702.0 536.8	4131.0 599.0	4599.0 666.9
R502	kPa psig	1766.0 256.1	1977.0 286.7	2215.0 321.2	2475.0 358.9	2865.0 415.4	3090.0 448.1
R507	kPa psig	2021.0 293.0	2281.0 330.7	2572.0 372.9	2890.0 419.1	3236.0 469.2	3566.0 517.1

Note:

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