



Crane Copper Tube

Copper Tube - NZS3501

VERSATILE, TRUSTED QUALITY

COPPER TUBE → PLUMBING → GASFITTING → SANITATION

Crane copper tube is manufactured to NZS3501 using the highest grade raw materials and modern drawing technology to provide superior products for water, gas and sanitation waste in domestic, commercial and industrial applications.



Crane Copper Tube – NZS3501

- **Compliance:** Crane copper tube complies with New Zealand Standard NZS3501 : 1976 Copper tubes for water, gas and sanitation.
- **Internal Surface Quality:** Crane Copper Tube uses special manufacturing processes to provide enhanced internal bore characteristics that offer improved corrosion resistance and levels of carbon residue well below the values set by the Standard.
- **Quality Manufacturing:** Crane copper tube is manufactured and inspected to the highest quality assurance standards.
- **Multi Applications:** Copper tube has great versatility for multiple uses including water, gas and sanitation drainage applications.
- **Inherent Strength:** Copper tube has inherent strength, providing good resistance to external damage, puncture, abrasion, vibration bumps, and has a wide operating range for pressure and vacuum.
- **Impervious:** Copper tube is impervious to oxygen, insecticide, solvents and toxins.
- **Non-Flammable:** Copper tube is non-flammable and does not emit toxic fumes during fire.
- **Full Flow Joints:** Copper tube jointing does not reduce the bore of the tube.
- **Low Friction Loss:** Copper tube provides high flow rates with minimal external dimensions.
- **U.V. Resistant:** Copper tube does not degrade from direct sunlight or become brittle with age.
- **Resists Rodent Attack:** Copper tube is not prone to damage due to rodent attack.
- **Multi Applications:** Copper tube is made to universal size not a unique brand size.
- **Stability:** Copper tube does not creep with age and has 7 to 15 times less lineal expansion than other materials with heat, and continues to perform at high temperatures.
- **Healthier & Non-tainting:** Copper tube does not adversely affect the taste of water, and *reduces the number of harmful micro-organisms in water.
*Study conducted by INCRA under project N°348 – 1984 using water contaminated with coliforms.
- **Proven Track Record:** Crane copper tube is part of a superior system with a proven track record.
- **Add Value For Life:** Copper tube adds to a home's resale value.
- **Recyclable:** Copper tube is a valuable recyclable material.

Table 1 – NZS3501 Copper Tube for Water & Gas – Straights

Crane Item Number	Nominal Size	Outside Diameter (mm)	Wall Thickness (mm)	Nominal Weight (Per length)	Length (m)	Temper	Hydrostatic Test Pressure (MPa)	Annealed State Safe Working Pressure (MPa)
50200129	15	14.73	1.02	1.96	5	Half Hard	5.55	6.84
50200131	20	21.08	1.02	2.87	5	Half Hard	3.90	4.68
50200133	25	27.43	1.02	3.78	5	Half Hard	2.95	3.55
50200132	25	27.43	1.02	3.78	5	Annealed	2.95	3.55
50200224	32	34.19	1.22	5.65	5	Hard Drawn	2.85	3.40
50200225	32	34.19	1.22	5.65	5	Hard Drawn	2.85	3.40
50200226	40	40.54	1.22	6.74	5	Hard Drawn	2.40	2.85
50200227	40	40.54	1.22	6.74	5	Hard Drawn	2.40	2.85
50200228	50	53.24	1.22	8.91	5	Hard Drawn	1.85	2.16
50200229	50	53.24	1.22	8.91	5	Hard Drawn	1.85	2.16
50200230	65	65.94	1.22	11.09	5	Hard Drawn	1.50	1.73

Table 2 – NZS3501 Copper Tube for Sanitation – Straights

Crane Item Number	Nominal Size	Outside Diameter (mm)	Wall Thickness (mm)	Nominal Weight (Per length)	Length (m)	Temper	Hydrostatic Test Pressure (MPa)	Annealed State Safe Working Pressure (MPa)
50200133	25	27.43	1.02	3.78	5	Half Hard	2.95	3.55
50200224	32	34.19	1.22	5.65	5	Hard Drawn	2.85	3.40
50200226	40	40.54	1.22	6.74	5	Hard Drawn	2.40	2.85
50200228	50	53.24	1.22	8.91	5	Hard Drawn	1.85	2.16
50200230	65	65.94	1.22	11.09	5	Hard Drawn	1.50	1.73
50200231	80	79.04	1.42	15.48	5	Hard Drawn	1.45	1.68
50200232	100	104.85	1.63	23.62	5	Hard Drawn	1.25	1.45
50200233	150	156.06	1.83	39.63	5	Hard Drawn	0.95	1.09

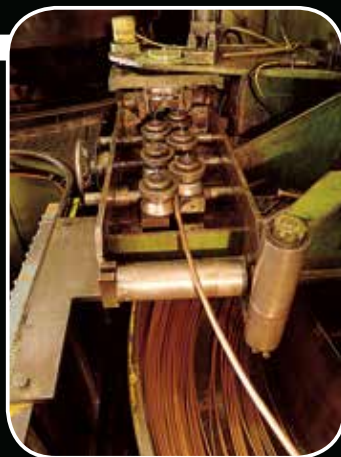


Table 3 – NZS3501 Light Gauge Copper Tube for Water & Gas – Straights

Crane Item Number	Nominal Size	Outside Diameter (mm)	Wall Thickness (mm)	Nominal Weight (Per length)	Length (m)	Temper	Hydrostatic Test Pressure (MPa)	Annealed State Safe Working Pressure (MPa)
50200128	15	14.73	0.70	1.38	5	Half Hard	3.80	4.59
50200130	20	21.08	0.90	2.55	5	Half Hard	3.40	4.10

Table 4 – NZS3501 Copper Tube for Water & Gas – Coils

Crane Item Number	Nominal Size	Outside Diameter (mm)	Wall Thickness (mm)	Nominal Weight (Per length)	Length (m)	Temper	Hydrostatic Test Pressure (MPa)	Annealed State Safe Working Pressure (MPa)
50200318	15	14.73	1.02	5.89	15	Annealed	5.55	6.84
50200328	20	21.08	1.02	8.62	15	Annealed	3.90	4.68

Safe Working Pressure

The safe working pressure at temperatures up to 65°C in Table 1 & 3 are calculated using the following formula:

$$P = \frac{2S \times t}{D - t}$$

where

- P = working pressure (MPa)
- t = wall thickness (mm)
- D = outside diameter (mm)
- S = stress (MPa)

- annealed condition, S = 46 MPa
- half hard condition, S = 60 MPa
- as drawn condition, S = 70 MPa

Where heating softens the copper tube, including by brazing, the maximum working pressure of annealed temper must apply. These values are shown in tables as the Annealed State Safe Working Pressure.

Hydrostatic Test Pressure

$$P = \frac{80 \times t}{D}$$

where

- P = working pressure (MPa)
- t = wall thickness (mm)
- D = outside diameter (mm)

Quality, reliability, and performance

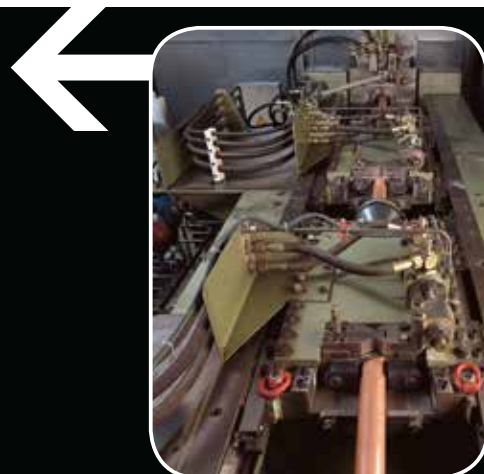


Table 5 - Copper Tube Flow & Friction Coefficients

Table	Nominal Size	Max. Outside Diameter (mm)	Wall Thickness (mm)	c (litres/metre)	F @ 15°C	F @ 65°C
1	10	11.35	0.91	0.0713	2524.36	2119.46
3	15	14.73	0.70	0.1396	400.208	336.134
1	15	14.73	1.02	0.1265	546.875	459.097
3	20	21.08	0.90	0.2919	80.6739	67.6599
1	20	21.08	1.02	0.2847	84.5755	70.9309
1 & 2	25	27.43	1.02	0.5063	20.1612	16.8973
1 & 2	32	34.19	1.22	0.7917	6.61590	5.55338
1 & 2	40	40.54	1.22	1.140	2.83052	2.37777
1 & 2	50	53.24	1.22	2.027	0.68157	0.57163
1 & 2	65	65.94	1.22	3.167	0.22769	0.19206
2	80	79.04	1.42	4.560	0.094847	0.079555
1	80	79.45	1.63	4.559	0.094893	0.079593
1	90	92.56	1.83	6.207	0.044758	0.037577
2	100	104.85	1.63	8.106	0.023916	0.020085
1	100	105.66	2.03	8.107	0.023936	0.020102
2	150	156.06	1.83	18.24	0.003431	0.002879
2	200	194.5	3.00	27.91	0.001446	0.001213

Table 6 – Fitting Friction Coefficients

Nominal Size	90° Elbow (Sharp)	90° Elbow (Long Rad.)	Tee (Branch Flow)	Tee (Line Flow)	Reducers	Stop Taps	Gate Valves	Swing Check Valves
10	0.118	0.064	0.125	0.046	0.051	0.714	0.019	0.300
15	0.105	0.057	0.118	0.046	0.051	0.714	0.017	0.253
20	0.083	0.046	0.104	0.046	0.051	0.714	0.013	0.177
25	0.074	0.038	0.095	0.046	0.051	0.714	0.012	0.147
32	0.067	0.031	0.088	0.046	0.051	0.714	0.010	0.124
40	0.059	0.026	0.081	0.046	0.051	0.714	0.009	0.102
50	0.050	0.020	0.075	0.046	0.051	0.714	0.009	0.102
65	0.045	0.017	0.069	0.046	0.051	0.714	0.008	0.102
80	0.040	0.015	0.060	0.046	0.051	0.714	0.007	0.102
90	0.038	0.013	0.058	0.046	0.051	0.714	0.007	0.102
100	0.036	0.012	0.056	0.046	0.051	0.714	0.007	0.102





Pressure Loss & Flow Rates for copper tube and fittings

Flow Rate

$$Q = v \times c$$

where:

Q = Flow rate (litres/sec)

v = flow velocity in (metres/sec)

c = tube flow co-efficient, refer table 4

Head or Pressure Loss due to friction of tube

$$H = F \times Q^{1.8}$$

$$P = H \times 9.81$$

where:

H = Head loss (metres/100 metres)

P = Pressure loss (kPa/100 metres)

F = friction co-efficient from table 4 below

Q = flow rate in (litres/sec)

Head or Pressure Loss due to friction of fitting

$$H = f \times \left[\frac{Q}{c} \right]^2$$

$$P = H \times 9.81$$

where:

f = Fitting friction co-efficient from table 5

Q = Flow rate (litres/sec)

c = tube flow co-efficient, refer table 4

Recommended Flow Velocity

Correct pipe sizing is essential to obtain acceptable water velocities and volumes. It is necessary to design all pipe work to have a minimum flow velocity greater than 0.5m/s, where velocities below this may allow suspended solids in the water to be deposited on the tube. Conversely flow rates greater than 3.0m/s can cause turbulence, which may destroy the protective surface film that is essential for the longevity of the system.

Physical Properties of Copper Tube

Composition	Alloy C12200 Copper = 99.90%min; Phosphorus=0.015-0.040%
Melting point	1083°C
Density	8.94 x 10 ³ kg/m ³
Thermal Expansion	0.177mm/10°C.m
Modulus of Elasticity	17,000 MPa

Tube Temper	Annealed	Bendable	As drawn
Hardness	70 max.	80-100	100 min.
Yield (0.2% proof), (MPa)	70	220	350
Ultimate (MPa)	220	280	380

Crane Copper Tube

ABN 51 008 408 151

A Division of
Crane Enfield Metals Pty. Limited

PO Box 319, Penrith
NSW, 2751, Australia
Phone: +612 4720 5350
Fax: +612 4720 5390
sales@cranecopper.com.au
www.cranecopper.com.au
CRN1110.BMS0315

Information contained in this brochure is provided as a guide only. Crane Copper Tube does not warrant that the information is accurate or without errors or omissions. Crane Copper Tube reserves the right to correct any errors or misprints. All information and product details contained within this document are provided as a guide only. Product use shall be conducted by a fully licensed plumber.