



HAILIANG
THE WORLD'S LARGEST PRODUCER OF
COPPER PRODUCT

COPPER TUBE & FITTINGS





SPK proudly and exclusively represents Hailiang NZS3501 copper tubes and fittings in NZ. Hailiang is the world's largest manufacturer of copper products with a turnover of \$25 billion USD per annum. All Hailiangs products are manufactured to strict international standards. In 2005, SPK's parent company, in partnership with Hailiang, jointly applied for and gained NZS3501 certification. Today, the range in New Zealand also includes Hailiang copper certified to AS/NZS1571 and AS1432.

Features and Benefits:

- Proven performance for over 100 years - Copper plumbing systems are strong, reliable, easy to bend and retains its shape. It does not burn and has a maximum working temperature of 200 °c.
- Ease of Installation - Tubes and fittings can be easily brazed together.
- Stock range - SPK stocks NZS3501 table 1, 2, 3 copper tubes in 5 meter lengths in sizes from 15mm to 100mm and 150mm by indent order.
- Warranty - Backed up by Hailiang's exemplary support, SPK provides a 50 Year Warranty on all SPK Hailiang copper systems.

NZS 3501.1976 TABLES 1, 2, 3**SPK COPPER PLUMBING SYSTEMS**

SPK Industries Copper tube is manufactured to New Zealand Standards to comply With NZS3501: 1976 Tables 1, 2 and 3.

The three tables in NZS 3501 specify tube for the following applications:

- Table 1.** Copper tube for water and gas reticulation
Table 2. Copper tube for sanitation
Table 3. Light gauge copper tube for water and gas reticulation

SPK Industries COPPER PLUMBING SYSTEMS PRODUCT RANGE & TECHNICAL DATA

TABLE 1**SPK Industries Copper Tube For Water And Gas Reticulation**

Copper tube in the sizes specified in Table 1 is manufactured to either annealed, half hard or "as drawn" temper.

	Dimensions (mm)				Maximum working pressure		
Nominal bore	Mean outside diameter max	Mean outside diameter min	wall thickness	Hydrostatic test pressure (Mpa)	annealed	half hard	as drawn
15	14.73	14.65	1.02	5.55	6.85	8.95	-
20	21.08	21	1.02	3.9	4.7	6.1	-
25	27.43	27.35	1.02	2.95	-	4.65	-
32	34.19	34.11	1.22	2.85	-	4.45	-
40	40.54	40.46	1.22	2.4	-	3.7	-
50	53.24	53.16	1.22	1.85	-	2.8	-
65	65.94	65.79	1.22	1.5	-	-	2.65
80	79.45	79.3	1.63	1.65	-	-	2.95
90	92.56	92.41	1.83	1.6	-	-	2.8
100	105.66	105.51	2.03	1.55	-	-	2.75

**TABLE 2****SPK Industries Copper Tube for Sanitation**

The copper tube in Table 2 is manufactured to "as drawn" temper.

Sizes over 100mm may not be readily available and enquiries should be directed to the supplier.

	Dimensions (mm)			
Nominal bore	Mean outside diameter max	Mean outside diameter min	wall thickness	Hydrostatic test pressure (Mpa)
25	27.43	27.35	1.02	2.95
32	34.19	34.11	1.22	2.85
40	40.54	40.46	1.22	2.4
50	53.24	53.16	1.22	1.85
65	65.94	65.79	1.22	1.5
80	79.04	78.89	1.42	1.45
90	92.15	92	1.63	1.4
100	104.85	104.7	1.63	1.25
125	130.25	130	1.63	1
150	156.06	155.76	1.83	0.95
200	194.5	194.25	3	1.25
250	268	266.4	3	0.9
300	324.9	323.3	4	1

TABLE 3**SPK Industries Light Gauge Copper Tube For Water And Gas Reticulation**

The copper tube in Table 3 is manufactured to half hard temper.

	Dimensions (mm)				
Nominal bore	Mean outside diameter max	Mean outside diameter min	wall thickness	Hydrostatic test pressure (Mpa)	Maximum working pressure (Mpa)
5	14.73	14.65	0.7	3.8	6
20	21.08	21	0.9	3.4	5.35



Maximum Working Pressures

When tubes are brazed or softened the maximum working pressure for annealed temper must apply.

The maximum working pressures at temperatures up to 65C⁰ in Tables 1 & 3 are calculated using the following formula:

$$P = \frac{2Ft}{(D - t)}$$

Where:

P = Pressure (MPa)

F = Stress (MPa)

T = Wall thickness(mm)

The Value for F(stress) is:

- 46MPa for tube in **annealed** condition
- 60MPa for tube in **half hard** condition
- 70MPa for tube in **as drawn** condition

Lengths and Packaging

SPK Industries Copper tube is made to NZS 3501 and is supplied in 5 metre standard lengths.

INSTALLATION OF SPK INDUSTRIES COPPER PLUMBING SYSTEMS

Design & Specification

Key design considerations include calculating the correct tube size for each part of the system to balance the inter-relationships of six primary parameters:

1. Available mains pressure
2. Pressure required at individual fixtures
3. Static pressure losses due to height
4. Water demand in the total system and each of its parts
5. Pressure losses due to the friction of water flow in the system
6. Velocity limitations based on noise and erosion



Pipe Sizing

Correct pipe sizing is important to obtain acceptable water velocities and volumes. Velocities of less than 0.5 m/s may allow suspended solids in the water to be deposited within tubes. Conversely velocities of greater than 3m/s can cause turbulence and may destroy the protective surface film that is essential for the longevity of copper systems. In extreme cases if the flow velocity is too high, suspended solids can cause erosion corrosion. New Zealand Building Industry Authority Approved Document G12/AS1 gives correct tube sizes to achieve acceptable flow rates.

A flushing facility should be provided where there is low draw-off. To prevent problems with stagnation, fixtures which are seldom used should be placed in a main flow line and/or close to a regularly used service.

It is vital to ensure that the tubes in both hot and cold water lines are not damaged by denting, flattening or twisting during installation. Such damage can cause stress concentrations leading to premature failure by fatigue, or excessive localized turbulence which may lead to erosion failure.

Joining

New Zealand Building Authority Approved Document G12/AS1 Tables 5 & 6 give details of the acceptable methods of joining copper tube for supply of hot and cold water. These include:

- Copper and copper alloy capillary fittings suitable for use with silver brazing alloy
- Silver brazing in accordance with BS 1723: The copper tube must be expanded with proper tools to form sockets and receive spigots
- Copper alloy compression fittings with flares formed with proprietary tool
- "Crox" type joints
- Seal ring compression joining systems

Where silver brazing is used for joining, the filler rod must have a nominal silver content of not less than 1.8% - this gives adequate ductility to the joint and eliminates the need for flux when making copper to copper joints.

If flux is used for brazing, it is important to remove any residue left afterwards as:

- Hardened flux can temporarily seal a poorly brazed joint
- Corrosion of the copper tube can occur if the flux residue becomes wet

The following methods of joining are not permitted by AS/NZS 3500.1.2:

- Crimping of a larger diameter tube to fit into a smaller tube prior to welding or brazing
- Joining by filling the space between unequal sized tubes with filler rod

Bending

Half hard and annealed temper tube specified in tables 1 and 2 of the New Zealand Standard NZS 3501 are suitable for bending, however:

- Specialised equipment should always be used to form bends in copper tube
- "As drawn" temper tube should be annealed prior to bending
- The smallest recommended radius for bending copper tube is at least three times the outside diameter of the tube, measured to the centre line of the tube

Care needs to be taken when bending light gauge tubing (NZS 3501 Table 3). The correct size bending tools must be used to ensure the tube is not damaged, or approved fittings used.

**Lagging**

Lagging is insulation placed around tubing either by the manufacturer in the case of pre-lagged copper tube, or by the installer to:

- Provide protection against water freezing
- Reduce heat loss from the water within the tube
- Protect against mechanical damage to the tube
- Protect the tube from aggressive environments such as acidic soils

Fibrous lagging materials, and in particular natural products such as wool should only be used where moisture can be prevented from reaching the lagging.

The thickness of the lagging required is dependent on the material used and the degree of protection required. In all cases the lagging manufacturer's instructions must be adhered to for satisfactory installation.

If weather conditions are particularly severe, the presence of lagging may not prevent water in the tube from freezing. Where a building is unattended during winter months it may be prudent to drain the pipe work completely to prevent damage from water freezing.

Tube Support

New Zealand Building Authority Approved Document G12/AS1, Section 5.3 specifies the requirements for tube supports and Table 7 from the same document gives details of the support spacing as follows:

Pipe Diameter (mm)	Maximum distance between supports (m)	
	Vertical Pipe	Graded Pipe
10 - 15	1.5	1.2
20 - 25	2	1.5

For other tube sizes, AS/NZS 3500.1.2:1998, National plumbing and drainage. Part 1.2 - Water supply - Acceptable solutions should be consulted.

Hot Water Piping

In addition to the considerations required for cold water supply, there are two other matters that must be addressed in designing and installing hot water piping systems:

- Heat expansion and contraction stress

Sufficient allowance must be made for expansion and contraction to occur freely, stress concentrations should be avoided so that movement can occur over as long a length as possible. The amount of expansion with temperature depends on the length of the run and the temperature rise - minimum practical values can be obtained from AS/NZS 3500.4.2.

Three accepted methods for accommodating thermal expansion are:

- Providing a clear space to permit movement within the system
- Allowing the expansion to occur in a controlled loop. Various other shapes can be used to allow controlled expansion, AS/NZS 3500.4.2 gives suitable dimensions for these loops
- Installation of expansion bellows

**Elevated Temperatures**

The combination of internal sediment and elevated temperature has the potential to initiate corrosion. Such problems can be alleviated with careful design and selection of tube sizes to obtain suitable water velocities and by maintaining temperature in the range 60deg C to 65deg C.

System Access

It is difficult to effect repairs to pipework concealed in buildings. For this reason it is recommended that all such pipework be installed so that it is readily accessible. Tubes enclosed by concrete must be continuously wrapped in impermeable, flexible material and ducts fitted with removable covers.

Generally, it is not recommended that pipework be cast into reinforced concrete or installed under floor slabs. If pipework has to be installed under floor slabs then the following precautions must be taken:

- Light gauge tubing (NZS 3501 Table 3) shall not be used under concrete
- Tubes shall be continuous and laid in a bed of river sand or fine grained soil which is placed and compacted in a manner which will not damage the pipework
- The tube shall be at least 75mm below the slab
- If jointing is required then silver brazing shall be used

Water Hammer

In order to eliminate Water Hammer care needs to be taken during the design of the system. It is also important to ensure that all pipework is secured correctly.

Pressure Testing

As soon as possible after installation the water supply system must be tested for leaks in accordance with Clause 8.0 of New Zealand Building Industry Authority Approved Document G12/As1. This document outlines the required procedure.

Commissioning

All systems should be thoroughly flushed out as soon as possible after installation to remove foreign matter. The flushing should continue until the flush water runs completely clear. The system should be put into full use immediately and not left for any period with stagnant water within it.

If a period between installation and full system use is unavoidable, then:

- Drain the system completely and dry out by blowing air through the system, or
- Keep the system completely full and flush clean water from each fixture at least twice per week until the system is in full use.



Copper Fittings

COPPER BRAZING TEE - EQUAL

CBT15	COPPER BRAZING TEE 15MM	10
CBT20	COPPER BRAZING TEE 20MM	10
CBT25	COPPER BRAZING TEE 25MM	10
CBT32	COPPER BRAZING TEE 32MM	10
CBT40	COPPER BRAZING TEE 40MM	5
CBT50	COPPER BRAZING TEE 50MM	5
CBT65	COPPER BRAZING TEE 65MM	1
CBT80	COPPER BRAZING TEE 80MM	1
CBT100	COPPER BRAZING TEE 100MM	1

COPPER BRAZING TEES - REDUCING - (END - BRANCH - END)

CBT2015	COPPER BRAZING TEE 20X15X20MM (E-B-E)	10
CBT201515	COPPER BRAZING TEE 20X15X15MM (E-B-E)	10
CBT202015	COPPER BRAZING TEE 20X20X15MM (E-B-E)	10
CBT2520	COPPER BRAZING TEE 25X20X25MM (E-B-E)	10
CBT2515	COPPER BRAZING TEE 25X15X25MM (E-B-E)	10

COPPER BRAZING ELBOWS - 90° - EXP 2 ENDS

CBE1590	COPPER BRAZING ELBOW 15MMX90'	20
CBE2090	COPPER BRAZING ELBOW 20MMX90'	10
CBE2590	COPPER BRAZING ELBOW 25MMX90'	10
CBE3290	COPPER BRAZING ELBOW 32MMX90'	10
CBE2520	COPPER BRAZING ELBOW 25X20MMX90'	10
CBE4090	COPPER BRAZING ELBOW 40MMX90'	5
CBE5090	COPPER BRAZING ELBOW 50MMX90'	3
CBE6590	COPPER BRAZING ELBOW 65MMX90'	1
CBE8090	COPPER BRAZING ELBOW 80MMX90'	1
CBE10090	COPPER BRAZING ELBOW 100MMX90'	1

COPPER BRAZING ELBOWS - 90° - SHORT RADIUS - EXP 2 ENDS

CBE1590S	COPPER BRAZING ELBOW 15MMX90' SHORT RADIUS	10
CBE2090S	COPPER BRAZING ELBOW 20MMX90' SHORT RADIUS	10
CBE2590S	COPPER BRAZING ELBOW 25MMX90' SHORT RADIUS	10

COPPER BRAZING ELBOWS - 45° - EXP 2 END

CBE1545	COPPER BRAZING ELBOW 15MMX45'	10
CBE2045	COPPER BRAZING ELBOW 20MMX45'	10
CBE2545	COPPER BRAZING ELBOW 25MMX45'	10

**COPPER TUBES & FITTINGS**

CBE3245	COPPER BRAZING ELBOW 32MMX45'	10
CBE4045	COPPER BRAZING ELBOW 40MMX45'	10
CBE5045	COPPER BRAZING ELBOW 50MMX45'	10
CBE6545	COPPER BRAZING ELBOW 65MMX45'	2
CBE8045	COPPER BRAZING ELBOW 80MMX45'	1
CBE10045	COPPER BRAZING ELBOW 100MMX45'	1

COPPER BRAZING BENDS - 90° - EXP 1 END

CBB1590	COPPER BRAZING BEND 15MMX90'	10
CBB2090	COPPER BRAZING BEND 20MMX90'	10
CBB2590	COPPER BRAZING BEND 25MMX90'	10
CBB3290	COPPER BRAZING BEND 32MMX90'	10
CBB4090	COPPER BRAZING BEND 40MMX90'	5
CBB5090	COPPER BRAZING BEND 50MMX90'	3
CBB6590	COPPER BRAZING BEND 65MMX90'	1
CBB8090	COPPER BRAZING BEND 80MMX90'	1
CBB10090	COPPER BRAZING BEND 100MMX92'	1

COPPER BRAZING BENDS - 45 ° - EXP 1 END

CBB1545	COPPER BRAZING BEND 15MMX45'	10
CBB2045	COPPER BRAZING BEND 20MMX45'	10
CBB2545	COPPER BRAZING BEND 25MMX45'	10
CBB3245	COPPER BRAZING BEND 32MMX45'	5
CBB4045	COPPER BRAZING BEND 40MMX45'	5
CBB5045	COPPER BRAZING BEND 50MMX45'	5
CBB6545	COPPER BRAZING BEND 65MMX45'	1
CBB8045	COPPER BRAZING BEND 80MMX45'	1
CBB10045	COPPER BRAZING BEND 100MMX45'	1

COPPER BRAZING BENDS - 90° - LONG REACH - EXP 1 END

CBB1590L	COPPER BRAZING BEND 15MMX90' LONG	10
CBB2090L	COPPER BRAZING BEND 20MMX90' LONG	10
CBB2590L	COPPER BRAZING BEND 25MMX90' LONG	10

MULTI STEP REDUCERS

CBR5020M	COPPER MULTI STEP REDUCER 50X20MM	5
CBR6540M	COPPER MULTI STEP REDUCER 65X40MM	5
CBR10050M	COPPER MULTI STEP REDUCER 100-50MM	5

COPPER BRAZING REDUCERS — SINGLE STEP

CBR1510	COPPER BRAZING REDUCER 15X10MM	10
CBR2015	COPPER BRAZING REDUCER 20X15MM	10
CBR2515	COPPER BRAZING REDUCER 25X15MM	10

**COPPER TUBES & FITTINGS**

CBR2520	COPPER BRAZING REDUCER 25X20MM	10
CBR3220	COPPER BRAZING REDUCER 32X20MM	10
CBR3225	COPPER BRAZING REDUCER 32X25MM	10
CBR4020	COPPER BRAZING REDUCER 40X20MM	10
CBR4025	COPPER BRAZING REDUCER 40X25MM	10
CBR4032	COPPER BRAZING REDUCER 40X32MM	10
CBR5040	COPPER BRAZING REDUCER 50X40MM	10
CBR5020S	COPPER BRAZING REDUCER 50X20MM	10
COPPER TUBE CONNECTORS		
CBC15	COPPER BRAZING CONNECTOR 15MM	10
CBC20	COPPER BRAZING CONNECTOR 20MM	10
COPPER CROX ELBOW		
CBEC15	COPPER BRAZING CROX ELBOW 15MM	10
COPPER COMPRESSION GLANDS		
CCG15	COPPER COMPRESSION GLAND 15MM	100
CCG20	COPPER COMPRESSION GLAND 20MM	100
CCG25	COPPER COMPRESSION GLAND 25MM	100
COPPER COPAMATE FLANGES - TABLE E - NEW RANGE		
CBF25	DN25 TABLE E NZ COPAMATE FLANGE	1
CBF32	DN32 TABLE E NZ COPAMATE FLANGE	1
CBF40	DN40 TABLE E NZ COPAMATE FLANGE	1
CBF50	DN50 TABLE E NZ COPAMATE FLANGE	1
CBF65	DN65 TABLE E NZ COPAMATE FLANGE	1
CBF80	DN80 TABLE E NZ COPAMATE FLANGE	1
CBF100	DN100 TABLE E NZ COPAMATE FLANGE	1
COPPER TUBE - 5 METRE		
CBTUB15L	COPPER TUBE 15MM X5M LIGHT/G - BENDABLE	10
CBTUB20L	COPPER TUBE 20MM X5M LIGHT/G - BENDABLE	10
CBTUB15S	COPPER TUBE 15MM X5M STD/G - BENDABLE	10
CBTUB20S	COPPER TUBE 20MM X5M STD/G - BENDABLE	5
CBTUB25	COPPER TUBE 25MM X5M STD/G - BENDABLE	5
CBTUB32	COPPER TUBE 32MM X5M STD/G -TBL 1	5
CBTUB40	COPPER TUBE 40MM X5M STD/G -TBL 1	3
CBTUB50	COPPER TUBE 50MM X5M STD/G -TBL 1	3
CBTUB65	COPPER TUBE 65MM X5M STD/G -TBL 1	1
CBTUB80-2	COPPER TUBE 80MM X5M STD/G -TBL 2	1
CBTUB100-2	COPPER TUBE 100MM X5M STD/G - TBL 2	1



WARRANTY

SPK – Hailiang Copper Tube to NZS3501

Hailiang Copper Tube supplied by SPK Industries Ltd complies with
NZS3501:1976 LIC # 2650



The New Zealand Standard NZS3501:1976 outlines the specification of copper tube for Water, Gas and Sanitation. The process of manufacture, chemical composition, dimensions, wall thickness, temper, hydrostatic test pressures and markings are also prescribed.

Copper Tube marked with NZS3501 LIC 2650 supplied by SPK Industries Ltd meets all the requirements of the standard.

SPK Industries Ltd and Hailiang Copper Processing Group warrant all tube marked with the relevant standard as complying with that standard, for the period of 50 years or as required by the New Zealand Building Code B2:Durability, as long as the SPK Industries limitations detailed below and installation instructions are followed as laid out in the SPK Industries technical documentation.

SPK Industries or Hailiang Copper Processing Group is unable to warrant in any way the following aspects of any copper installation.

- Workmanship and or installation practises.
- Against corrosive liquids which may be transported by or stored within the tube.
- External causes, where external, physical or chemical qualities produce damage to the tube, such as, without limitation, aggressive water or unsuitable and hostile environments.
- Abuse, such as, without limitation, vandalism
- Natural Disasters, such as, without limitation, flooding, windstorm and lightening
- Attachments or modifications to the tube that the manufacturer did not authorise
- The system of which the tube is a part.
- The use of copper tube for the reticulation of untreated / unsanitised water such as tank water or bore water, due to the possibility of unexplained microbiologically induced cold water pitting corrosion.
- Or any other cause beyond the Manufacturer's control.