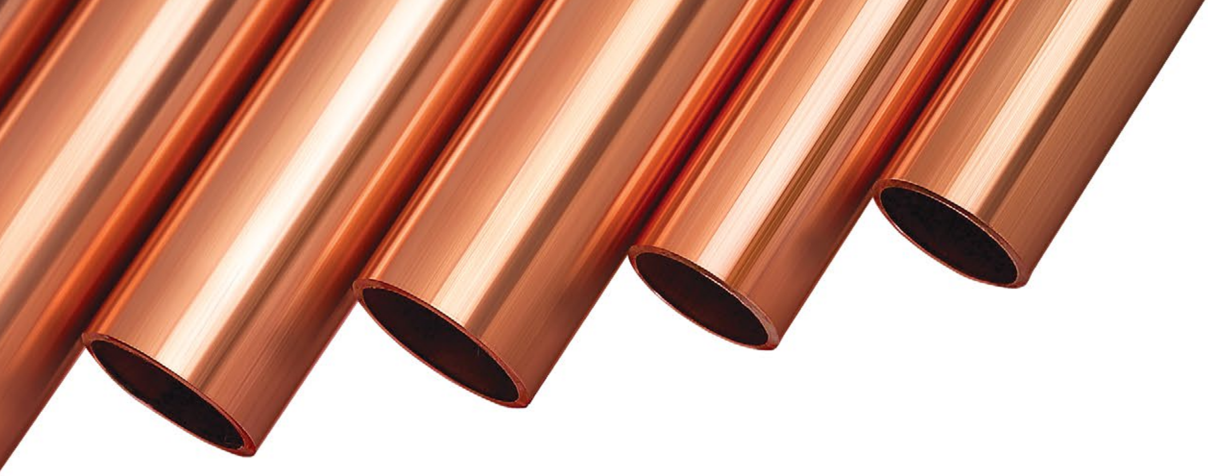
HALCOR

TECHNICAL GUIDE

COPPER TUBES FOR BUILDING INSTALLATIONS



Member of **Copper Alliance**

Halcor is the copper tubes division of ElvalHalcor S.A. and together with four more companies form the copper segment of ElvalHalcor S.A. that specializes in the production, processing and marketing of copper and copper alloys products with dynamic commercial presence in the European and global markets. For more than 80 years, Halcor has been offering innovative and added-value solutions that meet contemporary client demands in fields, such as plumbing, HVAC&R, renewable energy, architecture, engineering and industrial production.

The copper segment of ElvalHalcor S.A. is composed of six subsidiaries and seven associates/joint ventures, based in Greece, Belgium, Bulgaria, Romania and Turkey, while it operates a total of five production plants in Greece, Bulgaria and Turkey. The copper segment of ElvalHalcor S.A. develops and distributes a wide range of products, including copper and copper-alloy rolled and extruded products with Halcor being the sole producer of copper tubes in Greece.

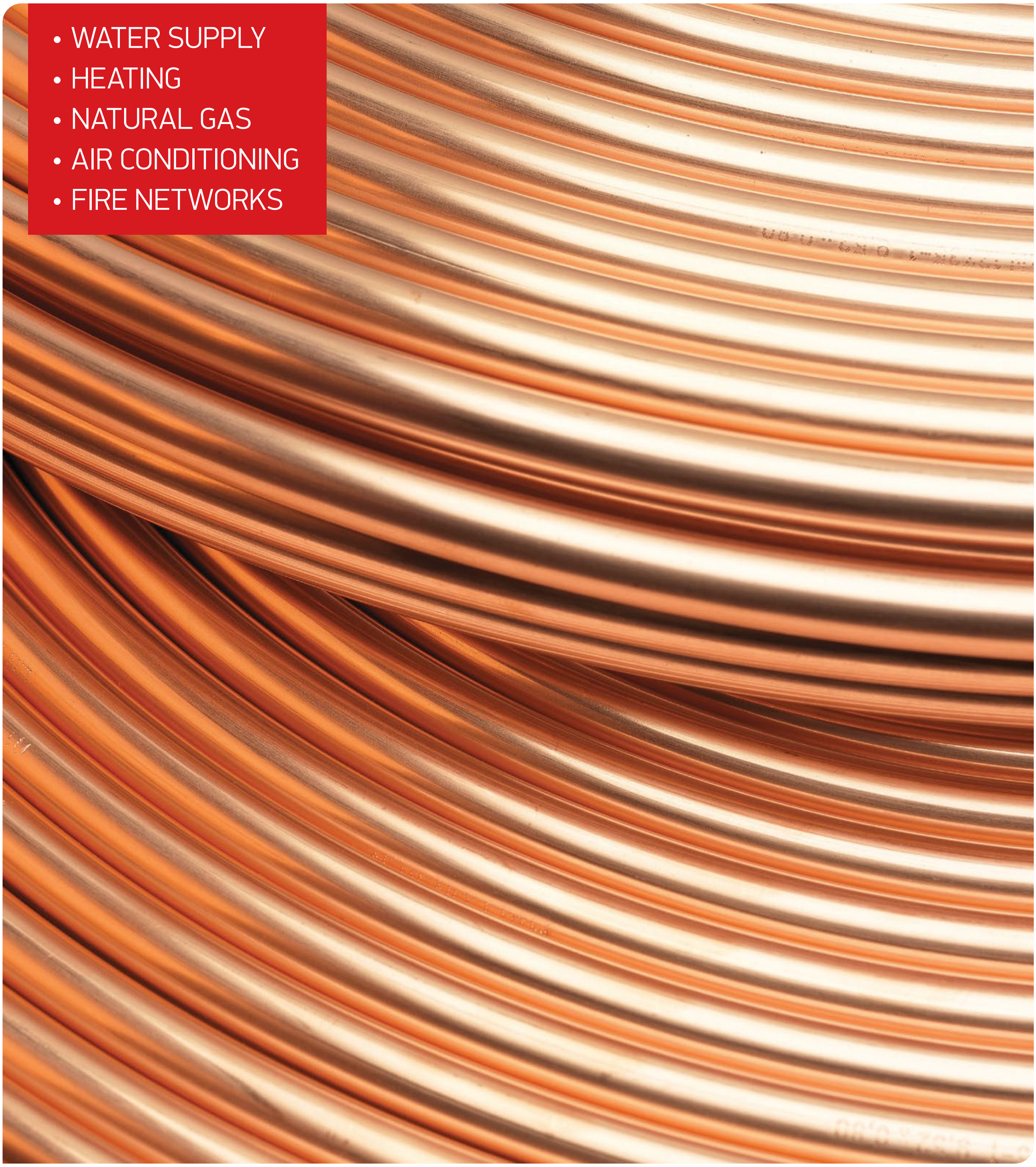
High quality in production is achieved through strict controls applied throughout the production process. With a consistent quality focus, Halcor implements an ISO 9001:2015 Certified Quality Management System and leverages high technologies and expert staff.

As a result of the strategic investments in research & development, Halcor is recognized as one of the leading copper producers globally, setting new standards in copper processing. Halcor maintains a consistent focus on quality and environmental protection and a strong commitment to the principles of sustainable development. In this context, all production facilities leverage advanced technologies to bring in the market innovative products that are energy efficient and environmentally friendly.

HELLENIC COPPER AND ALUMINIUM INDUSTRY S.A.

Uses of TALOS® copper tubes

- WATER SUPPLY
- HEATING
- NATURAL GAS
- AIR CONDITIONING
- FIRE NETWORKS



COPPER TUBES TALOS

CONTENTS

Plumbing installations and construction codes

The rules referring to a plumbing installation may vary depending on national regulations and construction codes. The content of this guide is based on general "good practice" principles and does not substitute applicable national regulations and construction codes.

The purpose of the guide is to assist the installer of plumbing systems in understanding the proper use of copper tubes in plumbing networks and to offer general guidelines and recommendations for plumbing installation procedures in buildings. In recent years, with the development of technology in all fields, particularly in the field of plumbing installations (heating - fresh water supply, natural gas, fire-protection, etc.) - there has been an inrush of new products made of different materials, resulting in severe concern on the part of technicians regarding which of these products would be best suited in each case, and mainly regarding the quality of the installations under consideration. The plumbing installations must be designed by specialized engineers and constructed by licensed plumbers.

A professional plumber must know and apply the national regulations and construction codes, must know and use the appropriate materials and accessories, instruments and devices and must be aware of the practical details associated with the construction and operation of a plumbing network.

Water supply & heating installation design data

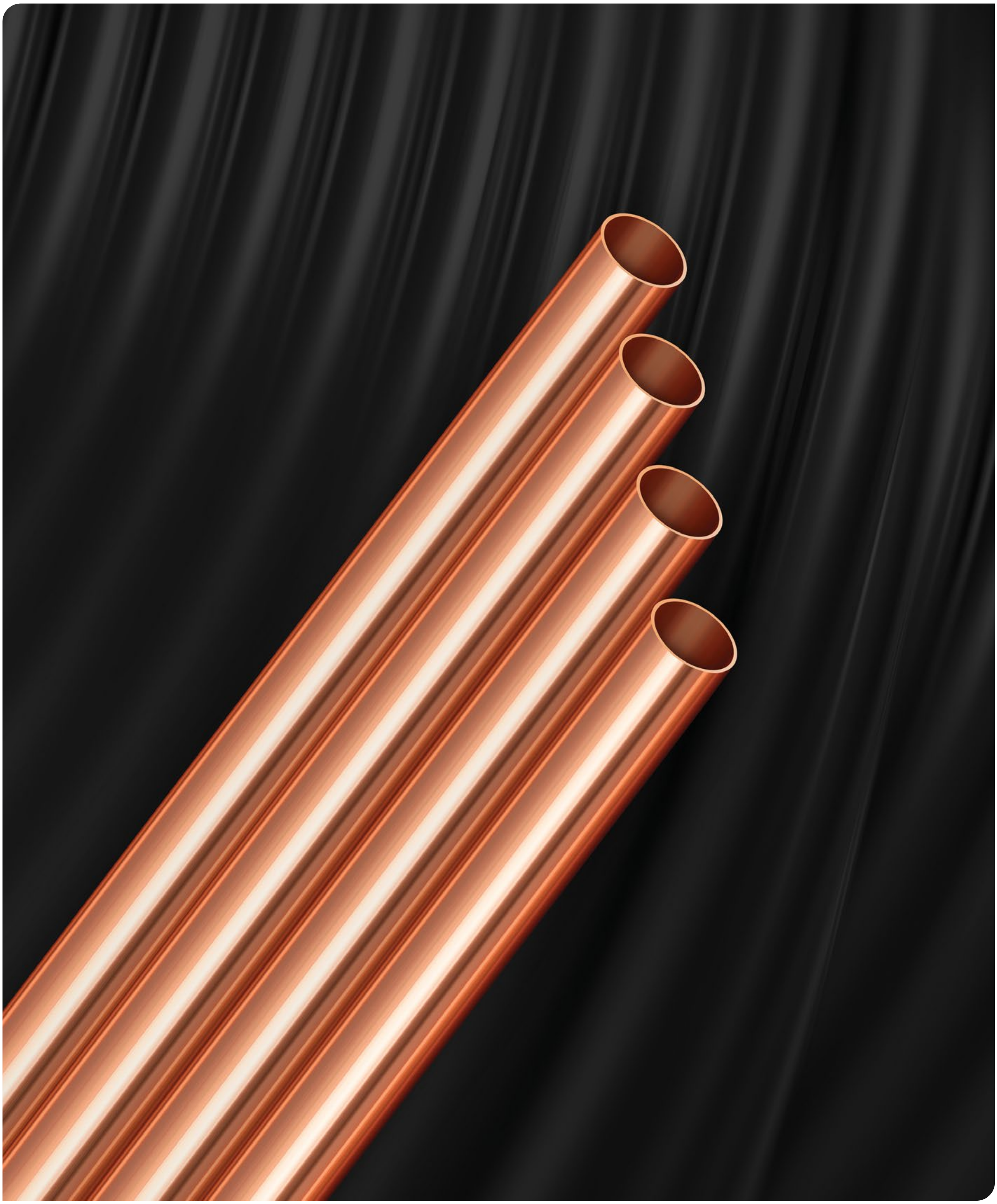
Design parameters

The main design data of a plumbing installation are:
1) Available pressure from the public network
2) Piping network design
3) Determination of water flow rate required at all network points
4) Selection of appropriate diameter for each copper tube to be used in the network
5) Calculation of pressure loss for each branch and the entire network in total, which must not exceed the minimum pressure available from the public network. In heating installations, it is necessary to also take into account the selection of other network data such as heating elements, boilers, circulators, safety valves, etc.
6) Velocity limitations based on noise and erosion

Intake	Copper tube diameter (mm)	Flow rate L/sec
Sinks	15	0,15
Wash basins	15	0,07
Sprinklers	15	0,15
Showers	15	0,15
Toilet bowls	15	0,13
Home appliances	15-18	0,25
Heaters	15	0,15
Urinals	15	0,13

Remarks:

- Water flow velocity for plumbing installations ranges between 1-2 m/s and should not exceeds 3 m/s
- The flow rate values of the above table in liters per second (L/sec) are approximate
- The minimum outflow pressure of the intakes ranges around 1 bar
- In special cases involving heaters or heat exchangers, follow the instructions given by the respective manufacturers, as regards flow rate and operating pressure



Calculation of loss of pressure

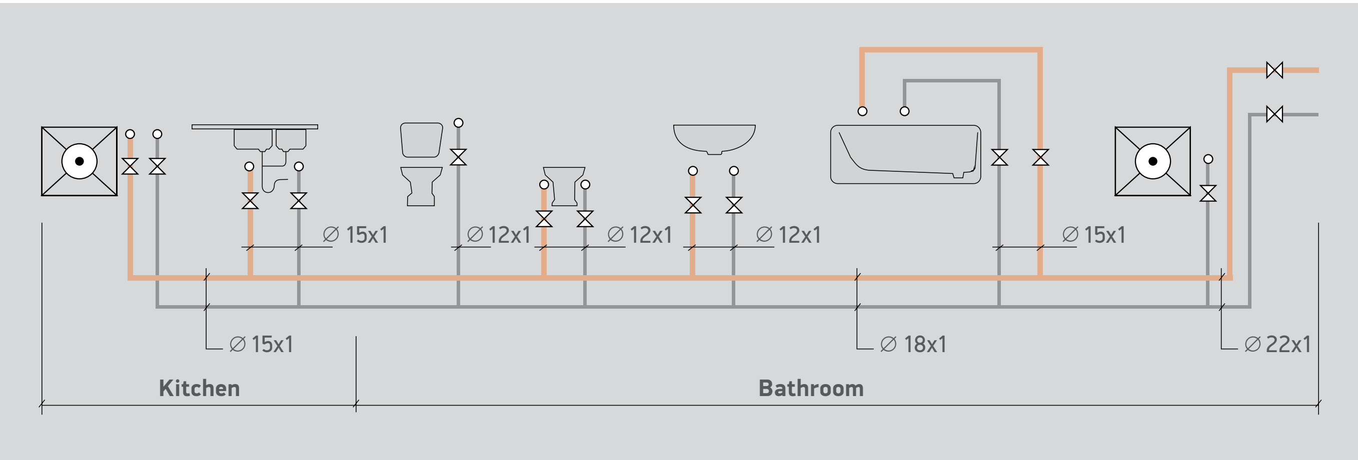
The water pressure available from the main distribution network varies.
Network losses are calculated assuming minimum main distribution pressure of approximately 4 bars.

The total pressure drop (ΔP) of the network is due to:
1) Losses due to difference in altitude (H)
2) Losses due to friction of the water flow inside the tube (ΔPL)
3) Losses due to internal friction caused by the use of fittings, valves and other control instruments (ΔPT)

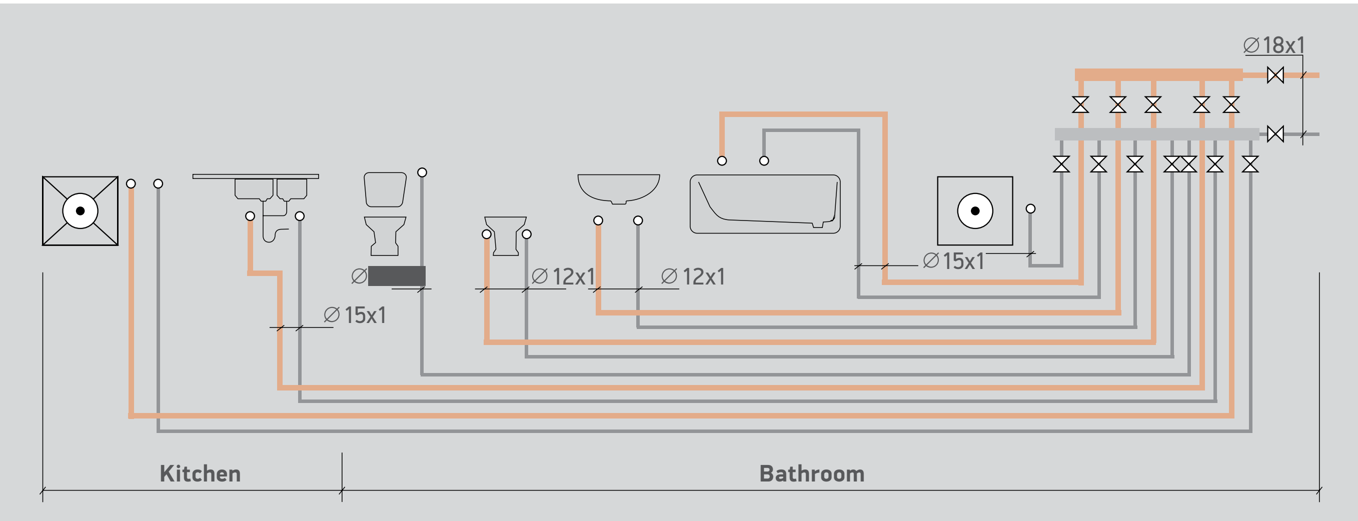
$$\Delta P = H + \Delta PL + \Delta PT$$

The total pressure drop of the entire network must always remain under 4 bar. The total pressure drop of the entire or section of the network is given by the sum of pressure losses of successive branches making up the specific section of the network.

Water distribution (hot - cold)



Water distribution (hot - cold) with manifold



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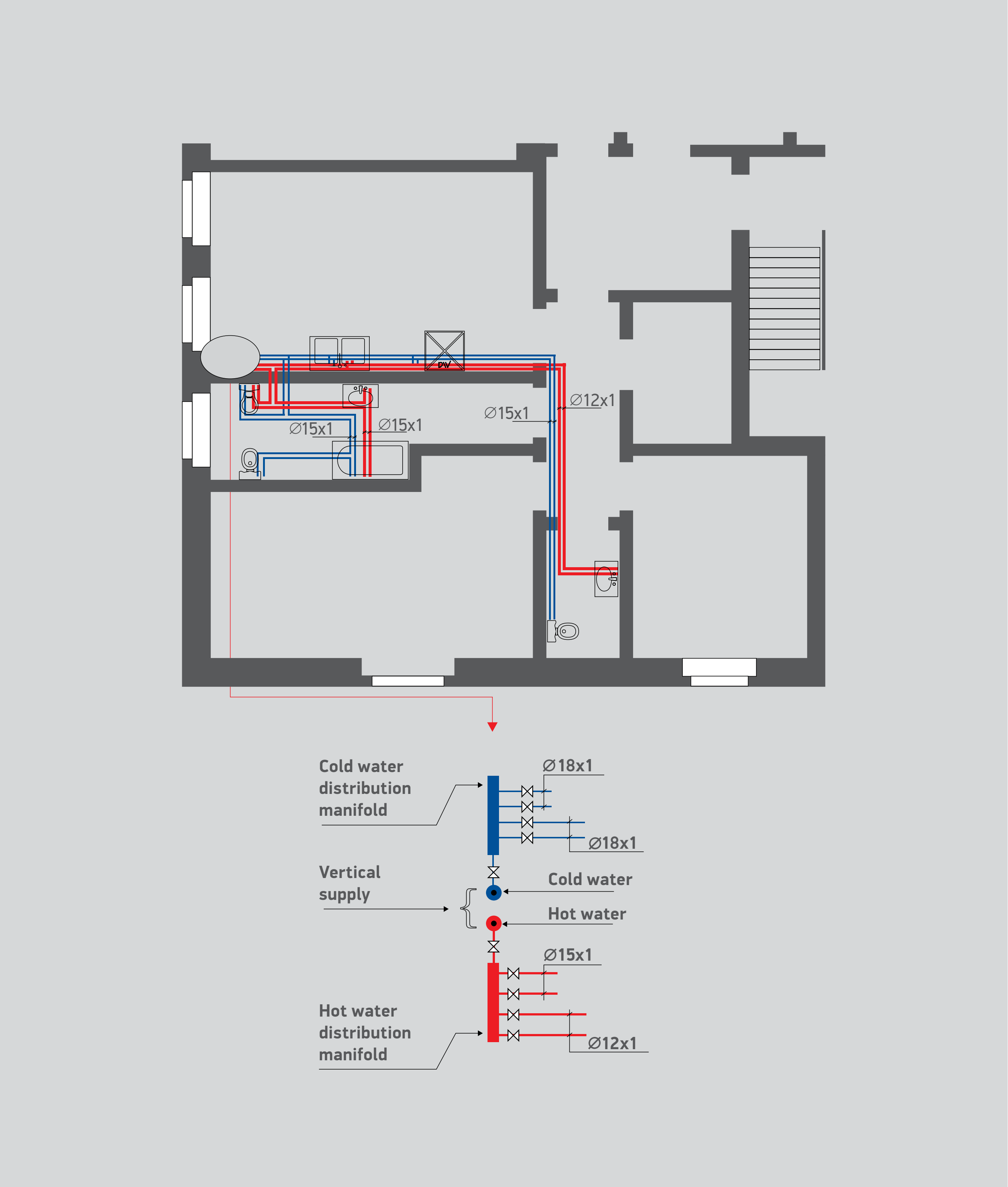
Typical drawing of modern plumbing installation



Selection of appropriate TALOS® copper tube diameter

The diameter of the copper tube to be installed in each section is selected based on the flow rate determined for the specific section (during the previous design stage) using the following table. Flow velocity must not exceed 2 m/sec and the diameter of the copper tube for the end sections must not be smaller than the value stated in the table with water consumption at each intake (see page 6).

Velocity	12x1		15x1		18x1		22x15		28x15	
m/s	l/s	l/min	l/s	l/min	l/s	l/min	l/s	l/min	l/s	l/min
3,00	0,24	14,1	0,40	24,0	0,60	360	0,90	54,0	1,74	88,2
2,75	0,22	12,9	0,36	22,0	0,55	33,0	0,87	49,0	1,35	81,4
2,50	0,20	11,8	0,33	20,0	0,50	30,0	0,75	45,0	1,23	74,0
2,25	0,18	10,6	0,30	18,0	0,45	27,0	0,68	40,5	1,10	66,6
2,00	0,16	9,4	0,26	16,0	0,40	24,0	0,60	36,0	0,98	59,2
1,75	0,14	8,2	0,23	14,0	0,35	21,0	0,53	31,5	0,86	51,2
1,50	0,12	7,0	0,20	12,0	0,30	18,0	0,45	27,0	0,74	51,8
1,25	0,10	5,9	0,17	10,0	0,25	15,0	0,38	22,5	0,61	44,4
1,00	0,08	4,7	0,13	8,0	0,20	12,0	0,30	18,0	0,49	36,8
0,75	0,06	3,5	0,10	6,0	0,15	9,0	0,23	16,5	0,37	29,4
0,50	0,04	2,4	0,07	4,0	0,10	6,0	0,15	9,0	0,25	22,1
0,25	0,02	1,2	0,03	2,0	0,05	3,0	0,07	4,5	0,13	7,4

In heating installations, the maximum limit flow velocity is substantially lower compared to cold water installations, mainly in order to limit noise. For instance, for a ∅15 copper tube, it ranges from 0,40 m/sec to 0,80 m/sec.

Copper tube heat transfer capacity

Heat transfer capacity of copper tubes for a temperature difference (Δt) of 20°C as a function of flow velocity.

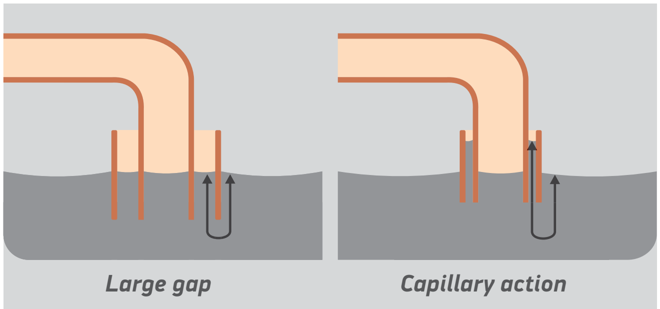
Size of copper tuber (OD x WT) mm	Flow rate (m/sec)	Heat capacity (Kcal/h)	Heat capacity (Watt)	Flow rate (m/sec)	Heat capacity (Kcal/h)	Heat capacity (Watt)
10×1	0,40	1.400	1.628	0,80	2.800	3.256
12×1	0,40	2.200	2.559	0,80	4.400	5.117
15×1	0,40	3.800	4.419	0,80	7.600	8.839
16×1	0,40	4.300	5.001	0,80	8.600	10.002
18×1	0,40	5.600	5.350	0,80	11.200	13.026
22×1	0,40	8.700	10.118	0,80	17.400	20.236
28×1	0,40	14.500	16.864	0,80	29.000	33.727
35×1	0,40	24.800	28.842	0,80	49.600	57.685
42×1,2	0,40	34.800	40.472	0,80	69.600	80.945
54×1,2	0,40	58.700	68.268	0,80	117.400	136.536
64×2				1,00	200.000	232.600
76,1×2				1,00	320.000	372.160
88,9×2				1,00	440.000	511.720
108×2,5				1,00	600.000	697.800

For small diameter copper tubes, select flow velocities in the vicinity of 0.40 m/sec For large diameter copper tubes, select flow velocities in the vicinity of 0.80 m/sec

Copper tube connections

A. Connections with capillary soldering

A simple and reliable method typically used for the creation of plumbing installation networks (fixed) is the one involving the use of copper fittings and soldering. The natural phenomenon behind this type of copper tube and copper fitting connection with the use of soldering, is the capillary phenomenon. The capillary phenomenon occurs regardless of gravity. Generally, connection with capillary soldering is a thermal connection method with one substance, the solder, (usually a tin-copper or tin-silver alloy), whose melting point is lower than the melting point of the pieces (copper tubes and fittings) to be connected. When heated, the solder melts and spreads, thus covering the gap between the copper tube and the fitting. After cooling, it becomes solid thus achieving the soldering effect.



The capillary attraction forces are such that the liquid solder is absorbed into the gap regardless of tube inclination, prevailing over gravity.

Types of soldering

Soldering is distinguished in two categories depending on the melting point.
1) Soldering with melting point < 450°C
2) Brazing with melting point > 450°C

Soldered joints, with capillary fittings, are used predominately in water supply and heating networks. Brazed joints, with capillary fittings, are used where greater joint strength is required or where service temperatures are high. Brazing is preferred, and often required, for joints in refrigeration piping. The use of a "de-oxidizing" (or "flux") substance is mandatory for soft soldering. "De-oxidizers" help in the following:

- Avoidance of surface oxidation during the soldering process
- Facilitation of flow of solder material
- Completion of cleaning of surface to be composed

(The selection of a particular solder depends primarily on the operating pressure and temperature of the system. Consideration should also be given to the stresses on joints)

	Solder brazing material	Melting range °C	Working Temp. °C	Type of deoxidizer	COLD WATER	HOT WATER	CENTRAL HEATING	NATURAL GAS	LPG	REFRIGERANTS	HEATING OIL	MEDICAL GASES
Solder alloy acc. to EN 29453 (DIN 1707) **Solder flux** acc. to EN 29454.1 (DIN 8511)	n/a (L-SnAg5)	221-240	230	3.1.1. (F-SW 21) 3.1.2. (F-SW 22) 2.1.2. (F-SW 25)	●	●	●				●	
	S-Sn97Cu3 (L-SnCu3)	230-250	240		●	●	●				●	
Brazing alloys acc. to EN 1044 (DIN 8513) **Brazing flux** acc. to EN 1045 (DIN 8511)	AG 106 (L-Ag34Sn)	630 - 730	710	FH10 (F-SH 1)	●	●	●	●	●	●	●	●
	AG 203 (L-Ag44)	680 - 740	730		●	●	●	●	●		●	●
	AG 104 (L-Ag45Sn)	640 - 680	670		●	●	●	●	●	●	●	●
	CP 105 (L-Ag2P)	650 - 810	710	n/a*	●	●	●	●	●	●	●	
	CP 203 (L-CuP6)	710 – 880	730		●	●	●	●	●	●	●	

For information on the above table, please see next page.

TABLE INFORMATION
** For copper tube brazing with brass/bronze fittings use FH10 type de-oxidizer. - For diameters > 54 mm and networks with mean operating temperature >-10°C, use soft soldering.*
- The difference between solidus and liquidus is the melting range and may be of importance when selecting a solder/brazing alloy. It indicates the speed with which the alloy will become fully solid after soldering/brazing. Alloys with narrow ranges solidify more quickly and therefore, require careful application of heat.
-Some installations, such as medical gas, high-purity gas and ACR systems, require the use of an inert gas during the brazing process. The purge gas displaces oxygen from the interior of the system while it is being subjected to the high temperatures of brazing and therefore eliminates the possibility of oxide formation on the interior tube surface.

B. Connections with press fittings

Press-connect joining of copper tubes is fast and requires no heat or open flame unlike soldering or brazing. The press-connect joining method (called press-fit) takes advantage of copper's ductility and its proven increased strength when cold worked. The joints rely on the sealing capability of a purpose-made fitting that contains an elastomeric gasket and the proper use of an approved pressing tool and jaws. Several manufacturers offer full product lines of press-connect fittings, valves and specialty items.

C. Connections with compression fittings

Connections with compression fittings are mainly utilized when we need to construct splittable networks and/or where it is not permitted to use heat or an open flame. Compression fittings are especially useful in installations that may require occasional disassembly or partial removal for maintenance. They require no special tools or skills to operate.

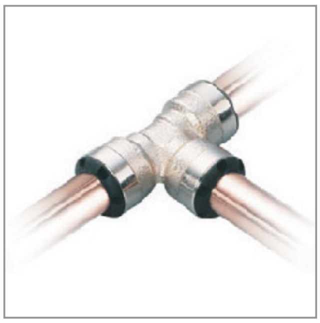
The compression fitting is composed of an outer compression nut and an inner ferrule. When the nut is tightened, the ferrule is compressed and clamps around the tube. The result is that the ferrule seals the space between the tube, nut, and fitting, thereby forming a tight joint.

D. Copper tube connections with Push-connect fittings

Like the press-connect joining method, the push-connect joining of copper tube is fast, and, also, requires no heat or open flame. However, unlike most other joining methods, no additional tools are required for installation. Push-connect joining utilizes an integral elastomeric gasket and stainless steel grab ring to produce a leak-free joint. Connection is established by a single motion, i.e. pushing the pipe into the fitting until it reaches the end (a "click" sound is heard).

There are two common types of push-connect fittings. Both create strong joints however one allows for easy removal after installation to allow for equipment service, while the second type cannot be easily removed once the fitting is installed.



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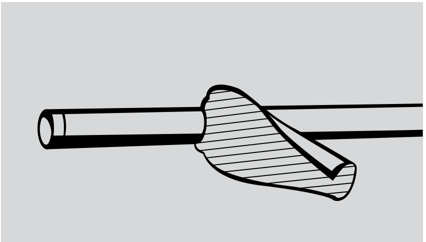
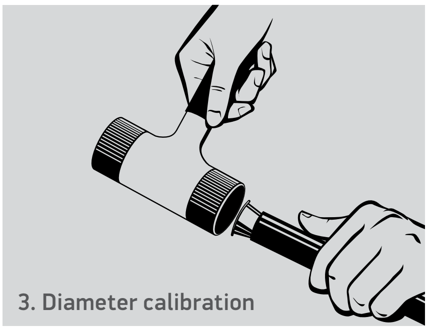
Protection measures for connections

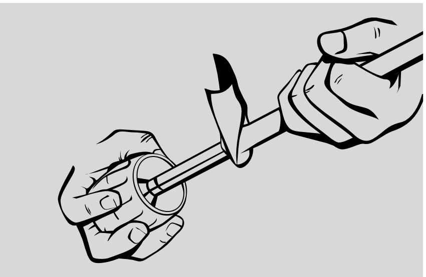
In any case, regardless of the method to be used, copper tube connections must be protected against environmental factors, such as permanent humidity, the soil and certain building materials. Once the connection works are completed and the network pressure test is carried out, the bare ends of the connections must be sealed with adhesive plastic tape.

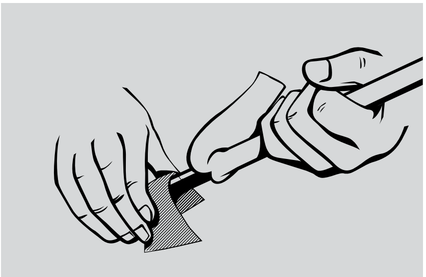
TALOS® COATED COPPER TUBES

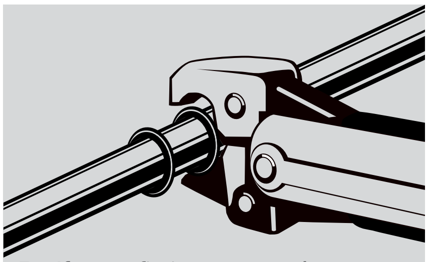

1. Cutting of plastic covering

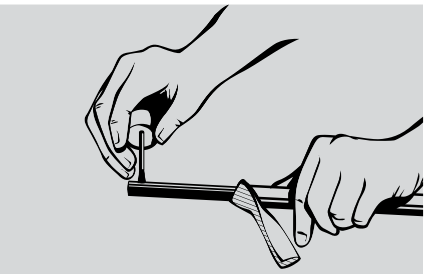

2. Folding of cut edges of plastic covering

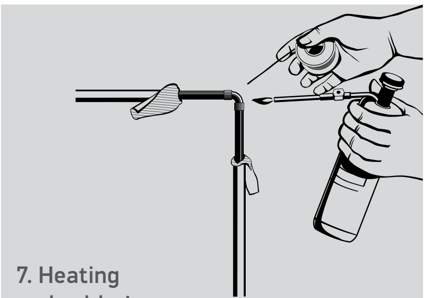

3. Diameter calibration

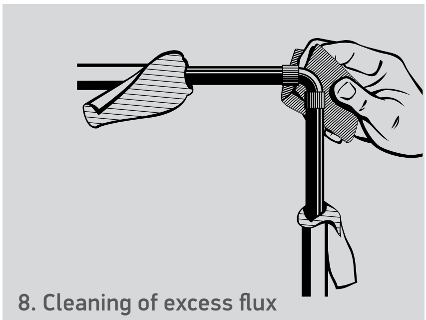

4. Deburring

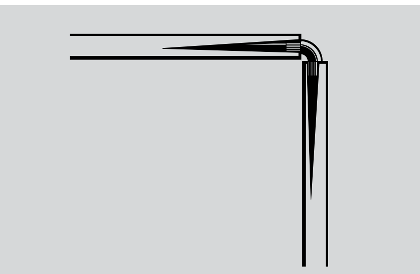

5. Cleaning of edges

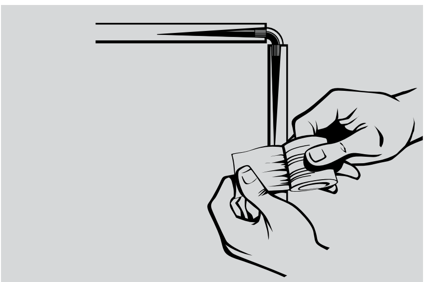

5a. If press fittings are used, then staps 9, 10, 11 apply

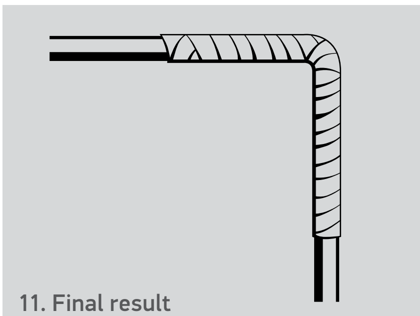

6. Application of solder flux


7. Heating and soldering


8. Cleaning of excess flux

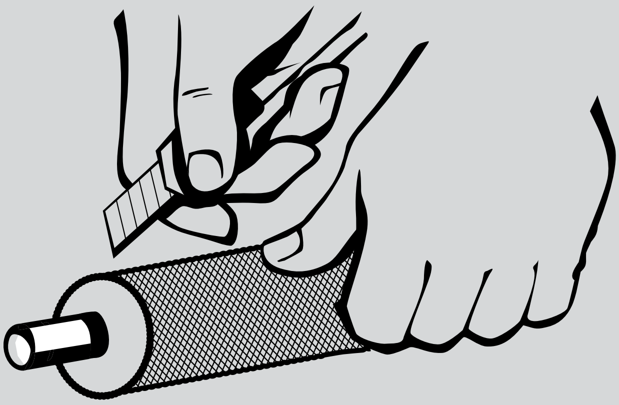

9. Repositioning of plastic covering


10. Overlapping with adhesive tape

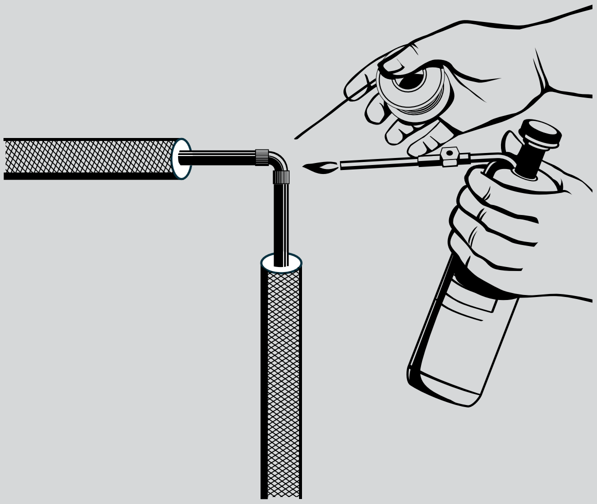

11. Final result

Protection measures for connections *(continued)*

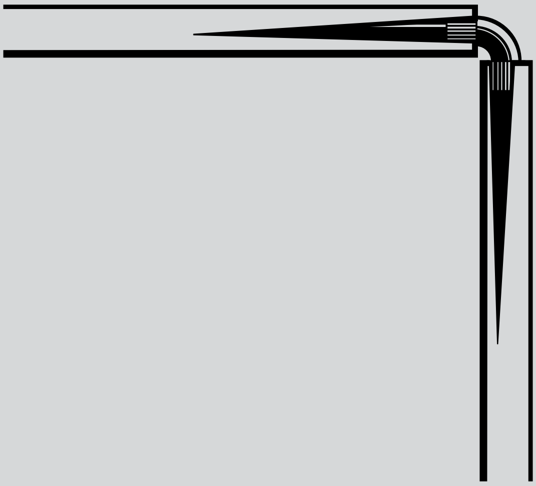
TALOS® ECUTHERM™ COPPER TUBES



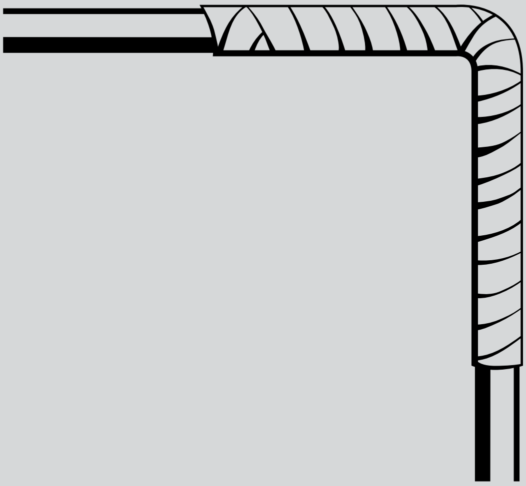
1. Cutting of foam insulation in radial direction



2. Soldering



3. Insulation repositioning



4. Overlapping with adhesive tape

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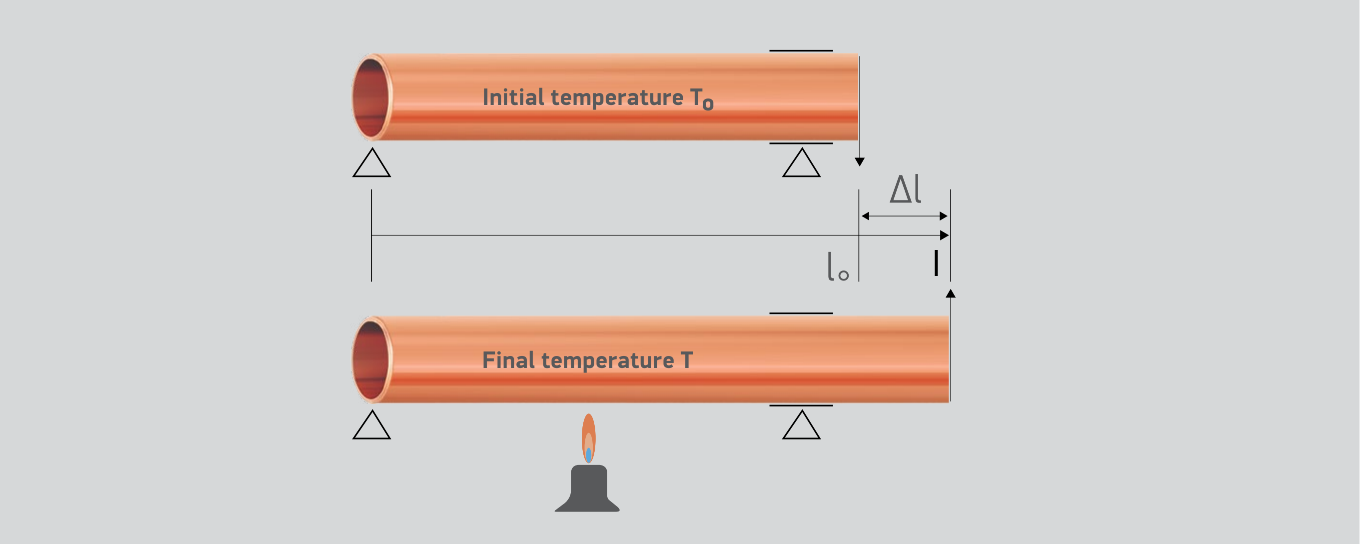
Expansion of copper tubes and methods for dealing with it.

The expansion of the copper tube (increase of length) due to a rise in its temperature, is calculated by the following formula:

$$\Delta l = l_o \cdot \alpha \cdot \Delta T$$

$$\Delta T = T - T_o$$

$$\alpha = 0{,}0168 \ \frac{mm}{m.°C}$$



where:
Δl the expansion (elongation) in mm,
lo the copper tube's initial length in m,
α the thermal expansion coefficient
(for copper it is 0.0168 mm/m.°C),
ΔT the maximum temperature variation
(temperature increase) in °C

EXAMPLE:

Copper tube of initial length lo = 6 m and To = 20°C.
The expansion for a final temperate of T = 80°C will be Δl=6.06 mm (Δl=6 x 0.0168 x 60 = 6.06).

Several factors need to be considered in order to deal with expansion, such as proper support and use of expansion fittings, the length of circuits, the diameter of the pipes and temperature differences during the operation of the networks. The following table gives the expansion for various lengths of copper tubes and temperature variations.

Tube length (m)	Thermal expansion of copper tube (Δl) in millimeters (mm), in relation to its length in meters (m) and the temperature difference Δt in degrees centigrade (°C)						
	Δt=40°	Δt=50°	Δt=60°	Δt=70°	Δt=80°	Δt=90°	Δt=100°
0,1	0,07	0,08	0,10	0,12	0,13	0,15	0,17
0,2	0,13	0,17	0,20	0,24	0,27	0,30	0,34
0,3	0,20	0,25	0,30	0,35	0,40	0,45	0,50
0,4	0,27	0,34	0,40	0,47	0,54	0,60	0,67
0,5	0,34	0,42	0,50	0,59	0,67	0,76	0,84
0,6	0,40	0,50	0,60	0,71	0,81	0,91	1,01
0,7	0,47	0,59	0,71	0,82	0,94	1,06	1,18
0,8	0,54	0,67	0,81	0,94	1,08	1,21	1,34
0,9	0,60	0,76	0,91	1,06	1,21	1,36	1,51
1	0,67	0,84	1,01	1,18	1,34	1,51	1,68
2	1,34	1,68	2,02	2,35	2,69	3,02	3,36
3	2,02	2,52	3,02	3,53	4,03	4,54	5,04
4	2,69	3,36	4,03	4,70	5,40	6,05	6,72
5	3,36	4,20	5,04	5,88	6,72	7,56	8,40
6	4,03	5,04	6,06	7,06	8,06	9,07	10,08
7	4,70	5,88	7,06	8,23	9,41	10,58	11,76
8	5,38	6,72	8,06	9,41	10,75	12,10	13,44
9	6,05	7,56	9,07	10,58	12,10	13,61	15,12
10	6,72	8,40	10,08	11,76	13,44	15,12	16,80
11	7,39	9,24	11,09	12,94	14,78	16,63	18,48
12	8,06	10,08	12,10	14,11	16,13	18,14	20,16
13	8,74	10,92	13,10	15,29	17,47	19,66	21,84
14	9,41	11,76	14,11	16,46	18,82	21,17	23,52
15	10,08	12,60	15,12	17,64	20,16	22,68	25,20
16	10,75	13,44	16,13	18,82	21,50	24,19	26,88
17	11,42	14,28	17,14	19,99	22,85	25,70	28,56
18	12,10	15,12	18,14	21,17	24,19	27,22	30,24
19	12,77	15,96	19,15	22,34	25,54	28,73	31,92
20	13,44	16,80	20,16	23,52	26,88	30,24	33,60
21	14,11	17,64	21,17	24,70	28,22	31,75	35,28
22	14,78	18,48	22,18	25,87	29,57	33,26	36,96
23	15,46	19,32	23,18	27,05	30,91	34,78	38,64
24	16,13	20,16	24,19	28,22	32,26	36,29	40,32
25	16,80	21,00	25,20	29,40	33,60	37,80	42,00

COPPER TUBES
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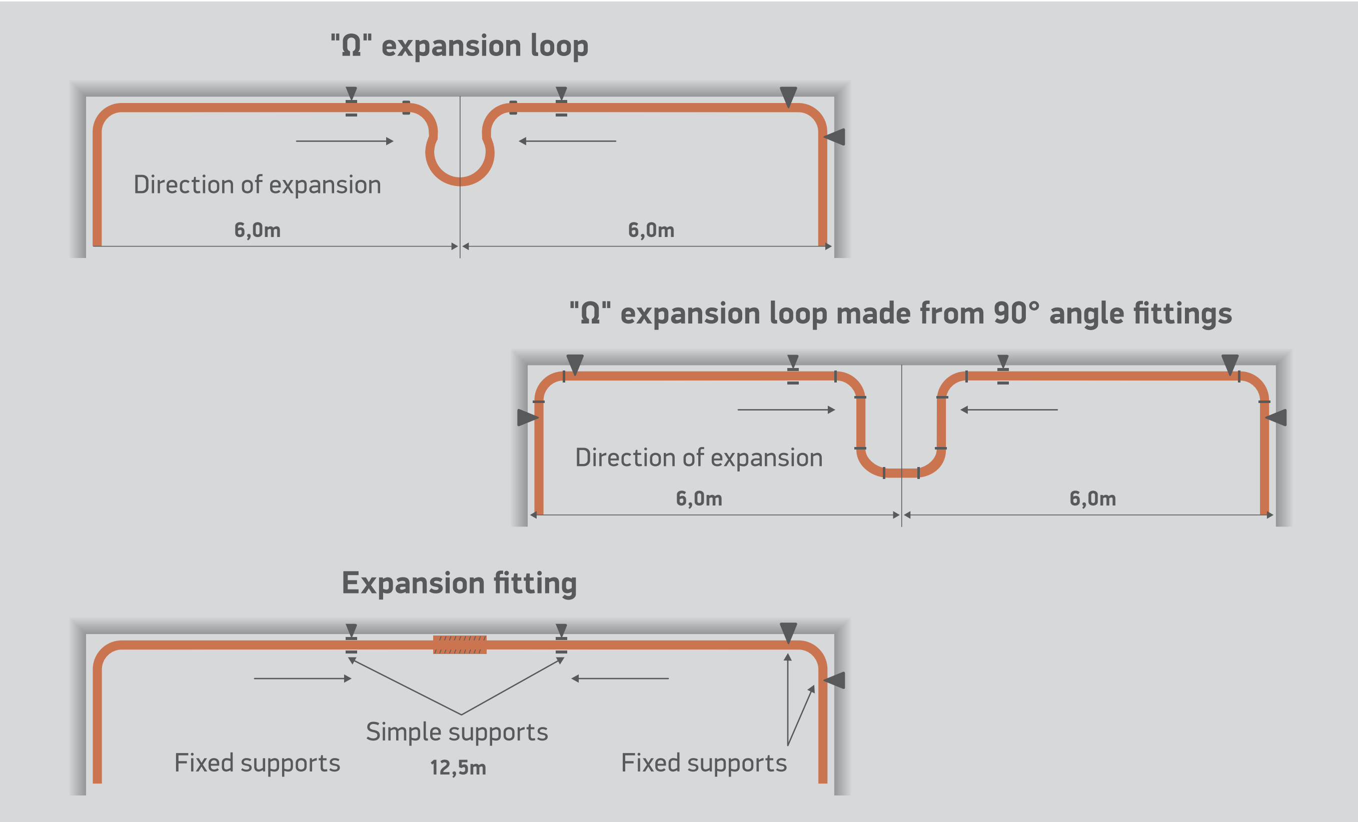
Example of expansion compensation in a long straight section of piping

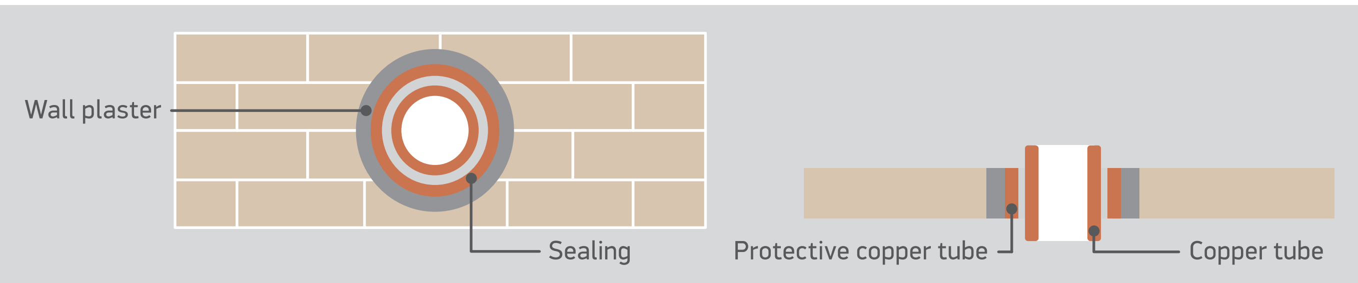
The figures below illustrate the method of dealing with the problem of expansion in a 25 meter long copper tube.

- What supports to use
- Where to anchor them
- Where to put plain supports
- In what direction to guide the motion of the piping, etc.



Copper tube wall passage - Passage from solid walls or floors

It is also very significant to take precautions in order to protect the copper tube while passing though solid walls or floors. A good solution would be to use a piece of copper tube with greater diameter and length slightly greater than the thickness of the wall as protection and to fill the intermediate gap with silicone.

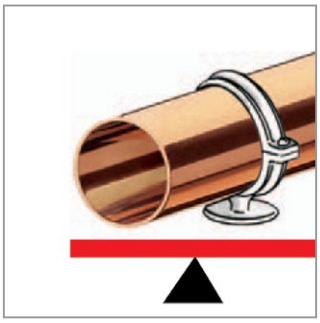


EXAMPLE: If we want to pass a ⌀15' tube, we use a ⌀18' drill and we cut a ⌀18' piece which we use as a ring.

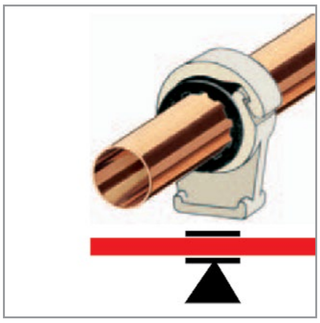
Support of copper tubes

The copper tubes are mounted on the walls or the ceiling by means of special supports made of bronze or plastic, at specific distance from each other. The minimum spacing between supports depends on the diameter of the copper tube on one hand and whether the section is horizontal or vertical on the other. They are given in the following table. In practice, two supports per floor are required in vertical piping and for tubes with diameter ∅<22 mm.

Size of copper tube (OD x WT)	Distance between supports (in m)	
	Vertical sections	Horizontal sections
10	1,2	0,8
12	1,5	1,0
15	1,8	1,2
22	2,4	1,8
28	2,4	1,8
35	3,0	2,4
42	3,0	2,4
54	3,0	2,7
67	3,6	3,0
76,1	3,6	3,0
108	3,6	3,0



Fixed support that does not allow any movement of the copper tube.



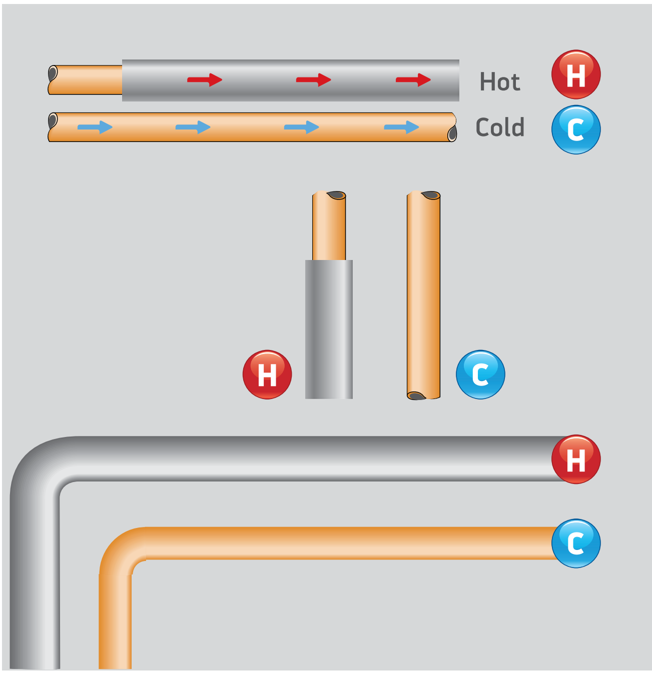
Plain support that allows movement - sliding of the copper tube.

Marking of water intakes and installation of copper tubes

Color marking must be provided for water intakes (blue for cold and red for hot).

When the cold and hot water copper tubes run parallel in vertical direction, the hot water will be on the left and the cold water on the right

When they run parallel and horizontally, the cold water piping should be installed lower than the hot water. The cold water piping must be installed in such a distance from chimneys or heating piping so as to not be affected by the heat.



COPPER TUBES
TALOS®

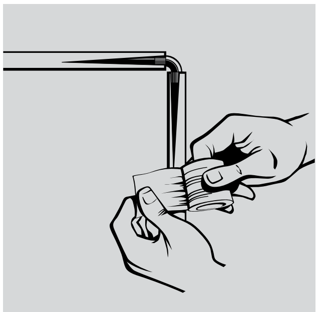
Protection measures of copper tubes

Protection measures of copper tubes against external factors and a humid environment.

- Copper tubes are not affected by building materials, nor by lime, when in dry form. The chemical elements that affect copper are sulphur and ammonia. However, none of the common building materials contain any such substances.
- Do not use gypsum to support the tubes. Do not use bare copper tubes into the soil, in yards, gardens, etc., without protection, as there are various fertilizers like nitric, ammonia, ashes, etc., which may affect bare copper tubes. In these cases, use TALOS® coated copper tubes.
- Measures must be taken for protecting the external surface of the piping, when it is in contact with wet surfaces for extended periods of time. In practice, such conditions may occur when the pipes are installed into the floors, in basement walls and bathroom floors and walls. If you're going to use a plastic "spiral" tube for the protection of copper tubes, then you should make sure to tear the spiral tube at the bottom, particularly in horizontal sections so as to avoid the retention of water within the spiral. The best solution for piping in damp walls, humid floors and wet spaces in general, where it is necessary to protect the pipes, is to use TALOS® coated copper tubes. Copper tube connections must be protected against environmental factors, such as permanent humidity, the soil and certain building materials. Once connection works are completed and the network pressure test is carried out, the bare ends of the connections must be sealed using and adhesive plastic tape.

Protection measures against frost

- The piping must be protected against frost by means of suitable insulation, depending on each application. Piping exposed to frost must be fitted with a drainage device. It is recommended that networks not being used for significant periods of time, remain empty during the critical low temperature period. For short periods of frost, the problem can be dealt with by allowing a small quantity of water to run from a drainage tap constantly.



COVERING OF CONNECTIONS: The ends are covered with tape, starting and ending at intact sections of the insulation material.

Main cautions to ensure professional results

- Upon assembly of the network, the piping interior must be kept clean and free from foreign matters such as burrs, dirt, sand, packaging material, etc.
- It must be ensured that the network is protected and it operates without any problems
- All the required piping tests must be carried out during construction and following the completion of the installations

Commissioning of the water supply installation

All networks must be well flushed after completion so as to remove any foreign materials from the interior of the piping. Flushing will continue until water comes out completely clean and then a pressure test will be carried out to ascertain tightness of the network. Then, the system must be set immediately in full operation.

The pressure test must be carried out before covering the piping, either at the entire installations or in parts thereof, to ensure tightness. Testing of the completed piping system can be accomplished by using pressurized air or water. Typically, the pressure test is carried out by applying pressure of 12 bar for a minimum period of ten minutes. No leak or pressure drop can occur during the test. Test pressures should never exceed the maximum operating pressure specified by the manufacturer of the fitting system. In hot water or heating networks, the pressure test also allows the determination of whether copper tube contraction/expansion has been dealt with properly in the entire network.

The tubes must never remain full or half-full with stagnant water for extended periods of time. However, in practice, there may be long periods of time between the completion of the installation and commissioning, as in the case of large buildings of apartment complexes which are often inhabited many years after construction. This must be taken into consideration in order to take necessary actions. The following must be done after flushing and the pressure test:

- Either maintain the network completely filled with water and renew the water by supplying the network with fresh water, flushing and renewing the water in all piping using the drainage taps
- Or empty the network completely and, if possible, blow it with compressed air and cap it so as to prevent the ingress of water or foreign materials

Once a plumbing installation is completed and permanently connected to the city network and until the building is inhabited, the owner must be given instructions to care for the renewal of water in the network at fixed intervals (one or twice a week).

Special consideration points

A plumbing network made of copper tubes in a building, may be likened to a living organism that adapts to its environment. Water flow during the first months of operation of a new copper tube network leads to the gradual formation of a thin surface coating made of copper oxide, which protects the network against corrosion throughout its service life.

- Therefore, it is important to care (either ourselves, or by notifying the owners) that the water in copper tube plumbing installations is renewed regularly, particularly during the first months of operation of the network
- As a living organism, copper plumbing networks must be in operation. If they are to remain out of operation for an extended period of time, we must see to it that water is renewed periodically, or that the network is completely drained as stated previously

Any section of an installation that is going to be in operation periodically, must be fitted with network isolation valves and drainage valves at the lowest point of the network. The supply lines and all the sections of an installation must be fitted with drainage valves.

- Long supply lines, that feed rarely-used installations, must be avoided.
- Dead network ends and vertical outlets which are rarely used may be the source of problems due to sedimentary materials that tend to settle in stagnant water

The electrolysis phenomenon and protective measures

It is recommended to use only one material, copper, in water transfer networks. When it is necessary to use copper tubes and steel tubes, we take the following measures in order to prevent galvanic corrosion of the steel:
a) Copper tubes must come after the steel tubes in the direction of water flow
b) Connection between copper tubes and steel tubes must be carried out with bronze fittings
c) Fittings with magnesium rods must be installed in certain points of the network to neutralize the galvanic corrosion phenomenon of the steel (mainly in solar water heater tanks)

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07/2019

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