TECHNICAL GUIDE

11 Edition 2017

LAWTON TUBES

The nations copper specialist

Contents

Company Profile

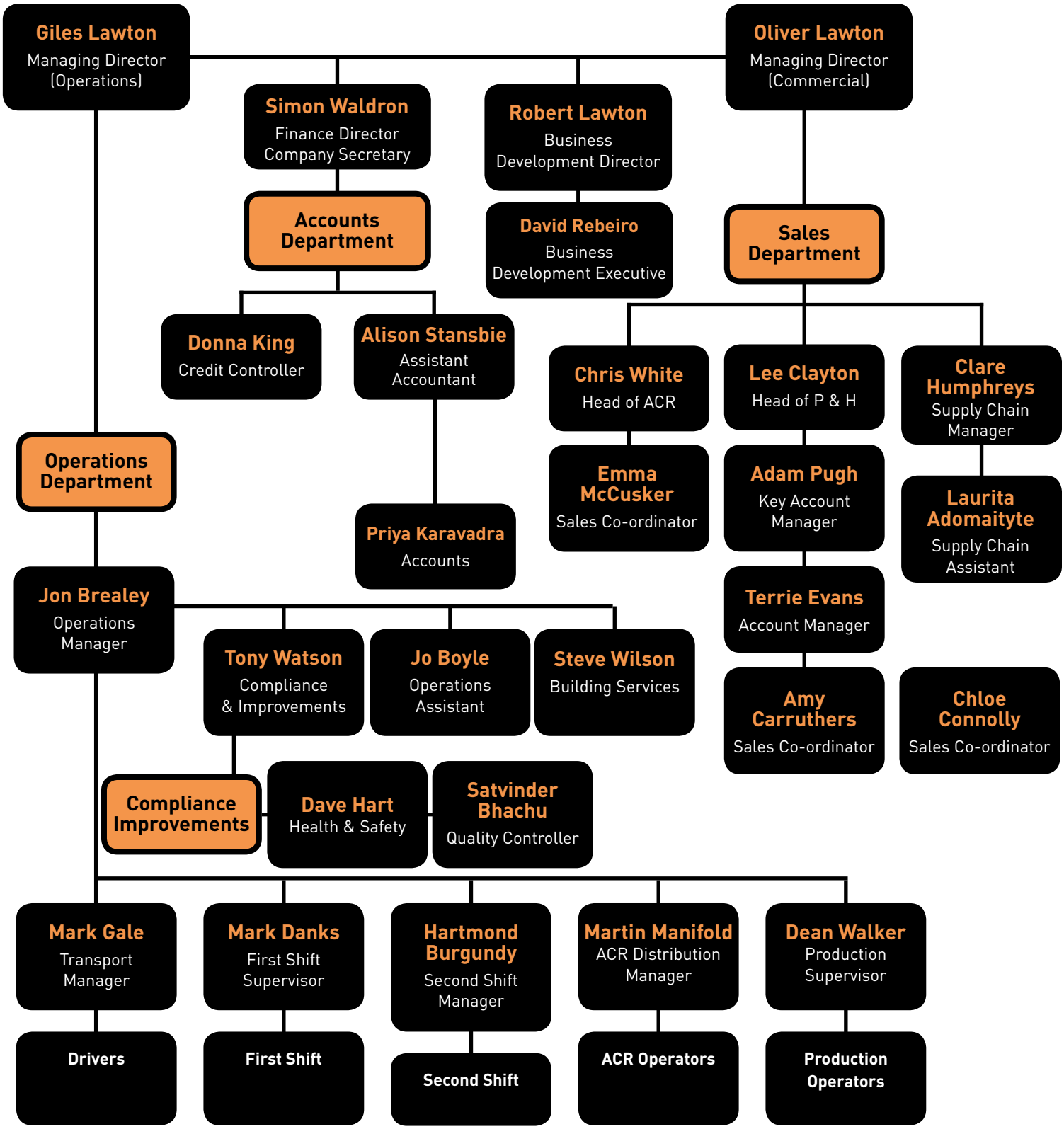
Established in 1917 and based in Coventry, The Lawton Tube Company is the UK's largest independent copper tube maker. The Company is a Private Limited Company without any group associations with the freedom necessary to satisfy customer requirements and respond to product and process changes with the latest technical requirements.

We offer a wide range of quality assured copper tubes, complying with the latest specifications, to both the construction and engineering markets. Lawton Tube is able to supply a range of standard products or special one off orders. Plant developments and installations have kept pace with market demands for a high integrity product and employ the latest manufacturing techniques. A fully integrated production system based on high speed block drawing and semi automated benches form the core of our primary processing. From initial extrusion to finished tube, Lawton Tube ensures that diameter, thickness, temper and length are all controlled within predetermined limits with the most up-to date manufacturing and inspection standards.

Lawton Tube has been assessed and registered as a BSI Approved Company operating Quality Systems to meet the requirements of BS EN ISO 9001-2008 and qualifies for the KITEMARK EN 1057 (plumbing) and EN 13348 (medical). Lawton Tube was the first company in the United Kingdom to have the EN 13348 (medical) KITEMARK. From receipt of certified raw materials to final inspection and despatch the aim is to manufacture a tube fit for purpose.

During 2001, Lawton Tube acquired Dorset Tube in Poole, which added to the breadth of Engineering tube supplied by the Coventry unit and included the production of cupro-nickel brake pipe tube. Dorset Tube has been assessed and registered as a BSI Approved Company and are operating Quality Systems to meet the requirements of BS EN ISO 9001-2008.

Company Structure



Trade Bodies

Lawton Tube are proud to be associated and support the following

Quality Policy

Lawton Tube Company is committed to maintain, on a continuous basis, an effectively Quality Management System, which complies with the requirements of the BS EN ISO 9001:2008 System for Quality Management.

The QMS is a framework guiding Lawton Tube Management and Employees to focus on identifying and meeting customer requirements consistently in an environment in which people understand, and are fully involved in achieving the business objectives through effective communication and leadership.

Lawton Tube is committed to complying with the requirements of the QMS and continually improving its effectiveness.

Lawton Tube is committed to continually improve on the organisational performance, making use of appropriate decision making tools to establish, analyse and improve through monitoring of agreed quality objectives.

Lawton Tube is committed to ensuring that resources required for the QMS processes are provided, adequately maintained and improved in order to meet customer's requirements.

In the interest of complying with customer requirements, Lawton Tube will enter into, and develop mutually beneficial relationships with suppliers of services and goods where deemed appropriate.

Lawton Tube will make arrangements to comply with current statutory and regulatory requirements including Health and Safety Legislation.

The Company is committed to the Quality Management System Procedures stated in this Manual and all employees are responsible for meeting the requirements laid down.

The Operations Manager is authorised to control and ensure the system is maintained. In the event of a major problem, which could have an adverse effect on the operation of the Quality System, this should be brought to the attention of the joint Managing Directors for resolution.

Engineering Copper Tubes

Pipeline solutions for Engineering applications.

Made to order so contact our Sales department with FULL enquiry. Average manufacturing time is 4 weeks.
We manufacture/distribute to the following European Specifications (American ASTM can also be offered):

BS EN 12449:1999 BS EN 12541:1999 BS EN 13600:2002

BS EN 12449 Seamless, round tubes for general purposes.

Material Analysis (C106)

Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
Minimum Copper Content 99.90 % (including silver)
Phosphorus 0.015-0.040 %
Total Impurity Maxima 0.060 % (excluding phosphorus and silver)

Mechanical Properties

BS EN 12449 Seamless, round tubes for general purposes

Material Temper	Tensile Strength min. (N/mm2)	Elongation min. (%)	Hardness (Indicative) HV5 VPN
R200 (soft)	200	40	40-65
R250 (Half Hard)	250	20	70-100
R290 (Hard)	290	5	95-120

BS EN 12451 Seamless, round tubes for heat exchangers

Material Analysis

Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
Minimum Copper Content 99.90 % (including silver)
Phosphorus 0.015-0.040 %
Total Impurity Maxima 0.060 % (excluding phosphorus and silver)

Mechanical Properties

BS EN 12451 Seamless, round tubes for heat exchangers

Material Temper	Tensile Strength min. (N/mm2)	Elongation min. (%)	Hardness (Indicative) HV5 VPN
R250 (Half Hard)	250	20	75-100
R290 (Hard)	290	5	Over 100

BS EN 13600 Seamless, round tubes for electrical purposes

Material Analysis (HC C101)

Material Grade Phosphorus de-oxidised copper; Cu-ETP or CW004A as defined in BS EN 1976.
Minimum Copper Content min 99.90 % (including silver)
Max Oxygen – 0.060 % is permitted, subject to agreement between the purchaser and Lawton Tubes
Max Lead – 0.005 %
Total Impurity Maxima 0.030 % (excluding oxygen, lead and silver)

Material Analysis (HC C103)

Material Grade Phosphorus de-oxidised copper; Cu-OF or CW008A as defined in BS EN 1976.
Minimum Copper Content min 99.95 % (including silver)
Max Lead – 0.005 %
Total Impurity Maxima 0.030 % (excluding lead and silver)

Mechanical Properties

BS EN 13600 Seamless, round tubes for electrical purposes

Material Temper	Tensile Strength min. (N/mm2)	Elongation min. (%)	Hardness (Indicative) HV5 VPN
R200 (soft)	200	40	35-65
R250 (Half Hard)	250	15	65-95
R290 (Hard)	290	5	90-110

Plumbing Copper Tubes

BS EN 1057

Material Analysis

Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
Minimum Copper Content 99.90 % (including silver)
Phosphorus 0.015-0.040 %
Total Impurity Maxima 0.060 % (excluding phosphorus and silver)
The melting point of copper is 1083ºC and it has a density of 8.9 gm/cc

Packaging

All tubes are bundle tied, 15-28mm (TX) are Yellow end capped in tubes of 10 (UK market only).

Marking

Sizes 15 - 108mm copper tubes are stamped with:
· Tube size
· Kitemark
· EN 1057
· Temper
· Manufacturer
· Date (quarter)
Sizes 133mm and above are stamped at either end of the tube.

All tubes 108mm and below are inkjet marked with similar data.

Mechanical Properties

BS EN 1057 Plumbing Copper Tubes

Dimensions and Tolerances (includes chrome plated and PVC covered)

O.D. (mm)	Wall (mm)	Temper	Max Working Pressure bar up to 65°C	Thickness Tolerance	Diameter Tolerance	
					Mean	Including Ovality
6	0.6 (TX)	Half Hard	133	±10%	± 0.04mm	±0.09mm
6	0.6	Soft	90	±10%	± 0.04mm	Not applicable
6	0.8 (TY)	Half Hard	188	±10%	± 0.04mm	±0.09mm
8	0.6 (TX)	Half Hard	97	±10%	± 0.04mm	±0.09mm
8	0.6	Soft	66	±10%	± 0.04mm	Not applicable
8	0.8 (TY)	Half Hard	136	±10%	± 0.04mm	±0.09mm
10	0.6 (TX)	Half Hard	77	±10%	± 0.04mm	±0.09mm
10	0.7 (TY)	Soft	62	±10%	± 0.04mm	Not applicable
10	0.8 (TY)	Half Hard	106	±10%	± 0.04mm	±0.09mm
12	0.6 (TX)	Half Hard	63	±10%	± 0.04mm	±0.09mm
12	0.8 (TY)	Half Hard	87	±10%	± 0.04mm	±0.09mm
15	0.7 (TX)	Half Hard	58	±10%	± 0.04mm	±0.09mm
15	1.0 (TY)	Half Hard	87	±13%	± 0.04mm	±0.09mm
15	1.0 (TY)	Soft	67	±13%	± 0.04mm	Not applicable
22	0.9 (TX)	Half Hard	51	±10%	± 0.05mm	±0.10mm
22	1.2 (TY)	Half Hard	69	±15%	± 0.05mm	±0.10mm
22	1.2 (TY)	Soft	57	±15%	± 0.05mm	Not applicable
28	0.9 (TX)	Half Hard	40	±10%	± 0.05mm	±0.10mm
28	1.2 (TY)	Half Hard	55	±15%	± 0.05mm	±0.10mm
35	1.0 (LiteX)	Hard	42	±15%	± 0.06mm	±0.07mm
35	1.2 (TX)	Half Hard	42	±10%	± 0.06mm	±0.11mm
35	1.5 (TY)	Hard	64	±10%	± 0.06mm	±0.07mm
42	1.0 (LiteX)	Hard	35	±15%	± 0.06mm	±0.07mm
42	1.2 (TX)	Half Hard	35	±10%	± 0.06mm	±0.11mm
42	1.5 (TY)	Hard	53	±10%	± 0.06mm	±0.07mm
54	1.2 (LiteX)	Hard	33	±15%	± 0.06mm	±0.07mm
54	1.2 (TX)	Half Hard	27	±10%	± 0.06mm	±0.11mm
54	2.0 (TY)	Hard	55	±10%	± 0.06mm	±0.07mm
66.7	1.2 (TX)	Hard	26	±15%	± 0.07mm	±0.10mm
66.7	2.0 (TY)	Hard	45	±15%	± 0.07mm	±0.10mm
76.1	1.5 (TX)	Hard	29	±15%	± 0.07mm	±0.10mm
76.1	2.0 (TY)	Hard	39	±15%	± 0.07mm	±0.10mm
108	1.5 (TX)	Hard	20	±15%	± 0.07mm	±0.20mm
108	2.5 (TY)	Hard	34	±15%	± 0.07mm	±0.20mm
133	1.5 (TX)	Hard	16	±15%	± 0.20mm	±0.70mm
159	2.0 (TX)	Hard	18	±15%	± 0.20mm	±0.70mm
219	3.0 (TX)	Hard	20	±15%	± 0.60mm	±1.50mm

Working pressures are to BS 2871:part1:1971

Material Temper EN 1173	Tensile Strength min. (N/mm2)	Elongation min. (%)	Hardness (Indicative) HV5 VPN
R200 (soft)	220	40	40-70
R250 (Half Hard)	250	30 (TX) 20 (TY)	75-100
R290 (Hard)	290	3	Over 100

Expansion of copper tube

Copper has a coefficient of linear expansion of 17 x 10-6oC. for example, a 10 metre length of copper tube carrying hot water at 600C will increase in length by almost 7mm when heated from 200C. Assuming that temperature cycling of the system is 200C, thaere will be a continuous cycle of expansion and contration of 3.4mm.
refer to table below.

Copper Tube Expansion

Temperature change	Tube length									
	3m	4m	5m	6m	7m	8m	9m	10m	12m	25m
10°	0.5mm	0.7mm	0.9mm	1.0mm	1.2mm	1.4mm	1.5mm	1.7mm	2.0mm	4.3mm
20°	1.0mm	1.4mm	1.7mm	2.0mm	2.4mm	2.7mm	3.0mm	3.4mm	4.0mm	8.5mm
30°	1.5mm	2.0mm	2.6mm	3.1mm	3.6mm	4.1mm	4.6mm	5.1mm	6.1mm	13.0mm
40°	2.0mm	2.7mm	3.4mm	4.1mm	4.8mm	5.4mm	6.1mm	6.8mm	8.2mm	17.0mm
50°	2.6mm	3.4mm	4.3mm	5.1mm	6.0mm	6.8mm	7.7mm	8.5mm	10.2mm	21.0mm
60°	3.1mm	4.1mm	5.1mm	6.1mm	7.1mm	8.2mm	9.2mm	10.2mm	12.2mm	26.0mm
70°	3.6mm	4.8mm	6.0mm	7.1mm	8.3mm	9.5mm	10.7mm	11.9mm	14.3mm	30.0mm
80°	4.1mm	5.4mm	6.8mm	8.2mm	9.5mm	10.9mm	12.2mm	13.6mm	16.3mm	34.0mm
90°	4.6mm	6.1mm	7.7mm	9.2mm	10.7mm	12.2mm	13.8mm	15.3mm	18.4mm	38.0mm
100°	5.1mm	6.8mm	8.5mm	10.2mm	11.9mm	13.6mm	15.3mm	17.0mm	20.4mm	43.0mm
150°	7.65mm	10.2mm	12.75mm	15.3mm	17.85mm	20.4mm	22.95mm	25.5mm	30.6mm	63.75mm
200°	10.2mm	13.6mm	17.0mm	20.4mm	23.8mm	27.2mm	30.6mm	34.0mm	40.8mm	85.0mm

Water Capacity

Table W Microbore

O/D mm	Capacity kg/m
6	0.0169
8	0.0347
10	0.0558

Table X 6mm - 159mm

O/D mm	Capacity kg/m
6	0.0169
8	0.0347
10	0.0615
12	0.0890
15	0.1416
18	0.2063
22	0.3140
28	0.5308
35	0.8220
42	1.2163
54	2.0712
67	3.2134
76	4.1699
108	8.6107
133	13.2647
159	18.8351

Table Y 6mm - 108mm

O/D mm	Capacity kg/m
6	0.0139
8	0.0302
10	0.0529
12	0.0818
15	0.1280
18	0.1952
22	0.2943
28	0.5050
35	0.7888
42	1.1758
54	1.9317
67	3.2375
76	4.0438
108	8.2527

PVC Coated Copper Tubes

The Plastic that we are using for the tube coating is a Low Density Polyethylene along with a World Wide UV stabiliser.

The Physical properties are as follows:

Mechanical

Melting point:	114°C
Vicat Softening Point	93°C (This can be generally treated as the maximum operating temperature)
Brittleness Point:	← -75°C
Hardness:	55 Shore D
Tensile Break:	13.40 MPa
Flexural Strength:	8.10 MPa
Elongation at Break	500%

Electrical

Volume Resistivity:	→1015 Ohm-cm^3
Surface Resistivity:	→1015 Ohm-cm^2

Resistance to some common chemicals below.

Polyethylene and Very Good Chemical Resistance

- Acetatic acid
- Amonium hydroxide 30%
- Calcium hydroxide 30%
- Diethylene glycol
- Ethylene glycol
- Ethanol 100%
- Glycerin
- Glycol
- Hydrogen peroxide 30%
- Mercury
- Methanol
- Potassium hydroxide 30%
- Sodium hydroxide 30%

Polyethylene and Good Chemical Resistance

- Acetone
- Formaldehyde 10-40%
- Gas oil
- Caproic acid
- Iodine
- Isobutanol
- Isopropanol
- Mineral oil
- Motor oil
- Natural gas
- Gasoline
- Phenol
- Tranformer oil
- Vaseline

Polyethylene and Medium Chemical Resistance

- Dibutylether
- Ethylene acetate 100%
- Furfurol 100%
- Heptane
- Paraffin

Polyethylene and Poor Chemical Resistance
- Diethylether
- Ethylenechloride
- Hydrogen peroxide 90%
- Methylene chloride

Polyethylene and None Chemical Resistant
- Acetylene dichloride

PVC Coated Copper Tubes

This range is ideal for use within walls, outside, underground and in aggressive atmospheres. The covering creates a thermal barrier reducing heat loss underground and condensation from exposure in extreme weather conditions. Tubes are specifically made in 5.8m lengths for direct loading and shipping in full containers.

Tubes can withstand temperatures from -40 to +120 degrees centigrade.

Tubes can be bent (except 35-54mm) and jointed as per standard plain EN1057 tubes using EN1254 fittings. To expose bare copper, plastic coating needs to be cut and pulled back away from the joint and flame (if brazing). Once joint has been made coating needs returning back to original position and both joint and cut need to be protected using an impervious plastic tape.

White Plastic Coated Copper Tubes
to BS EN 13349 / BS EN 1057 R250/R290

LAWTON COATED

Product Code	O.D. (mm)	Length (m)	Wall (mm)	Tube Thickness
TXPVCW015	15	5.8 & 6	0.7	1.0
TXPVCW022	22	5.8 & 6	0.9	1.0
TXPVCW028	28	5.8 & 6	0.9	1.0
TXPVCW035	35	5.8 & 6	1.2	1.5
TXPVCW042	42	5.8 & 6	1.2	1.5
TXPVCW054	54	5.8 & 6	1.2	1.5
TXPVCW067	67	5.8 & 6	1.2	1.5
TXPVCW076	76	5.8 & 6	1.5	1.5
TXPVCW108	108	5.8 & 6	1.5	1.5

PVC Covered Coils
to BS EN 1057 R220

LAWTON COATED

Product Code	O.D. (mm)	Length (m)	Wall (mm)	Tube Thickness
TWPVCBLK008	8 PVC Black	25	0.8	1.0
TWPVCW008	8 PVC White	25	0.6	1.0
TWPVCW010	10 PVC White	25 & 50	0.7	1.0
TWPVCY015	15 PVC Yellow/Blue	25	1.0	1.5
TWPVCY022	22 PVC Yellow/Blue	25	1.2	1.5
TWPVCY028	28 PVC Yellow	20	1.2	1.5

PVC Covered Tube to BS EN 1057 R250

Product Code	O.D. (mm)	Length (m)	Wall(mm)	Tube Thickness
TXPVCY015	15 PVC Yellow	3 & 6	0.7	1.0
TXPVCY022	22 PVC Yellow	3 & 6	0.9	1.0
TXPVCY028	28 PVC Yellow	3 & 6	0.9	1.0

Green Plastic Coated Copper Tubes to BS EN 13349 / BS EN 1057 R250/R290

Product Code	O.D. (mm)	Length (m)	Wall (mm)	Tube Thickness
TYPVCG015	15	5.8 & 6	0.7 or 1.0	1.0
TYPVCG022	22	5.8 & 6	0.9 or 1.2	1.0
TYPVCG028	28	5.8 & 6	0.9 or 1.2	1.0
TYPVCG035	35	5.8 & 6	1.0 or 1.5	1.5
TYPVCG042	42	5.8 & 6	1.0 or 1.5	1.5
TYPVCG054	54	5.8 & 6	1.2 or 1.5	1.5
TYPVCG067	67	5.8 & 6	2.0	1.5
TYPVCG076	76	5.8 & 6	2.0	1.5
TYPVCG108	108	5.8 & 6	2.5	1.5

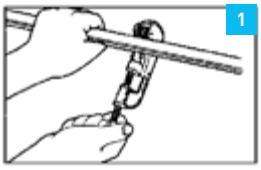
Nature of Heat Insulator

Test	Unit	Onside of insulator	Inside of insulator
Tensile Strength	N/mm [kg/cm^2]	31.5^2 10 [3.2]	29.5^2 10 [3.0]
Elongation	%	70	100
Compression strain	% (25%)	3.4	6
Water absorbing capacity	G/m^2	0.003	0.008
Conductivity factor	W/(mk^2) [kcal/m^{2}hm^2]	0.040(0.035)	0.038(0.033)
Temperature of heat resisting		-40 ~120	-40 ~120

Copper tube and solder type fittings

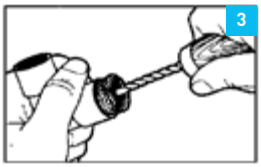
1. Cut tube square with the cutter or fine hack saw (32 tooth blade is recommended). Remove Burr.
2. Clean outside end of copper tube thoroughly with sand cloth or sandpaper equal depth of fitting. Leave no dark spots.
3. Clean inside of fitting carefully to tube stop with wire brush. Note: Sand cloth or sandpaper may also be used.
4. Using a brush, apply light uniform coat of soldering flux to the outside of the tube and inside of the fitting.
5. Slip tube into fitting to tube stop. Turn tube back and forth once or twice to distribute flux evenly.
6. Apply heat uniformly around the fitting with torch. When solder melts upon contact with heated fitting, the proper soldering temperature has been reached. Remove flame and feed solder slightly off center at the bottom of the joint. Proceed across the bottom of the fitting and up to the top center position. Return to the starting point, and then proceed up the incomplete side to the top, again, overlapping the solder metal. Wipe off surplus solder with a piece of cloth.

CAUTION: Do not overheat the joint or direct the flame into the face of the fitting cup. Overheating could burn the flux, which will destroy its effectiveness and the solder will not enter the joint properly.

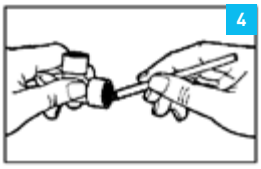


Cut tube to length & remove burr with file or scraper.

Clean outside of tube with sandpaper or sand cloth.

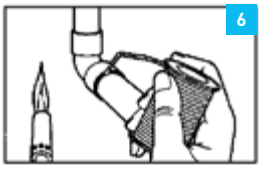


Clean inside of fitting with wire brush, sand cloth or sandpaper.



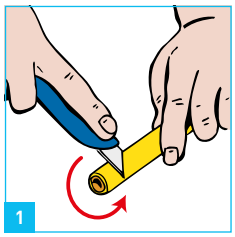
Apply flux thoroughly to inside of fitting.

Apply flux thoroughly to outside of tube - assemble tube and fitting.

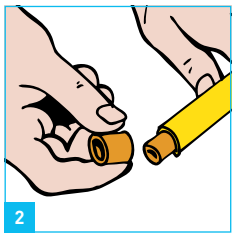


Apply heat with torch.When solder melts upon contact with heated fitting, the proper temp for soldering has been reached. Remove flame & feed solder to the joint at one or two points until a ring of solder appears at the end of the fitting.

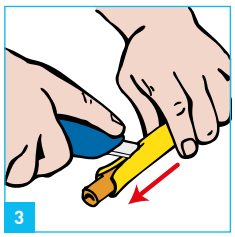
Plastic Coated Copper Tube Installation Guide



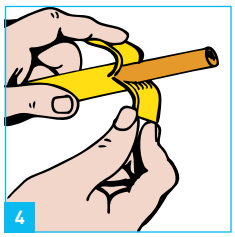
Make circular incision in plastic cover



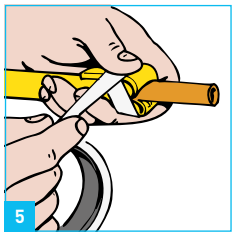
Remove the cut plastic from the end of the tube



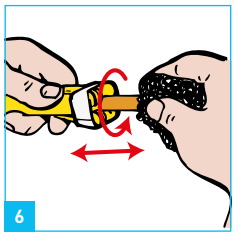
Make the incision in plastic along tube



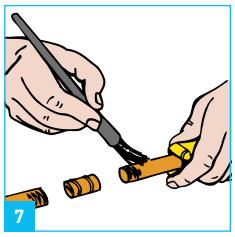
Peel back the plastic cover carefully



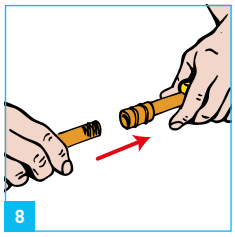
Secure the spliced plastic cover with tape



Clean tube and fitting with a suitable abrasive pad

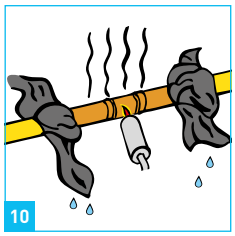


Apply Flux

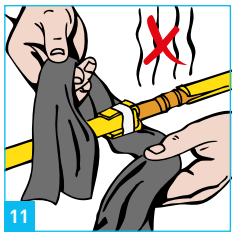


Connect tube and fitting

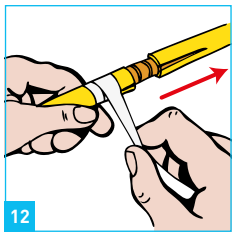
Wrap exposed plastic with a damp cloth



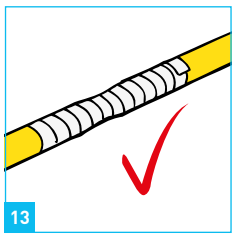
Heat with blow lamp



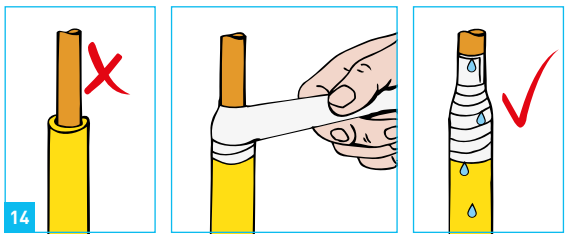
When cooled remove damp cloth and re-position plastic



Secure with tape



The finished joint



Exposed ends should be sealed with tape

Installation Instructions for plastic coated tube

For both capillary and compression fittings the tube should be cut with a pipe cutter or with a fine tooth hacksaw and deburred inside and outside.

When using capillary fittings, the plastics cover should be cut lengthways and folded back about 100mm and care should be taken not to allow the flame of the torch or blowlamp to come into contact with the covering. It is recommended that the end of the plastic and part of the exposed copper be wrapped with a wet rag, to prevent over-heating and damage of the cover. The use of excess flux should be avoided and any residual flux should be removed to prevent unsightly stains or in extreme cases corrosion of the pipework. When using compression fittings, the plastics cover should be cut and removed sufficiently to permit entry of the copper tube through the coupling nut and up to the tube stop in the body of the fitting and where appropriate for the tube end to be flared.

When joints are complete it is essential that any cut and folded plastics are returned to their original position and the lengthways cut and any exposed pipework and fitting are carefully and completely protected by spirally taping the joint with self-adhesive polyethylene or PVC waterproof tape.

Moisture should be prevented from entering the channels in plastics coverings at positions where the covering has been terminated. This can be achieved by the application of a suitable waterproof adhesive plastic tape over the last 25mm or so of plastics covering and a similar length of immediately adjacent bare copper tube.

When using 'O' ring seal fittings, such as in push-fit or press-fit fittings, care must be taken when removing the plastics covering not to create a lengthways score mark on the copper where the fitting will be placed. Such a score could prevent the 'O' ring from making a complete seal. The plastics cover should be cut and removed sufficiently to permit entry of the copper tube up to the tube stop in the body of the fitting. When joints are complete it is essential that any cut and folded plastics are returned to their original position and the lengthways cut and any exposed pipework and fitting are carefully and completely protected by spirally taping the joint with self-adhesive polyethylene or PVC waterproof tape. Before jointing soft temper tubing with fittings it is essential that a re-rounding tool be used.

Installation of plastic covered tube

Experienced, time-served, plumbers are familiar with the installation of copper tube systems since they have been used for very many years and are considered the standard material against which all others are measured. The plastic coated products are increasing in use and some comments on their installation follow.
Plastic coated tubes are Lawton copper tubes sheathed in a continuous plastics cover.
The covering on it has air channels on its internal surface. Although plastic coated tubes are primarily designed for protection against external aggressive materials, the cover creates a thermal barrier that reduces heat loss from buried hot service tube and condensation along surface fixed cold service pipework. Plastic coated tubes are particularly recommended for domestic hot water and heating services, especially if the pipes are to be buried in plaster or screed, or for cold water services exposed to conditions of high humidity where condensation may be a problem.
Plastic coated tubes are primarily intended for internal / underground applications and outdoor surface fixing of these products is therefore not recommended.

Maintaining the Protection

To maintain protection any breach made in the plastic cover must be made good to ensure the protective properties are maintained. To maintain a continuous protective coating where the plastics cover has been cut back exposing the copper, for making joints for instance, the bare copper tube (and fitting) should be carefully and completely wrapped with an adhesive polythene or PVC waterproof tape: see Installation Instructions 3.1.5. Moisture should be prevented from entering the channels in the plastics coating where it has been terminated, breached or

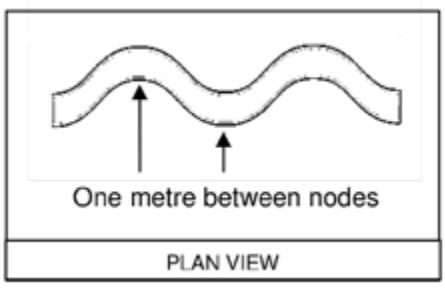
damaged. The best way to do this is by the spiral, overlapping application of a suitable waterproof adhesive plastics tape over at least the last 25mm of intact plastics covering and at least a similar length of immediately adjacent bare copper pipe.

Taking Care of Expansion and Contraction

For the relatively short tube runs encountered in domestic installations, thermal expansion and contraction is normally accommodated by bends, elbows, off-sets, etc. and no special precautions are generally required. However, on longer straight tube runs (usually in excess of 10 metres) consideration should be given to the use of expansion devices such as expansion bellows or loops. Where burying in concrete is allowed, Plastic coated tube helps to take care of thermal expansion and contraction.
Where pipework carrying hot water is buried in concrete, precautions need to be taken to protect the tubing from both external corrosion and the effects of thermal movement. In such circumstances Plastic coated tube, by virtue of the air channels formed on the inside surface of the plastics coating, not only provides external protection and a degree of thermal insulation but also, when laid in the manner recommended, has a greater ability to absorb the stresses imposed by thermal movement.

The coefficient of linear expansion of copper is 16.8 x 10-6 per °C. This means, for example, that a 10m length of copper tube, irrespective of diameter, thickness or temper, will increase in length by 10.2mm when its temperature is increased by 60°C (a typical value for a central heating system). On cooling down, the tube will contract to its original length. If this thermal movement is not allowed for in design and installation, considerable cyclic stress will be imposed on the tubing and/or associated fittings. These stresses can lead to either premature failure of the joint (i.e. a so-called "pulled joint") or fatigue failure of the tube itself. To avoid this, ideally fittings should not be buried in concrete. Clearly, if firmly buried in screed the branch of a tee will become a fixed point and this situation should be avoided wherever possible. If burying the system in concrete is unavoidable, however, any joints such as tees, elbows, etc., should be installed so that they are free to move when the pipework system expands and contracts. For example, a tee joint and approximately one metre of its branch should be laid in a duct filled with a material that will "give" (e.g. vermiculite) and covered with a duct cover. This will normally be sufficient to absorb the stresses imposed on the branch.
When soft coiled tubing is properly installed, in a serpentine (snake-like) manner, the copper tube is free to move within the castellated plastics sleeve. When in concrete, the plastics sleeve is fixed in position but tube movement from expansion and contraction is accommodated within channels of the sleeve.

When installing the tube in a serpentine manner, it is useful to regard each segment of the "snake" as an arc in which each change of direction can then accommodate about 1mm of expansion. Thus, as a guide, we would recommend that the "wavelength" of the "snake" should be no more than about two metres, i.e. one metre between the "nodes". The minimum displacement of a "snaked" tube line is considered to be one full diameter of the pipe size concerned, although more commonly two to three diameters is the distance used.



At corners of a buried installation, a bend should be put in the tube, rather than an elbow fitting. A smooth bend, of generous radius, is better able to absorb stresses than a bend of tight radius but either is preferable to an elbow, which becomes an anchor point only slightly less rigid than a tee. Similarly, where the tubing leaves the screed to connect to radiators etc., a bend of generous radius is preferred. The plastics sleeve should be continued almost up to the radiator connection since, if it is cut back to floor level, there is a risk that concrete will adhere to the bare copper tube and create an anchor point.

Burying in Plaster, Screed and Concrete

Soft temper (R220) copper tubing, made to the requirements of BS EN 1057, is the preferred material for this type of application. This pipework is supplied in long length coils and generally does not need fittings under screed. Such tubing is available in 8 to 22mm sizes.

Where pipework is fitted within ducted systems, i.e. where the pipework is surrounded by air and not directly embedded in concrete, Yorkex straight length material, to BS EN 1057 R250 / R290 can be used. Indeed, in such a system the pipework is free to move in the surrounding air space and therefore acts in a manner similar to surface-fixed tubing. However, some construction materials may contain contaminants, which are aggressive to copper; we do not therefore recommend that bare copper tubing be embedded directly into concrete or plaster. Instead, tubing fixed in such locations should be protected by a factory-applied plastics covering such as that provided by Lawton Plastic covered tube. It should also be borne in mind that the minimum recommended depth to which plastics coated pipework should be buried in screed or plaster is 50mm, measuring from the top of the tube in situ. For tubing embedded in plaster, this may require chasing the pipework into the wall.

Before going ahead with any design or installation work, it is recommended that the view of the local water supplier on the subject of "accessibility of pipework" is established since the interpretation and application of the water supplier regulations may vary from region to region.

Good Practice

During installation, it is suggested that the end of the tube be nipped or covered to prevent dust or dirt entering. A further tip when tube is used for a central heating system is to mark with coloured tape or pencil the flow and return tubes so that at the manifold and radiator valve connections, there is a clear indication which pipes carry the flow and which the return. This is particularly useful where solid floors are to be laid.

Flushing and Avoidance of Stagnation

BS 6700(2), Section 3.1.10.1 states that; "every new water service, cistern, distributing pipe, hot water cylinder, or other appliance and any extension or modification to such a service shall be thoroughly flushed with drinking water before being taken into use"

All water services/heating systems should be thoroughly flushed with clean water as soon as possible after completion to remove foreign matter including filings, flux residues etc. Flushing should continue until the discharge water is completely clear. It should be borne in mind that simply filling a system and then draining down does not constitute a flush and, in most cases, will serve merely to move extraneous matter from one point in the pipework installation to another.

Ideally, new/modified systems should be brought into use immediately after flushing and not left charged with stagnant water. If it is not possible to bring the system into immediate use then it should be completely drained down. If this is for an extended period then disinfection may be required (see Section 3.3.)

It is, in practice, notoriously difficult to effect a 100% drain down of an installation particularly where long, horizontal tube runs are involved. Instead, it is recommended, for the purpose on minimizing the risk of pipework deterioration and/or water quality problems, that the systems be left fully charged and flushed through at regular intervals. The system should be flushed, at a frequency of no less than twice per week, by opening all outlets for a period that is long enough to completely recharge the system with fresh water. This practice should continue until such time as the system is brought into regular use. Under certain circumstances, consideration should also be given to frost protection.

Reference to the need to avoid stagnation in pipework is made in various publications including a HSE publication(1) which provides information on how to prevent the development of legionella bacteria.

Certain systems will require to be disinfected, prior to bringing into use, to comply with the requirements of BS 6700(2).

Plumbing Metric Endfeed Fittings

Copper end feed type fittings manufactured to:

BS EN 1254-1:1998 Part 1 Specification for copper and copper alloy fittings with capillary ends for soldering and brazing for use with copper tubes.

BS EN 1254-1:1998 Part 5 Specification for copper and copper alloy fittings with short ends for capillary brazing for use with copper tubes.

35mm plus size fittings are supplied in individually sealed protective polythene bags and are specifically designed for copper systems.

Specific Benefits Include:

Lawton tube endfeed fittings are guaranteed against manufacturing defects for 25 years.

All fittings supplied contain less than 100mg/m2 (0.01mg/cm2) of hydrocarbons on the degreased surface.

Each fitting is engraved with unique branding together with the EN spec and fitting size where space permits.

All sealed in protective polythene bags and are product labelled.

Fittings are supplied in reinforced cardboard boxes, labelled with product information and outline drawing of fitting.

Each fitting is engraved with unique branding, space permitting

54mm sample

Working Temperatures and Pressure

Service Temperature*				
Size	Min -40°C	30°C	65°C	Max 110°C
8mm to 28mm	25 bar	25 bar	25 bar	16 bar
35mm to 54mm	25 bar	25 bar	16 bar	10 bar
67mm	16 bar	16 bar	16 bar	10 bar

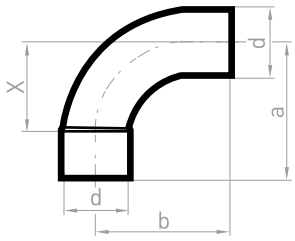
*LTC Fittings performance when correctly assembled with Lawton Tube's EN1057 copper tube using tin/copper soft solder EN 29453 or tin/silver soft solder EN 29453

Service Temperature**						
Size	Min -196°C	65°C	120°C	150°C	175°C	Max 200°C
8mm	62.5 bar	62.5 bar	58.8 bar	46.7 bar	35.5 bar	23.3 bar
10mm	50.9 bar	50.9 bar	47.9 bar	38.0 bar	28.9 bar	19.0 bar
12mm	42.9 bar	42.9 bar	40.3 bar	32.0 bar	24.3 bar	16.0 bar
15mm	40.3 bar	40.3 bar	37.9 bar	30.1 bar	22.8 bar	15.0 bar
22mm	35.6 bar	35.6 bar	33.5 bar	26.6 bar	20.2 bar	13.3 bar
28mm	28.2 bar	28.2 bar	26.5 bar	21.1 bar	16.0 bar	10.5 bar
35mm	25.2 bar	25.2 bar	23.7 bar	18.8 bar	14.3 bar	9.4 bar
42mm	23.2 bar	23.2 bar	21.8 bar	17.3 bar	13.1 bar	8.6 bar
54mm	19.8 bar	19.8 bar	18.6 bar	14.7 bar	11.2 bar	7.4 bar

** Max hydraulic working pressure for LTC fittings when assembled with Lawton Tube's EN1057 copper tube using hard solder (brazing alloy) to EN 1044

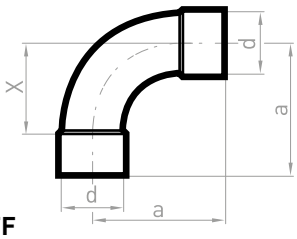
Service Temperature***					
Size	Min -196°C	65°C	120°C	150°C	Max 200°C
67mm	18.6 bar	18.6 bar	17.5 bar	14.0 bar	6.9 bar
76mm	18.6 bar	18.6 bar	17.5 bar	14.0 bar	6.9 bar
108mm	17.2 bar	17.2 bar	16.2 bar	12.9 bar	6.4 bar
133mm	10.5 bar	10.5 bar	8.5 bar	7.7 bar	4.1 bar
159mm	11.7 bar	11.7 bar	9.7 bar	8.6 bar	4.6 bar

*** Max hydraulic working pressure for LTC fittings when assembled with Lawton Tube's EN1057 copper tube using hard solder (brazing alloy) to EN 1044



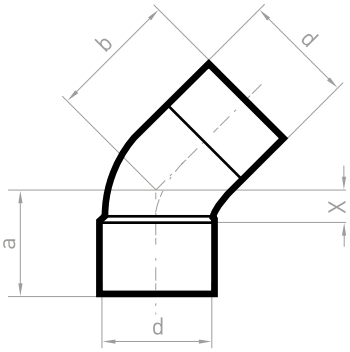
Bend 90° - MF

Dimensions (mm)				Product Code
d	a	b	x	
12	23	25	14.4	EFELS012
15	29	31	18	EFELS015
22	42	44	26.4	EFELS022
28	52	54	33.6	EFELS028
35	65	67	42	EFELS035
42	77.5	79.5	50.4	EFELS042
54	97	99	64.8	EFELS054
67	117	120	84	EFELS067
76	125	128	91.3	EFELS076
108	177	180	129.6	EFELS108
133	212	215	177	EFELS133
159	262	265	227	EFELS159



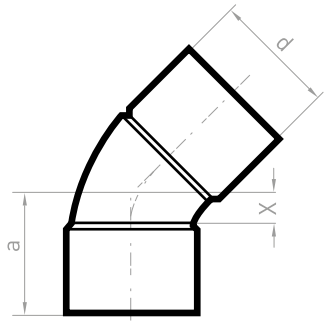
Bend 90° Long Radius - FF

Dimensions (mm)			Product Code
d	a	x	
67	117	84	EFELLR067
76	125	91.3	EFELLR076
108	177	129.6	EFELLR108
133	212	177	EFELLR133
159	262	227	EFELLR159



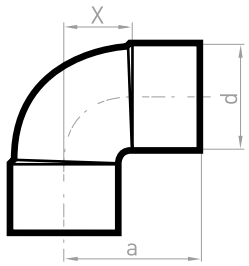
Elbow 45° - MF

Dimensions (mm)				Product Code
d	a	b	x	
12	13.6	15.6	4.7	EFELS01245
15	16.9	18.9	6.1	EFELS01545
22	23.2	25.2	6.7	EFELS02245
28	28.6	30.6	10.6	EFELS02845
35	37	39	14	EFELS03545
42	42	44	15	EFELS04245
54	52	54	20	EFELS05445
67	65	58	28.5	EFELS06745
76	68	71	32	EFELS07645
108	110	113	60	EFELS10845
133	280	280	235	EFELS13345
159	335	335	290	EFELS15945



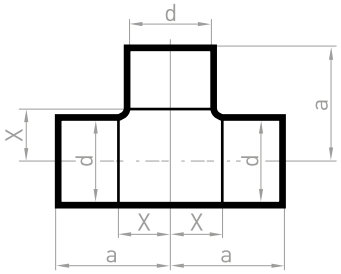
Elbow 45° - FF

Dimensions (mm)			Product Code
d	a	x	
10	13.6	14.5	EFEL01045
12	13.6	4.7	EFEL01245
15	16.9	6.1	EFEL01545
22	23.2	7.6	EFEL02245
28	28.6	10.6	EFEL02845
35	37	14	EFEL03545
42	42	15	EFEL04245
54	52	20	EFEL05445
67	65	28.5	EFEL06745
76	68	32	EFEL07645
108	110	60	EFEL10845
133	280	235	EFEL13345
159	335	290	EFEL15945
219	120	50	EFEL21945



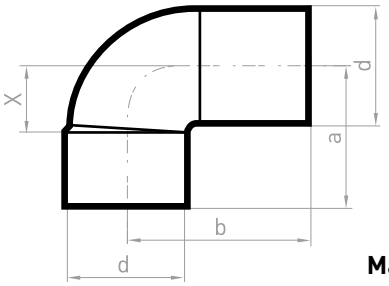
Elbow 90° - FF

Dimensions (mm)			Product Code
d	a	x	
8	16	6.8	EFEL008
10	16	7.4	EFEL010
12	16.2	7.6	EFEL012
15	29	18	EFEL015
22	28	12.6	EFEL022
28	35	16.6	EFEL028
35	46	23	EFEL035
42	55	28	EFEL042
54	70	38	EFEL054
67	83.5	50	EFEL067
76	91.5	58	EFEL076
108	127	79.5	EFEL108
133	127	79.5	EFEL133
159	160	100	EFEL159
219	200	130	EFEL219



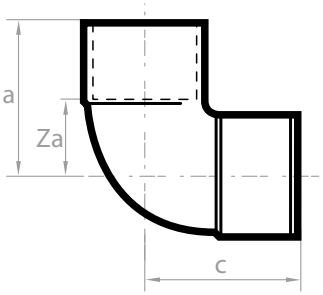
Equal Tee - FFF

Dimensions (mm)			Product Code
d	a	x	
8	12.8	6	EFTE008
10	15.4	7.6	EFTE010
12	18	9	EFTE012
15	20	9	EFTE015
22	28	12	EFTE022
28	34	15	EFTE028
35	42	20	EFTE035
42	50	23	EFTE042
54	61.5	29.5	EFTE054
67	78	42	EFTE067
76	80	46	EFTE076
108	112	64	EFTE108
133	135	85	EFTE133
159	160	100	EFTE159
219	178	115	EFTE219



Street Elbow 90° - MF

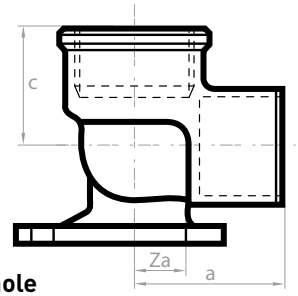
Dimensions (mm)				Product Code
d	a	b	x	
12	16.2	18.5	7.6	EFELS012
15	19.2	21.5	8.5	EFELS015
22	28	30.5	12.6	EFELS022
28	35	37.5	16.6	EFELS028
35	46	54	24	EFELS035
42	56	66	29	EFELS042
54	71	82	39	EFELS054
67	83.5	95	50	EFELS067
76	91.5	105	58	EFELS076
108	127	137	79.5	EFELS108
133	127	137	79.5	EFELS133
159	160	180	100	EFELS159



Male Elbow 90°

Dimensions (mm)				Product Code
Size	a	c	Za	
15mm x 1/2"	20	33	9	EFELMI0151/2
22mm x 3/4"	27	34	11	EFELMI0223/4
28mm x 1"	34	38	15	EFELMI0281

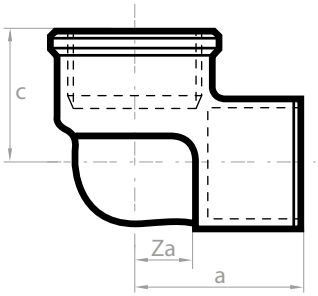
Suitable for: Copper x BSP parallel male thread



Backplate Elbow 90°, 3 hole

Size	Dimensions (mm) a	c	Za	Product Code
15mm x 1/2"	23	41	12	EFELWL0151/2
22mm x 3/4"	31	27	15	EFELWL0223/4

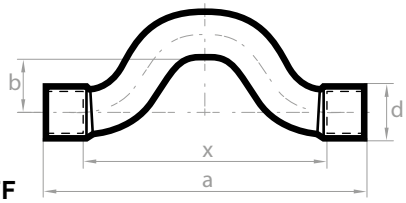
Suitable for: Copper x BSP parallel female thread



Female Elbow 90°

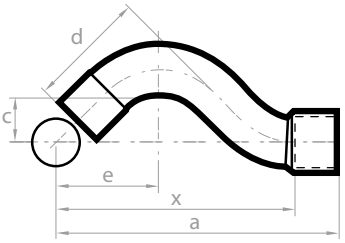
Size	Dimensions (mm) a	c	Za	Product Code
15mm x 1/2"	23	21	12	EFELFI0151/2
22mm x 3/4"	30	27	14	EFELFI0223/4
28mm x 1"	34	37	15	EFELFI 0281

Suitable for: Copper x BSP parallel female thread



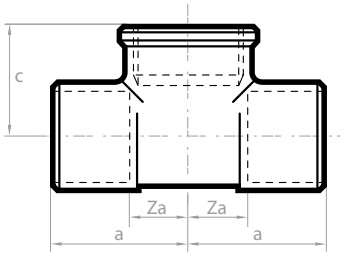
Full Crossover - FF

d	Dimensions (mm) a	b	x	Product Code
15	112.5	20	90	EFFC015
22	145	24	112	EFFC022



Part Crossover - MF

d	Dimensions (mm) a	b	c	e	x	Product Code
15	93	43	20	35	80	EFPC015
22	120	54	24	45	106	EFPC022

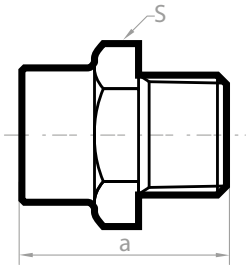


Female Met-Imp Tee

Size	Dimensions (mm) a	c	Za	Product Code
15 x 15mm x 1/2"	23	21	12	EFTEFI015151/2
22 x 22mm x 3/4"	30	27	14	EFTEFI022223/4
28 x 28mm x 1"	37	26	19	EFTEFI028281

Suitable for: Copper ends x BSP parallel female branch

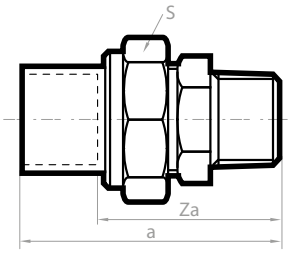
Male Nipple



Size	Dimensions (mm) a	S	Product Code
3/8" x 1/4"	27	17	EFNIP1/81/4
1/2" x 3/8"	31	23	EFNIP1/23/8
3/4" x 1/2"	39	28	EFNIP3/41/2
1" x 3/4"	41	33	EFNIP13/4
1 1/4" x 1"	46	44	EFNIP11/41
1 1/2" x 1 1/4"	51	50	EFNIP11/211/4
2" x 1 1/2"	53	62	EFNIP211/2
2 1/2" x 2"	62	77	EFNIP21/22

Suitable for: Union thread x BSP taper male thread cone joint

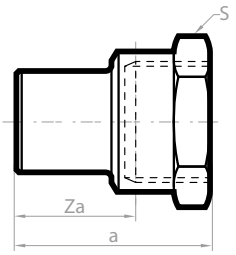
Straight male Union Connector



Size	Dimensions (mm) a	Za	S	Product Code
15mm x 1/2"	61	46	30	EFUND151/2
22mm x 3/4"	66	48	37	EFUND223/4
28mm x 1"	74	55	46	EFUND281
35mm x 1 1/4"	74	50	53	EFUND3511/4
42mm x 1 1/2"	81	53	65	EFUND4211/2
54mm x 2"	108	71	82	EFUND542

Suitable for: Copper x BSP taper male thread cone joint

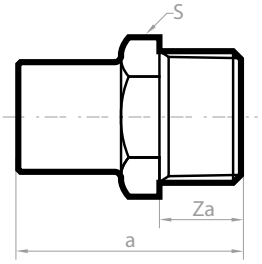
Straight female adaptor



Size	Dimensions (mm) a	c	Za	Product Code
15mm x 1/2"	30	20	25	EFCOFI0151/2
22mm x 3/4"	37	22	30	EFCOFI0223/4
28mm x 1"	43	30	37	EFCOFI0281
35mm x 1 1/4"	51	38	46	EFCOFI03511/4
42mm x 1 1/2"	55	40	52	EFCOFI04211/2
54mm x 2"	64	66	40	EFCOFI0542

Suitable for: Male copper x BSP parallel female thread

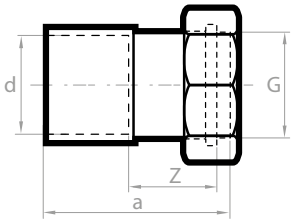
Straight male adaptor



Size	Dimensions (mm) a	c	Za	Product Code
15mm x 1/2"	37	15	24	EFCOMI0151/2
22mm x 3/4"	40	16	25	EFCOMI0223/4
28mm x 1"	46	17	32	EFCOMI0281
35mm x 1 1/4"	54	20	40	EFCOMI03511/4
42mm x 1 1/2"	61	20	50	EFCOMI04211/2
54mm x 2"	63	21	60	EFCOMI0542
108mm x 4"	76	55	119	EFCOMI1084
67mm x 2 1/2"	64	30	80	EFCOMI06721/2
76mm x 2 1/2"	63	29	86	EFCOMI07621/2

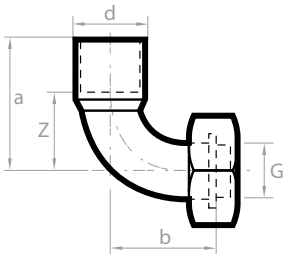
Suitable for: Male copper x BSP taper thread

Straight Tap Connector - FF

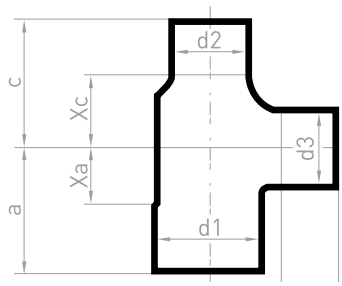


d	Dimensions (mm) G	a	Z	Product Code
15	1/2	30	14	EFSTC0151/2
15	3/4	39	23	EFSTC0153/4
22	3/4	37	16	EFSTC0223/4

Bent Tap Connector 90°



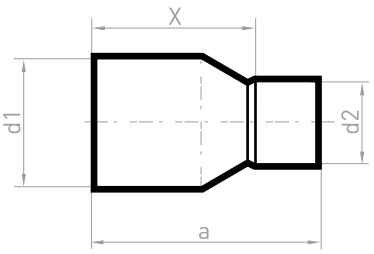
d	Dimensions (mm) G	a	b	Z	Product Code
15	1/2	27	26	16	EFBTC0151/2
22	3/4	39	34	23	EFBTC0223/4



Reducing Tee - FFF

d1xd2xd3	Dimensions (mm) a	b	c	Xa	Xb	Xc	Product Code
12x12x10	16	16	17.5	7	7	9.5	EFTE0121210
15x12x12	18	18	18	7	9	9	EFTE0151212
15x12x15	18	18	18	7	9	7	EFTE0151215
15x15x10	18	18	19	7	9	9	EFTE0151510
15x15x12	19	19	19	8	8	10	EFTE0151512
15x22x15	27	28	27	16	12	16	EFTE0152215
22x15x12	25	23	22.5	9	12	30.5	EFTE0221512
22x15x15	25	23	24	9	12	13	EFTE0221515
22x15x22	25	23	25	9	12	9	EFTE0221522
22x22x15	28	28	27	12	12	16	EFTE0222215
28x15x15	28	26	26.5	9	15	15.5	EFTE0281515
28x15x22	28	26	28.5	9	15	12.5	EFTE0281522
28x22x15	31	31	30	12	15	19	EFTE0282215
28x22x22	31	31	32	12	15	16	EFTE0282222
28x22x28	31	31	31	12	15	12	EFTE0282228
28x28x15	34	34	33	15	15	22	EFTE0282815
35x15x28	32.5	30	34	9.5	19	15	EFTE0351528
35x15x35	32.5	30	32.5	9.5	19	0.5	EFTE0351535
35x22x22	36	35	37.5	13	19	21.5	EFTE0352222
35x22x28	36	35	37	13	19	18	EFTE0352228
35x22x35	36	35	36	13	19	13	EFTE0352235
35x28x22	38	38	40	15	19	24	EFTE0352822
35x28x28	38	38	40	15	19	21	EFTE0352828
35x28x35	38	38	38	15	19	15	EFTE0352835
35x35x15	42	41	42	19	18	31	EFTE0353515
35x35x22	42	42	42.5	19	19	26.5	EFTE0353522
35x35x28	42	42	42.5	19	19	23.5	EFTE0353528
35x42x35	49.5	50	49.5	26.5	23	26.5	EFTE0354235
42x15x42	36.5	34	36.5	9.5	23	9.5	EFTE0421542
42x22x35	40.5	39	40.5	13.5	23	17	EFTE0422235
42x22x42	40	39	40	13	23	13	EFTE0422242
42x28x22	42.5	42	44	15.5	23	28	EFTE0422822
42x28x28	42.5	42	43	15.5	23	24	EFTE0422828
42x28x35	42.5	42	44	15.5	23	21	EFTE0422835
42x28x42	43	42	43	16	23	16	EFTE0422842

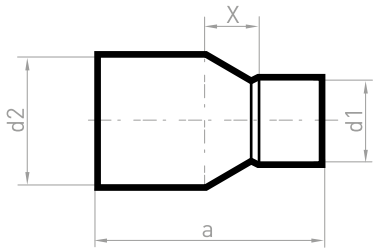
d1xd2xd3	Dimensions (mm) a	b	c	Xa	Xb	Xc	Product Code
42x35x28	46	46	46	19	23	27	EFTE0423528
42x35x35	46	46	46.5	19	23	23.5	EFTE0423535
42x35x42	46.5	46	46.5	19.5	23	19.5	EFTE0423542
42x42x28	50	50	50	23	23	31	EFTE0424228
42x42x35	50	50	50	23	23	27	EFTE0424235
42x54x42	62	61	62	35	29	35	EFTE0425442
54x15x54	41.5	40	41.5	9.5	29	9.5	EFTE0541554
54x22x42	46	45	47	14	29	20	EFTE0542242
54x22x54	45	45	45	13	29	13	EFTE0542254
54x28x42	49	48	49.5	17	29	22.5	EFTE0542842
54x28x54	48	48	48	16	29	16	EFTE0542854
54x35x35	52	52	51	20	29	28	EFTE0543535
54x35x54	51.5	52	51.5	19.5	29	19.5	EFTE0543554
54x42x42	55	56	56.5	23	29	23	EFTE0544242
54x42x54	55	56	55	23	29	23	EFTE0544254
67x67x28	54.5	61	54.5	21	42	35	EFTE0676728
67x67x35	58.5	64	58.5	25	41	21	EFTE0676735
67x67x42	61	67	61	27	41	27	EFTE0676742
67x67x54	67	74	67	33.5	42	33.5	EFTE0676754
67x54x67	74	74	73	40	40	41	EFTE0675467
76x76x35	59	70	59.5	25.5	46	25.5	EFTE0767635
76x76x42	63	74	63	29	46	29	EFTE0767642
76x76x54	69	79	69	35	46	35	EFTE0767654
76x76x67	78	81	78	44.5	48	44.5	EFTE0767667
108x108x22	72	88	72	24.5	72	24.5	EFTE10810822
108x108x35	77	92	22	29.5	65	29.5	EFTE10810835
108x108x42	80	97	80	32.5	70	32.5	EFTE10810842
108x108x54	86	97	86	38.5	65	38.5	EFTE10810845
108x108x67	91	97	91	43.5	64	43.5	EFTE10810867
108x108x76	95	97	95	47.5	64	47.5	EFTE10810876
133x133x108	139	142	139	89	94.5	89	EFTE133133108
159x159x76	101	120	101	53.5	86.5	53.5	EFTE15915976
159x159x133	130	120	130	92.5	86.5	82.5	EFTE159159133
159x159x108	117	142	117	69.5	94.5	69.5	EFTE159159108



Reducer - MF

Dimensions (mm)			Product Code
d	a	x	
10x8	19	12	EFRED0108
12x8	21.5	14.5	EFRED0128
15x8	25	17	EFRED01508
15x8	38	30	EFREDLT01508
15x10	24	16	EFRED01510
15x12	40	30	EFREDLT01512
15x12	26	17.5	EFRED01512
22x12	33	25	EFRED02212
22x15	33	22	EFRED02215
28x12	41	32	EFRED02812
28x22	44	28	EFRED02822
35x15	50	39	EFRED03515
35x22	50	35	EFRED03522
35x28	50	32	EFRED03528
42x15	65	54	EFRED04215
42x18	59	46	EFRED04218
42x22	58	42	EFRED04222
42x28	58	40	EFRED04228
42x35	60	35	EFRED04235
54x15	70	60	EFRED05415
54x22	70	52	EFRED05422
54x28	70	45	EFRED05428
54x35	70	45	EFRED05435
54x42	70	45	EFRED05442
67x28	80	60	EFRED06728

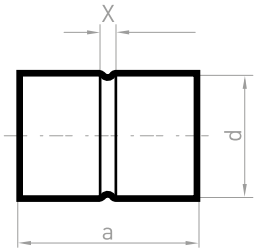
Dimensions (mm)			Product Code
d	a	x	
67x35	80	60	EFRED06735
67x42	88	58	EFRED06742
67x54	80	48	EFRED06754
76x35	90	66	EFRED07635
76x42	90	60	EFRED07642
76x54	85	50	EFRED07654
76x64	80	50	EFRED07664
76x67	81	48.5	EFRED07667
108x35	116	84	EFRED10835
108x42	116	74	EFRED10842
108x54	116	84	EFRED10854
108x64	110	80	EFRED10864
108x67	112	80	EFRED10867
108x76	108	72	EFRED10876
133x76	119	82.5	EFRED13376
133x108	106	70	EFRED133108
159x76	150	110	EFRED15976
159x108	130	80	EFRED159108
159x133	123	70	EFRED159133
219x159	150	90	EFRED219159



Reducing Coupling - FF

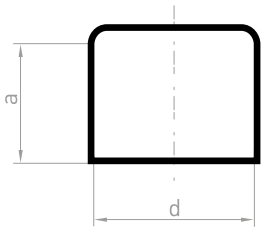
Dimensions (mm)			Product Code
d	a	x	
12x10	20	3	EFCP01210
15x12	24	4	EFCP01512
22x12	32	8	EFCP02212
22x15	32	8	EFCP02215
28x15	38	12	EFCP02815
28x22	40	6	EFCP02822
35x22	48	8	EFCP03522
35x28	48	6	EFCP03528
42x15	54	16	EFCP04215
42x22	56	13	EFCP04222
42x28	56	10	EFCP04228
42x35	60	10	EFCP04235
54x22	70	20	EFCP05422
54x28	70	20	EFCP05428
54x35	70	10	EFCP05435

Dimensions (mm)			Product Code
d	a	x	
54x42	70	10	EFCP05442
64x42	78	14	EFCP06442
64x54	78	12	EFCP06454
67x54	85	12	EFCP06754
76x54	84	18	EFCP07654
76x64	84	18	EFCP07664
76x67	85	18	EFCP07667
108x54	105	20	EFCP10854
108x76	105	20	EFCP10876
108x89	105	20	EFCP10889
133x76	110	35	EFCP13376
133x89	112	35	EFCP13389
133x108	100	25	EFCP133108
159x108	135	45	EFCP159108
159x133	120	50	EFCP159133



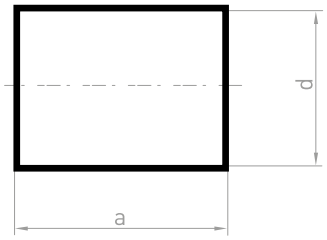
Straight Coupling with Stop - FF

Dimensions (mm)			Product Code
d	a	x	
8	15	1.2	EFCP008
10	18	1.5	EFCP010
12	19	1.8	EFCP012
15	24.5	1.8	EFCP015
22	33	2.2	EFCP022
28	40	3	EFCP028
35	49	3	EFCP035
42	38	4	EFCP042
54	69	5	EFCP054
67	72	5	EFCP067
76	72	5	EFCP076
108	100	3	EFCP108
133	100	3	EFCP133
159	100	4	EFCP159
219	116	5	EFCP219



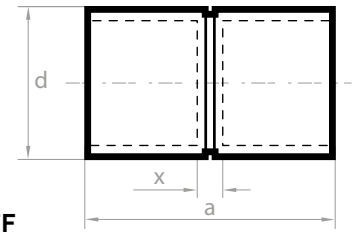
Stop End - F

Dimensions (mm)		Product Code
d	a	
8	6.8	EFEC008
10	7.8	EFEC010
12	8.6	EFEC012
15	10.6	EFEC015
22	15.4	EFEC022
28	18.4	EFEC028
35	23	EFEC035
42	27	EFEC042
54	32	EFEC054
67	33.5	EFEC067
76	33.5	EFEC076
108	47.5	EFEC108
159	62.5	EFEC159



Slip Coupling - F

Dimensions (mm)		Product Code
d	a	
15	24	EFSC015
22	33	EFSC022
28	38	EFSC028
35	48	EFSC035
42	58	EFSC042
54	66	EFSC054



Met-Imp Coupling - FF

Dimensions (mm)			Product Code
d	a	x	
15 x 1/2 IMP	24.5	1.8	EFCP0151/2
22 x 3/4 IMP	33	2.2	EFCP0223/4
28 x 1 IMP	40	3	EFCP0281
35 x 1 1/4 IMP	49	3	EFCP03511/4

Lawton Soldering Flux

Non-corrosive soft solder flux paste for soldering applications of copper to tin alloys. Water-soluble. With halogens. It complies with EN-ISO 9454 (2.1.2.C).

Packing

Supplied in plastic jars of 113g or 453g boxed.

Chemical Composition

20% Etoxiled Fatty alcohol 5% Fatty acid 50% Amine chloride 25% Water

Hazards Identification

Human: This product is not dangerous for the health
Environment: It is not considered dangerous for the environment

First Aids Measures

After inhalation: Bring the operative to breathe fresh air and consult a doctor.
By contact with the skin: Wash with water and soap.
By contact with eyes: Rinse out with abundant clear water during 15 minutes keeping open eyes and consult a opthamologist in case of persistent irritation.
After ingestion: Wash out with abundant clear water during 15 minutes keeping open eyes and consult a opthamologist in case of persistent irritation.

Fire Fighting Measures

Extinction means: use powders, foams or pulverised water.
Peculiar danger by the exposure to the substance or its combustion: None; the product cannot explode and set on fire. **Special protecting kit:** Use a mask in closed locations

Accidental Release Measures

Personal precautions: Described prevention measures at point 8 **Cleaning method:** Absorb the product with sand or sawdust. Clean the soiled surface with abundant hot water.

Handling And Storage

Handling: Avoid always, if it is possible, the contact with the skin; therefore it's recommended to use the applicator brush. Keep the bottle always tightly closed. Avoid the direct vapour's inhalation caused by the heating Storage: None, in normal conditions of use

Exposure Control / Personal Protection.

Exposure limit: None **Breathing protection:** Use facemask if you work large period of time in small and poorly ventilated spaces. In open spaces or in open air it is no necessary. **Eye protection:** It is recommended to use safety goggles in order to avoid splashing **Skin protection:** Only in the event of hyper-sensibility or allergy to the product, it is necessary to use gloves of neoprene. Normally the use of the application brush avoids skin irritations.

Physical And Chemical Properties

Physical state at 20º C: Paste Freezing point: -10 º C **Odour:** None **Ignition point:** Not Determined (higher than 200ºC) **Colour:** Yellowish Vapour pressure: N.D. pH: 6/7 **Density:** 1.10 gr/cc **Boiling point:** 110 liquid part **Water solubility:** Total

Stability & Reactivity

Stability: Stable emulsion up to 65º and activity till 300ºC **Conditions to be avoided:** None **Materials to be avoided:** None **Hazardous decomposition products:** None

Toxicological Information

Severe Toxicity: DL50 oral rat. It is not toxic in its maximum dosage **Poisoning routes:** None **Acute effects / symptoms:** During the heating it may irritate slightly the eyes, the mucous nasal and the respiratory tract. Irritant to the skin if there are open wounds, making sting. There is not described any case of migraine, of spontaneous vomits or nausea produced by the local use of the product. **Chronic effects:** There is no described any case of chronic alteration produced by the local use of the product.

Ecological Information

Ecological toxicity: None described

Waste Disposal

Product Disposal: Respect local and national regulations. Dispose remaining product through an authorized waste disposal party. **Used container disposal:** Dispose container through an authorized waste disposal party.

Transport Information

There is no special consideration necessary

Regulatory Information

Classification: This product is not subject to classification as per the European Directive criteria regarding the control of dangerous substances and derivatives. The product has been adapted to the European Norm EN 29454 (2.1.2.C) of November 1993 about "Soft soldering fluxes" in substitution of the Norm DIN 8511

Leaded Solder Wire

Lawtons leaded soft solder is a leaded alloy developed for plumbing and industrial applications of non-potable water supplies, heating and gas installations.

Type of Alloy

Compliant to the European and international standard: EN-ISO 9453: 2014.
Alloy No. 136
Alloy Designation Pb74Sn25Sb1
Melting Temperature 185 - 263ºC

Packing

Format: solid solder wire. Diameters: 0,35mm to 6mm. Delivered in reels of 500gr

Composition

25% Tin 74% Lead 1% Antimony

Hazards Identification

Eyes: Burns caused by the melted material **Skin:** Burns caused by the melted material
Ingestion: Harmful due to lead content. **Inhalation:** It may be harmful and damage health in case of inhalation of the fumes emitted when this product is heated. It must be only used in ventilated areas.
The activators of the resin do not implied any hazard given its low concentration in the final product.

First Aid Measures

Eyes Flush immediately with water. Get dermatologist attention. **Skin** Wash with soap and water **Ingestion** Wash mouth with water and seek medical attention. **Inhalation** Evacuate to fresh air and seek medical attention

Fire Fighting Measures

Specific hazards None, the product cannot explode or become inflamed.
Extinguishing media Use pulverised water or foam
Fire-fighting equipment Foresee breathing protection. Use face mask

Accidental Released Measures

The supplied state of the material, present no risk of spillage.
Individual precautions - Use gloves to avoid burns in case of contact with the product.
Environmental protection precautions - Avoid the product entering into underground water pipes or ground waters.
Cleaning methods - Collect the product by mechanical means, avoiding dust formation. To remove completely, clean the surface with plenty of water.

Handling and Storage

Handling Whenever it is possible, avoid contact with skin. Use in well ventilated areas. Avoid direct inhalation of fumes. Preventive instructions against explosions and fires: no special requirements.

Storage - Requirements to be met by premises with storerooms and containers:
No special requirements.
Remarks for combined storage: not required
Further instructions about storage conditions:
Keep container tightly sealed.
Store in tightly closed and dry environments.
Storage class: VFD Class (Regulation on fluid fuels): deleted

Exposure Controls / Personal Protection

Additional instructions for the fitting of technical facilities: With the molten material: use in ventilated environments, or well equipped with fume extraction. Components with acceptable limit values that require monitoring at the workplace: the product does not contain any relevant quantities of substances which limit values must be controlled in the workplace.

Additional instructions: the current lists at the time of preparation were used as basis.

Personal protective equipment.
General protective and hygienic measures: Keep away from food, drinks and animal food. Wash hands before breaks and after work. Avoid contact with eyes and skin.
Respiratory protection: Use mask in poorly ventilated places.
Skin Protection: Gloves, only during the heating process.
Eye protection: Wear safety goggles to prevent potential spills during the operational phase.

Exposure limit values:

Substance Name	VLA-ED (mg/m³)	VLA-EC (mg/m³)
Tin	2	-
Lead	0.15	-

Physical and Chemical Properties

Appearance Solid
Colour Silver grey
Odour None
Flash point Not applicable
Combustion properties Non oxidant
Ignition Not applicable
Danger of explosion Not applicable
Relative density 10,54 Gr/cc.

Stability and Reactivity

Stability
Heat: heating may cause oxides steams and metal fumes.
Humidity: Keep the product dry.
Duration: Product not expired.

Toxicological Information

Acute toxicity Tin: 40 µg/m³ Lead: 2,0 mg/ m³
Exposure ways Inhalation
Acute effects / symptoms During its heating may cause slight eye , nasal mucous and respiratory tract irritation.
Chronic effects Only after years of constant activity in unfavourable conditions, it may present risk of lung edema.

Ecological Information

General notes:
Level of damage to water 1 (self-classification): limited danger for water. Do not allow the undiluted product or in large quantities to infiltrate in ground waters, in water courses or in water pipes. It must not end up in sewages or drainage ditches.

Disposal Considerations

Storage and handling
Recommendation: Do not dispose of this substance with household waste. It should not reach sewer system.
Unclean packaging
Recommendation: Dispose of according to official regulations.

Information Concerning Transport

There is no special consideration in this regard.

Regulatory Information

Rating: This product is not subject to classification according to the criteria by the EC Directives on the Control of Dangerous Substances and Preparations.

R-Phrases: R 20/22 Harmful by inhalation and ingestion.
S-Phrases: S 2 Keep out of the reach of children.
S 13 Keep away from food, drinks and feed.
S 21 Do not smoke while using it.
S 26 In case of contact with eyes, rinse immediately with plenty water and consult a doctor.

WARNING: USE ONLY IN WELL VENTILATED AREAS
as when this product is heated may emit dangerous fumes for health if inhaled.

Lead Free Solder Wire

Lawtons lead free soft solder is a lead free alloy developed for plumbing and industrial applications of potable water supplies, heating and gas installations.

Type of Alloy

Compliant to the European and international standard: EN-ISO 9453: 2014.
Alloy No. 402
Alloy Designation S-Sn97Cu3
Melting Temperature 220 eutectic

Packing

Format: solid solder wire. Diameters: 0,35mm to 6mm. Delivered in reels of 500gr

Composition

97% Tin 3% Copper

Hazards Identification

Eyes: Burns caused by the melted material **Skin:** Burns caused by the melted material
Ingestion: Not applicable. **Inhalation:** Evacuate to fresh air and seek medical attention

First Aid Measures

Eyes Flush immediately with water. Get dermatologist attention. **Skin** Wash with soap and water **Ingestion** Wash mouth with water and seek medical attention. **Inhalation** Evacuate to fresh air and seek medical attention

Fire Fighting Measures

Specific hazards None, the product cannot explode or become inflamed.
Extinguishing media Not applicable
Fire-fighting equipment Not applicable

Accidental Released Measures

The supplied state of the material, present no risk of spillage.
Individual precautions - Use gloves to avoid burns in case of contact with the product.
Environmental protection precautions - Avoid the product entering into underground water pipes or ground waters.
Cleaning methods - Collect the product by mechanical means, avoiding dust formation. To remove completely, clean the surface with plenty of water.

Handling and Storage

Handling Whenever it is possible, avoid contact with skin. Use in well ventilated areas. Avoid direct inhalation of fumes. Preventive instructions against explosions and fires: no special requirements.

Storage - Requirements to be met by premises with storerooms and containers:
No special requirements.
Remarks for combined storage: not required
Further instructions about storage conditions:

Keep container tightly sealed.

Store in tightly closed and dry environments.

Storage class: VFD Class (Regulation on fluid fuels): deleted

Exposure Controls / Personal Protection

Additional instructions for the fitting of technical facilities: With the molten material: use in ventilated environments, or well equipped with fume extraction. Components with acceptable limit values that require monitoring at the workplace: the product does not contain any relevant quantities of substances which limit values must be controlled in the workplace.

Additional instructions: the current lists at the time of preparation were used as basis.

Personal protective equipment.
General protective and hygienic measures: Keep away from food, drinks and animal food. Wash hands before breaks and after work. Avoid contact with eyes and skin.
Respiratory protection: Use mask in poorly ventilated places.
Skin Protection: Gloves, only during the heating process.
Eye protection: Wear safety goggles to prevent potential spills during the operational phase.

Exposure limit values:

Substance Name	VLA-ED (mg/m^3)	VLA-EC (mg/m^3)
Tin	2	-
Copper	1	-

Physical and Chemical Properties

Appearance Solid
Colour Silver grey
Odour None
Flash point Not applicable
Combustion properties Non oxidant
Ignition Not applicable
Danger of explosion Not applicable
Relative density 7.33

Stability and Reactivity

Stability
Heat: heating may cause oxides steams and metal fumes.
Humidity: Keep the product dry.
Duration: Product not expired.

Toxicological Information

Acute toxicity Tin: 2 mg/ m^3 Silver: 0,1 mg/ m^3 Copper: 1 mg/ m^3
Exposure ways Inhalation
Acute effects / symptoms During its heating may cause slight eye , nasal mucous and respiratory tract irritation.
Chronic effects Only after years of constant activity in unfavourable conditions, it may present risk of lung edema.

Ecological Information

General notes:
Level of damage to water 1 (self-classification): limited danger for water. Do not allow the undiluted product or in large quantities to infiltrate in ground waters, in water courses or in water pipes. It must not end up in sewers or drainage ditches.

Disposal Considerations

Storage and handling
Recommendation: Do not dispose of this substance with household waste. It should not reach sewer system.
Unclean packaging
Recommendation: Dispose of according to official regulations.

Information Concerning Transport

There is no special consideration in this regard.

Regulatory Information

Rating: This product is not subject to classification according to the criteria by the EC Directives on the Control of Dangerous Substances and Preparations.

R-Phrases: R 20/22 Harmful by inhalation and ingestion.
S-Phrases: S 2 Keep out of the reach of children.
S 13 Keep away from food, drinks and feed.
S 21 Do not smoke while using it.
S 26 In case of contact with eyes, rinse immediately with plenty water and consult a doctor.

WARNING: USE ONLY IN WELL VENTILATED AREAS
as when this product is heated may emit dangerous fumes for health if inhaled.

Medical Gas Tubes

BS EN 13348

Specifically designed for copper medical gas and vacuum systems. Superseding earlier 'hybridised' copper tube standards such BS EN 1057 & BS 2871 Part 1 Table X
Conforms to HTM 02-01:2006 & NHS engineering spec. C11

Specific Benefits Include:
· Tighter limits on cleanliness determination.
· Improved identification to avoid confusion with similar sizes of water service tube.
· Lawton Tubes are the first British company to be awarded the kitemark licence to supply to this standard.

Material Analysis
Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
Minimum Copper Content 99.90 % (including silver)
Phosphorus 0.015-0.040 %
Total Impurity Maxima 0.060 % (excluding phosphorus and silver)
The melting point of copper is 1083ºC and it has a density of 8.9 gm/cc

Cleanliness
Maximum total carbon content 0.20 mg/dm2.

Packaging
Each tube individually end capped, tube bundles polythene wrapped* and sealed.

Marking
Sizes 12 -108mm copper tubes are stamped and inkjet marked with:
· Tube size
· Kitemark
· EN 13348
· Temper
· Manufacturer
· Date & Batch Code 12mm to 28mm sizes are also inkjet marked with additional data to enable traceability

Sizes above 108mm (133mm/159mm/219mm) are made to EN 1057 and cleaned to EN 13348

No KM66240

Mechanical Properties

Dimensions and Tolerances

O.D. (mm)	Wall (mm)	Temper	Max Working Pressure bar up to 65°C	Thickness Tolerance	Diameter Tolerance	
					Mean	Including Ovality
12	0.6 (TX)	Half Hard	63	±10%	± 0.04mm	±0.09mm
12	0.8 (TY)	Half Hard	87	±10%	± 0.04mm	±0.09mm
15	0.7 (TX)	Half Hard	58	±10%	± 0.04mm	±0.09mm
15	1.0 (TY)	Half Hard	87	±13%	± 0.04mm	±0.09mm
22	0.9 (TX)	Half Hard	51	±10%	± 0.05mm	±0.10mm
22	1.2 (TY)	Half Hard	69	±15%	± 0.05mm	±0.10mm
28	0.9 (TX)	Half Hard	40	±10%	± 0.05mm	±0.10mm
28	1.2 (TY)	Half Hard	55	±15%	± 0.05mm	±0.10mm
35	1.0	Hard	42	±15%	± 0.06mm	±0.07mm
35	1.2 (TX)	Half Hard	42	±10%	± 0.06mm	±0.11mm
35	1.5 (TY)	Hard	64	±10%	± 0.06mm	±0.07mm
42	1.0	Hard	35	±15%	± 0.06mm	±0.07mm
42	1.2 (TX)	Half Hard	35	±10%	± 0.06mm	±0.11mm
42	1.5 (TY)	Hard	53	±10%	± 0.06mm	±0.07mm
54	1.0	Hard	27	±15%	± 0.06mm	±0.07mm
54	1.2 (TX)	Half Hard	27	±10%	± 0.06mm	±0.11mm
54	2.0 (TY)	Hard	55	±10%	± 0.06mm	±0.07mm
66.7	1.2 (TX)	Hard	26	±15%	± 0.07mm	±0.10mm
66.7	2.0 (TY)	Hard	45	±15%	± 0.07mm	±0.10mm
76.1	1.5 (TX)	Hard	29	±15%	± 0.07mm	±0.10mm
76.1	2.0 (TY)	Hard	39	±15%	± 0.07mm	±0.10mm
108	1.5 (TX)	Hard	20	±15%	± 0.07mm	±0.20mm
108	2.5 (TY)	Hard	34	±15%	± 0.07mm	±0.20mm
133	1.5 (TX)	Hard	16	±15%	± 0.20mm	±0.70mm
159	2.0 (TX)	Hard	18	±15%	± 0.20mm	±0.70mm
219	3.0 (TX)	Hard	20	±15%	± 0.60mm	±1.50mm

Working pressures are to BS 2871:part1:1971

Medical Gas Tubes to BS EN 13348

Material Temper EN 1173	Tensile Strength min. (N/mm2)	Elongation min. (%)	Hardness (Indicative) HV5 VPN
R250 (Half Hard)	250	30 (TX) 20 (TY)	75-100
R290 (Hard)	290	3	Over 100

Medical Gas Metric Endfeed Fittings

Degreased copper end feed type fittings manufactured to:

BS EN 1254-1:1998 Part 1 Specification for copper and copper alloy fittings with capillary ends for soldering and brazing for use with copper tubes.
BS EN 1254-1:1998 Part 5 Specification for copper and copper alloy fittings with short ends for capillary brazing for use with copper tubes.
All fittings are supplied in individually sealed protective polythene bags and are specifically designed for copper medical gas and vacuum systems.

Specific Benefits Include:

Complies to NHS (UK) Health Technical Memorandum 02-01:2006
All fittings supplied contain less than 100mg/m2 (0.01mg/cm2) of hydrocarbons on the degreased surface.
Improved identification to avoid confusion with similar sizes of water service fittings.
All individually sealed protective polythene bags are product labelled.
Fittings are supplied in reinforced cardboard boxes, labelled with product information and outline drawing of fitting.
Each fitting is engraved with unique branding, where space permits.

54mm sample

No KM536466

LAWTON MED FITTINGS

Working Temperatures and Pressure

Service Temperature*				
Size	Min -40°C	30°C	65°C	Max 110°C
8mm to 28mm	25 bar	25 bar	25 bar	16 bar
35mm to 54mm	25 bar	25 bar	16 bar	10 bar
67mm	16 bar	16 bar	16 bar	10 bar

*LTC Fittings performance when correctly assembled with Lawton Tube's EN13448 copper tube using tin/copper soft solder EN 29453 or tin/silver soft solder EN 29453

Service Temperature**						
Size	Min -196°C	65°C	120°C	150°C	175°C	Max 200°C
8mm	62.5 bar	62.5 bar	58.8 bar	46.7 bar	35.5 bar	23.3 bar
10mm	50.9 bar	50.9 bar	47.9 bar	38.0 bar	28.9 bar	19.0 bar
12mm	42.9 bar	42.9 bar	40.3 bar	32.0 bar	24.3 bar	16.0 bar
15mm	40.3 bar	40.3 bar	37.9 bar	30.1 bar	22.8 bar	15.0 bar
22mm	35.6 bar	35.6 bar	33.5 bar	26.6 bar	20.2 bar	13.3 bar
28mm	28.2 bar	28.2 bar	26.5 bar	21.1 bar	16.0 bar	10.5 bar
35mm	25.2 bar	25.2 bar	23.7 bar	18.8 bar	14.3 bar	9.4 bar
42mm	23.2 bar	23.2 bar	21.8 bar	17.3 bar	13.1 bar	8.6 bar
54mm	19.8 bar	19.8 bar	18.6 bar	14.7 bar	11.2 bar	7.4 bar

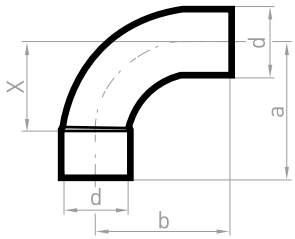
** Max hydraulic working pressure for LTC fittings when assembled with Lawton Tube's EN13348 copper tube using hard solder (brazing alloy) to EN 1044

Service Temperature***					
Size	Min -196°C	65°C	120°C	150°C	Max 200°C
67mm	18.6 bar	18.6 bar	17.5 bar	14.0 bar	6.9 bar
76mm	18.6 bar	18.6 bar	17.5 bar	14.0 bar	6.9 bar
108mm	17.2 bar	17.2 bar	16.2 bar	12.9 bar	6.4 bar
133mm	10.5 bar	10.5 bar	8.5 bar	7.7 bar	4.1 bar
159mm	11.7 bar	11.7 bar	9.7 bar	8.6 bar	4.6 bar

*** Max hydraulic working pressure for LTC fittings when assembled with Lawton Tube's EN13348 copper tube using hard solder (brazing alloy) to EN 1044

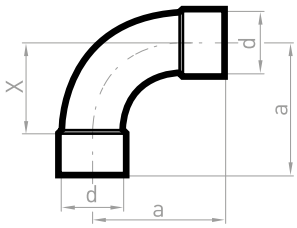
Mechanical Properties

EN3448 Copper end feed fitiing



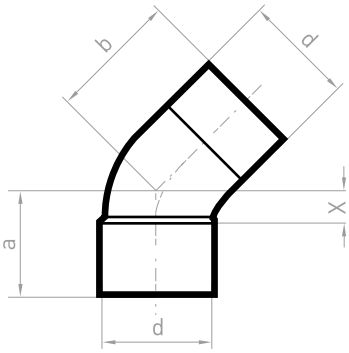
Bend 90° - MF

Dimensions (mm)				Product Code
d	a	b	x	
12	23	25	14.4	MEDELS012
15	29	31	18	MEDELS015
22	42	44	26.4	MEDELS022
28	52	54	33.6	MEDELS028
35	65	67	42	MEDELS035
42	77.5	79.5	50.4	MEDELS042
54	97	99	64.8	MEDELS054
67	117	120	84	MEDELS067
76	125	128	91.3	MEDELS076
108	177	180	129.6	MEDELS108
133	212	215	177	MEDELS133
159	262	265	227	MEDELS159



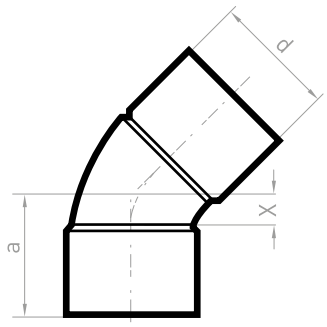
Bend 90° - FF

Dimensions (mm)			Product Code
d	a	x	
12	23	14.4	MEDEL012
15	29	18	MEDEL015
22	42	26.4	MEDEL022
28	52	33.6	MEDEL028
35	65	42	MEDEL035
42	77.5	50.4	MEDEL042
54	97	64.8	MEDEL054
67	117	84	MEDEL067
76	125	91.3	MEDEL076
108	177	129.6	MEDEL108
133	212	177	MEDEL133
159	262	227	MEDEL159



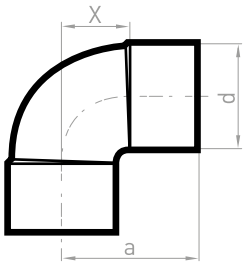
Elbow 45° - MF

Dimensions (mm)				Product Code
d	a	b	x	
12	13.6	15.6	4.7	MEDELS01245
15	16.9	18.9	6.1	MEDELS01545
22	23.2	25.2	6.7	MEDELS02245
28	28.6	30.6	10.6	MEDELS02845
35	37	39	14	MEDELS03545
42	42	44	15	MEDELS04245
54	52	54	20	MEDELS05445
67	65	58	28.5	MEDELS06745
76	68	71	32	MEDELS07645
108	110	113	60	MEDELS10845
133	280	280	235	MEDELS13345
159	335	335	290	MEDELS05945



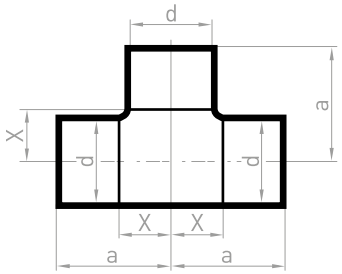
Elbow 45° - FF

Dimensions (mm)			Product Code
d	a	x	
12	13.6	4.7	MEDEL01245
15	16.9	6.1	MEDEL01545
22	23.2	7.6	MEDEL02245
28	28.6	10.6	MEDEL02845
35	37	14	MEDEL03545
42	42	15	MEDEL04245
54	52	20	MEDEL05445
67	65	28.5	MEDEL06745
76	68	32	MEDEL07645
108	110	60	MEDEL10845
133	280	235	MEDEL13345
159	335	290	MEDEL15945
219	120	50	MEDEL21945



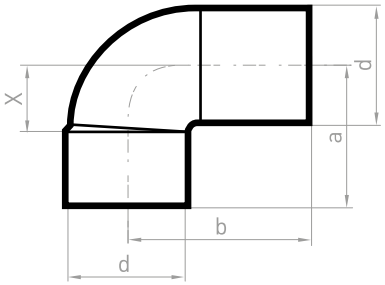
Elbow 90° - FF

Dimensions (mm)			Product Code
d	a	x	
12	16.2	7.6	MEDEL012
22	28	12.6	MEDEL015
28	35	16.6	MEDEL028
35	46	23	MEDEL035
42	55	28	MEDEL042
54	70	38	MEDEL054
67	83.5	50	MEDEL067
76	91.5	58	MEDEL076
108	127	79.5	MEDEL108
133	127	79.5	MEDEL133
159	160	100	MEDEL159
219	200	130	MEDEL219



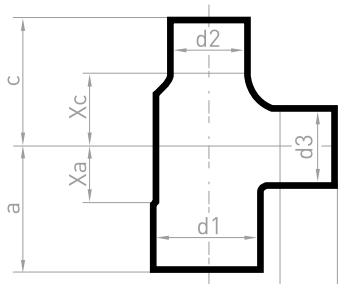
Equal Tee - FFF

Dimensions (mm)			Product Code
d	a	x	
12	18	9	MEDTE012
22	28	12	MEDTE022
28	34	15	MEDTE028
35	42	20	MEDTE035
42	50	23	MEDTE042
54	61.5	29.5	MEDTE054
67	78	42	MEDTE067
76	80	46	MEDTE076
108	112	64	MEDTE108
133	135	85	MEDTE133
159	160	100	MEDTE159
219	178	115	MEDTE219



Street Elbow 90° - MF

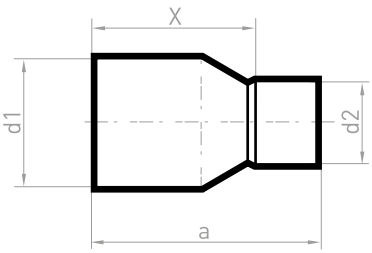
Dimensions (mm)				Product Code
d	a	b	x	
12	16.2	18.5	7.6	MEDELS012
15	19.2	21.5	8.5	MEDELS015
22	28	30.5	12.6	MEDELS022
28	35	37.5	16.6	MEDELS028
35	46	54	24	MEDELS035
42	56	66	29	MEDELS042
54	71	82	39	MEDELS054
67	83.5	95	50	MEDELS067
76	91.5	105	58	MEDELS076
108	127	137	79.5	MEDELS108
133	127	137	79.5	MEDELS133
159	160	180	100	MEDELS159



Reducing Tee - FFF

d1xd2xd3	a	b	c	Xa	Xb	Xc	Product Code
12x12x10	16	16	17.5	7	7	9.5	MEDTE0121210
15x12x12	18	18	18	7	9	9	MEDTE0151212
15x12x15	18	18	18	7	9	7	MEDTE0151215
15x15x12	19	19	19	8	8	10	MEDTE0151512
15x22x15	27	28	27	16	12	16	MEDTE0152215
22x15x12	25	23	22.5	9	12	30.5	MEDTE0221512
22x15x15	25	23	24	9	12	13	MEDTE0221515
22x15x22	25	23	25	9	12	9	MEDTE0221522
22x22x15	28	28	27	12	12	16	MEDTE0222215
28x15x15	28	26	26.5	9	15	15.5	MEDTE0281515
28x15x22	28	26	28.5	9	15	12.5	MEDTE0281522
28x22x15	31	31	30	12	15	19	MEDTE0282215
28x22x22	31	31	32	12	15	16	MEDTE0282222
28x22x28	31	31	31	12	15	12	MEDTE0282228
28x28x15	34	34	33	15	15	22	MEDTE0282815
35x15x28	32.5	30	34	9.5	19	15	MEDTE0351528
35x15x35	32.5	30	32.5	9.5	19	0.5	MEDTE0351535
35x22x22	36	35	37.5	13	19	21.5	MEDTE0352222
35x22x28	36	35	37	13	19	18	MEDTE0352228
35x22x35	36	35	36	13	19	13	MEDTE0352235
35x28x22	38	38	40	15	19	24	MEDTE0352822
35x28x28	38	38	40	15	19	21	MEDTE0352828
35x28x35	38	38	38	15	19	15	MEDTE0352835
35x35x15	42	41	42	19	18	31	MEDTE0353515
35x35x22	42	42	42.5	19	19	26.5	MEDTE0353522
35x35x28	42	42	42.5	19	19	23.5	MEDTE0353528
35x42x35	49.5	50	49.5	26.5	23	26.5	MEDTE0354235
42x15x42	36.5	34	36.5	9.5	23	9.5	MEDTE0421542
42x22x35	40.5	39	40.5	13.5	23	17	MEDTE0422235
42x22x42	40	39	40	13	23	13	MEDTE0422242
42x28x22	42.5	42	44	15.5	23	28	MEDTE0422822
42x28x28	42.5	42	43	15.5	23	24	MEDTE0422828
42x28x35	42.5	42	44	15.5	23	21	MEDTE0422835
42x28x42	43	42	43	16	23	16	MEDTE0422842

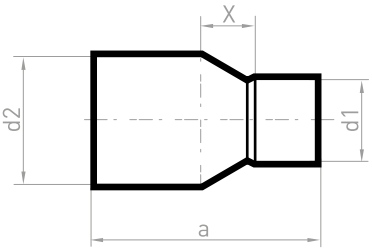
d1xd2xd3	a	b	c	Xa	Xb	Xc	Product Code
42x35x28	46	46	46	19	23	27	MEDTE0423528
42x35x35	46	46	46.5	19	23	23.5	MEDTE0423535
42x35x42	46.5	46	46.5	19.5	23	19.5	MEDTE0423542
42x42x28	50	50	50	23	23	31	MEDTE0424228
42x42x35	50	50	50	23	23	27	MEDTE0424235
42x54x42	62	61	62	35	29	35	MEDTE0425442
54x15x54	41.5	40	41.5	9.5	29	9.5	MEDTE0541554
54x22x42	46	45	47	14	29	20	MEDTE0542242
54x22x54	45	45	45	13	29	13	MEDTE0542254
54x28x42	49	48	49.5	17	29	22.5	MEDTE0542842
54x28x54	48	48	48	16	29	16	MEDTE0542854
54x35x35	52	52	51	20	29	28	MEDTE0543535
54x35x54	51.5	52	51.5	19.5	29	19.5	MEDTE0543554
54x42x42	55	56	56.5	23	29	23	MEDTE0544242
54x42x54	55	56	55	23	29	23	MEDTE0544254
67x67x28	54.5	61	54.5	21	42	35	MEDTE0676728
67x67x35	58.5	64	58.5	25	41	21	MEDTE0676735
67x67x42	61	67	61	27	41	27	MEDTE0676742
67x67x54	67	74	67	33.5	42	33.5	MEDTE0676754
67x5467	74	74	73	40	40	41	MEDTE0675467
76x76x35	59	70	59.5	25.5	46	25.5	MEDTE0767635
76x76x42	63	74	63	29	46	29	MEDTE0767642
76x76x54	69	79	69	35	46	35	MEDTE0767654
76x76x67	78	81	78	44.5	48	44.5	MEDTE0767667
108x108x22	72	88	72	24.5	72	24.5	MEDTE10810822
108x108x35	77	92	22	29.5	65	29.5	MEDTE10810835
108x108x42	80	97	80	32.5	70	32.5	MEDTE10810842
108x108x54	86	97	86	38.5	65	38.5	MEDTE10810854
108x108x67	91	97	91	43.5	64	43.5	MEDTE10810867
108x108x76	95	97	95	47.5	64	47.5	MEDTE10810876
133x133x108	139	142	139	89	94.5	89	MEDTE133133108
159x159x76	101	120	101	53.5	86.5	53.5	MEDTE15915976
159x159x133	130	120	130	92.5	86.5	82.5	MEDTE159159133
159x159x108	117	142	117	69.5	94.5	69.5	MEDTE159159108



Reducer - MF

Dimensions (mm)			Product Code
d	a	x	
12x8	21.5	14.5	MEDRED0128
15x12	26	17.5	MEDRED01512
22x12	33	25	MEDRED02212
22x15	33	22	MEDRED02215
28x12	41	32	MEDRED02812
28x22	44	28	MEDRED02822
35x15	50	39	MEDRED03515
35x22	50	35	MEDRED03522
35x28	50	32	MEDRED03528
42x15	65	54	MEDRED04215
42x18	59	46	MEDRED04218
42x22	58	42	MEDRED04222
42x28	58	40	MEDRED04228
42x35	60	35	MEDRED04235
54x15	70	60	MEDRED05415
54x22	70	52	MEDRED05422
54x28	70	45	MEDRED05428
54x35	70	45	MEDRED05435
54x42	70	45	MEDRED05442
67x28	80	60	MEDRED06728

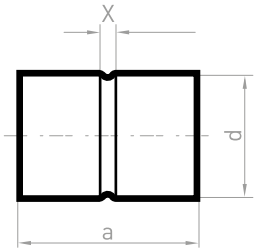
Dimensions (mm)			Product Code
d	a	x	
67x35	80	60	MEDRED06735
67x42	88	58	MEDRED06742
67x54	80	48	MEDRED06754
76x35	90	66	MEDRED07635
76x42	90	60	MEDRED07642
76x54	85	50	MEDRED07654
76x64	80	50	MEDRED07664
76x67	81	48.5	MEDRED07667
108x35	116	84	MEDRED10835
108x42	116	74	MEDRED10842
108x54	116	84	MEDRED10854
108x64	110	80	MEDRED10864
108x67	112	80	MEDRED10867
108x76	108	72	MEDRED10876
133x76	119	82.5	MEDRED13376
133x108	106	70	MEDRED133108
159x76	150	110	MEDRED15976
159x108	130	80	MEDRED159108
159x133	123	70	MEDRED159133
219x159	150	90	MEDRED219159



Reducing Coupling - FF

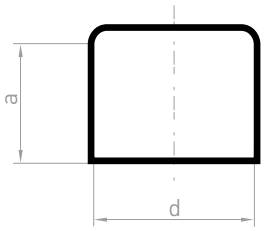
Dimensions (mm)			Product Code
d	a	x	
12x10	20	3	MEDCP01210
15x12	24	4	MEDCP01512
22x12	32	8	MEDCP02212
22x15	32	8	MEDCP02215
28x15	38	12	MEDCP02815
28x22	40	6	MEDCP02822
35x22	48	8	MEDCP03522
35x28	48	6	MEDCP03528
42x15	54	16	MEDCP04215
42x22	56	13	MEDCP04222
42x28	56	10	MEDCP04228
42x35	60	10	MEDCP04235
54x22	70	20	MEDCP05422
54x28	70	20	MEDCP05428
54x35	70	10	MEDCP05435

Dimensions (mm)			Product Code
d	a	x	
54x42	70	10	MEDCP05442
64x42	78	14	MEDCP06442
64x54	78	12	MEDCP06454
67x54	85	12	MEDCP06754
76x54	84	18	MEDCP07654
76x64	84	18	MEDCP07664
76x67	85	18	MEDCP07667
108x54	105	20	MEDCP10854
108x76	105	20	MEDCP10876
108x89	105	20	MEDCP10889
133x76	110	35	MEDCP13376
133x89	112	35	MEDCP13389
133x108	100	25	MEDCP133108
159x108	135	45	MEDCP159108
159x133	120	50	MEDCP159133



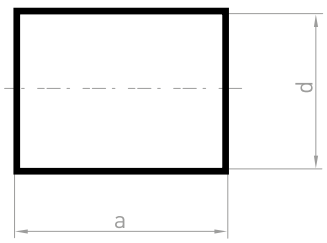
Straight Coupling with Stop - FF

Dimensions (mm)			Product Code
d	a	x	
12	19	1.8	MEDCP012
15	24.5	1.8	MEDCP015
22	33	2.2	MEDCP022
28	40	3	MEDCP028
35	49	3	MEDCP035
42	38	4	MEDCP042
54	69	5	MEDCP054
67	72	5	MEDCP067
76	72	5	MEDCP076
108	100	3	MEDCP108
133	100	3	MEDCP133
159	100	4	MEDCP159
219	116	5	MEDCP219



Stop End - F

Dimensions (mm)		Product Code
d	a	
12	8.6	MEDEC012
15	10.6	MEDEC015
22	15.4	MEDEC022
28	18.4	MEDEC028
35	23	MEDEC035
42	27	MEDEC042
54	32	MEDEC054
67	33.5	MEDEC067
76	33.5	MEDEC076
108	47.5	MEDEC108
159	62.5	MEDEC159



Slip Coupling - F

Dimensions (mm)		Product Code
d	a	
15	24	MEDSC015
22	33	MEDSC022
28	38	MEDSC028
35	48	MEDSC035
42	58	MEDSC042
54	66	MEDSC054

Brazing Rods

All Lawton solder rods conform to HTM 02 Spec

Type of Product

5% Silver Brazing Alloy

Composition

5% Silver

89% Copper

6% Phosphorous

Impurities to BSEN 17672 Group CP

Alloy conforms to: BSEN 17672:2010 CuP104

Melting Range

645 - 815ºC

Appearance

Copper coloured metal

Occupational Health Data

TLV

Odour threshold

Silver	0.1mg/m3 as fume
Phosphorous	1mg/m3 as phosphoric acid
Copper	0.2mg/m3 as fume

Working Temp

710ºC

Tensile Strength 600 N/mm^2

Hardness (HV) 190

Elongation 7%

Electrical Conductivity 10% I.A.C.S. at 20ºC

Refrigeration and Air Conditioning Tubes

Pipeline solutions for refrigeration and air conditioning, all to EN 12735-1:2016.

Our copper tubing is designed specifically for refrigeration and air conditioning use and accordingly cleaned, nitrogen-purged and capped.

Material Analysis

Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
Minimum Copper Content 99.90 % (including silver)
Phosphorus 0.015-0.040 %
Total Impurity Maxima 0.060 % (excluding phosphorus and silver)
The melting point of copper is 1083ºC and it has a density of 8.9 gm/cc

Mechanical Properties

BS EN 12735-1 Refrigeration and Air Conditioning Tubes

Material Temper EN 1173	Tensile Strength min. (N/mm2)	Elongation min. (%)	Hardness (Indicative) HV5 VPN
R220 (soft)	220	40	40-70
R250 (Half Hard)	250	30	75-100
R290 (Hard)	290	3	Over 100

The table below and on the next page give the maximum working pressure (MWP)
They have been calculated based on the requirements of EN378:2:2008 using the stress values according to EN 14276. Although straight tube is supplied in either half hard or fully hard condition, we have also quoted figures based on annealed condition which is representative of the tube in the area immediately surrounding brazed joints.
The maximum test pressure can be 1.5 times that of the (MWP)

Standard Copper Coiled Tube to EN 12735-1 R220

O.D. (inches)	Wall (inches)	Gauge (SWG)	MWP in annealed condition up to 100 c
1/4	0.028	22	125
5/16	0.028	22	98
5/16	0.036	20	129
3/8	0.032	21	81
1/2	0.032	21	69
5/8	0.036	20	61
3/4	0.040	19	54
7/8	0.040	19	46

Copper Straight Tube to EN 12735-1 R250/R290

O.D. (inches)	Wall (inches)	Gauge (SWG)	MWP in annealed condition at 100deg C	MWP in supplied* condition at 100deg C
3/8"	0.032	21	93	108
1/2"	0.036	20	78	91
1/2"	0.048	18	102	118
5/8"	0.036	20	62	73
5/8"	0.040	19	67	79
5/8"	0.048	18	81	95
3/4"	0.036	20	51	61
3/4"	0.040	19	57	73
3/4"	0.048	18	65	77
3/4"	0.064	16	88	102
7/8"	0.040	19	46	55
7/8"	0.048	18	55	66
7/8"	0.064	16	75	88
7/8"	0.104	12	125	142
1.1/8"	0.048	18	43	51
1.1/8"	0.064	16	57	68
1.1/8"	0.080	14	72	85
1.3/8"	0.048	18	35	41
1.3/8"	0.064	16	47	55
1.3/8"	0.080	14	59	69
1.3/8"	0.104	12	77	90
1.5/8"	0.048	18	29	35
1.5/8"	0.064	16	39	47
1.5/8"	0.080	14	49	58
1.5/8"	0.104	12	65	76
1.5/8"	0.116	11	73	85
2.1/8"	0.048	18	22	27
2.1/8"	0.064	16	30	35
2.1/8"	0.080	14	37	44
2.1/8"	0.104	12	49	58
2.5/8"	0.048	18	18	25
2.5/8"	0.064	16	24	33
2.5/8"	0.080	14	30	41
2.5/8"	0.104	12	39	54
3.1/8"	0.064	16	20	28
3.1/8"	0.080	14	25	35
3.1/8"	0.104	12	33	45
3.5/8"	0.064	16	17	24
3.5/8"	0.080	14	22	30
4.1/8"	0.064	16	15	21
4.1/8"	0.080	14	19	26
4.1/8"	0.104	12	25	34

*Sizes 3/8 - 2 1/8" supplied in Half Hard, Sizes 2 5/8 - 4 1/8" supplied Hard

ACR Fitting Range

Copper end feed type fittings manufactured to:

ASME B16.22-2013-Wrought Copper and Copper Alloy Solder Joint pressure Fittings.

Specific benefits include:

All sealed in protective polythene bags and are product labelled. Fittings are supplied in reinforced cardboard boxes, labelled with product information and outline drawing of fitting.Each fitting is engraved with unique branding, space permitting

3 1/8 sample


LAWTON
ACR FITTINGS

Pressure Equipment Directive
Declaration of Conformity

We hereby certify that the fittings stipulated above, which may be used in assemblies subject to the Pressure Equipment Directive, complies with all relevant provisions, National Laws and Regulations adopting this Directive.

Product Description

A range of ACR fittings up to 7/8" nominal diameter are suitable when used with CO_2 applications not exceeding 80 bar, or 55°c, conforming to EN 378-2.

Supplier: The Lawton Tube Company, Torrington Avenue, Coventry, CV4 9AB
Standard: BS EN 378-2:2008 (+A1:2009)
Notified Body: Not applicable

Oliver Lawton, Managing Director

Date: 13th April 2011

Fittings manufactured under Sound Engineering Practice cannot be CE marked, under the terms and conditions of the Directive.

Fittings for Co_2

Degreased copper fittings specifically for ACR and manufactured to ASME B16.22-2001 which can be used in assemblies subject to the Pressure Equipment Directive. The burst pressure of each fitting size at 55°c has been determined and a safety factor of at least 3 has been applied to establish a recommended maximum working pressure. All testing has been conducted in accordance with BS EN 378-2:2008 (+A1:2009).

Maximum Working Pressures

LAWTON ACR FITTINGS

Size	Burst Pressure	up to 55°C	up to 100°C	up to 150°C
1/4 "	500 bar	150 bar	15 bar	131 bar
3/8 "	360 bar	120 bar	120 bar	105 bar
1/2 "	320 bar	100 bar	100 bar	87 bar
5/8 "	300 bar	100 bar	100 bar	87 bar
3/4 "	280 bar	90 bar	90 bar	79 bar
7/8 "	240 bar	80 bar	80 bar	70 bar
1 1/8 "	220 bar	75 bar	75 bar	66 bar
1 3/8 "	220 bar	65 bar	65 bar	57 bar
1 5/8 "	180 bar	55 bar	55 bar	48 bar
2 1/8"	100 bar	33 bar	33 bar	29 bar
2 5/8"	93 bar	31 bar	31 bar	27 bar
3 1/8"	87 bar	29 bar	29 bar	25 bar
3 5/8"	84 bar	28 bar	28 bar	24.5 bar
4 1/8"	81 bar	27 bar	27 bar	23.5 bar

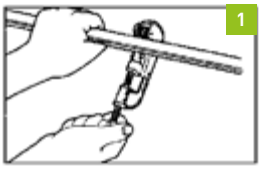
Copper tube and solder type fittings

1. Cut tube square with the cutter or fine hack saw (32 tooth blade is recommended). Remove Burr.

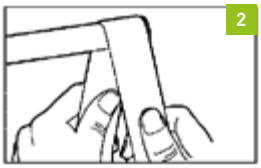
2. Clean outside end of copper tube thoroughly with sand cloth or sandpaper equal depth of fitting. Leave no dark spots.

3. Clean inside of fitting carefully to tube stop with wire brush. Note: Sand cloth or sandpaper may also be used.

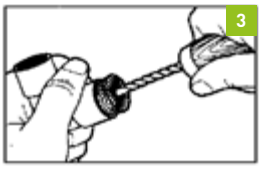
4. Apply heat uniformly around the fitting with torch. When brazing rod melts upon contact with heated fitting, the proper brazing temperature has been reached. Remove flame and feed brazing rod slightly off center at the bottom of the joint. Proceed across the bottom of the fitting and up to the top center position. Return to the starting point, and then proceed up the incomplete side to the top, again, overlapping the filler metal. Wipe off surplus brazing alloy with a piece of cloth.



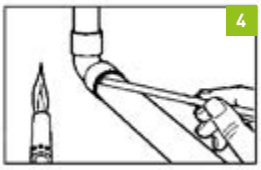
Cut tube to length & remove burr with file or scraper.



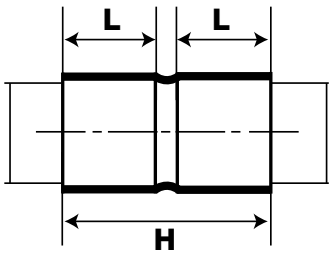
Clean outside of tube with sandpaper or sand cloth.



Clean inside of fitting with wire brush, sand cloth or sandpaper.

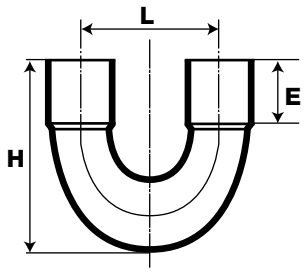


Apply heat with torch.When brazing rod melts upon contact with heated fitting, the proper temp for brazing has been reached. Remove flame & feed rod to the joint at one or two points until a ring of brazing appears at the end of the fitting.



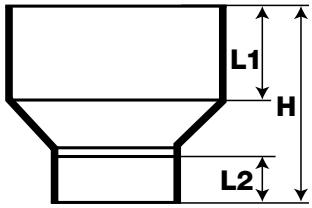
Straight Coupler

Dimensions (mm)			Product Code
Size	H	L	
1/4	15	6.4	RFCP14
3/8	18	7.874	RFCP38
1/2	22	9.652	RFCP12
5/8	28	12.7	RFCP58
3/4	34	15.748	RFCP34
7/8	40	19.05	RFCP78
1	48	23.1	RFCP1
1 1/8	48	23.114	RFCP1.18
1 3/8	52	24.638	RFCP1.38
1 5/8	58	27.686	RFCP1.58
2 1/8	70	34.036	RFCP2.18
2 5/8	77	37.338	RFCP2.58
3 1/8	87	42.164	RFCP3.18
3 5/8	99	48.514	RFCP3.58
4 1/8	113	54.864	RFCP4.18



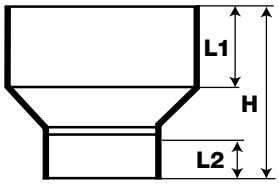
U-bend

Dimensions (mm)				Product Code
Size	L	H	E	
U3/8*1 1/2	38.1	32.7	7.874	RFUB38X1.12
U1/2*1 1/2	38.1	36.3	9.652	RFUB12X1.12
U5/8*1 7/8	47.6	49	12.7	RFUB58X1.78
U5/8*2	50.8	46.9		RFUB58X2
U3/4*2	50.8	51.6	15.748	RFUB34X2
U3/4*2 1/8	54	53.8	15.748	RFUB34X2.18
U3/4*2 1/2	63.5	60.3	15.748	RFUB34X2.12
U3/4*2 1/4	57.1	55.3	15.748	RFUB34X2.14
U7/8*2	50.8	57.2	19.05	RFUB78X2
U7/8*2 1/2	63.5	63.3	19.05	RFUB78X2.12
U1 1/8*2 1/8	54	65.5	23.114	RFUB1.18X2.18
U1 1/8*3	76.2	77.5	23.114	RFUB1.18X3
U1 1/8*2 1/2	63.5	75.3	24.638	RFUB1.18X2.12
U1 3/8*3 3/4	95.3	94.9	24.638	RFUB1.38X3.34
U1 5/8*4 1/2	114.3	107.7	27.686	RFUB1.58X4.12
U2 1/8*5 1/2	139.7	132.8	34.036	RFUB2.18X5.12



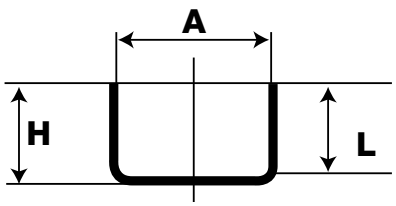
Reducer Coupler

Dimensions (mm)				Product Code
Size	H	L1	L2	
3/4*1/2	31	15.748	9.652	RFCP34X12
1/2*3/8	25	9.652	7.874	RFCP12X38
3/8*1/4	20.5	7.874	6.4	RFCP38X14
5/8*1/4	28.1	12.7	6.4	RFCP58X14
5/8*3/8	28.3	12.7	7.874	RFCP58X38
5/8*1/2	28	12.7	9.652	RFCP58X12
7/8*1/2	37.5	19.05	9.652	RFCP78X12
7/8*3/4	40.5	19.05	15.748	RFCP78X34
7/8*3/8	38.3	19.05	7.874	RFCP78X38
7/8*5/8	39.6	19.05	12.7	RFCP78X58
1 1/8*1/2	47.2	23.114	23.1	RFCP1.18X12
1 1/8*5/8	46.6	23.114	12.7	RFCP1.18X58
1 1/8*3/4	48.9	23.114	15.748	RFCP1.18X34
1 1/8*7/8	50.2	23.114	19.05	RFCP1.18X78
1 3/8*1/2	52	24.638	9.652	RFCP1.38X12
1 3/8*5/8	45.7	24.638	12.7	RFCP1.38X58
1 3/8*3/4	52.5	24.638	15.748	RFCP1.38X34
1 3/8*7/8	53.6	24.638	19.05	RFCP1.38X78
1 5/8*3/8	60.3	27.686	7.874	RFCP1.58X38
1 5/8*5/8	59	27.686	12.7	RFCP1.58X58
1 5/8*1 1/8	61.5	27.686	23.114	RFCP1.58X1.18
1 5/8*1 3/8	59.6	27.686	24.638	RFCP1.58X1.38
2 1/8*5/8	72.5	34.036	12.7	RFCP2.18X58
2 1/8*3/4	74	34.036	15.748	RFCP2.18X34
2 1/8*7/8	76	34.036	19.05	RFCP2.18X78
2 1/8*1 1/8	75.8	34.036	23.114	RFCP2.18X1.18
2 1/8*1 3/8	74.7	34.036	24.638	RFCP2.18X1.38
2 1/8*1 5/8	84.5	34.036	27.686	RFCP2.18X1.58
2 5/8*1 1/8	88	37.338	23.114	RFCP2.58X1.18
2 5/8*1 3/8	84.3	37.338	24.638	RFCP2.58X1.38
2 5/8*1 5/8	84.3	37.338	27.686	RFCP2.58X1.58
2 5/8*2 1/8	85.3	37.338	34.036	RFCP2.58X2.18
3 1/8*1 3/8	95	42.164	24.638	RFCP3.18X1.38
3 1/8*1 5/8	97	42.164	27.686	RFCP3.18X1.58
3 1/8*2 1/8	95.3	42.164	34.036	RFCP3.18X2.18
3 1/8*2 5/8	91.5	42.164	37.338	RFCP3.18X2.58
3 5/8*1 1/8	111	48.514	23.114	RFCP3.58X1.18
3 5/8*1 5/8	125.5	48.514	27.686	RFCP3.58X1.58
3 5/8*2 1/8	112.5	48.514	34.036	RFCP3.58X2.18
3 5/8*2 5/8	121.7	48.514	37.338	RFCP3.58X2.58
3 5/8*3 1/8	121.1	48.514	42.164	RFCP3.58X3.18
4 1/8*1 5/8	125.5	54.864	27.686	RFCP4.18X1.58
4 1/8*2 1/8	121.5	54.864	34.036	RFCP4.18X2.18
4 1/8*2 5/8	121.7	54.864	37.338	RFCP4.18X2.58
4 1/8*3 1/8	121.2	54.864	42.164	RFCP4.18X3.18
4 1/8*3 5/8	115.5	54.864	48.514	RFCP4.18X3.58



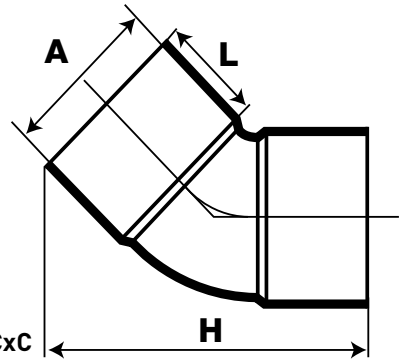
Fitting Reducer cfx

Size	Dimensions (mm) H	L1	L2	Product Code
1/2*3/8	23/2	11.176	7.874	RFRED12X38
3/4*3/8	35.3	17.526	7.874	RFRED34X38
3/4*5/8	34.9	17.526	12.7	RFRED34X58
1/2*1/4	25.2	11.176	6.4	RFRED12X14
3/8*1/4	20.5	9.652	6.4	RFRED38X14
3/4*1/2	33	17.526	9.652	RFRED34X12
5/8*3/8	29.2	14.224	7.874	RFRED58X38
5/8*1/2	28.9	14.224	9.652	RFRED58X12
7/8*3/8	38.1	20.574	7.874	RFRED78X38
7/8*1/2	37.7	20.574	9.652	RFRED78X12
3/4*5/8	34.9	17.526	12.7	RFRED34X58
7/8*5/8	38.7	20.574	12.7	RFRED78X58
7/8*3/4	42.6	20.574	15.748	RFRED78X34
1 1/8*5/8	49.1	24.638	12.7	RFRED1.18X58
1 1/8*3/4	47.8	24.638	15.748	RFRED1.18X34
1 1/8*7/8	50	24.638	19.05	RFRED1.18X78
1 3/8*5/8	51.9	26.162	12.7	RFRED1.38X58
1 3/8*3/4	53.6	26.162	15.748	RFRED1.38X34
1 3/8*7/8	55.6	26.162	19.05	RFRED1.38X78
1 3/8*1 1/8	57	26.162	23.114	RFRED1.38X1.18
1 5/8*7/8	55.6	29.464	19.05	RFRED1.58X78
1 5/8*1 1/8	62.2	29.464	23.114	RFRED1.58X1.18
1 5/8*1 3/8	62.9	29.464	24.638	RFRED1.58X1.38
2 1/8*5/8	75.5	35.814	12.7	RFRED2.18X58
2 1/8*7/8	75.5	35.814	19.05	RFRED2.18X78
2 1/8*1 1/8	78.6	35.814	23.114	RFRED2.18X1.18
2 1/8*1 3/8	75.5	35.814	24.638	RFRED2.18X1.38
2 1/8*1 5/8	75.5	35.814	27.686	RFRED2.18X1.58
2 5/8*1 1/8	84.6	38.862	23.114	RFRED2.58X1.18
2 5/8*1 3/8	85	38.862	24.638	RFRED2.58X1.38
2 5/8*1 5/8	84.2	38.862	27.686	RFRED2.58X1.58
2 5/8*2 1/8	85.2	38.862	34.036	RFRED2.58X2.18
3 1/8*1 3/8	96	43.688	24.638	RFRED3.18X1.38
3 1/8*1 5/8	93.4	43.688	27.686	RFRED3.18X1.58
3 1/8*2 1/8	96.6	43.688	34.036	RFRED3.18X2.18
3 1/8*2 5/8	92.3	43.688	37.338	RFRED3.18X2.58
3 5/8*2 5/8	104.5	50.038	37.338	RFRED3.58X2.58
3 5/8*3 1/8	102.8	50.038	42.164	RFRED3.58X3.18
4 1/8*1 5/8	128	56.388	27.686	RFRED4.18X1.58
4 1/8*2 1/8	121	56.388	34.036	RFRED4.18X2.18
4 1/8*2 5/8	114	56.388	37.338	RFRED4.18X2.58
4 1/8*3 1/8	116.8	56.388	42.164	RFRED4.18X3.18
4 1/8*3 5/8	115.5	56.388	48.514	RFRED4.18X3.58



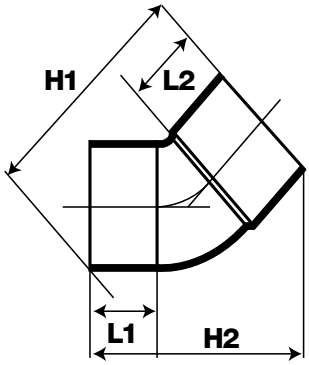
End Cap

Size	Dimensions (mm) H	L	Product Code
3/8	9.5	7.874	RFEC38
1/2	11.5	9.652	RFEC12
5/8	14.5	12.7	RFEC58
3/4	18	15.748	RFEC34
7/8	22	19.05	RFEC78
1	26	23.1	RFEC1
1 1/8	27	23.114	RFEC1.18
1 3/8	29.5	24.638	RFEC1.38
1 5/8	32.5	27.686	RFEC1.58
2 1/8	38.5	34.036	RFEC2.18
2 5/8	40	37.338	RFEC2.58
3 1/8	47.5	42.164	RFEC3.18
3 5/8	54.5	48.514	RFEC3.58
4 1/8	61	54.864	RFEC4.18



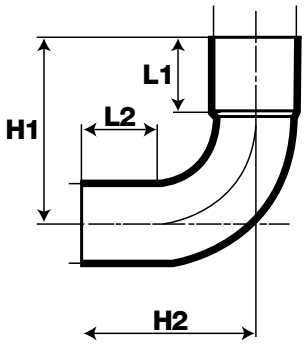
45deg Elbow CxC

Size	Dimensions (mm) H	L	Product Code
1/4	22.3	6.4	RFEL45/14
3/8	27.5	7.874	RFEL45/38
1/2	32	9.652	RFEL45/12
5/8	38.3	12.7	RFEL45/58
7/8	57	19.05	RFEL45/78
1 1/8	68.2	23.114	RFEL45/1.18
1 3/8	74.5	24.638	RFEL45/1.38
1 5/8	84	27.686	RFEL45/1.58
2 1/8	92.5	34.036	RFEL45/2.18
2 5/8	127.5	37.338	RFEL45/2.58
3 1/8	143	42.164	RFEL45/3.18
3 5/8	166.5	48.514	RFEL45/3.58
4 1/8	187.5	54.864	RFEL45/4.18



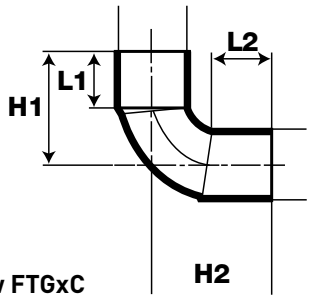
45deg Street Elbow FTGxC

Dimensions (mm)					Product Code
CCL	H1	H2	L1	L2	
3/8	31.2	32.2	7.874	9.652	RFELS45/38
1/2	36	37.2	9.652	11.176	RFELS45/12
5/8	42.8	44.3	12.7	14.224	RFELS45/58
3/4	52.8	54.5	15.748	17.526	RFELS45/34
7/8	60.8	62.3	19.05	20.574	RFELS45/78
1 1/8	69.4	70.9	23.114	24.638	RFELS45/1.18
1 3/8	79	81.7	24.638	26.162	RFELS45/1.38
1 5/8	88	90	27.686	29.464	RFELS45/1.58
2 1/8	110	114	34.036	35.814	RFELS45/2.18
2 5/8	126.7	128.6	37.338	38.862	RFELS45/2.58
3 1/8	146	149.5	42.164	43.688	RFELS45/3.18
4 1/8	185.5	189	54.864	56.388	RFELS45/4.18



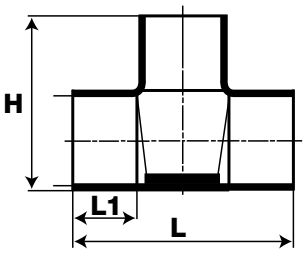
90 deg Long Radius Street Elbow FTGxC

Dimensions (mm)					Product Code
CCL	H1	H2	L1	L2	
1/4	20	18.5	6.4	7.9	RFELLRS14
3/8	23	23.5	7.874	9.652	RFELLRS38
1/2	27.6	28.8	9.652	11.176	RFELLRS12
5/8	35	34	12.7	14.224	RFELLRS58
3/4	41.5	43.5	15.748	17.526	RFELLRS34
7/8	50	49.3	19.05	20.574	RFELLRS78
1 1/8	62.2	70.2	23.114	24.638	RFELLRS1.18
1 3/8	75.5	81.5	24.638	26.162	RFELLRS1.38
1 5/8	86.5	89.5	27.686	29.464	RFELLRS1.58
2 1/8	110	113	34.036	35.814	RFELLRS2.18
2 5/8	133	142.5	37.338	38.862	RFELLRS2.58
3 1/8	165.5	168	42.164	43.688	RFELLRS3.18
3 5/8	193	193	48.514	50.038	RFELLRS3.58



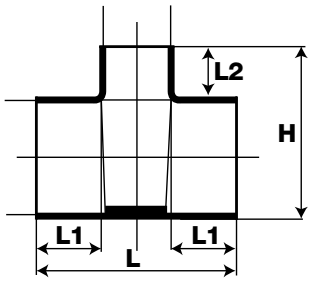
90deg Short Radius Street Elbow FTGxC

Dimensions (mm)					Product Code
CCL	H1	H2	L1	L2	
3/8	18.2	23.4	7.874	9.652	RFELSRS38
1/2	19.5	25	9.652	11.176	RFELSRS12
5/8	23.5	29.3	12.7	14.224	RFELSRS58
3/4	30.5	36.5	48	17.526	RFELSRS34
7/8	36	39	19.05	20.574	RFELSRS78
1	40.5	44	23.	24.6	RFELSRS1
1 1/8	42	47	23.114	24.638	RFELSRS1.18
1 3/8	47	57.5	24.638	26.162	RFELSRS1.38
1 5/8	51.5	62.5	27.686	29.464	RFELSRS1.58
2 1/8	65	74	34.036	35.814	RFELSRS2.18
2 5/8	79.6	87.3	37.338	38.862	RFELSRS2.58
3 1/8	97.5	101	42.164	43.688	RFELSRS3.18
4 1/8	120	124	54.864	56.388	RFELSRS4.18



Equal Tee CxCxC

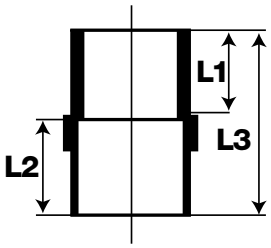
Dimensions (mm)				Product Code
Size	L	H	E	
1/4	25.5	16.2	6.4	RFTE14
3/8	30.5	20.8	7.874	RFTE38
1/2	35.5	25.1	9.652	RFTE12
5/8	43.7	32.6	12.7	RFTE58
3/4	53	39.6	15.748	RFTE34
7/8	62.5	46.1	19.05	RFTE78
1	73.2	53.8	23.1	RFTE1
1 1/8	77.7	56	23.114	RFTE1.18
1 3/8	85.5	65.2	24.638	RFTE1.38
1 5/8	99	73.3	27.686	RFTE1.58
2 1/8	126	93	34.036	RFTE2.18
2 5/8	146	112	37.338	RFTE2.58
3 1/8	170	129	42.164	RFTE3.18
3 5/8	198	147	48.514	RFTE3.58
4 1/8	220	168	54.864	RFTE4.18



Reducing Tee CxCxC

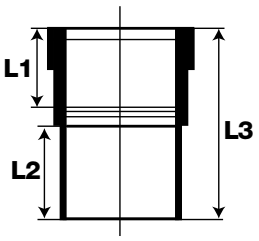
Dimensions (mm)					Product Code
SIZE	L	H	L1	L2	
3/8*1/4	28	20	7.874	6.4	RFTE38x38x14
3/8*5/8	45	33	7.874	12.7	RFTE38x38x58
1/2*1/4	43	24	9.652	6.4	RFTE12x12x14
1/2*3/8	35	23.5	9.652	7.874	RFTE12x12x38
1/2*5/8	52	32/5	9/652	12/7	RFTE12x12x58
5/8*3/8	38	27	12.7	7.874	RFTE58x58x38
5/8*1/2	42	29.5	12.7	9.652	RFTE58x58x12
5/8*3/4	63.5	38.5	12.7	15.748	RFTE58x58x34
5/8*7/8	50	39	12.7	19.05	RFTE58x58x78
3/4*3/8	42.5	31	15.748	7.874	RFTE34x34x38
3/4*1/2	46.5	32.5	15.748	9.652	RFTE34x34x12
7/8*1/2	53	36.5	19.05	9.652	RFTE78x78x12
7/8*3/8	52	33.5	19.05	7.874	RFTE78x78x38
7/8*3/4	60	42	19.05	15.748	RFTE78x78x34
7/8*5/8	56.5	38	19.05	12.7	RFTE78x78x58
7/8*1 1/8	71	52	19.05	23.114	RFTE78x78x1.18
1 1/8*1/2	62	42.5	23.114	9.652	RFTE1.18x1.18x12
1 1/8*3/4	69	51.5	23.114	15.748	RFTE1.18x1.18x34
1 1/8*5/8	64	46	23.114	12.7	RFTE1.18x1.18x1.58
1 1/8*7/8	70	53	23.114	19.05	RFTE1.18x1.18x1.78
1 1/8*1 3/8	86	63.5	23.114	24.638	RFTE1.18x1.18x1.38
1 1/8*1 5/8	120	73.3	23.114	27.686	RFTE1.18x1.18x1.58
1 3/8*5/8	70	52.5	24.638	12.7	RFTE1.38x1.38x58
1 3/8*7/8	75	59	24.638	19.05	RFTE1.38x1.38x78
1 3/8*1 5/8	93	71	24.638	27.686	RFTE1.38x1.38x1.58
1 3/8*2 1/8	150	93	24.638	34.036	RFTE1.38x1.38x2.18
1 3/8*1 1/8	72	61	24.638	23.114	RFTE1.38x1.38x1.18
1 5/8*5/8	73.5	63	27.686	12.7	RFTE1.58x1.58x58

Dimensions (mm)					Product Code
SIZE	L	H	L1	L2	
1 5/8*3/4	76	65	27.686	15.748	RFTE1.58x1.58x34
1 5/8*7/8	81	65	27.686	19.05	RFTE1.58x1.58x78
1 5/8*1 3/8	92.5	72	27.686	24.638	RFTE1.58x1.58x1.38
1 5/8*1 1/8	85	71	27.686	23.114	RFTE1.58x1.58x1.18
1 5/8*2 1/8	147	93	27.686	34.036	RFTE1.58x1.58x2.18
2 1/8*5/8	89	74	34.036	12.7	RFTE2.18x2.18x58
2 1/8*7/8	92	79	34.036	19.05	RFTE2.18x2.18x78
2 1/8*1 3/8	110	85	34.036	24.638	RFTE2.18x2.18x1.38
2 1/8*1 5/8	112.5	90	34.036	27.686	RFTE2.18x2.18x1.58
2 1/8*1 1/8	102	84.5	34.036	23.114	RFTE2.18x2.18x1.18
2 1/8*2 5/8	173	110	34.036	37.338	RFTE2.18x2.18x2.58
2 5/8*5/8	92.5	88	37.338	12.7	RFTE2.58x2.58x58
2 5/8*7/8	103	94	37.338	19.05	RFTE2.58x2.58x78
2 5/8*1 1/8	108	97	37.338	23.114	RFTE2.58x2.58x1.18
2 5/8*1 3/8	113	99	37.338	24.638	RFTE2.58x2.58x1.38
2 5/8*1 5/8	120	104	37.338	27.686	RFTE2.58x2.58x1.58
2 5/8*2 1/8	130	105	37.338	34.036	RFTE2.58x2.58x2.18
3 1/8*5/8	102.5	101	42.164	12.7	RFTE3.18x3.18x58
3 1/8*2 1/8	146	120	42.164	34.036	RFTE3.18x3.18x2.18
3 1/8*1 5/8	134	114	42.164	27.686	RFTE3.18x3.18x1.58
4 1/8*7/8	138	134	54.864	19.05	RFTE4.18x4.18x78
4 1/8*1 1/8	141	136	54.864	23.114	RFTE4.18x4.18x1.18
4 1/8*1 3/8	150	140	54.864	24.638	RFTE4.18x4.18x1.38
4 1/8*1 5/8	161	145	54.864	27.686	RFTE4.18x4.18x1.58
4 1/8*2 1/8	167	153	54.864	34.036	RFTE4.18x4.18x2.18
4 1/8*2 5/8	181	153	54.864	37.338	RFTE4.18x4.18x2.58
4 1/8*3 1/8	194	157	54.864	42.164	RFTE4.18x4.18x3.18



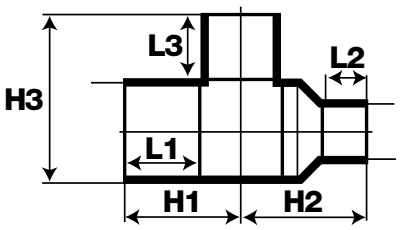
Male Adaptor CxM

Dimensions (mm)				Product Code
Size	L1	L2	L3	
7/8*3/4MC	16	19.1	37.5	RFMAD78x34
1 1/8*1MC	20	23.1	44.6	RFMAD1.18x1
2 1/8*2MC	22	34	59.5	RFMAD2.18x2
1/2*1/2MC	13.4	9.7	33.5	RFMAD12x12



Female Adaptor CxF

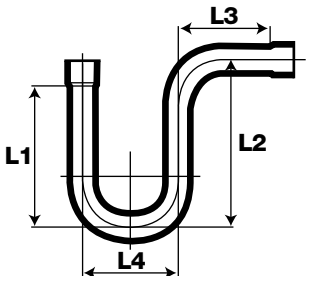
Dimensions (mm)				Product Code
Size	L1	L2	L3	
5/8*1/2FC	15	16	33.3	RFFAD58X12
3/4*3/4FC	16.8	15.8	38.9	RFFAD34X34
7/8*1/2FC	15.5	19.1	35.6	RFFAD78X12



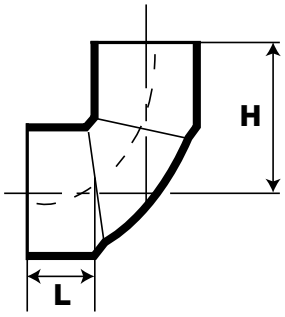
Reducing tee One End and branch

Dimensions (mm)							Product Code
SIZE	H1	H2	H3	L1	L2	L3	
1/2*3/8*3/8	16.5	20.5	24.5	9.652	7.874	7.874	RFTE12X38X38
1/2*3/8*1/2	18	22	25	9.652	7.874	9.652	RFTE12X38X12
5/8*3/8*3/8	19	22	27	12.7	7.874	7.874	RFTE58X38X38
5/8*1/2*3/8	19	21.5	27	12.7	9.652	7.874	RFTE58X12X38
5/8*1/2*1/2	21.5	23.5	29.5	12.7	9.652	9.652	RFTE58X12X12
3/4*5/8*5/8	26	27	35.5	15.748	12.7	12.7	RFTE34X58X58
7/8*1/2*1/2	26.5	31	31	19.05	9.652	9.652	RFTE78X12X12
7/8*1/2*7/8	31.5	36	44.5	19.05	9.652	19.05	RFTE78X12X78
7/8*5/8*1/2	28	29.5	31	19.05	12.7	9.652	RFTE78X58X12
7/8*5/8*7/8	31.5	35	44.5	19.05	12.7	9.652	RFTE78X58X78
7/8*3/4*3/4	31	34	43	19.05	15.748	15.748	RFTE78X34X34
7/8*5/8*5/8	28	30	38.5	19.05	12.7	12.7	RFTE78X58X58
1 1/8*5/8*5/8	33	35	46	23.114	12.7	12.7	RFTE1.18X58X58
1 1/8*5/8*7/8	35.5	40	52	23.114	19.05	19.05	RFTE1.18X58X78
1 1/8*5/8*1 1/8	39	42	57	23.114	12.7	23.114	RFTE1.18X58X1.18
1 1/8*7/8*7/8	35	42	52	23.114	19.05	19.05	RFTE1.18X78X78
1 1/8*7/8*1 1/8	39	46	57	23.114	19.05	23.114	RFTE1.18X78X1.18
1 1/8*7/8*5/8	32	39	46	23.114	19.05	12.7	RFTE1.18X78X58
1 1/8*7/8*1/2	30.5	38	42.5	23.114	19.05	9.652	RFTE1.18X78X12
1 3/8*5/8*1 3/8	43	54	64.5	24.638	12.7	24.638	RFTE1.38X58X1.38
1 3/8*7/8*5/8	35	45	52.5	24.638	19.05	12.7	RFTE1.38X78X58
1 3/8*7/8*7/8	38	51.5	59	24.638	19.05	19.05	RFTE1.38X78X78
1 3/8*7/8*1 3/8	43	58	64.5	24.638	19.05	24.638	RFTE1.38X78X1.38
1 3/8*1 1/8*7/8	37	45	57	24.638	23.114	19.05	RFTE1.38X1.18X78
1 3/8*1 1/8*5/8	34	44	53.5	24.638	23.114	12.7	RFTE1.38X1.18X58
1 3/8*1 1/8*1 1/8	41	49	57	24.638	23.114	23.114	RFTE1.38X1.18X1.18
1 5/8*7/8*7/8	40	54	67	27.686	19.05	19.05	RFTE1.58X78X78
1 5/8*7/8*1 5/8	50	60	76	27.686	19.05	27.686	RFTE1.58X78X1.58
1 5/8*1 1/8*7/8	41	53.5	66.5	27.686	23.114	19.05	RFTE1.58X1.18X78
1 5/8*1 1/8*1 1/8	42.5	52.5	71	27.686	23.114	23.114	RFTE1.58X1.18X1.18
1 5/8*1 1/8*1 3/8	48	56	72.5	27.686	23.114	24.638	RFTE1.58X1.18X1.38
1 5/8*1 1/8*1 5/8	51	59	75	27.686	23.114	27.686	RFTE1.58X1.18X1.58
1 5/8*1 3/8*1 3/8	42.5	55	72.5	27.686	24.638	24.638	RFTE1.58X1.38X1.38
1 5/8*1 3/8*1 5/8	51.5	59.5	75	27.686	24.638	27.686	RFTE1.58X1.38X1.58
2 1/8*1 1/8*1 1/8	50	64	84.5	34.036	23.114	23.114	RFTE2.18X1.18X1.18
2 1/8*1 3/8*7/8	47.5	61.5	79	34.036	24.638	19.05	RFTE2.18X1.38X78
2 1/8*1 3/8*1 1/8	50	63	87	34.036	24.638	23.114	RFTE2.18X1.38X1.18
2 1/8*1 3/8*1 3/8	54	69	85	34.036	24.638	24.638	RFTE2.18X1.38X1.38
2 1/8*1 3/8*2 1/8	63	75	92	34.036	24.638	34.036	RFTE2.18X1.38X2.18
2 1/8*1 5/8*1 1/8	50	61	84	34.036	27.686	23.114	RFTE2.18X1.58X1.18
2 1/8*1 5/8* 7/8	48	61	77.5	34.036	27.686	19.05	RFTE2.18X1.58X78
2 1/8*1 5/8*1 3/8	54	65	85.5	34.036	27.686	24.638	RFTE2.18X1.58X1.38
2 1/8*1 5/8*1 5/8	56.5	63.5	89	34.036	27686	27.686	RFTE2.18X1.58X1.58
2 5/8*7/8*2 5/8	73.5	88	112	37.338	19.05	37.338	RFTE2.58X78X2.58
2 5/8*2 1/8*1 5/8	61.5	73	101	37.338	34.036	27.686	RFTE2.58X2.18X1.58
2 5/8*2 1/8*2 1/8	67.5	78.5	105.5	37.338	34.036	34.036	RFTE2.58X2.18X2.18
3 1/8*2 1/8*2 1/8	72	88	123	42.164	34.036	34.036	RFTE3.18X2.18X2.18
3 1/8*2 5/8*1 5/8	70	77	121	42.164	34.036	27.686	RFTE3.18X2.58X1.58
3 1/8*2 5/8*2 1/8	71.5	83.5	123	42.164	37.338	34.036	RFTE3.18X2.58X2.18

P-Trap

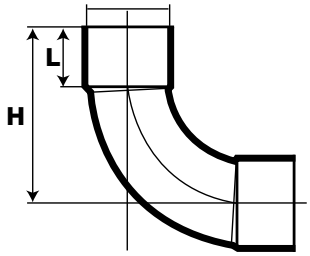


Dimensions (mm)					Product Code
SIZE	L1	L2	L3	L4	
3/8	87.2	35.1	95.2	38.1	RFPT38
1/2	64	73.2	42.6	43.2	RFPT12
5/8	80.2	94.8	55.6	57.2	RFPT58
3/4	134.1	152.4	73	76.2	RFPT34
7/8	133.4	142.9	69.85	76.2	RFPT78
1 1/8	125	134.1	55.2	89.7	RFPT1.18
1 3/8	133.4	177.6	88.9	127	RFPT1.38
1 5/8	196.8	223.8	88.9	127	RFPT1.58
2 1/8	219	250.8	104.8	152.4	RFPT2.18



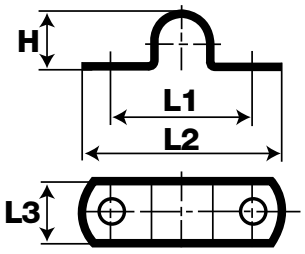
90deg Short Radius Elbow

Dimensions (mm)			Product Code
Size	H	L	
1/4	14.6	6.4	RFELSR14
3/8	16.9	7.874	RFELSR38
1/2	19.5	9.652	RFELSR12
5/8	22.6	12.7	RFELSR58
3/4	28.5	15.748	RFELSR34
7/8	33.8	19.05	RFELSR78
1	40	23.1	RFELSR1
1 1/8	41.8	23.114	RFELSR1.18
1 3/8	47	24.638	RFELSR1.38
1 5/8	53.5	27.686	RFELSR1.58
2 1/8	66	34.036	RFELSR2.18
2 5/8	79.6	37.338	RFELSR2.58
3 1/8	98	42.164	RFELSR3.18
3 5/8	111	48.514	RFELSR3.58
4 1/8	120	54.864	RFELSR4.18



90deg Long Radius Elbow

Dimensions (mm)			Product Code
Size	H	L	
1/4	19	6.4	RFELLR14
3/8	23.5	7.874	RFELLR38
1/2	27.8	9.652	RFELLR12
5/8	34	12.7	RFELLR58
3/4	41.5	15.748	RFELLR34
7/8	50.8	19.05	RFELLR78
1 1/8	62.5	23.114	RFELLR1.18
1 3/8	73.6	24.638	RFELLR1.38
1 5/8	84	27.686	RFELLR1.58
2 1/8	110	34.036	RFELLR2.18
2 5/8	131.5	37.338	RFELLR2.58
3 1/8	165	42.164	RFELLR3.18
3 5/8	193	48.514	RFELLR3.58
4 1/8	217	54.864	RFELLR4.18



Tube Strap - Double Hole

Dimensions (mm)						Product Code
SIZE	L1	L2	L3	H		
1/2	33.5	46	13	14.2	6.6	RFSPS12
5/8	36	53	13	16.5	8	RFSPS58
3/4	40.2	53.3	13	20.2	9.6	RFSPS34
7/8	44	61.5	13	22.5	11.3	RFSPS78
1 1/8	48.8	67	13	30.5	14	RFSPS1.18
1 3/8	58	71	13	36.5	17.8	RFSPS1.38
1 5/8	62	74	12.8	42	21	RFSPS1.58
2 1/8	79.3	91.7	13	55.5	27.25	RFSPS2.18

Brazing Rods

Type of Product

5% Silver Brazing Alloy

Composition

5% Silver

89% Copper

6% Phosphorous

Impurities to BSEN 17672 Group CP

Alloy conforms to
BSEN 17672:2010 CuP104

Melting Range

645 - 815ºC

Appearance

Copper coloured metal

Occupational Health Data

TLV

Odour threshold

Silver	0.1mg/m3 as fume
Phosphorous	1mg/m3 as phosphoric acid
Copper	0.2mg/m3 as fume

Working Temp

710ºC

Tensile Strength 600N/mm^2

Hardness 190

Elongation 7%

Electrical Conductivity
10% I.A.C.S. at 20ºC

Type of Product

2% Silver Brazing Alloy

Composition

2% Silver

91.7% Copper

6.3% Phosphorous

Impurities to BSEN 17672 Group CP

Alloy conforms to
BSEN 17672:2010 CuP104

Melting Range

645 - 825ºC

Appearance

Copper coloured metal

Occupational Health Data

TLV

Odour threshold

Silver	0.1mg/m3 as fume
Phosphorous	1mg/m3 as phosphoric acid
Copper	0.2mg/m3 as fume

Working Temp

740ºC

Tensile Strength 490N/mm^2

Hardness 195

Elongation 5%

Electrical Conductivity
9% I.A.C.S. at 20ºC

Type of Product

Square 0.2% Silver Brazing Alloy

Composition

0.2% Silver

93.5% Copper

6.3% Phosphorous

Impurities to BSEN 17672 Group CP

Alloy conforms to
BSEN 17672:2010 CuP104

Melting Range

645 - 815ºC

Appearance

Copper coloured metal

Occupational Health Data

TLV

Odour threshold

Silver	0.1mg/m3 as fume
Phosphorous	1mg/m3 as phosphoric acid
Copper	0.2mg/m3 as fume

Working Temp

760ºC

Tensile Strength 490N/mm^2

Hardness 195

Elongation 5%

Electrical Conductivity
8.5% I.A.C.S. at 20ºC

Lawton K65

Lawton K65 is a high copper alloy with high mechanical strength.

Typical Applications

Tubes for air conditioning and refrigeration, heating and solar engineering, brake line tubing

Material designation

EN CuFe2P CW1076
UNS* C19400
* Unified numbering system

Physical Properties*

Thermal Conductivity W/(m-K) >260
DensityG/CM3 8.91
*Reference values at room temperature

Temper (DIN EN12449)

R300** soft annealed
R420** hard

According to DIN EN 12449

Chemical Composition		Mechanical properties (annealed)	
Fe	2.10-2.60 %	Rn	min.>300 N/mm2
Zn	0.05-0.20%	Rn	max.>250 N/mm2
P	0.015-0.15 %	A	min. >25%
Pb	max. 0.03 %		
Cu	balance		

**Conformity to PED 97/23/EC can be certified through product inspection by a technical inspection agency such as TUV.

Fabrication properties	
Cold working	excellent
Electroplating	excellent
Hot-dip tinning	excellent
Machinability	poor

Joining	
Brazing	excellent
Soft soldering	excellent
Inert gas shielded	
arc welding	excellent
Resistance	
welding	good
Laser welding	good

Corrosion resistance

Lawton K65 is insensitive to stress corrosion cracking. Lawton K65 exhibits good resistance in natural atmosphere (also marine atmosphere) and industrial atmosphere. It has a better resistance to erosion and pitting corrosion than Cu-DHP in different types of water and neutral saline solutions.

LAWTON K65

Sizes available				
Type of delivery		Outside diameter mm*	Manufacture	Temper
Straight lengths	plain	7-108	seamless	hard or annealed
(max. 7800 mm)	inner-grooved	7-16	seamless	hard or annealed
Level-wound coils (LWC)	plain	7-20	seamless	hard or annealed
(coil weight on request)	inner-grooved	7-16	seamless	hard or annealed

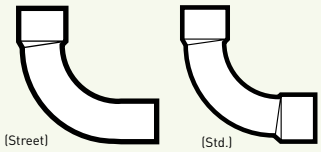
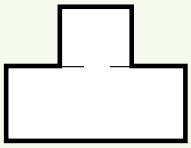
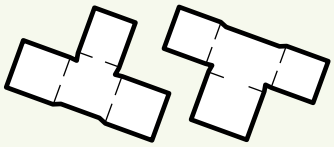
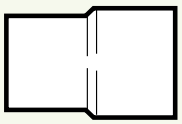
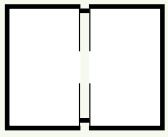
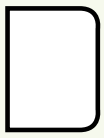
*Wall thicknesses and other sizes on request

Relevant standards and specifications

DIN EN 12449 Seamless, round tubes for general purposes
Wieland R-1084 Seamless drawn plain or inner-grooved tubes in K65 in LWC for pressure vesels and piping
Wieland R-1085 Seamless drawn plain or inner-grooved copper tubes in K65 in straight lengths for pressure vessels and piping
VdTUV-Werkstoffblatt, new draft 03.2010 Seamless drawn tubes in CuFe2P (CW107C) Wieland K65

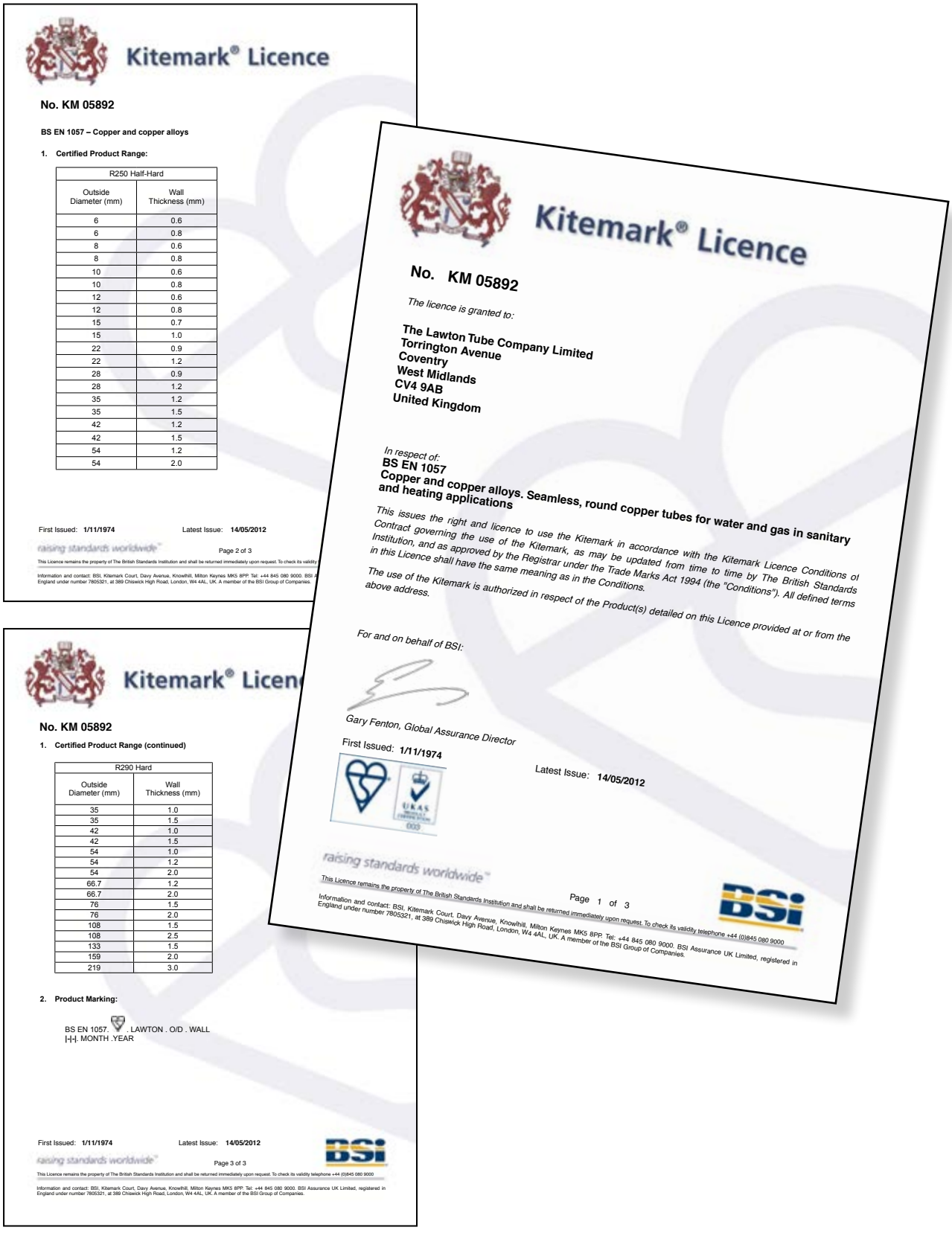
Lawton K65 Fittings

LAWTON CO2 FITTINGS

Fitting	Size		Max Working Pressure at 150deg C	Bag Qty	Box Qty
90° Long Radius Elbows 	Street	Std.			
	3/8*	3/8	120bar	5	100
	1/2*	1/2	120bar	5	100
	5/8*	5/8	120bar	5	100
	3/4*	3/4	120bar	5	100
	7/8*	7/8	120bar	5	100
	1 1/8*	1 1/8	120bar	5	100
	1 3/8*	1 3/8	120bar	1	60
	1 5/8*	1 5/8	120 bar	1	20
Equal Tee 	3/8		120bar	5	100
	1/2		120bar	5	100
	5/8		120bar	5	100
	3/4		120bar	5	100
	7/8		120bar	5	100
	1.1/8		120bar	5	100
	1.3/8		120bar	1	60
	1.5/8		120 bar	1	20
Reducer Tees 	1/2 x 1/2 x 3/8*		120 bar	5	100
	1/2 x 3/8 x 3/8*		120 bar	5	100
	5/8 x 5/8 x 1/2*		120 bar	5	100
	3/4 x 3/4 x 5/8*		120 bar	5	100
	5/8 x 1/2 x 1/2*		120 bar	5	100
	5/8 x 5/8 x 3/8*		120 bar	5	100
	7/8 x 7/8 x 3/4*		120 bar	5	100
45° Elbows 	1 1/8 x 1 1/8 x 7/8*		120 bar	5	100
	1 1/8 x 7/8 x 1/2*		120 bar	5	100
	1 3/8 x 1 3/8 x 7/8*		120 bar	5	100
	Street	Std.			
	3/4*	3/4*	120 bar	5	100
	7/8*	7/8*	120 bar	5	100
Fitting Reducer 	1 1/8*	1 1/8*	120 bar	5	100
	1 3/8*	1 3/8	120 bar	5	100
	1 5/8*	1 5/8*	120 bar	5	100
	1/2 x 3/8		120bar	5	100
	5/8 x 3/8		120bar	5	100
	5/8 x 1/2		120bar	5	100
	3/4 x 1/2		120bar	5	100
	3/4 x 5/8		120bar	5	100
	7/8 x 3/8		120bar	5	100
	7/8 x 5/8		120bar	5	100
Coupler 	1 1/8 x 5/8		120bar	5	100
	7/8 x 3/4		120bar	5	100
	1 1/8 x 3/4		120bar	5	100
	1 1/8 x 7/8		120bar	5	100
	1 3/8 x 1 1/8		120bar	1	60
	1 5/8 x 1 3/8		120 bar	1	60
	3/8		120bar	5	100
	1/2		120bar	5	100
End Cap 	5/8		120bar	5	100
	3/4		120bar	5	100
	7/8		120bar	5	100
	1 1/8		120bar	5	100
	1 3/8		120bar	1	60
	1 5/8		120bar	1	60
	3/8*		120bar	5	100
	1/2*		120bar	5	100
	5/8		120bar	5	100
	3/4		120bar	5	100
	7/8		120bar	5	100
	1 1/8		120bar	5	100
	1 3/8		120bar	1	60
	1 5/8		120 bar	1	60

All K65 end fittings are made from K65 tube

Kitemark – BS EN 1057



Kitemark® Licence

No. KM 05892

BS EN 1057 – Copper and copper alloys

1. Certified Product Range:

R250 Half-Hard	
Outside Diameter (mm)	Wall Thickness (mm)
6	0.6
6	0.8
8	0.6
8	0.8
10	0.6
10	0.8
12	0.6
12	0.8
15	0.7
15	1.0
22	0.9
22	1.2
28	0.9
28	1.2
35	1.2
35	1.5
42	1.2
42	1.5
54	1.2
54	2.0

First Issued: 1/11/1974 Latest Issue: 14/05/2012

raising standards worldwide™

Page 2 of 3

This Licence remains the property of The British Standards Institution and shall be returned immediately upon request. To check its validity

Information and contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: +44 845 080 9000. BSI A
England under number 7805321, at 389 Chiswick High Road, London, W4 4AL, UK. A member of the BSI Group of Companies.

Kitemark® Licence

No. KM 05892

The licence is granted to:

The Lawton Tube Company Limited
Torrington Avenue
Coventry
West Midlands
CV4 9AB
United Kingdom

In respect of:
BS EN 1057
Copper and copper alloys. Seamless, round copper tubes for water and gas in sanitary and heating applications

This issues the right and licence to use the Kitemark in accordance with the Kitemark Licence Conditions of Contract governing the use of the Kitemark, as may be updated from time to time by The British Standards Institution, and as approved by the Registrar under the Trade Marks Act 1994 (the "Conditions"). All defined terms in this Licence shall have the same meaning as in the Conditions.

The use of the Kitemark is authorized in respect of the Product(s) detailed on this Licence provided at or from the above address.

For and on behalf of BSI:

Gary Fenton, Global Assurance Director

First Issued: 1/11/1974 Latest Issue: 14/05/2012

raising standards worldwide™

Page 1 of 3

This Licence remains the property of The British Standards Institution and shall be returned immediately upon request. To check its validity telephone +44 (0)845 080 9000

Information and contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP Tel: +44 845 080 9000. BSI Assurance UK Limited, registered in England under number 7805321, at 389 Chiswick High Road, London, W4 4AL, UK. A member of the BSI Group of Companies.

Kitemark® Licen

No. KM 05892

1. Certified Product Range (continued)

R290 Hard	
Outside Diameter (mm)	Wall Thickness (mm)
35	1.0
35	1.5
42	1.0
42	1.5
54	1.0
54	1.2
54	2.0
66.7	1.2
66.7	2.0
76	1.5
76	2.0
108	1.5
108	2.5
133	1.5
159	2.0
219	3.0

2. Product Marking:

BS EN 1057. . LAWTON . O/D . WALL
|-|-|. MONTH .YEAR

First Issued: 1/11/1974 Latest Issue: 14/05/2012

raising standards worldwide™

Page 3 of 3

This Licence remains the property of The British Standards Institution and shall be returned immediately upon request. To check its validity telephone +44 (0)845 080 9000

Information and contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: +44 845 080 9000. BSI Assurance UK Limited, registered in England under number 7805321, at 389 Chiswick High Road, London, W4 4AL, UK. A member of the BSI Group of Companies.

CE Mark Cert – EN 1057

Certificate

EC-CERTIFICATE OF CONFORMITY

0086-CPD-544438

SUPPLEMENTARY INFORMATION SHEET

The Lawton Tube Company Limited, Torrington Avenue
Coventry, CV4 9AB, United Kingdom

raising standards worldwide™

Page 2 of 3

Certificate

EC-CERTIFICATE OF CONFORMITY

0086-CPD-544438

In compliance with the Directive 89/106/EEC of the Council of European Communities of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to the construction products (Construction Products Directive - CPD), amended by the Directive 93/68/EEC of the Council of European Communities of 22 July 1993, it has been stated that the construction product

Copper and Copper Alloys – Seamless Round Copper Tubes for Water and Gas in Sanitary and Heating Applications

as detailed on the Supplementary Information Sheet

Produced in the factory &
placed on the market by

The Lawton Tube Company Limited
Torrington Avenue
Coventry
CV4 9AB
United Kingdom

is submitted by the manufacturer to a factory production control and to the further testing of samples taken at the factory in accordance with a prescribed test plan and that the approved body British Standards Institution has performed the initial type-testing for the relevant characteristics of the product, the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

This certificate attests that all provisions concerning the attestation of conformity and the performances described in Annex ZA of the standard

EN 1057:2006

were applied and that the product fulfils all the prescribed requirements.

For and on behalf of the British Standards Institution, a Notified Body for the above Directive (Notified Body Number 0086):

David Ford, Director, Healthcare and Testing Services

Date 2 December 2009

This certificate first issued Date 2 December 2009

This certificate remains valid as long as the conditions laid down in the harmonised technical specification in reference or the manufacturing conditions in the factory or the factory product control itself are not modified significantly.

The British Standards Institution is incorporated by Royal Charter.

raising standards worldwide™

Page 1 of 3

Certificate

EC-CERTIFICATE OF CONFORMI

0086-CPD-544438

SUPPLEMENTARY INFORMATION

The Lawton Tube Company Limited, Torringt
Coventry, CV4 9AB, United Kingdo

raising standards worldwide™

Page 3 of 3

Kitemark – IS EN 1057

National Standards Authority of Ireland

Licence to use a Standard Mark

The National Standards Authority of Ireland,
in exercise of the power conferred on it by subsection (1) of Section 21
of the National Standards Authority Act (No. 28 of 1996), hereby grants to

The Lawton Tube Co. Ltd
Torrington Avenue
Coventry
West Midlands CV4 9AB

a license to use the Irish Standard Mark on or in connection with
Copper & Copper Alloys: Seamless Round Copper Tubes for Water and Gas in Sanitary and Heating Applications
to indicate conformity to Irish Standard

IS EN 1057: 1996

An Irish Standard Mark License authorises the Licensee to use
the Irish Standard Mark in conjunction with the relevant Irish Standard
Number, on a product which is the subject of the license, and which
conforms to the relevant Irish Standard Specification.
The license is not assignable, and shall remain in force until revoked by,
or surrendered by the licensee to, the National Standards Authority of Ireland.

License Number: 1.7.19
Date of issue: 05 October 2005
Revision Date: 05 October 2005

Signed: Chief Executive Officer Signed: Chairperson

The validity of this certificate is maintained through on-going surveillance inspections.

National Standards Authority of Ireland, Glasnevin, Dublin 9, Ireland

Kitemark – BS EN13348

Kitemark® Licence

No. KM 66240

The British Standards Institution hereby grants to:

The Lawton Tube Company Limited
Torrington Avenue
Coventry
West Midlands
CV4 9AB
United Kingdom

In respect of:
Copper and copper alloys - Seamless, round copper tubes for medical gases or vacuum

This issues the right and licence to use the Kitemark in accordance with the Kitemark Licence Conditions or Contract governing the use of the Kitemark, as may be updated from time to time by The British Standards Institution, and as approved by the Registrar under the Trade Marks Act 1994 (the "Conditions"). All defined terms in this Licence shall have the same meaning as in the Conditions.

The use of the Kitemark is authorized in respect of the Product(s) detailed on this Licence provided at or from the above address.

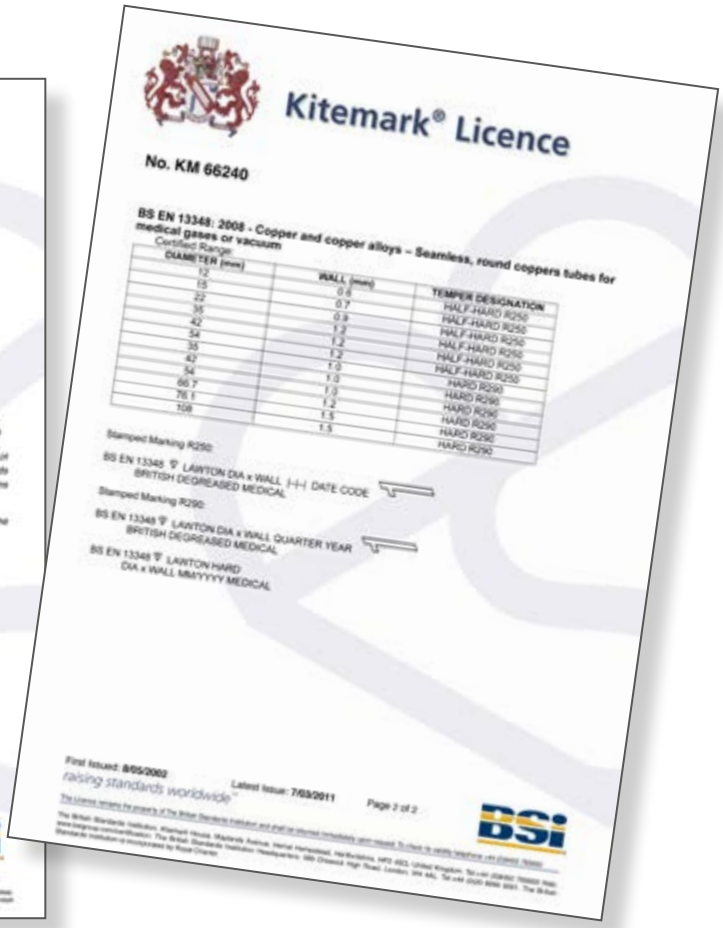
For and on behalf of The British Standards Institution:

David W Ford, Executive Director, Healthcare & Testing Services

First issued: 6/05/2002 Latest issue: 7/03/2011

raising standards worldwide™

Page 1 of 2



Kitemark® Licence

No. KM 66240

BS EN 13348: 2008 - Copper and copper alloys – Seamless, round coppers tubes for medical gases or vacuum

Certified Range:

DIAMETER (mm)	WALL (mm)	TEMPER DESIGNATION
12	0.6	HALF-HARD R250
15	0.7	HALF-HARD R250
22	0.9	HALF-HARD R250
28	1.2	HALF-HARD R250
42	1.2	HALF-HARD R250
54	1.2	HALF-HARD R250
35	1.2	HALF-HARD R250
42	1.2	HALF-HARD R250
54	1.0	HALF-HARD R250
66.7	1.2	HARD R290
76.1	1.2	HARD R290
108	1.5	HARD R290
	1.5	HARD R290
		HARD R290
		HARD R290

Stamped Marking R250:
BS EN 13348 LAWTON DIA x WALL HH DATE CODE
BRITISH DEGREASED MEDICAL

Stamped Marking R290:
BS EN 13348 LAWTON DIA x WALL QUARTER YEAR
BRITISH DEGREASED MEDICAL

BS EN 13348 LAWTON HARD
DIA x WALL MM/YYYY MEDICAL

First issued: 6/05/2002 Latest issue: 7/03/2011

raising standards worldwide™

Page 2 of 2

Water Regulations Advisory Scheme

Our Ref: HL/M120139
Test Report: MAT/LAB 179E

3rd May 2012

The Lawton Tube Company Ltd.
Tonnington Avenue,
Tile Hill,
Coventry,
CV4 9AB

WATER REGULATIONS ADVISORY SCHEME (WRAS)
MATERIAL APPROVAL

The material referred to in this letter is suitable for contact with wholesome water for domestic purposes having met the requirements of BS 6920-1:2000 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

The reference relates solely to its effect on the quality of the water with which it may come into contact and does not signify the approval of its mechanical or physical properties for any use.

FLUXES **5090**

Lawton Soldering Flux. Cream coloured flux paste. Apply as per manufacturer's instructions. For use with water up to 70°C.

APPROVAL NUMBER: 1204519
APPROVAL HOLDER: THE LAWTON TUBE COMPANY LTD.

The Scheme reserves the right to review approval. This approval is valid between April 2012 and April 2017.

An entry, as above, will accordingly be included in the Water Fittings Directory on-line under the section headed, "Materials which have passed full tests of effect on water quality".

The Directory may be found at: www.wras.co.uk/directory

Yours faithfully

Jason Furnival
Approvals & Enquiries Manager
Water Regulations Advisory Scheme

WRAS APPROVED PRODUCT

This certifies that

THE LAWTON TUBE COMPANY LIMITED

has had the undermentioned product examined, tested and found, when correctly installed, to comply with the requirements of the United Kingdom Water Supply (Water Fittings) Regulations/Scottish Water Byelaws.

LTC RANGE OF COPPER END FEED FITTINGS EN 1254 (FOR SOLDERING OR BRAZING) FOR USE WITH KITE MARKED COPPER TUBE TO BS EN1057.

This certificate by itself is not evidence of a valid WRAS Approval. Confirmation of the current status of an approval must be obtained from the WRAS Directory (www.wras.co.uk/directory)

The product so mentioned will be listed in the Water Fittings and Materials Directory for a period until:

31 JANUARY 2018

1301066
Certificate No.

Chairman, Test and Assessment Group *Secretary*

WRAS APPROVED PRODUCT

Quality System ISO 9001:2008

Affiliation Certificates

30 Year Guarantee

Enjoy the added bonus of an extra 5 year warranty with no additional premiums if Lawton's EN1057 15-219mm range is fitted with any flame-free jointed piping system. (contact us for full terms and conditions)

LAWTON PLUMBING

25 Year Guarantee

The Lawton Tube Company Limited ("Lawton") guarantees its plain copper tubes and its copper end feed fittings for water, heating, gas and sanitation purposes, for the period of 25 years from the date of purchase, against fault or defect due to defective materials or manufacture or failure to comply with the provision of the quality stamped on the tube/fitting.

If any tube/fitting shall fail this guarantee Lawton shall:

- Replace the faulty tube/fitting
- Pay the installer's costs of removing or replacing the faulty tube/fitting (up to an amount of £75,000 per claim.)
- Pay any costs or damages suffered/incurred as a result of the failure (up to an amount of £250,000 per claim.)

Lawton reserves the right to remedy the failure itself or by its own nominated contractor.

Oliver Lawton, Managing Director

Conditions
This guarantee is conditional upon:
Proper installation of the tube/fitting in accordance with all relevant practices and regulations.
Lawton being notified of the failure as soon as practicable but in any event within 14 days after the failure.
The claimant taking all appropriate or necessary measures to mitigate the damages or losses suffered.
Lawton being given the opportunity to inspect the faulty tube and the installation (with or without its own experts) to satisfy itself as to the failure of the tube, and if required to remove the faulty tube/fitting for testing. Lawton having no liability for any indirect or consequential losses.
Lawton's total liability under this guarantee not exceeding the sum of £250,000.
This guarantee extends only to the original purchaser/installer of the tube/fitting and is not capable of assignment and applies only to the tube/fitting sold and installed in the United Kingdom.

COSHH – Hazard data sheet for all other copper tubes

Copper CU and Its Salts

General Data – Grade 11 Chemical
Copper is reddish brown ductile malleable metal. It is highly conductive for heat and electricity. There are many alloys of copper, brass and bronze being the most common.

It forms two ranges of salts, cuprous and cuprice – the latter being more stable.

Uses

1 The manufacture of a wide range of alloys e.g.
   a. Brass which contains 37% zinc and other elements such as tin, manganese, nickel, iron and aluminium.
   b. Bronze which contains tin, lead, nickel phosphorous and silicon.
   c. High conductivity alloys containing silver, cadium and chromium.
   d. High strength alloys with beryllium, nickel, cobalt and silicon.
   e. For machinability with tellurium.
   f. When combined with 10%-30% nickel provides an alloy suitable for welding and capable of carrying corrosive liquids.
2 In the electricity industry for high conductivity.
3 Building industry for piping water and gas.
4 Copper Salts are colouring agents and fungicides.

Hazard
Copper itself is virtually non-toxic in its industrial application. Some of the salts however, and particular copper sulphate are toxic if swallowed. Inhalation of the fume from welding or melting of brass leads to metal fumer fever but this effect is attributed to zinc oxide fume. Similarly the inhalation of powered bronze can cause metal fume fever.

Acute Poisoning
In industrial practice acute poisoning may arise in 2 ways:-

1 By inhalation of fume from welding or brazing copper alloys. Metal fume fever develops some hours after exposure.
2 By swallowing copper sulphate solution which produces abdominal cramp, nausea, vomiting and diarrhoea.

Chronic Poisoning – Unknown

Occupational Exposure Limits HSE EH40/89

	Long Term Exposure Limit		Short Term Exposure Limit	
	PPM	Mg M3	PPM	Mg M3
Fume	-	0.2	-	-
Dust	-	1	-	1

Precautions
All melting, welding and brazing operations should be performed in controlled atmospheric conditions and should not be undertaken in enclosed spaces without exhaust ventilation and fresh airline respirators.

Personal Protective Equipment
A respirator to BS 2091 should be worn when other safety measures are not available.

First Aid

1 Inhalation of fume rarely causes immediate symptoms but if they occur remove from the fume. Oxygen and artificial respiration rarely called for.
2 Ingestion of solutions of copper salts, particularly copper sulphate – dilute the poison by giving copious quantities of water to drink.
3 Remove the patient to hospital immediately together with a sample of fluid drunk and preserving specimens of vomits.

Company Environmental Policy

The Lawton Tube Company Limited is the UK's leading independent supplier of copper tube and fittings. We form an indispensable link between one of the world's most versatile metals and a wide variety of finished goods.

We recognise and understand that our business activities, products and services have an effect on the local, regional and the global environment.

As a consequence of this our business is committed to identifying our environmental hazards and risks and to manage them effectively by implementing and maintaining an environmental management system (EMS).

The scope of our EMS covers the manufacture and distribution of solid drawn copper alloy tubes to national, international standards, customer own specifications and the supply of refrigeration tubes and fittings and medical fittings.

Our environmental commitments are to:

- Implement and maintain an Environmental Management System (EMS) ISO14001.
- Comply with applicable environmental legal and other requirements which relate to the businesses environmental hazards and risks (aspects).
- Have a process for setting, monitoring and improving environmental objectives and targets.
- To encourage an ethos of preventing pollution, reducing waste and minimise the consumption of resources where practical.
- Educate, train and motivate employees to carry out tasks in an environmentally responsible manner.
- Encourage environmental protection and best practice among suppliers and subcontractors.
- The business is committed to continual improvement of environmental performance. This Policy will be communicated to all staff, and those who work for or on its behalf. The policy will also be made available to the public.

Health & Safety Policy

The Lawton Tube Co. Ltd recognises Health and Safety issues are an integral part of our business, and we are committed to ensuring the Health and Safety of all persons likely to be affected by activities on our premises. These include our employees, customers, contractors and self-employed persons working on our site, and visitors.

Our aim is to improve and promote health and safety at work throughout the organization, by using appropriate systems to implement the Health and Safety policy, its objectives and suitable safeguard arrangements.

The Managers and Employees are committed to the health and safety policy, and improving the health and safety performance of our business.

The policy is expressed in 'Key Commitments' that set the standards and practices that our businesses shall employ, in addressing health and safety issues.

All employees have a legal duty and obligation to co-operate, be involved and committed to ensuring the health and safety policy, objectives and safety arrangements are complied with for themselves and others.

The scope of the OH&S management system includes:

The scope of the OHSAS management system is covered by the company processes in section 4.1a which contributes to the manufacture and distribution of copper tube and fittings from the two company sites at Coventry and Poole.

KEY COMMITMENTS

1. Comply with relevant national Health and Safety Legislation & other requirements.
   - Identify and conform to, if not exceed, all current and applicable health and safety legislations and regulations and other requirements to which the business subscribes.

2. Keep up to date with developments in Health and Safety
   - Identify developments in health and safety and ensure these are integrated into the safety arrangements.

3. Identify and assess all significant risks to Health and Safety
   - Define and implement a formal programme of risk assessments.

4. Eliminate or introduce measures to adequately control these Risks
   - Establish a systematic approach to the identification of significant hazards, risk assessments and the allocation of resources to eliminate and or control these hazards.
   - Provide a safe and healthy working environment and implement appropriate measures to prevent accidents and incidents occurring.

5. Put in place appropriate Health and Safety Policies and Procedures
   - Introduce formal systems (i.e. OHSAS 18001) to implement the health and safety policy, objectives and arrangements.

6. Provide adequate resources to ensure our Policies and Procedures are implemented.
   - Provide sufficient resources to fulfil legal obligations.

7. Involve and consult with our employees
   - Establish a culture of employee involvement and cooperation to address issues affecting their health and safety.

8. Ensure all employees are informed of our Policies and Procedures
   - Promote health and safety awareness at all levels of management and throughout the Company.

9. Ensure all employees comply with our Safety Policies and Procedures
   - Clearly define health and safety responsibilities of all personnel and communicate these throughout the Company.
   - All employees have a legal duty and obligation to co-operate, be involved and committed to ensuring the health and safety policy, objectives and safety arrangements are complied with.
   - Ensure contractors comply with the Health and Safety Rules and Procedures for Contractors'.

10. Carry out periodic review of our Safety Policies and Procedures
    - Complete planned health and safety audits to review and check the effectiveness of each sites' management of the Health and Safety policy and arrangements.

11. Continually improve our Health and Safety performance
    - Monitor and improve safety performance alongside other management performance criteria.
    - Establish and maintain a 'Safety Committee' for discussing health and safety matters and identifying improvement opportunities.
    - Be committed to the prevention of injury and ill health.

LAWTON TUBES

The nations copper specialist

Standard Conditions Of Sale

The buyer's attention is in particular drawn to the provisions of condition 12.4.

1. INTERPRETATION

1.1 The definitions and rules of interpretation in this condition apply in these conditions.

Buyer: The person, firm or company who purchases the Goods from the Company.

Company: The Lawton Tube Company Limited (CRN 00165130)

Contract: Any contract between the Company and the Buyer for the sale and purchase of the Goods, incorporating these conditions.

Delivery Point: The place where delivery of the Goods is to take place under condition 4.

Goods: Any goods agreed in the Contract to be supplied to the Buyer by the Company (including any part or parts of them).

1.2 A reference to a particular law is a reference to it as it is in force for the time being taking account of any amendment, extension, application or re-enactment and includes any subordinate legislation for the time being in force made under it.

1.3 Words in the singular include the plural and in the plural include the singular.

1.4 A reference to one gender includes a reference to the other gender.

1.5 Condition headings do not affect the interpretation of these conditions.

2. APPLICATION OF TERMS

2.1 Subject to any variation under condition 2.3 the Contract shall be on these conditions to the exclusion of all other terms and conditions (including any terms or conditions which the Buyer purports to apply under any purchase order, confirmation of order, specification or other document).

2.2 No terms or conditions endorsed on, delivered with or contained in the Buyer's purchase order, confirmation of order, specification or other document shall form part of the Contract simply as a result of such document being referred to in the Contract.

2.3 These conditions apply to all the Company's sales and any variation to these conditions and any representations about the Goods shall have no effect unless expressly agreed in writing and signed by a Director of the Company. The Buyer acknowledges that it has not relied on any statement, promise or representation made or given by or on behalf of the Company which is not set out in the Contract. Nothing in this condition shall exclude or limit the Company's liability for fraudulent misrepresentation.

2.4 Each order or acceptance of a quotation for Goods by the Buyer from the Company shall be deemed to be an offer by the Buyer to buy Goods subject to these conditions.

2.5 No order placed by the Buyer shall be deemed to be accepted by the Company until a written acknowledgement of order is issued by the Company or (if earlier) the Company delivers the Goods to the Buyer.

2.6 The Buyer shall ensure that the terms of its order and any applicable specification are complete and accurate.

2.7 Any quotation is given on the basis that no Contract shall come into existence until the Company despatches an acknowledgement of order to the Buyer.

3. DESCRIPTION

3.1 The quantity and description of the Goods shall be as set out in the Company's quotation or acknowledgement of order.

3.2 All samples, drawings, descriptive matter, specifications and advertising issued by the Company and any descriptions or illustrations contained in the Company's catalogues or brochures are issued or published for the sole purpose of giving an approximate idea of the Goods described in them. They shall not form part of the Contract and this is not a sale by sample.

3.3 If the Goods are to be manufactured or any process is to be applied to the Goods by the Seller in accordance with a specification submitted by the Buyer:¬

(a) The Buyer shall supply such specification within sufficient time to enable the Company to complete delivery of the goods by the estimated delivery date.

(b) The Buyer shall indemnify the Company against all loss damages costs and expenses awarded against or incurred by the Company in connection with or paid or agreed to be paid by the Company in settlement of any claim for infringement of any patent, copyright, design, trade mark or other industrial or intellectual property rights of any other person which results from the Company's use of the Buyer's specification.

(c) The Company reserves the right to make any changes in the specification of the Goods which are required to conform with any applicable statutory or EC requirements.

(d) The Company shall be under no liability in respect of any defect in the Goods arising from any drawing design or other specification supplied by the Buyer

4. RAW MATERIALS AND SPECIAL TOOLS

4.1 Contracts and orders are accepted subject to the Company being able to obtain at all necessary times the raw materials and any special tools required to execute the order.

4.2 Any dies or tools made or obtained specially for an order remain the Seller's property, even when the Buyer has been charged with the cost or part cost.

5. DELIVERY

5.1 Unless otherwise agreed in writing by the Company, delivery of the Goods shall take place at the Buyer's place of business.

5.2 The Buyer shall take delivery of the Goods within 7 days of the Company giving it notice that the Goods are ready for delivery.

5.3 Any dates specified by the Company for delivery of the Goods are intended to be an estimate and time for delivery shall not be made of the essence by notice. If no dates are so specified, delivery shall be within a reasonable time.

5.4 Subject to the other provisions of these conditions the Company shall not be liable for any direct, indirect or consequential loss (all three of which terms include, without limitation, pure economic loss, loss of profits, loss of business, depletion of goodwill and similar loss), costs, damages, charges or expenses caused directly or indirectly by any delay in the delivery of the Goods (even if caused by the Company's negligence), nor shall any delay entitle the Buyer to terminate or rescind the Contract.

5.5 If for any reason the Buyer fails to accept delivery of any of the Goods when they are ready for delivery, or the Company is unable to deliver the Goods on time because the Buyer has not provided appropriate instructions, documents, licences or authorisations:

(a) risk in the Goods shall pass to the Buyer (including for loss or damage caused by the Company's negligence);

(b) the Goods shall be deemed to have been delivered; and

(c) the Company may store the Goods until delivery, whereupon the Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance).

5.6 The Buyer shall provide at the Delivery Point and at its expense adequate and appropriate equipment and manual labour for unloading the Goods.

5.7 If the Company delivers to the Buyer a quantity of Goods of up to 10% more or less than the quantity ordered by the Buyer, the Buyer shall not be entitled to object to or reject the Goods or any of them by reason of the surplus or shortfall and shall pay for such goods at the pro rata Contract rate.

5.8 The Company may deliver the Goods by separate instalments. Each separate instalment shall be invoiced and paid for in accordance with the provisions of the Contract.

5.9 Each instalment shall be a separate Contract and no cancellation or termination of any one Contract relating to an instalment shall entitle the Buyer to repudiate or cancel any other Contract or instalment.

5.10 Where the Buyer has given firm instructions for the manufacture or delivery of Goods and subsequently requests the Seller to defer delivery, any Goods completed will be invoiced on completion, holding and storage charges at the reasonable cost of storage including delivery will be invoiced subsequently when applicable.

6. NON-DELIVERY

6.1 The quantity of any consignment of Goods as recorded by the Company on despatch from the Company's place of business shall be conclusive evidence of the quantity received by the Buyer on delivery unless the Buyer can provide conclusive evidence proving the contrary.

6.2 The Company shall not be liable for any loss or non-delivery of Goods (even if caused by the Company's negligence) unless the Buyer gives written notice and a complete claim to the Company (and to the carrier if applicable) of the non-delivery within 3 working days of the date when the Goods would in the ordinary course of events have been received.

6.3 Any liability of the Company for non-delivery of the Goods shall be limited to replacing the Goods within a reasonable time or issuing a credit note at the pro rata Contract rate against any invoice raised for such Goods.

7. EXPORT ORDERS

7.1 Unless the context otherwise requires any term or expression which is defined in or given a particular meaning by the provisions of "Incoterms", the definition of meaning given by the Incoterms in force at the date when the contract is made, shall have the same meaning in these conditions or any contract for the sale or supply of Goods by the Company to the Buyer, but if there is any conflict between the provisions of Incoterms and these conditions, the latter shall prevail.

7.2 The Buyer shall be responsible for complying with any legislation or regulations governing the importation of the Goods into the country of destination and for the payment of any duties on them.

8. RISK/TITLE

8.1 Risk shall pass to the Buyer so that the Buyer is responsible for all loss. damage or deterioration to the Goods:

(a) If the Company delivers the Goods by its own transport at the time when the Goods or a relevant part thereof arrive at the place of delivery or,

(b) In all other circumstances at the time when the Goods or a relevant part thereof leave the premises of the Company whether or not the Company arranges transport and where the Goods are delivered by carrier any claims for loss or damage in transit must be made by the Buyer against the carrier in accordance with the carriers conditions.

8.2 Ownership of the Goods shall not pass to the Buyer until the Company has received in full (in cash or cleared funds) all sums due to it in respect of:

(a) the Goods; and

(b) all other sums which are or which become due to the Company from the Buyer on any account.

8.3 Until ownership of the Goods has passed to the Buyer, the Buyer shall:

(a) hold the Goods on a fiduciary basis as the Company's bailee;

(b) store the Goods (at no cost to the Company) separately from all other goods of the Buyer or any third party in such a way that they remain readily identifiable as the Company's property;

(c) not destroy, deface or obscure any identifying mark or packaging on or relating to the Goods; and

(d) maintain the Goods in satisfactory condition and keep them insured on the Company's behalf for their full price against all risks to the reasonable satisfaction of the Company. On request the Buyer shall produce the policy of insurance to the Company.

8.4 The Buyer may resell the Goods before ownership has passed to it solely on the following conditions:

(a) any sale shall be effected in the ordinary course of the Buyer's business at full market value; and

(b) any such sale shall be a sale of the Company's property on the Buyer's own behalf and the Buyer shall deal as principal when making such a sale.

8.5 The Buyer's right to possession of the Goods shall terminate immediately if:

(a) the Buyer has a bankruptcy order made against him or makes an arrangement or composition with his creditors, or otherwise takes the benefit of any statutory provision for the time being in force for the relief of insolvent debtors, or (being a body corporate) convenes a meeting of creditors (whether formal or informal), or enters into liquidation (whether voluntary or compulsory) except a solvent voluntary liquidation for the purpose only of reconstruction or amalgamation, or has a receiver and/or manager, administrator or administrative receiver appointed of its undertaking or any part thereof, or documents are filed with the court for the appointment of an administrator of the Buyer or notice of intention to appoint an administrator is given by the Buyer or its directors or by a qualifying floating charge holder (as defined in paragraph 14 of Schedule B1 to the Insolvency Act 1986), or a resolution is passed or a petition presented to any court for the winding-up of the Buyer or for the granting of an administration order in respect of the Buyer, or any proceedings are commenced relating to the insolvency or possible insolvency of the Buyer; or

(b) the Buyer suffers or allows any execution, whether legal or equitable, to be levied on his/its property or obtained against him/it, or fails to observe or perform any of his/its obligations under the Contract or any other contract between the Company and the Buyer, or is unable to pay its debts within the meaning of section 123 of the Insolvency Act 1986 or the Buyer ceases or threatens to cease to trade; or

(c) the Buyer encumbers or in any way charges any of the Goods.

8.6 The Company shall be entitled to recover payment for the Goods notwithstanding that ownership of any of the Goods has not passed from the Company.

8.7 The Buyer grants the Company, its agents and employees an irrevocable licence at any time to enter any premises where the Goods are or may be stored in order to inspect them, or, where the Buyer's right to possession has terminated, to recover them.

8.8 Where the Company is unable to determine whether any Goods are the goods in respect of which the Buyer's right to possession has terminated, the Buyer shall be deemed to have sold all goods of the kind sold by the Company to the Buyer in the order in which they were invoiced to the Buyer.

8.9 On termination of the Contract, howsoever caused, the Company's (but not the Buyer's) rights contained in this condition 7 shall remain in effect.

9. PRICE

9.1 Unless otherwise agreed by the Company in writing, the price for the Goods shall be the price set out in the order acknowledgement or if no price is stated the Company's price list published on the date of delivery or deemed delivery.

9.2 Notwithstanding clause 9.1, where the date for delivery of the Goods (or any part of them) is more than three months after the date of the order acknowledgement, the Company reserves the right to increase the price for the Goods to take account of any increase in the price of copper on the London Metal Exchange between the date of acknowledgement and the date of delivery.

9.3 The price for the Goods shall be exclusive of any value added tax and all costs or charges in relation to packaging, loading, unloading, carriage and insurance, all of which amounts the Buyer shall pay in addition when it is due to pay for the Goods.

10. PAYMENT

10.1 Subject to condition 10.4 and to any terms for payment contained in the order acknowledgement, payment of the price for the Goods is due in pounds sterling.

10.2 Time for payment shall be of the essence.

10.3 No payment shall be deemed to have been received until the Company has received cleared funds.

10.4 All payments payable to the Company under the Contract shall become due immediately on its termination despite any other provision.

10.5 The Buyer shall make all payments due under the Contract in full without any deduction whether by way of set-off, counterclaim, discount, abatement or otherwise unless the Buyer has a valid court order requiring an amount equal to such deduction to be paid by the Company to the Buyer.

10.6 If the Buyer fails to pay the Company any sum due pursuant to the Contract, the Buyer shall be liable to pay interest to the Company on such sum from the due date for payment at the annual rate of 8% above the base lending rate from time to time of Barclays Bank Plc, accruing on a daily basis until payment is made, whether before or after any judgment.

11. QUALITY

11.1 The Goods shall be manufactured and supplied in accordance with the description contained in the Company's specification (if any) and shall be of normal industrial quality.

11.2 The Company may from time to time make changes in the specification of the Goods which are required to comply with any applicable safety or statutory requirements or which do not materially affect the quality of fitness for the purpose of the Goods.

11.3 The Company shall not be liable for a breach of any express or implied warranty unless:

(a) the Buyer gives written notice of the defect to the Company, and, if the defect is as a result of damage in transit to the carrier, within 3 days of the date of delivery followed by a complete claim in writing within 5 days of the date of delivery; and

(b) the Company is given a reasonable opportunity after receiving the notice of examining such Goods and the Buyer permits the Goods to be collected by the Company or (if asked to do so by the Company) returns such Goods to the Company's place of business at the Company's cost for the examination to take place there. Where Goods are accepted from the carrier concerned without being checked, the delivery book of the carrier concerned must be signed "not examined".

11.4 The Company shall not be liable for any breach of warranty if:

(a) the Buyer makes any further use of such Goods after giving such notice; or

(b) the defect arises because the Buyer failed to follow the Company's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods or (if there are none) good trade practice; or

(c) the Buyer alters or repairs such Goods without the written consent of the Company.

11.5 Subject to condition 11.3 and condition 11.4, if any of the Goods do not conform with any warrant the Company shall at its option repair or replace such Goods (or the defective part) or refund the price of such Goods at the pro rata Contract rate provided that, if the Company so requests, the Buyer shall, at the Company's expense, return the Goods or the part of such Goods which is defective to the Company.

11.6 If the Company complies with condition 11.5 it shall have no further liability for a breach of warranty in respect of such Goods.

12. LIMITATION OF LIABILITY

12.1 Subject to condition 4, condition 6 and condition 11, the following provisions set out the entire financial liability of the Company (including any liability for the acts or omissions of its employees, agents and sub-contractors) to the Buyer in respect of:

(a) any breach of these conditions;

(b) any use made or resale by the Buyer of any of the Goods, or of any product incorporating any of the Goods; and

(c) any representation, statement or tortious act or omission including negligence arising under or in connection with the Contract.

12.2 All warranties, conditions and other terms implied by statute or common law (save for the conditions implied by section 12 of the Sale of Goods Act 1979) are, to the fullest extent permitted by law, excluded from the Contract.

12.3 Nothing in these conditions excludes or limits the liability of the Company:

(a) for death or personal injury caused by the Company's negligence; or

(b) for any matter which it would be illegal for the Company to exclude or attempt to exclude its liability; or

(c) for fraud or fraudulent misrepresentation.

12.4 Subject to condition 12.2 and condition 12.3:

(a) the Company's total liability in contract, tort (including negligence or breach of statutory duty), misrepresentation, restitution or otherwise, arising in connection with the performance or contemplated performance of the Contract shall be limited to the Contract price; and

(b) the Company shall not be liable to the Buyer for loss of profit, loss of business, or depletion of goodwill in each case whether direct, indirect or consequential, or any claims for consequential compensation whatsoever (howsoever caused) which arise out of or in connection with the Contract.

13. ASSIGNMENT

13.1 The Company may assign the Contract or any part of it to any person, firm or company.

13.2 The Buyer shall not be entitled to assign the Contract or any part of it without the prior written consent of the Company.

14. FORCE MAJEURE

The Company reserves the right to defer the date of delivery or to cancel the Contract or reduce the volume of the Goods ordered by the Buyer (without liability to the Buyer) if it is prevented from or delayed in the carrying on of its business due to circumstances beyond the reasonable control of the Company including, without limitation, acts of God, governmental actions, war or national emergency, acts of terrorism, protests, riot, civil commotion, fire, explosion, flood, epidemic, lock-outs, strikes or other labour disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials or import or export regulations or embargoes, power failure or breakdown in machinery.

15. NOTICE OF TERMINATION OR PARTIAL DELIVERY

In the event of an outbreak of hostilities (whether war is declared or not) in which Great Britain is involved, or in the event of national emergency, or if the Company's works should become whether directly or indirectly so engaged on the Government orders or orders under priority directions as to prevent or delay work on other orders, the Company shall be entitled at any time, on notice to the Buyer, to make partial deliveries only or to determine the contract, without prejudice in any case to rights accrued in respect of deliveries already made.

16. TERMINATION OF CONTRACT

Without prejudice to any other right or remedy available to the Company, the Company shall be entitled to cancel the contract or suspend any further deliveries under the contract without any liability to the Buyer and if the Goods have been delivered but not paid for, the price shall become immediately due and payable notwithstanding any previous agreement or arrangement to the contrary if:-

16.1 The Buyer fails to make any payment of the purchase price on the due date or commits any other breach of the terms of the contract or

16.2 Any of the events or circumstances referred to in condition 8.5 shall occur

17. INDEMNITY

The Buyer will indemnify the Company against all damages, penalties, costs and expenses to which the Company may become liable as a result of work done in accordance with the Buyer's specification which involves the infringement of any letters patent or registered design or copyright.

18. CANCELLATION

No order or contract may be cancelled by the Buyer except with the agreement in writing of the Company and on terms that the Buyer shall indemnify the Company in full against all loss (including loss of profit) costs, including the costs of all labour and materials used, damages charges and expenses incurred by the Company as a result of cancellation.

19. GENERAL

19.1 Each right or remedy of the Company under the Contract is without prejudice to any other right or remedy of the Company whether under the Contract or not.

19.2 If any provision of the Contract is found by any court, tribunal or administrative body of competent jurisdiction to be wholly or partly illegal, invalid, void, voidable, unenforceable or unreasonable it shall to the extent of such illegality, invalidity, voidness, voidability, unenforceability or unreasonableness be deemed severable and the remaining provisions of the Contract and the remainder of such provision shall continue in full force and effect.

19.3 Failure or delay by the Company in enforcing or partially enforcing any provision of the Contract shall not be construed as a waiver of any of its rights under the Contract.

19.4 Any waiver by the Company of any breach of, or any default under, any provision of the Contract by the Buyer shall not be deemed a waiver of any subsequent breach or default and shall in no way affect the other terms of the Contract.

19.5 The parties to the Contract do not intend that any term of the Contract shall be enforceable by virtue of the Contracts (Rights of Third Parties) Act 1999 by any person that is not a party to it.

19.6 This Contract and any dispute or claim arising out of or in connection with it or its subject matter or formation (including non-contractual disputes or claims) shall be governed by and construed in accordance with English law, and the parties submit to the exclusive jurisdiction of the English courts.

20. COMMUNICATIONS

20.1 All communications between the parties about the Contract shall be in writing and delivered by hand or sent by pre-paid first class post or sent by fax or email:

(a) (in case of communications to the Company) to its registered office or in the case of fax or email to the relevant fax number or email address specified in the order acknowledgement or such changed number or address as shall be notified to the Buyer by the Company; or

(b) (in the case of the communications to the Buyer) to the registered office of the addressee (if it is a company) or (in any other case) to any address of the Buyer set out in any document which forms part of the Contract and in the case of fax or email to the relevant fax number or email address specified in any such document or such other address or fax number as shall be notified to the Company by the Buyer.

20.2 Communications shall be deemed to have been received:

(a) if sent by pre-paid first class post, two days (excluding Saturdays, Sundays and bank and public holidays) after posting (exclusive of the day of posting); or

(b) if delivered by hand, on the day of delivery; or

(c) if sent by fax on a working day prior to 4.00 pm, at the time of transmission and otherwise on the next working day.

(d) If sent by email, 3 hours after an email is sent and in proving the service of any notice it will be sufficient to prove that the email was sent to the specified email address of the addressee.

LAWTON
TUBES

The nations copper specialist

The Lawton Tube Co. Ltd
Torrington Avenue, Coventry CV4 9AB

Telephone: (024) 7646 6203
Fax: (024) 7669 4183
E-mail: sales@lawtontubes.co.uk

www.lawtontubes.co.uk