

Section - 12 Copper Tubes

12.1 GENERAL

These clauses shall be read in continuation of Section 1 of this specification.

- 12.1.1 The copper tubes shall be manufactured to BS-2871, Part 1, Table 'Y' / EN 1057 R 220-250 and marking shall be engraved as per relevant standard.
- 12.1.2 The tubes shall be suitable for underground use for the transmission of potable water.
- 12.1.3 The tubes shall be supplied in the following forms:
- 12.1.4 15mm to 28mm Ø - soft coils of 20 meters length.
- 12.1.5 42mm & 54mm Ø - half-hard 5.8 meters straight length.
- 12.1.6 Tube samples and test results including 'Drift Test' results shall be provided at the client's request.
- 12.1.7 The coiled tubing is to be secured against uncoiling during transit, the straight lengths to be supplied in wooden boxes and are to be fitted with end caps to prevent damage during transit.
- 12.1.8 All tubes are to be new and factory fresh, tubes which have developed thick 'patina' through standing in stockyards etc. will not be accepted.

12.2 SHEATHING

- 12.2.1 The copper tubes shall be externally coated over their entire length with continuous seamless polyethylene sheathing. The color of this sheathing shall be Green/Blue.

12.3 TUBE SIZES

12.3.1 The copper tubes shall comply with the following specification with regard to size:

Tube Nominal size	Outside dia (mm)		Nominal wall	Thickness
(mm)	Max.	Min.	Thickness (mm)	sheathing (mm)
15	15.045	14.965	1.0	1.0
22	22.055	21.975	1.2	1.0
28	28.055	27.975	1.2	1.0
42	42.07	41.99	1.5	1.6
54	54.07	53.99	2.0	1.6



Section - 13

Copper Fittings, Ferrules, Stopcocks & Poly Adapters

13.1 GENERAL

These clauses shall be read in continuation of Section 1 of this specification.

- 13.1.1 The compression fittings shall be manufactured to BS-864, Part 2, Type 'B', and shall be the 'manipulative' type with 2 locking rings and marked as BS 864.2.
- 13.1.2 The capillary fittings shall be manufactured to BS-864, Part 2, and shall be of the 'integral' solder ring type and marked as BS 864.
- 13.1.3 All the above fittings as referred in Clause 13.1.1 & 13.1.2, shall be suitable for use with copper tube to BS-2871, Part 1, Table 'Y' / EN 1057 R-220-250, shall also be suitable for underground use with potable water and shall be wrapped by lubricated tape.
- 13.1.4 All poly fittings shall be compression type and shall be manufactured to BS 864, Part 3, Type A marked as BS 864.3 and shall also be suitable for use with potable water.
- 13.1.5 All nuts on these fittings shall be hexagonal or octagonal.
- 13.1.6 All fittings must be new, clean and recent manufactured.

13.2 MARKING

- 13.2.1 All fittings shall have engraved and/or casted the following:-
- A. The manufacturer's name and identification mark.
 - B. British Standard Number:
 - C. Compression Fittings - BS-864.2 or BS-864.3
 - D. Capillary Fittings - BS-864
 - E. Poly Adapters - BS-864.5
 - F. The size of the fitting in mm.

N.B. In the case of universal swivel ferrule, these will not have the BS number on them. However, ferrules may have their size indicated in "imperial" measurement. In addition to the above, an arrow indicating the "direction of flow" engraved and/or cast into them.

13.3 MATERIALS

13.3.1 All fittings including nuts & bolts, unions, etc., are to be manufactured from 'gunmetal' to BS-1400 LG2 or DZR Brass except material specified else where in the specifications. Samples with complete material specifications shall be supplied at the time of tendering.

13.3.2 Universal swivel ferrules, saddles and Poly Adapters must be manufactured from 'gunmetal', no other material will be accepted.

13.3.3 Stopcock, material option will depends on the application type:

- **For Above ground application:** Stopcock are to be manufactured from gunmetal to BS-1400 LG2 or DZR brass.
- **For under ground application:** If the Stopcock will be in direct contact with soil then it must be manufactured from gunmetal to BS-1400 LG2. If not (inside chamber with wrapping protection) either DZR brass/ gunmetal.

Note. Specifications of both applications will depend in the tender requirements.

13.3.4 Gaskets to be supplied with fittings in this section must be suitable for use with potable water and the type of gasket to be set out in the offer.

13.4 UNIVERSAL SWIVEL FERRULE

13.4.1 The ferrule shall be suitable for connecting copper service pipes, (copper tubes to BS-2871, Part 1, Table 'Y'/ EN 1057 R 220-250), to cement lined ductile iron distribution mains to, (BS-4772/ISO 2531/EN545), and shall be ductile iron distribution pattern. Screws down type ferrules with crutch heads are not acceptable.

13.4.2 The ferrules shall be suitable for insertion under-pressure by the use of a normal under-pressure-tapping machine, as well as for normal dry installation.

13.4.3 The ferrules shall be manufactured throughout in 'gunmetal' to BS-1400 LG2 including the inner plug, the top plug may be of PVC.

13.4.4 The following inlet/outlet connection will be required: -

Size of ferrule	Type of outlet connection
½" x 15mm	Copper compression , BS 864-2, Type 'B'
¾" x 22mm	Copper compression , BS 864-2, Type 'B'
1" x 28mm	Copper compression , BS 864-2, Type 'B'
1½" x 42mm	Copper compression , BS 864-2, Type 'B'
2" x 54mm	Copper compression , BS 864-2, Type 'B'

N.B. See also under 13.2.1. for details of connections and markings for the above ferrules.

13.5 STOPCOCKS

13.5.1 Stopcocks are to be manufactured to BS-1010, with crutch heads and loose jumpers. The stopcock shall be manufactured from gunmetal to BS-1400 LG2 or DZR according to the type of the application as mentioned in clause 13.3.3.

13.5.2 Stopcock washers are to be suitable for use with potable water at a normal temperature of 50° C.

13.5.3 Stopcocks will be required with the following types of connection: -

Size of stopcock	Type of connection
15mm	Copper compression Type 'B'
22mm	Copper compression Type 'B'
28mm	Copper compression Type 'B'
42mm	Copper compression Type 'B'
54mm	Copper compression Type 'B'

N.B. See clause 13.2.1 for details of connections, markings and materials for the above stopcocks.

13.6 SADDLES

- 13.6.1 Saddle strap shall be manufactured from 'gunmetal' to BS-1400 LG2 with bolts size suitable for ferrule connections up to 54mm, (2 inches).
- 13.6.2 All bolts and nuts shall be stainless steel.
- 13.6.3 The saddles shall be suitable for use with ductile iron pipes to BSEN 545 / ISO 2531.

13.7 POLY ADAPTERS

- 13.7.1 The poly adapters shall be manufactured to BS-864, Part 3, Type A, shall be marked as BS 864.5 and shall be made of gunmetal to BS 1400 LG2.
- 13.7.2 The fittings shall be suitable for Polyethylene pipes. The PE pipe shall comply to the requirements of BS 1972, 1973, 3284 & 3796.
- 13.7.3 The fittings shall meet performance requirements for joints and compression fittings for use with PE pipe as per BS 5114.
- 13.7.4 The fittings shall be suitable for working pressure of 12 Bar at 20° C.
- 13.7.5 Minimum length of threaded engagement excluding chamfer shall be as follows:

S. No.	NOMINAL SIZE	MINIMUM LENGTH OF THREADED ENGAGEMENT
	inch	mm
1	3/8	5.5
2	1/2	5.5
3	3/4	7.0
4	1 1/4	7.0
5	1 1/2	7.0
6	2	8.0

- 13.7.6 Internal Support
The internal support shall be Class "C" or it shall be color coded BLUE in accordance with pipe specifications to BS 1972 & 3284.

- 13.7.7 Testing

13.7.7.1 Internal Pressure

The fitting when assembled shall be capable to withstand internal hydrostatic pressure of 36 Bar for One Hour, when tested with PE pipe, complied with the requirement of BS 3284 or BS 3796 Class "D".

13.7.7.2 External Pressure

The fittings when assembled shall be capable to withstand external hydrostatic pressure of 0.1 Bar and 0.8 Bar with open-end test for One Hour.

13.7.7.3 Pull out Test

The axial moment of the pipe from the socket of the fitting shall not exceed 1.0mm when longitudinal force is applied as per table below for a minimum period of One Hour:

Nominal Size	LONGITUDINAL FORCE IN NEWTON					
	Class Type 32 Pipe BS-1972, BS-1973			Class Type 50 Pipe BS-3284, BS-3796		
	B	C	D	B	C	D
3/8	–	470	580	–	–	690
1/2	–	725	870	–	850	1070
3/4	810	1140	1380	–	1370	1660
1 1/4	1320	1760	2180	1600	2080	2650
1 1/2	2710	3700	4530	3080	4350	5660
2	4370	5780	–	44830	6760	8520

