

# Comparison of Copper and Steel Pipework Costs for Non-domestic Installations 2007

DAVIS LANGDON



## Copper in commercial applications

Research commissioned by the UK Copper Board into the total installation costs of non-domestic plumbing and heating systems with diameters up to 54mm shows that copper is more cost-effective to install than steel. The research looked at flame-free press fittings as well as the 'traditional' jointing techniques of capillary soldering and compression fittings. Press fittings are fast and easy to install and the results have shown that contractors and specifiers can expect significant cost savings when using them in place of steel systems.

The study was carried out by Davis Langdon LLP using data from the 2007 edition of Spon's Mechanical and Electrical Services Price Book. Copper (tube to EN1057, fittings to EN1254) was compared to black steel pipe (to BS1387).

### Method of research

The Spon's data was broken down into material cost, labour hours and labour cost. A series of tables was built up for pipework and three commonly used fittings, bends, tees and reducers for a range of pipe sizes. Varying quantities of each of the pipework components were aggregated and priced to represent different installations and these were compared for the two materials.

Materials cost is the price for delivery to site in reasonable quantities with typical trade discounts, together with any ancillary materials required in the installation process and including percentage allowances for waste, overheads, profits and preliminaries.

### Comparing copper (EN1057 - R250) and black steel tube (BS1387)

Copper and steel pipe are produced in a slightly different range of sizes (diameters). Copper is measured on the outside diameter and steel on the inside diameter. For the comparison the nearest equivalent steel size was selected for each copper tube diameter. Typically copper weighs between one third and one half of the equivalent steel pipe. Copper is therefore easier to handle and to support on fixings. Another advantage for copper is the

saving on manpower, resulting from the fitting of lighter components into position; this was accounted for under labour hours. The time taken to install copper tube is significantly less than for steel. The results clearly show a copper advantage, see Table 1.

Pipe size, mm	Copper	Steel	Saving with copper
15	0.52	0.65	19%
22	0.57	0.65	11%
28	0.63	0.72	11%
35	0.70	0.79	11%
42	0.80	0.86	7%
54	0.86	0.96	11%

TABLE 1 - Labour hours per m of pipe, labour rate is £25.37/hour

### Comparing copper and steel fittings

The research then compared the material and labour costs for various copper jointing techniques with elbows, tees and reducers. When combining material and labour costs for flame-free press fittings, copper provides substantial savings over steel, see Table 2.

Pipe size, mm	Copper	Steel	Saving with copper
15	8.33	17.06	51%
22	9.50	22.67	58%
28	13.18	26.34	50%
35	18.49	31.66	42%
42	26.74	37.60	29%
54	34.41	45.02	24%

TABLE 2 - Installed cost of copper press elbow fittings compared to steel jointing, material cost + labour rate x labour hours

For press fitting elbows the cost of the copper fittings is greater than that of the steel. However, the copper fitting can be installed in significantly less time than the steel. The result is that for installed cost the copper press fitting shows substantial savings over steel.

## Summary of costs of installed components

Pipe size, mm	15	22	28	35	42	54
Pipe	25%	12%	13%	1%	-5%	-2%
Capillary elbow	64%	68%	64%	49%	41%	21%
Capillary tee	60%	65%	59%	43%	36%	16%
Capillary reducer		60%	60%	47%	44%	34%
Compression elbow	63%	64%	50%	40%	23%	0%
Compression tee	60%	64%	48%	34%	20%	2%
Press elbow	51%	58%	50%	42%	29%	24%
Press tee	50%	56%	44%	38%	26%	24%
Press reducer		52%	36%	33%	15%	-2%

TABLE 3 - Summary of copper/steel cost comparison for components

Copper is always less expensive than steel up to and including 35mm. Pipe then becomes slightly more expensive whilst fittings remain cheaper for most types up to and including 54mm.

### Costs of installations

For comparison purposes the relative costs of partial installations, consisting of a length of tube and a number of fittings, are shown for each tube size, Tables 4, 5 and 6.

Pipe size, mm	Pipe, m	Bends, No.	Tees, No.	Reducers, No.
15	20	10		
22	20	10	4	8
28	20	10	4	8
35	20	10	4	8
42	20	10	4	8
54	20	10	4	8

TABLE 4 - Quantities for six partial installations, each using a single pipe size.

Pipe size, mm	Copper capillary £	Copper compression £	Copper press £	Steel £
15	363	366	385	574
22	545	569	592	932
28	644	741	749	1,077
35	926	1,005	990	1,270
42	1,143	1,320	1,286	1,462
54	1,530	1,773	1,613	1,758

TABLE 5 - Cost of installation

Pipe size, mm	Saving with copper capillary	Saving with copper compression	Saving with copper press
15	37%	36%	33%
22	41%	39%	36%
28	40%	31%	30%
35	27%	21%	22%
42	22%	10%	12%
54	13%	-1%	8%

TABLE 6 - Percentage cost saving of a copper installation compared to a steel one in the various pipe sizes

The data clearly demonstrates the cost-effectiveness of the various copper systems. All three copper fitting types are clearly less expensive than steel for tube sizes up to 42mm. At 54mm both capillary and press fittings are still more cost-effective than steel.

## A typical installation

Using a mixture of tube sizes and various fittings, a typical pipework installation was designed. Table 7 shows the sizes and quantities of pipework components and Table 8 shows the cost of a representative installation.

Pipe size, mm	Pipe, m	Bends, No.	Tees, No.	Reducers, No.
15	150	50		
22	250	100	25	40
28	100	20	8	16
35	25	10	4	8
42	10	4	2	4
54	20	6	7	2

TABLE 7 - Quantities

Copper capillary	Copper compression	Copper press	Steel
£13,945	£14,623	£14,737	£20,117
<b>Saving with copper capillary</b>	<b>Saving with copper compression</b>	<b>Saving with copper press</b>	
<b>31%</b>	<b>27%</b>	<b>27%</b>	

TABLE 8 - Cost of installation and comparison with steel cost

It can be seen that all three copper jointing techniques produce a significantly less expensive installation than one in steel.

## Conclusion

**Substantial cost savings can be achieved when installing copper tube and fittings in place of steel in non-domestic installations.**

The use of copper capillary, compression and press fittings enable contractors to install commercial pipework systems quicker and more effectively. Cost comparison studies of copper and steel, with tube diameters up to and including 54mm, have shown significant labour and overall cost savings in favour of copper systems.

For a typical installed system a cost saving of 27% was achieved when using copper press fittings and compression fittings, and a saving of 31% when using capillary fittings as opposed to steel.

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