

Steel tubes and fittings for sprinklers

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INTRODUCTION

Steel tube is commonly used for pipework in sprinkler systems in commercial and industrial premises. In this document the terms 'tube' and 'pipe' can be considered as meaning the same product. Steel is a good material to use because it is readily available in a range of standard sizes, rigid and structurally sound and reliable and well proven in use over many years. There is also a large base of skilled installers, who are familiar with steel tube.

FIRE RATING

Steel tube is classified as Class A1 under European Union Construction Products legislation, which means that it will not contribute to the spread of fire and does not need to be tested for reaction to fire (BS EN 10255-Table ZA.1 refers).

STEEL TUBE GRADES

As a general guideline, it is recommended that steel tube with a specified minimum yield strength (SMYS) value of 195N/mm² should be employed. Either seamless or welded tube can be used, although welded is normally more readily available.

Appropriate steel tube grades should be selected either from National (including European) or International Standards or alternatively suitable equivalent proprietary materials from a reputable tube manufacturer may be used.

Medium Quality Black (un galvanised) steel pipe is the most commonly used pipe for sprinkler systems. Occasionally the client's specification may ask for Heavy Quality pipe or galvanised pipe. Light Weight pipe is not used.

STEELMAKING PROCESS AND MANUFACTURER'S CERTIFICATION

The tube manufacturer should operate a quality system in accordance with either BS EN ISO 9001 or BS EN ISO 9002. Tubes should be supplied with a Test Report 2.2 in accordance with BS EN 10204

as standard. A Test Report will show the chemical composition of the steel together with mechanical test results i.e. (yield strength, tensile strength and elongation) Test Reports in accordance with BS EN 10204 will state on them what class they are (e.g. 2.2).

RECOMMENDED DIMENSIONS FOR TUBES

The diameter and thickness of the steel tube to be used should be in accordance with the relevant system design standards and in some cases customers may have specific requirements.

Note: The external diameter of pipes are the same regardless of pipe grade i.e. Medium Quality pipe has the same external diameter as Heavy quality pipe. But Heavy quality has a smaller internal diameter than Medium quality.

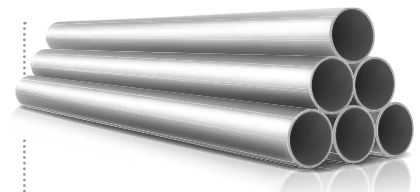
TUBE SERVICE LIFE

Steel tube correctly installed and maintained in accordance with best industry practices should have a satisfactory service life. However, it is not possible to declare an actual working life since this will depend on many factors whilst in operation that are beyond the direct control of the steel tube manufacturer.

CORROSION PROTECTION

Environmental factors, such as whether the water is soft or hard, the presence of bacteria, the use of corrosion inhibitors and the dissolved oxygen and carbon dioxide contents can all influence the rate of corrosion and the interaction between these various factors is complex.

Galvanised tube can be used, although this is not essential for appropriately designed sprinkler systems. Where tube is supplied hot dip galvanised, a suitable steel composition is preferable. As a general guideline, this means that the silicon content of the steel tube should ideally either be $\leq 0.05\%$ or in the range 0.15 – 0.25%. Hot dip galvanizing is normally carried out either in



THE LIFESPAN OF ANY CARBON STEEL PIPE IS DEPENDENT ON:

- THE SPECIFIC SERVICE CONDITIONS
- THE SYSTEM BEING PROPERLY DESIGNED
- CORRECT INSTALLATION PROCEDURES BEING FOLLOWED
- THE ADOPTION OF A SUITABLE MAINTENANCE PRACTICE
- THE USE OF APPROPRIATE CORROSION PROTECTION, INHIBITORS OR OTHER SYSTEM ADDITIVES

APPLICABLE STANDARDS



BS EN ISO 9001



BS EN ISO 9002



BS EN 10204

accordance with BS EN 10240 or BS EN ISO 1461. Galvanised tubes are not suitable for use at temperatures above 60°C and should not be used in contact with copper-based alloy tubing, fittings or washers, due to the possibility of a galvanic corrosion reaction.

A range of external coatings may be applied to steel tubes where external corrosion protection is specifically required. It should be noted that the red paint, normally applied to steel tubes for sprinkler systems, is only intended as a temporary/transit protection for the tubes and it should not be assumed to offer any degree of long- term protection.

NB, OD, MD EXPLAINED

Nominal Bore, Outside Diameter, Mean Diameter

The size of steel pipes (the diameter) is referred to as nominal bore or NB for short, i.e. 32mm NB Medium Quality.

This NB is not the actual Internal, Mean or Outside Diameter of the pipe.

NB is an industry identification that all manufacturers, designers and installers recognise as the size of a pipe,

Medium Quality and Heavy Quality are references to the wall thickness of the pipe and is referred to as MQ or HQ for short.

Example: 32mm NB MQ is accepted in the sprinkler industry as a pipe manufactured within the specified tolerances of BS EN 10255.

For sprinkler system hydraulic calculations, the designer must know the actual mean bore of the pipe for accuracy of the calculations. BS EN 12845 LPC Rules has a table (TB227.T2) that gives him/her the actual mean bore of the pipe. The mean size in Table 227.T2 is calculated using the following formula.

EN 10255 Specified outside diameter mm	Nominal diameter (DN) mm	Thread size ⁽²⁾ inch	EN 10255 L2 ISO 65 L2 Replacing BS 1387 - Light		EN 10255 Medium series ISO 65 M replacing BS 1387 - Medium		EN 10255 Heavy series ISO 65 H replacing BS 1387 - Heavy	
			Mean size		Mean size		Mean size	
			mm	Value of k	mm	Value of k	mm	Value of k
NON-GALVANISED								
26,9	20	¾	22,05	2,47 x 10 ⁻⁵	21,70	2,67 x 10 ⁻⁵	20,50	3,52 x 10 ⁻⁵
33,7	25	1	27,70	8,14 x 10 ⁻⁶	27,35	8,66 x 10 ⁻⁶	25,75	1,16 x 10 ⁻⁵
42,4	32	1¼	36,40	2,15 x 10 ⁻⁶	36,05	2,25 x 10 ⁻⁶	34,45	2,81 x 10 ⁻⁶
48,3	40	1½	42,30	1,04 x 10 ⁻⁶	41,95	1,08 x 10 ⁻⁶	40,35	1,30 x 10 ⁻⁶
60,3	50	2	53,50	3,30 x 10 ⁻⁷	53,05	3,44 x 10 ⁻⁷	51,25	4,07 x 10 ⁻⁷
76,1	65	2½	69,20	9,42 x 10 ⁻⁸	68,75	9,72 x 10 ⁻⁸	66,95	1,11 x 10 ⁻⁷
88,9	80	3	81,10	4,35 x 10 ⁻⁸	80,75	4,44 x 10 ⁻⁸	78,75	5,02 x 10 ⁻⁸
114,3	100	4	105,45	1,21 x 10 ⁻⁸	105,05	1,23 x 10 ⁻⁸	103,25	1,34 x 10 ⁻⁸
165,1	150	6			155,20	1,84 x 10 ⁻⁹	154,40	1,89 x 10 ⁻⁹

If we look at the say 32mm NB MQ pipe the actual internal bore is calculated as follows.

$$[(OD\ min - 2 \times wall\ thickness) + (OD\ max - 2 \times wall\ thickness)] \div 2$$

$$= [(42mm - 2 \times 3.2mm) + (42.9mm - 2 \times 3.2mm)] \div 2$$

$$= [(42mm - 6.4mm) + (42.9mm - 6.4mm)] \div 2$$

$$= [(35.6mm) + (36.5mm)] \div 2$$

$$= 72.1mm \div 2$$

$$= 36.05mm$$

Specified Diameter	Nominal Bore	OD min	OD max	Medium Weight	Heavy Weight
	NB			Wall Thickness	Wall Thickness
33.7	25	33.3	34.2	3.2	4.0
42.4	32	42.0	42.9	3.2	4.0
48.3	40	47.9	48.8	3.2	4.0
60.3	50	59.7	60.8	3.6	4.5
76.1	65	75.3	76.6	3.6	4.5
88.9	80	88.0	89.5	4.0	5.0
114.3	100	113.1	115.0	4.5	5.4
139.7	125	138.5	140.8	5.0	5.4
165.1	150	163.9	165.1	5.0	5.4

NOTE: Other diameters and thicknesses may be available depending on supply source.

PRESENTED BY

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If you have a question or seek advice regarding automatic water-based fire suppression systems, please email the team : ian.gough@bafsa.org.uk or joe.mcafferty@bafsa.org.uk. If they do not have an answer for you, they will know someone who has! FAQs can be found at bafsa.org.uk/sprinkler-systems/faqs/