

FITTING EQUIVALENT LENGTHS

Pressure losses in fittings are due to the turbulence created as water flows through the fitting. Hence, the pressure losses in fittings are constant for a given flow (Q), regardless of the type of pipe used to construct the system.

The pressure loss in fittings is determined using the concept of “equivalent length”. The pressure drop in a fitting is given in terms of the length of straight pipe. For example, the pressure loss in a 2 inch tee is equal to the friction loss in 10 feet of 2 inch Schedule 40 steel pipe. (See the table below.)

Since the pressure loss in fittings is constant regardless of the type of pipe used in system, the equivalent length in a dry system constructed using steel piping will be different (less than) in a wet system (because the friction loss per length of pipe is higher in a dry system than in a wet system). The equivalent lengths indicated in the table below must be adjusted for “C” factors other than 120. Similarly, the equivalent lengths indicated below also must be adjusted were the piping is other than Schedule 40 steel pipe is used.

Fitting Equivalent Lengths (C=120; Schedule 40 Steel Pipe)			
Fitting Size	90° Standard Elbow	90° Long Turn Elbow	Tee/Cross (90° Flow)
1	2	2	5
1-1/4	3	2	6
1-1/2	4	2	8
2	5	3	10
2-1/2	6	4	12
3	7	5	15
3-1/2	8	5	17
4	10	6	20
5	12	8	25
6	14	9	30

The following factors are utilized to adjust the equivalent lengths for different “C” factors. The equivalent lengths for Schedule 40 are multiplied by the factors below to adjust for other piping materials with a “C” factor for other than 120.

Pipe “C” Factor	Adjustment Factor
100	0.713
120	1.000
130	1.160
140	1.330
150	1.510

The following equation is utilized to adjust the equivalent lengths for piping materials with inside diameters other than Schedule 40 steel pipe.

$$\text{Adjustment Factor} = (\text{Actual I.D.} \div \text{Schedule 40 I.D.})^{4.87}$$

The equivalent length for piping materials with inside diameters either greater than or less than Schedule 40 steel pipe is determined by multiplying the adjustment factor determined using the equation above by the equivalent length for Schedule 40 steel piping.

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