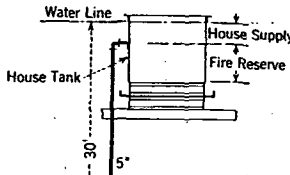


PIPE SIZES FOR DOWN-FEED COLD WATER SYSTEM

The risers for down-feed systems may be reduced considerably in size compared with those for up-feed systems because of the 0.43 lb per foot gain in pressure due to increasing hydrostatic head as the lowest story is approached. It has proved practicable to select down-feed riser sizes

FIG. 4. TYPICAL LAYOUT FOR DOWN-FEED SYSTEM



FLOOR	FIXTURES ON FLOOR	GPM PER FIXTURE	MAXIMUM GPM ON FLOOR	MAXIMUM GPM ON RISER	USAGE (PER CENT)	PROBABLE FLOW IN RISER GPM	ALLOWABLE DROP LB PER 100 FT	PIPE SIZE IN.
8th	197 4" 4 W.C.-F.V. 2 U.-F.V. 3 Lav.	215 4" 6 W.C.-F.V. 4 Lav.	122 3" 1 S.S.					
7th	166 2" 4 W.C.-F.V. 2 U.-F.V. 3 Lav.	211 2 1/2" 6 W.C.-F.V. 4 Lav.	121 2" 1 S.S.					
6th	145 2" 4 W.C.-F.V. 2 U.-F.V. 3 Lav.	196 2 1/2" 6 W.C.-F.V. 4 Lav.	120 2" 1 S.S.					
5th	117 2" 4 W.C.-F.V. 2 U.-F.V. 3 Lav.	180 2" 6 W.C.-F.V. 4 Lav.	120 2" 1 S.S.					
4th	25 1" 10 Lav.	160 2" 4 W.C.-F.V. 2 U.-F.V. 3 Lav.	119 2" 3 W.C.-F.V. 1 Lav. 1 S.S.					
3rd	11 3/4" 1 S.S.	130 2" 4 W.C.-F.V. 2 U.-F.V. 3 Lav.	90 2" 2 Lav.					
2nd	8 3/4" 1 S.S.	98 1 1/2" 2 W.C.-F.V. 1 U.-F.V. 1 Lav.	89 1 1/2" 3 W.C.-F.V. 1 Lav.					
1st	4 3/4" 1 S.S.	45 1 1/4" 1 W.C.-F.V.	4 3/4" 1 S.S.					

on the basis of a pressure drop of 30 lb per 100 ft. The 13 lb difference between 43 lb per 100 ft and 30 lb per 100 ft will usually take care of the friction in the fittings.

The overhead mains, however, must be selected conservatively, as the pressure at the top will be low and the pressure drop available for friction will necessarily be small. In nearly all tall buildings the pressure is limited to that due to the hydrostatic head between the house tank and the main, though sometimes this is increased by the use of a pneumatic house tank.

Where flush valves are used on top story closets the minimum practicable difference in elevation between the overhead mains and the bottom of an open type house tank is 20 ft, and flush valves specially adapted to operate on about 7 lb pressure must be used. In many installations gravity tank closets are used on the top story.

Example 4. Suppose an installation has a house tank in which the water line is 20 ft above the level of the top fixtures to be supplied and that the length of run to the farthest fixtures on this level is 400 ft with the pipe fittings adding another 200 ft, making an equivalent length of 600 ft. What would be the size of main coming out of the tank where a probable flow rate of 400 gpm may be expected, of the horizontal main where a probable flow rate of 200 gpm may be expected, and of the riser down to the fixture level where the probable flow rate is approximately 100 gpm?

TABLE 5. TYPICAL CALCULATION OF PIPE SIZES ON DOWN-FEED RISER WITH FLUSH VALVE WATER-CLOSETS AND URINALS

(Riser No. 1. Fig. 4)

FLOOR OF BLDG.	FIXTURES ON FLOOR	GPM PER FIXTURE	MAXIMUM GPM ON FLOOR	MAXIMUM GPM ON RISER	USAGE (PER CENT)	PROBABLE FLOW IN RISER GPM	ALLOWABLE DROP LB PER 100 FT	PIPE SIZE IN.
1st	1 S.S.	4	4	4	100	4	30	3/4
2nd	1 S.S.	4	4	8	100	8	30	3/4
3rd	1 S.S.	4	4	12	92	11	30	3/4
4th	10 Lav.	3	30	42	58	25	30	1
5th	4 W.C. 2 U. 3 Lav.	45 30 3	180 60 9	249	40	117	30	2
6th	4 W.C. 2 U. 3 Lav.	45 30 3	180 60 9	249	27	145	30	2
7th	4 W.C. 2 U. 3 Lav.	45 30 3	180 60 9	249	21	166	30	2
8th	4 W.C. 2 U. 3 Lav.	45 30 3	180 60 9	249	19	197	2	4

Here the level of the water in the house tank is 20 ft above the faucet of the highest fixture and the gravity pressure will be $0.43 \text{ lb} \times 20 \text{ ft} = 8.6 \text{ lb}$ and, if a total pressure drop of 1 lb is assumed, the pressure on the farthest fixture under times of peak load will be $8.6 \text{ lb} - 1 \text{ lb} = 7.6 \text{ lb}$ while the drop per 100 ft of equivalent run will have to be $1 \text{ lb} \times 100 = 0.1667 \text{ lb}$.

Referring to Fig. 2 it will be noted that where the flow through the main is 400 gpm, an 8-in. pipe would be required; that where the flow is reduced to 200 gpm, a 6-in. pipe would be sufficient; and that where the flow is 100 gpm in the riser branch and riser, a 5-in. size would be correct. Of course these are somewhat excessive flows and the head from the tank is small so that large sizes are to be expected. It would be necessary to carry a 5-in. riser down to the branch of the top floor, then reduce to 4 in. for the branch to the floor below the top, and below this the pipes could be sized for a 30 lb drop per 100 ft. In such a case, tank closets should doubtless be used on the top floor.