TABLE 1. DEMAND WEIGHTS OF FIXTURES IN FIXTURE UNITS[a]

| FIXTURE OR GROUP[b] | OCCUPANCY | TYPE OF SUPPLY CONTROL | WEIGHT IN FIXTURE UNITS[c] |
|---|---|---|---|
| Water closet | Public | Flush valve | 10 |
| Water closet | Public | Flush tank | 5 |
| Pedestal urinal | Public | Flush valve | 10 |
| Stall or wall urinal | Public | Flush valve | 5 |
| Stall or wall urinal | Public | Flush tank | 3 |
| Lavatory | Public | Faucet | 2 |
| Bathtub | Public | Faucet | 4 |
| Shower head | Public | Mixing valve | 4 |
| Service sink | Office, etc. | Faucet | 3 |
| Kitchen sink | Hotel or restaurant | Faucet | 4 |
| Water closet | Private | Flush valve | 6 |
| Water closet | Private | Flush tank | 3 |
| Lavatory | Private | Faucet | 1 |
| Bathtub | Private | Faucet | 2 |
| Shower head | Private | Mixing valve | 2 |
| Bathroom group | Private | Flush valve for closet | 8 |
| Bathroom group | Private | Flush tank for closet | 6 |
| Separate shower | Private | Mixing valve | 2 |
| Kitchen sink | Private | Faucet | 2 |
| Laundry trays (1-3) | Private | Faucet | 3 |
| Combination fixture | Private | Faucet | 3 |

[a] For supply outlets likely to impose continuous demands, estimate continuous supply separately and add to total demand for fixtures.
[b] For fixtures not listed, weights may be assumed by comparing the fixture to a listed one using water in similar quantities and at similar rates.
[c] The given weights are for total demand. For fixtures with both hot and cold water supplies, the weights for maximum separate demands may be taken as ¾ the listed demand for the supply.

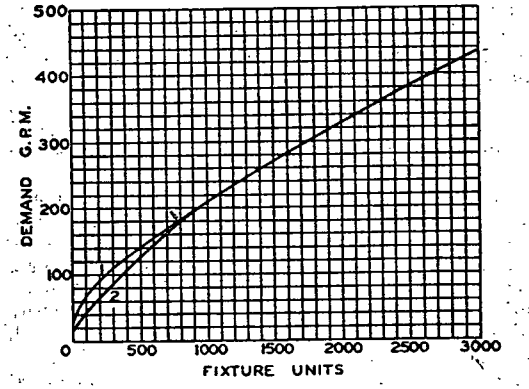


FIG 1. ESTIMATE CURVES FOR DEMAND LOAD

No. 1 for system predominantly for flush valves.

No. 2 for system predominantly for flush tanks.

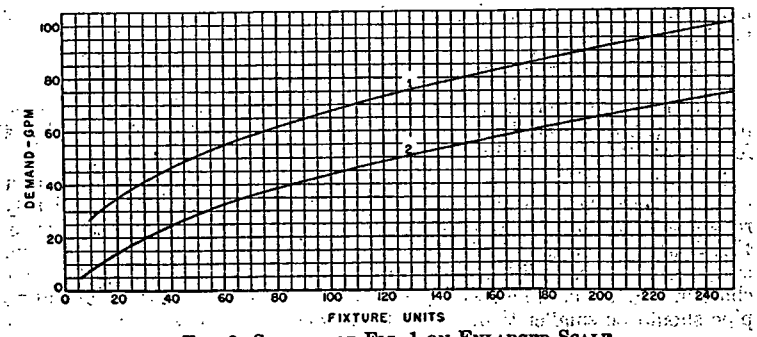


FIG. 2. SECTION OF FIG. 1 ON ENLARGED SCALE



TABLE 2. PERFORMANCE REQUIREMENTS OF WATER METERS[a]

| SIZE IN. | NORMAL TEST-FLOW LIMITS GPM | MINIMUM TEST-FLOW GPM |
|---|---|---|
| ⅝ | 1 to 20 | ¼ |
| ¾ | 2 to 34 | ½ |
| 1 | 3 to 53 | ¾ |
| 1½ | 5 to 100 | 1½ |
| 2 | 8 to 160 | 2 |
| 3 | 16 to 315 | 4 |
| 4 | 28 to 500 | 7 |
| 6 | 48 to 1,000 | 12 |

[a] *American Water Works Association Standards:*
Registration. The registration on the meter dial shall indicate the quantity recorded to be not less than 98 per cent nor more than 102 per cent of the water actually passed through the meter while it is being tested at rates of flow within the specified limits herein under normal test flow limits: There shall be not less than 90 per cent of the actual flow recorded when a test is made at the rate of flow set forth under minimum test flow.

As copper tubing is not likely to retain interior incrustation to any serious extent, Fig. 5 may be used safely to estimate carrying capacity of copper tubing[2].

## SIZING COLD WATER SUPPLY PIPING

In order to apply the foregoing principles to the sizing of the supply pipes in the usual up-feed system, it is necessary to ascertain the minimum pressure in the street main, and from this should be subtracted the minimum pressure required for the operation of the topmost fixture. (A pressure of 15 psi is ample for flush valves but reference should be made to the manufacturers' requirements. A minimum of 8 psi should be allowed for other fixtures.) The pressure differential thus obtained will be available for overcoming pressure losses in the distributing system and in overcoming the difference in elevation between the water main and the highest fixture.

The pressure losses in the distributing system will consist of the pressure losses in the piping itself, the pressure losses in the pipe fittings, and the pressure losses in the water meter, if any. Estimated pressure losses for disc-type meters for various rates of flow are given in Fig. 6. Flow limits

TABLE 3. ALLOWANCE IN EQUIVALENT LENGTH OF PIPE FOR FRICTION LOSS IN VALVES AND THREADED FITTINGS

| DIAMETER OF FITTING IN. | EQUIVALENT LENGTH OF PIPE FOR VARIOUS FITTINGS | | | | | | |
|---|---|---|---|---|---|---|---|
| | 90 Deg Standard Ell Ft | 45 Deg Standard Ell Ft | 90 Deg Side Tee Ft | Coupling or Straight Run of Tee Ft | Gate Valve Ft | Globe Valve Ft | Angle Valve Ft |
| ⅜ | 1 | 0.6 | 1.5 | 0.3 | 0.2 | 8 | 4 |
| ½ | 2 | 1.2 | 3 | 0.6 | 0.4 | 15 | 8 |
| ¾ | 2.5 | 1.5 | 4 | 0.8 | 0.5 | 20 | 12 |
| 1 | 3 | 1.8 | 5 | 0.9 | 0.6 | 25 | 15 |
| 1¼ | 4 | 2.4 | 6 | 1.2 | 0.8 | 35 | 18 |
| 1½ | 5 | 3 | 7 | 1.5 | 1.0 | 45 | 22 |
| 2 | 7 | 4 | 10 | 2 | 1.3 | 55 | 28 |
| 2½ | 8 | 5 | 12 | 2.5 | 1.6 | 65 | 34 |
| 3 | 10 | 6 | 15 | 3 | 2 | 80 | 40 |
| 3½ | 12 | 7 | 18 | 3.6 | 2.4 | 100 | 50 |
| 4 | 14 | 8 | 21 | 4.0 | 2.7 | 125 | 55 |
| 5 | 17 | 10 | 25 | 5 | 3.3 | 140 | 70 |
| 6 | 20 | 12 | 30 | 6 | 4 | 165 | 80 |