

TABLE 7. HOT WATER REQUIREMENTS FOR APARTMENT BUILDINGS

| CLASS | HOT-WATER FIXTURES PER APARTMENT |           |                      |                  |                  |                     | GALLONS<br>HOT WATER<br>PER APARTMENT<br>PER MAXIMUM<br>Hour |
|-------|----------------------------------|-----------|----------------------|------------------|------------------|---------------------|--------------------------------------------------------------|
|       | Lavatories                       | Bath Tubs | Showers<br>Over Tubs | Kitchen<br>Sinks | Laundry<br>Trays | Separate<br>Showers |                                                              |
| A     | 1                                | 1         | 1                    | 1                | 2                | 0                   | 25                                                           |
| A     | 2                                | 2         | 1                    | 1                | 2                | 0                   | 30                                                           |
| A     | 2                                | 2         | 2                    | 1                | 2                | 0                   | 35                                                           |
| B     | 1                                | 1         | 1                    | 1                | 2                | 1                   | 55                                                           |
| C     | 1                                | 1         | 0                    | 1                | 2                | 0                   | 20                                                           |
|       |                                  |           | 0                    | 1                | 1                | 0                   | 15                                                           |

Note.—The quantity of hot water required per day is usually about 10 times the maximum hour requirement.

TABLE 8. HOT WATER REQUIREMENTS FOR HOTELS

| CLASS                       | GALLONS                                      |                                             | ADD FOR KITCHENS<br>PER MEAL CAPACITY |                        | ADD FOR LAUNDRY      |                       |                                      |
|-----------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------|------------------------|----------------------|-----------------------|--------------------------------------|
|                             | Hot Water<br>per H. W.<br>Fixture<br>per Day | Per H. W.<br>Fixture per<br>Maximum<br>Hour | Per Day                               | Per<br>Maximum<br>Hour | Per Piece<br>per Day | Per Washer<br>per Day | Per Washer<br>per<br>Maximum<br>Hour |
| High-class transient.....   | 85                                           | 6.8                                         | 3.0                                   | 1.0                    | 1.0                  | 1200                  | 250                                  |
| Medium-class transient..... | 70                                           | 6.5                                         | 2.5                                   | 0.80                   | 1.0                  | 1000                  | 200                                  |
| Apartment hotels.....       | 50                                           | 5.0                                         | 2.0                                   | 0.60                   | 1.0                  | 1000                  | 200                                  |

Note.—Instantaneous demand rate for laundry washers from 25 to 50 gal. per minute.

TABLE 9. HOT WATER REQUIREMENTS FOR OFFICE BUILDINGS

| CLASS                                                                    | HOT WATER PER HOT-WATER FIXTURE |                  |
|--------------------------------------------------------------------------|---------------------------------|------------------|
|                                                                          | Per Day                         | Per Maximum Hour |
| Having hot water in public toilets only.....                             | 50                              | 5.0              |
| Having hot water in private offices as well as in public<br>toilets..... | 30                              | 3.0              |
| For self-closing hot-water fixtures deduct.....                          | 40%                             | 25%              |

TABLE 10. HOT WATER REQUIREMENTS FOR HOSPITALS

|                                                                   | HOT WATER   | HOT WATER   |
|-------------------------------------------------------------------|-------------|-------------|
|                                                                   | Per Patient | Per Fixture |
| Gallons used per average day.....                                 | 82          | 48          |
| Gallons used per maximum day.....                                 | 127         | 65          |
| Average maximum rate of flow for 15 min. in gallons per hour..... | 11          | 7           |
| Maximum rate of flow for 15 min. in gallons per hour.....         | 19          | 8           |

Note.—The values in this table are based on *Utility Demands of a Modern Hospital*, by Larson, Nelson and Rose (A.S.H.V.E. TRANSACTIONS, Vol. 34, 1928).  
Note.—The hot water used is 25 per cent of total water requirements. The above requirements are for a hospital without a laundry.

direction, when the other fixtures within the building are in use to their estimated average capacity?

The answer, according to Table 5, is found to be 75.8 lb. at the intersection of 100 ft. vertical height and 75 ft. horizontal run.

Note.—If only 10 lb. be required at the uppermost fixture, then 70.8 lb. would be the answer.

#### House Tank on Roof

If the tank is elevated above the highest fixture, similar computations will apply for branch connections and main risers except that the main riser will have its greatest diameter at the top. It will be seen that an elevation of 35 ft. or more will give the necessary 15 lb. pressure at the highest fixture and that the pressure drop may be made equal to the static head from the top fixtures down, or 40 lb. per 100.

TABLE 11. WATER REQUIREMENTS FOR HOSPITALS<sup>a,c</sup>

|                                                                      | TOTAL<br>WATER | TOTAL WATER USED EX-<br>CLUSIVE OF AMOUNT<br>USED IN TOILETS, SLOP<br>SINKS, SOFTENER FLUSH-<br>ING AND REFRIGERATION<br>COOLING |             | COLD WATER USED EX-<br>CLUSIVE OF AMOUNT<br>USED IN TOILETS, SLOP<br>SINKS, SOFTENER FLUSH-<br>ING AND REFRIGERATION<br>COOLING |             |
|----------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------|-------------|
|                                                                      |                | Per Patient <sup>b</sup>                                                                                                         | Per Fixture | Per Patient                                                                                                                     | Per Fixture |
| Gallons used per average day.....                                    | 366            | 77                                                                                                                               | 275         | 104                                                                                                                             | 193         |
| Gallons used per maximum day.....                                    | 527            | 116                                                                                                                              | 423         | 174                                                                                                                             | 296         |
| Average maximum rate of flow for<br>15 min. in gallons per hour..... | 29             | 7                                                                                                                                | 25          | 8                                                                                                                               | 14          |
| Maximum rate of flow for 15 min.<br>in gallons per hour.....         | 50             | 12                                                                                                                               | 44          | 16                                                                                                                              | 30          |

<sup>a</sup>The values given are based on *Utility Demands of a Modern Hospital*, by Larson, Nelson and Rose (A.S.H.V.E. TRANSACTIONS, Vol. 34, 1928).

<sup>b</sup>The items in this column, include water used for flushing softeners and refrigeration condenser.

<sup>c</sup>Laundry not included.

#### Pipe Sizes for Hot Water Supply

Tables 7, 8, 9 and 10 give the hot-water requirements for several kinds of buildings in terms of gallons per maximum hour and per day. Table 11 gives the total water requirements for hospitals.

Pipe sizes for hot-water systems may be calculated from the foregoing data on cold-water systems, using the same quantities for the gallons of hot water required per minute as is given for the cold water. It should be borne in mind that a column of hot water is lighter than one of cold water, amounting to about 2½ ft. per 100 ft. in the height of columns of equal weight. In case the cold water must first be fed down from roof tanks to heaters in the basement and then back up to the top-floor fixtures, the extra length of run must be taken into consideration. As a check on the total quantity of hot and cold water required per day, this is generally from two to three times the amount of hot water required and from 80 to 100 gal. per occupant of the building.

The return main for circulating systems may be the size of the most distant hot water flow main. It is obvious that no advantage will be gained by making the return any larger than this, but it is equally obvious