

SIZING WATER SOFTENERS/FILTERS

NOTE: To be used as a guide only, as conditions vary greatly.

COMPENSATED HARDNESS

When sizing water conditioning equipment, the hardness should be based on compensated hardness. Compensated hardness takes into consideration minerals and other factors that will reduce the softening capacity of a softener. These items cannot be picked up in a standard hardness test. To arrive at compensated hardness, multiply the figure on the right by the hardness in grains per gallon by your test that fit into the hardness category on the left.

YOUR TEST HARDNESS	MULTIPLY BY
1-20	1.1
21-40	1.2
41-70	1.3
71-100	1.4
100-Plus	1.5

Always determine BOTH (1) Flow Rate and (2) Capacity in Total Grains.

SPACE AVAILABLE FOR EQUIPMENT

Length _____ Width _____ Height _____ Entrance door size _____
 Stairs _____ Hall _____ Any obstructions in path of entry of equipment _____
 Floor strength to hold weight of equipment _____. Floor drain size (ability to handle backwash water) _____. Water available for backwash or equipment installed _____.

SCHOOLS

(Estimated @ 25 gallons per day per student)

NUMBER OF STUDENTS	100	200	300	400	500	800	1,000
Total water usage	2,500	5,000	7,500	10,000	12,500	20,000	25,000
Peak flow with flush valves	60	90	120	150	180	250	300
Peak flow with flush tanks	30	50	80	90	100	130	160
Hot water only gallons per day	600	1,200	1,800	2,400	3,000	4,800	6,000
Hot water only gallons per minute	15	23	30	40	50	60	70

APARTMENTS/TRAILER PARKS

(Central laundry included. Based on 3 people @ 60 gallons per day)

NUMBER OF UNITS	4	5	6	8	10	15	20	30	40	50	100
Total water usage gallons per day	720	900	1,000	1,440	1,800	2,700	3,600	5,400	7,200	9,000	18,000
Gallons per minute peak flow with flush tanks (no lawn sprinkling)	22	25	30	40	50	75	90	110	125	140	220
Hot water only gallons per day	240	300	360	480	600	900	1,200	1,800	2,400	3,000	6,000
Hot water peak flow gallons per minute	12	15	20	26	30	45	55	65	75	85	110

MOTELS (Not Hotels)

Figures are based on 40 gallons per person per day. 2 1/2 people per unit, each unit containing a bathroom group. Estimate water usage for restaurant or cocktail bar facilities separately.

NUMBER OF UNITS	10	20	30	40	50	75	100	125	150
Total water usage gallons per day	1,000	2,000	3,000	4,000	5,000	7,500	10,000	12,500	15,000
Peak gallons per minute with flush valve	65	90	109	128	145	180	210	240	270
Peak gallons per minute with flush tanks	26	43	55	65	75	105	130	152	172
Hot water only gallons per day (estimate 16 gallons per person)	400	800	1,200	1,600	2,000	3,000	4,000	5,400	6,000
Hot water only flow gallons per minute	17	25	36	43	48	62	73	85	96

WATER REQUIREMENTS OF OTHER ESTABLISHMENTS

****TO BE USED AS GUIDELINES ONLY**

ANIMALS - GPD	EACH HORSE - 10 (add 5 in stables): EACH MILKING COW - 15 (add 15 with drinking cup): EACH DRY COW - 10 (with drinking cup add 10: EACH HOG - 3: EACH SHEEP - 2: EACH 100 CHICKENS in lighted henhouse - 5.
BEAUTY/BARBER SHOPS	200 gallons per day per operator.
BOILERS	To determine daily make-up in gallons: 1) multiply boiler horsepower by 4.25. 2) then multiply (1) by hours per day of operation; 3) then multiply by the percentage operating rating; 4) then subtract the percentage of condensate return.
CLUBS	Showers X 600 GPD. Lavatories X 150 GPD. Meals X 4 gallons.
COOLING TOWERS	To determine daily make up in gallons; 1) Multiply the tonnage by 4 (this includes 2 gallons per ton hour evaporation and 2 gallons per ton hour bleed off). 2) Then multiply (1) by the hours per day of operation.
DORMITORIES	Estimate 40 gallons per person per day total water usage. Estimate 16 gallons per person per day hot water only.
GOLF CLUB/ GYM/FACTORY	Showers X 1300 GPD. Lavatories X 150 GPD. Meals X 4 gallons. Factory-16 GPD per employee not including process.
HOTELS	350 GPD per guest room (hot and cold). Hot only 225 GPD per guest room
HOSPITALS	250 GPD per bed for total water usage. 170 GPD per bed for hot water only.
LAUNDRY (WASHATERIA)	Flow rate - divide capacity of machine by 2 gallons per cycle - multiply pounds of laundry by 2 1./2l Total daily usage - gallons per cycle X 2 loads per hour X hours of operation X number of machines
NURSING HOMES	75 GPD per bed for total water usage. 50 GPD per bed for hot water only.
OFFICE BUILDING	15 GPD per person for total water usage. 2 GPD per person for hot water only. NOTE: NON-MEDI-CAL.
OIL REFINERY	80,000 gallons per day per 100 barrels of crude processed.
PACKING HOUSE	6 GPD per hot to 12 GPD per steer slaughtered.
POULTRY PACKING	1 gallon per day per bird.
RESIDENCE	60 GPD inside usage per person. 100 GPD per person inside & outside.
RESTAURANTS	Estimate 10 GPD per person (total water usage) or estimate 4 GPD per person (hot only). Add 30% water usage for 24 hour restaurants, add 2 GPD per person for cocktail/bar facilities.
RO SOFTENING	GPD product + GPD reject X grains compensated hardness (see previous page) X 1.5 (to use mini-mum salt capacity) X 2 days per regeneration or twins).
SCHOOLS	With cafeteria and showers estimate 25 GPD per student (total water usage) or estimate 10 GPD per student (hot water only). With cafeteria, no showers, estimate 15 GPD per student (total water usage) or estimate 4 GPD per student (hot water only).
STOCKYARDS	160-200 gallons per acre total per day.
SUGAR REFINERY	1 gallon per pound of sugar.

FLOW RATES IN PIPES - NOMINAL TO PEAK		QUICK CHECK - FLOW RATE
1" = 16-30 gpm	3" = 120-270 gpm	Nominal flow rate of a pipe = D ² x 20 Diameter squared x 20
1-1/4" = 30-35 gpm	4" = 250-500 gpm	
1-1/2" = 40-70 gpm	6" = 500-1100 gpm	
2" = 65-120 gpm	8" = 1000-2000 gpm	
2-1/2" = 80-170 gpm	10" = 500-3000 gpm	
		Twice the diameter x 4 times the flow

For additional information call: 610-275-4453 or Fax: 610-279-6299
Please call for current prices.

FLOW RATES USING FIXTURE COUNTS

Before recommending a softener it is important to determine soft water service flow requirements and volume in a given time period. Water meters are the best source for such data. Where meters are not used, flow rates and total requirements may be estimated using the basic information. After determining this information, a properly sized softening unit may be recommended.

Use FIXTURE UNIT TABLE and INTERMITTENT FLOW RATE TABLE for average and maximum flow rates in private and public buildings in gallons per minute. The unit flow rates are to be used when actual continuous and peak flow rates are not known.

The average rates may be used when line pressure less the conditioner pressure drop is at least 30 psi at the highest point of use in the building. [approximately 4 psi loss per story.]

The maximum rates are equal to the fixture count figures commonly used to size drains and are applicable especially in low water pressure areas where pressure drop is critical.

D E T E R M I N E F L O W R A T E

TYPE OF FIXTURE	UNIT FACTOR	
	PRIVATE	PUBLIC
Bar sink	1	2
Bathtub/shower	2	4
Bedpan Washer	-	10
Bidet	2	4
Combination sink and tray	3	-
Dental unit or cuspidor	-	1
Dental lavatory	1	2
Drinking fountain	1	2
House bibb or sill cock (std. type)	3	5
House trailer (each)	6	6
Laundry tub or washer	2	4
Lavatory	1	2
Lawn sprinkler (each head)	1	1
Kitchen sink	2	4
Sink, service (janitor's)	2	4
Sink or domestic type dishwasher	2	4
Sink (flushing rim, clinic)	-	10
Sink (washup, each set of fixtures)	-	2
Sink (circular spray)	-	4
Urinal (wall or stand)	-	5
Urinal (flush tank)	-	3
Water closet (toilet):		
Flush valve	6	10*
Tank Type	3	5*

FIXTURE COUNT FACTOR	AVERAGE GPM	MAXIMUM GPM
5	4	5
10	6	8
15	8	12
20	10	15
25	12	18
30	14	21
40	17	25
50	20	29
75	24	37
100	31	44
150	40	56
200	50	65
250	58	75
300	65	84
350	72	93
400	79	110
450	85	120
500	91	130
600	103	150
700	114	165
900	124	180
900	134	200
1000	143	210
1200	162	240
1400	181	260
1600	198	285
1800	216	310
2000	240	330
2200	260	354.5
2400	290	375
2600	300	395
2800	340	420
3000	380	440

NOTES:

- 1) For equipment not listed and likely to impose continuous demands (air conditioners, boilers, commercial dishwashers, etc.), estimate continuous supply and add to total flow rate for fixtures.
- 2) For fixtures not listed, unit factors may be estimated by comparing the fixture to listed one using water at a similar rate.
- 3) The given unit factors are for total demand for fixtures with both hot and cold water supplies. The unit factors for maximum hot water demand may be taken as 60% of the total unit factors.

DIRECTIONS:

- 1) Multiply the quantity of each type of fixture by its unit factor given in the UNIT TABLE.

PRIVATE-Apartments, trailers, homes, dorms, etc.

PUBLIC - Hospitals, motels nursing homes, schools, etc.

- 2) Add the values found in step 1 to determine the total fixture units.
- 3) Determine flow rates required from INTERMITTENT FLOW RATE TABLE Example-School (public)

TYPE OF FIXTURE	QTY	UNIT FACTOR	TOTAL
Water closet (toilet)			
flush vlv	15	10	300
Lavatory	15	2	30
Shower	5	4	20

TOTAL UNITS = 350

Flow rate (from table) average - 72 gpm; max - 93 gpm