20 Baths at 40 gal and 33 per cent	270 gal
20 Lavs. at 20 gal and 25 per cent	100 gal
20 Sinks at 30 gal and 33 per cent	200 gal
20 Trays at 50 gal and 60 per cent	600 gal
Total	1170 gal
Probable peak use at one time	35 per cent
Probable actual peak demand	409 gph

If three persons are assumed to an apartment the total daily use of hot water should approximate 20 × 3 × 40 gal = 2400 gal and if the peak hour is 10 per cent of this amount, the peak hour by this method shows a probable demand of one-tenth of 2400 gal, which indicates that the values in Table 13 are safe.

SWIMMING POOL HEATING REQUIREMENTS

Swimming pools present a problem of hot water heating demand which is frequently overestimated. Few outdoor swimming pools require water heating, and in some cases they require the addition of cold water to regulate the temperature. The recirculation system of a swimming pool consists of the pumps, hair and lint catchers, and filters together with all necessary pipe connections to the inlets and outlets of the pool. The water heater, the sterlizing equipment and suction cleaner are usually installed or connected to the recirculation system and may be considered as integral parts of the system.

The recirculation system and all its component parts should be designed to provide the required volume of circulation so that the water turnover ratio is at least two times per day and where heavy loads are anticipated the turnover ratio should be increased to three times or more. Many states have regulations prescribing the circulation turnover.

The water heaters for swimming pools are usually instantaneous steam

Table 13. Ordinary Maximum Hourly Demand for Hot Water for Various Fixtures in Gallons and Probable Percentage of Usage

Type of Building	Lavatories		Baths	Showers	Slop Sinks	Kitchen Sinks	Pantry Sinks	Foot Baths	Wash Trays	Av. Max Uses
	Private	Public								
Maximum Probable Usage gph	20	20	40	300	30	30	20	20	50	
	Probable Usage in Per Cent of Maximum Ordinary Use									
Apt. house	25	50	33	67	67	33	50	25	60	35
Club	25	75	50	67	67	67	100	25	80	60
Gym.	25	100	100	100	.....	....	.....	100	.....	80
Hospital	25	75	50	33	67	67	100	25	80	45
Hotel	25	100	50	33	100	67	100	25	80	70
Industrial	25	150	100	100	67	67	.....	100	.....	90
Laundries	25	100	.....	.....	33	....	.....	.....	100	100
Office building	25	75	.....	.....	50	....	.....	.....	.....	20
Baths	25	150	150	100	50	....	.....	.....	.....	100
Residences	25	.....	50	33	50	33	50	50	60	50
Schools	25	75	.....	100	67	33	100	50	.....	25
Y. M. C. A.	25	100	100	100	67	67	100	100	80	75

[a]Percentage of fixtures likely to be demanding maximum probable usage at any one time.

coil heaters. These heaters should be sized so that they will have sufficient capacity to heat the water delivered by the circulating pump 15 F per hour.

The water temperature in a pool is usually maintained at about 72 F. A few states have regulations prohibiting higher water temperatures than 70 F. The room temperature should be approximately 5 F higher, but not more than 8 F higher nor less than 2 F lower, than the water temperature.

Example 6. Assume a swimming pool 75 ft long, 30 ft wide with an average depth of 6 ft. If the water is to be heated from a temperature of 50 to 65 F, what capacity heater and steam consumption is required with a turnover ratio of two times per day?

Pool volume: $75 \times 30 \times 6 \times 7.5 = 100{,}000$ gal.

With a turnover ratio of twice in 24 hr, the heating capacity is: $\frac{100{,}000}{2 \times 24} = 2080$ gal per hour.

The steam consumption would be: $\frac{2080 \times 8.33\ (65 - 50)}{970} = 268$ lb steam per hour.

Regulation of swimming pool temperatures is essential for successful operation and economy. It is therefore recommended that the steam supply to the heater be provided with a bypass which may be used for pool filling and initial heating and that a smaller bypass be installed with an automatic control valve having the capacity to heat the circulation water approximately 5 F per hour.

Table 14. Hot Water Consumption in Various Types of Buildings for Different Purposes

Type of Building	Conditions	Gallons
Hotels	Room with basin only	10 (per day)
	Room with bath	
	(Transient)	40 (per day)
	(Men)	40 (per day)
	(Mixed)	60 (per day)
	(Women)	80 (per day)
	Two-room suite and bath	80 (per day)
	Three-room suite and bath	100 (per day)
Public Buildings	Public bath or lavatory	150 (per day per fixture)
	Public shower	200 (per day per fixture)
	Public lavatory with attendant	200 (per day per fixture)
Industrial Buildings	Per office employee	2 (per day)
	Per factory employee	5 (per day)
	Cleaning floors	3 (per 1000 sq ft per day)
Restaurants	$0.50 Meals	0.5 (per customer with hand washing)
		1.0 (per customer with machine washing)
	$1.00 Meals	1.0 (per customer with hand washing)
		2.0 (per customer with machine washing)
	$1.50 Meals	1.5 (per customer with hand washing)
		4.0 (per customer with machine washing)