

INTRODUCTION

The miscellaneous applications of A. O. Smith commercial water heating equipment are far too many to enumerate here. This equipment is being used for different purposes in various industries, such as raising bean sprouts in the Oriental food industry, pre-warming stand-by diesel engines for fast starting, providing heat through coil grids, curing of concrete, egg washing in the poultry industry, automatic feather-removing equipment in the poultry industry, film development and print washing in the photographic industry, degreasing of steel parts in the metal industry - and many other uses.

HOT WATER FOR EVERY NEED

There is an A. O. Smith commercial water heater or water heating system to fit every need, whether the demand is for 10 GPH or 10,000 GPH. All of this equipment (with the possible exception of the larger A. O. Smith BTP models and glass-lined storage tanks) is designed to go through standard size doorways; thus eliminating the necessity of cutting access ways into existing buildings. The model HW-670 - 670,000 BTU/hr. input with a rated output of 656 GPH at 100°F rise (equivalent to a 16 hp boiler) has a shipping weight of 353 pounds and can be easily carried to the job site through a 36" doorway by two men. These commercial water heaters and also the storage tanks are frequently installed in multiples to meet demands of larger applications.

A. O. Smith commercial water heaters are of two basic designs - finned copper heat exchanger forced flow type and also self-contained tank type:

- **COPPER HEAT EXCHANGER MODELS** are available as gas-fired units and offer the maximum in operating efficiency along with the greatest flexibility of application. Forced flow installations permit the selection of any heater and tank size combination to meet job requirements without stack loss from the hot water generator during stand-by periods.

A. O. Smith patented piping systems have been developed to provide for most efficient use of single heater - tank combinations or with multiples of either component. A choice of either single or dual temperature systems is offered with the added feature of minimum storage tank temperature - Aqua-Hot piping kits are available for one and two temperature application using single or multiple heaters. Factory assembled skid-mount systems are also available.

- **SELF-CONTAINED TANK TYPE MODELS** are offered for either gas, electric, or oil sources of energy in a variety of input and storage capacities. Some BTP models are available with dual fuel. These models are also used as single heaters or in multiples to meet larger requirements. Dual temperature applications are handled by the use of thermostatically controlled mixing valves.

Manifold kits for 2, 3 or 4 heater applications of this type of equipment are offered to assist installations and also to assure equal draw for all units.

The designer of hot water supply systems for the miscellaneous applications covered in this Section is referred to Section A (Equipment Selection) for a choice of equipment to meet his specific requirements.

INDUSTRIAL PLANTS

See page B 421.0 for Bradley wash sinks data.
See page B 115.0 for shower head water usage.

REQUIREMENTS

Hot water needs in an industrial plant can be categorized as follows: cafeteria, washrooms and manufacturing processes. A fourth category, heating of sprinkler tanks to avoid freezing (although not truly a hot water supply consideration) is also covered in this section. There is no system available that can economically provide both space heating and hot water from the same unit. New design and replacement trends are toward individual water heating systems located at the point of usage and smaller compact boilers for space heating. This improves operating efficiencies by reducing the stand-by losses encountered in large centralized heating plants and the low efficiencies associated with low firing rates.

CAFETERIA

Cafeteria needs of an industrial plant are similar to those of any restaurant. The sizing information for cafeterias can be found in Section B, food service sizing. This sizing is based on the maximum number of persons fed at the industrial plant and the length of time allowed for lunch. If the executive dining room is located a considerable distance from the main cafeteria, it should be handled as a separate system.

MANUFACTURING PROCESSES

The use of hot water in manufacturing processes varies so widely that it is impossible to develop suitable sizing tables. Each application must therefore, be handled as an individual case. This information may be obtained from the production manager of the particular plant involved. To determine the correct sizing, it is necessary to know the required hot water temperature, peak demand (in gallons), and the characteristics of usage. For example, a dump load for batch mixing that has a relatively high GPM flow rate of short duration would require a storage tank sufficient in size to meet that demand. The recovery capacity of the water heating equipment would in this case be based on the length of time before the next draw off.

In an application requiring a steady GPM flow rate use a system employing a relatively small storage tank. In a system requiring critical temperature control (even when sensitive water-mixing valves are used) never use a purely instantaneous system; instead, use a small storage tank to act as a stabilizer. This small stabilizing tank will assure the hot side of the mixing valve a constant supply of even temperature hot water, rather than the rapid fluctuations that can occur in a purely instantaneous system.

Storage tanks should not be large with any continuous operating system that has any usage characteristic that can lower the tank temperature even for a short while. This is specially true with high temperature requirements. Tanks working under these conditions cannot stabilize temperature unless either (a) recovery capacity is considerably larger than usage, or (b) a waiting period is provided for desired outlet temperature to be reestablished.

Where a purely instantaneous system is applicable, minimum flow rates are also a point of consideration. The effect on water outlet temperatures by any of the system or heater operating characteristics must be rationalized when selecting gas, electric or oil fired equipment for these applications.

SIZING FOR INDUSTRIAL SHOWER ROOMS

The industrial shower room is normally considered a dump load. The average shower head delivers 3 GPM of 105°F hot water, equivalent to 2 GPM of 140°F water mixed with 1 GPM of 40°F water. Since many shower heads deliver more than 3 GPM, the actual flow rate should be determined, if possible. (See table of shower head characteristics on page B 115.0). If the flow rate is greater, reduce it to 3 GPM maximum by inserting a flow regulating device in the shower head. Greater rates of flow are wasteful.

The length of the shower period should also be determined. If the length of showering cannot be determined, a 20-minute period may be assumed. (It is known that a majority of the people leaving a shift will not wait more than 20 minutes to shower.) To determine the peak demand, assume that all showers, multi-station wash fountains, and lavatories, are in operation at full flow during the shower period. In some industries, because of health or safety considerations, it is mandatory that personnel shower before leaving the plant. But even in these cases, facilities are generally adequate for the entire shift to clean up in a 20-minute period.

Because of the characteristics of this type of load, the storage tank should be capable of supplying almost the entire hot water peak demand. The recovery capacity of the heating equipment should be adequate to reheat the storage tank before the next shift. It may be advisable to select a heater capacity that will reheat the tank in less than a 3-hour period, even in a one-shift plant, if other hot water demands are made upon the system.

For applications of this type, it is advisable to never store water in the tank at a temperature exceeding 140°F. The dangers involved in delivering high temperature hot water for showering are obvious.