

capacity, of standard machine and twice this amount for high duty machines, may be figured per hour.

Flat Work Ironers

The capacity of flat work ironers depends upon width of machine, number of rolls, steam pressure carried and efficiency of venting and draining steam and air. The proportions given in the cases cited give a good index as to the number of machines required. Probably it is not advisable to install flat work ironers with less than five rolls, especially when blankets are to be laundered, which is usually the case in a flat work laundry. With a lesser number of rolls too much material has to be run through twice or more. In most cases a six-roll flat work ironer is preferable. Care must be taken to see that the length of the rolls is well above the width of the widest sheets, etc. to be ironed.

Flat work ironers are rated on length of roll in inches and number of heated rolls. Thus a 110 in. five-roll machine has five heated rolls each 110 in. long.

Tumbler Dryers

The proportion of tumbler dryer capacity to washers is established in the instance previously mentioned. For an unusually large proportion of blankets and similar articles, larger tumbler dryers would be required, and in a locality where no blankets were used they may be reduced.

Tumbler dryers are simply high duty dryers for work that could be done in the dry rooms. It is not an absolutely necessary machine, but is practically so regarded today.

Tumbler dryers are rated on diameter and length of the cylinder for the reception of material to be dried. A 42 in. x 72 in. drying tumbler has cylinder 42 in. diameter x 72 in. long.

Each of these machines is provided with a small hot-air fan as part of the machine. Provisions should be made for a duct from air outlet to discharge out-of-doors, as the lint and humid air carried is objectionable when discharged into the rooms.

Water, Steam and Power Requirements

The minimum water, steam and power requirements are about 100 gal. of cold water, 80 gal. of hot water, 30 lb. of steam and 1 k.w. of electricity per 100 lb. of clothes (dry). The average laundry will exceed these by 50 per cent and small laundries by 100 per cent.

The instantaneous demands for steam and water are much higher than the average. Due to the heavy instantaneous demands, especially in a small laundry, it is well to supply the laundry from the main boiler plant, where these drafts will be least felt. In this case the amounts given in Table 1 are satisfactory for a medium size flat work laundry, with standard washers. They should be doubled if high duty washers are used.

If an individual boiler is installed for the laundry, or for other reason the load curve must be flattened out, the use of larger tanks and consequently more storage is necessary. Tanks double the sizes given in this table are frequently required. In estimating the hot water demand the laundry trays may ordinarily be neglected.

TABLE 1. WATER REQUIREMENTS OF STANDARD WASHERS

SIZE OF WASHING MACHINE	GALLONS HOT WATER PER HOUR PER WASHER	CAPACITY IN STORAGE TANK PER WASHER
Small.....	150	100
Medium.....	200	150
Large.....	300	200

The average drying tumbler, say 42 in. x 72 in. requires about 600 lb. of steam per hour. Steam requirements of other machines and dry room combined do not exceed one third that of the drying tumbler. Washing machines have steam connections and sometimes considerable steam is used there, but this is reflected in the reduced amount of hot water used. In some cases steam is liable to carry oil in suspension and its use in washing machines is objectionable so provision for its elimination should be made.

The maximum demand for electric feeders should be taken at full connected load for direct current, and for alternating current the power to operate the largest washing machine should be added to the full connected load. The reason for the latter requirement is to provide for reversal of machines which is negligible with direct current but considerable for alternating current.

Washing machines require from 2 to 8 hp. for drive according to size, plus 100 per cent for reversing when alternating-current machines are used. Extractors require 2 to 5 hp. to drive, according to size. Tumbler dryers require 3 to 6 hp. to drive, according to size. Flat work ironers from $\frac{3}{4}$ to 2 hp. according to size. Electric irons require from 500 to 1000 watts, according to size.

Steam Pressure Required

The capacity required of the flat work ironer largely fixes the steam pressure required as all other machines may use steam at widely varying pressures without appreciably effecting their operation or capacity.

With a flat work ironer of five or six-rolls and of ample capacity 70 lb. per square inch is generally sufficient but pressures of 90 lb. are not uncommon in order to get the capacity out of the machine. Occasionally the work on such a machine is so light that 50 lb. is sufficient.

Sixty pounds are ample for the disinfecter and small presses used for miscellaneous pressing work.

Pipe Sizes and Systems of Piping

The branches to each machine must be large enough to meet instantaneous requirements but the steam and water mains need not exceed one half the combined area of the branches, as it is unlikely that more than two heavy machines will be drawing full capacity simultaneously.

Steam connections to washing machines are $\frac{3}{4}$ in. to 1 in. according to size; tumbler dryers, 1 in. to $1\frac{1}{4}$ in. according to size; dry rooms generally $\frac{3}{4}$ in.; flat work ironers, $\frac{3}{4}$ in. to 1 in. according to size; to starch cookers $\frac{1}{2}$ in. and to garment presses and miscellaneous small machines $\frac{1}{2}$ in. There are several small connections to the disinfecter, but main supply should be 1 in.