

## DISHWASHING MACHINE STANDARDS FROM A MANUFACTURER'S VIEWPOINT<sup>1</sup>

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Prior to 1944, there seemed to be no common meeting ground for representatives of the dishwashing machine industry and public health officials. When industry was considering a new model or models, or the redesign of old units, the major problem immediately became how wide a national acceptance can be obtained. When our problems were discussed with various public health officials, we seemed to always turn up with about as many answers as the number of health officials contacted.

In 1944, The National Sanitation Foundation (NSF), a non-profit group, with headquarters at the School of Public Health at the University of Michigan, was organized. The Foundation charter provides for a broad consideration of the problems of public health and environmental sanitation and charges the trustees with the obligation of approaching solutions through research and development.

Here at last, it was felt, was the answer to one of our major problems.

Very soon after NSF was founded, definite research programs were started; and one of the very first was the testing of commercial dishwashing machines. These research findings were published in bulletin form and were widely distributed. Research Bulletin No. 1 was published October 1, 1947, and contained a complete research study on the sliding-door, single-tank, stationary-rack, spray-type, dishwashing machines. Research Bulletin No. 2 was published August 1, 1949, and contained a study of a single-tank, spray-type, automatic rack-conveyor-type dishwashing machines, with final curtain rinse.

Research work is slow, concise, and factual. Therefore, even though a considerable amount of ground was covered in Bulletins No. 1 and No. 2, all phases of dishwasher testing has not been completed.

However, in June of 1948, a dishwashing panel was formed. Health officials and industry were assembled at the same table for the purpose of thoroughly discussing and recommending certain procedures. These recommendations are contained in the Clinic Report publication published in July of 1948. This was the first time in the history of the dishwashing machine industry where people of national repute representing health officials and industry sat down at a conference table and discussed their mutual problems on a national basis. Not only were these problems discussed, but definite recommendations were formulated. These recommendations are contained in the NSF published Clinic Report IV, pages 53 to 70 inclusive.

This clinic and the research work previously done by the Foundation by no means completed the work. It was necessary that the multiple-tank, spray type, automatic rack type, machines with final curtain rinse be tested. When this work was finished, NSF published a single bulletin, containing in condensed form a summary of the findings and the further research being carried on at that time. This bulletin is the standard No. 3 as prepared by NSF and was published in May of 1953. All of the findings were of course based on actual research work. It is recognized that industry's part in NSF is not all there is to the problem of clean dishes, but it is pertinent to point out that industry is vitally interested in this tie-in with public health.

### DESCRIPTION OF SPRAY TYPE MACHINES

The "Spray-type Machine" is the type of unit which, at present, is produced in volume by the major manufacturers of dishwashing machines, and is the only type of machine on which research has been conducted by NSF. Since dishwashing machines are produced for the very small operation, as well as medium and very large operations, it would be well, at this point to break down these various types of



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spray-type machines into four well-defined groups, with a short description of each type:

#### GROUP 1.

This group consists of Small, Stationary-Rack, Door or Rolling-Hood-Type Machines. There are three sub-groups of this type of machine as follows:

*Sub-Group (a)*—This is a front door opening, under-counter or free standing unit. It is a small unit usually installed in front or back bars of taverns for glass washing, front or back bars of soda fountains for glass and mixed dishwashing, hospital diet kitchens, decentralized washing in small hospitals, or in small restaurants for mixed glass and dish washing, where the restaurant has a customer count of up to approximately 50 persons per meal. To permit ease of operation a unit of this type often is installed

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at each station in a front or back bar of taverns or soda fountains.

*Sub-Group (b)*—These are revolving-hood, telescopic-hood, or sliding or rolling-door models. They are small machines which usually employ 16" x 16" or 18" x 18" racks. These units normally are installed in the same type of establishment as the unit described under *Sub-Group (a)*, except that larger models increase the capacities to the point where they will handle quantities of dishes for customer counts up to 125 persons per meal.

*Sub-Group (c)*—These are the most commonly used of all dishwashing machines and they probably include one-third of the units produced today. This type is the vertical, sliding-door unit, constructed for either straight-through or corner installation. It normally utilized a 20" x 20" rack. Since this is the most popular dishwashing machine used, it naturally was selected by NSF as the first type of unit on which basic research was to be conducted. This work was completed, and Research Bulletin No. 1 was published by NSF in October of 1947. This machine normally is installed for centralized mixed dish or glass washing in dish pantries, where the establishment has a customer count of up to 250 persons per meal.

#### GROUP No. 2

The second group of machines are termed the Single-Tank, Automatic -Rack - Conveyor, Curtain-Rinse-type. This is produced in both small and medium-sized units, with recirculated pumped wash solution and final curtain rinse. Since this type of machine is second in popular demand, it was only natural that it was selected by NSF for the second research project on dishwashing machine testing. This research work was completed by NSF and Bulletin No. 2 was published in August of 1949.

These units normally are installed in dish pantries for centralized, mixed dish washing in medium-sized establishments. The smaller unit has a mixed dish capacity of approximately 300 to 400 persons per meal, and the medium-sized unit of from 400 to 600 persons per meal. Many times these units are used in very large establishments for the washing of glasses and silverware only, where a large-

er unit is utilized for the washing of the mixed dishes.

#### GROUP No. 3

This third group of spray-type dishwashing machines is classed as the Multiple-Tank, Automatic -Rack-Conveyor Type, With Final Curtain Rinse. These machines are constructed with two or more units built in the same housing and are, therefore, high-capacity machines. They are constructed with a recirculated, pumped wash, a recirculated, pumped rinse, and a final hot water curtain rinse.

These multiple-tank units normally are installed in dish pantries for centralized washing in large restaurants, hotels, institutions, and industrial feeding operations. They usually are produced in three sizes, the smallest having a mixed dish capacity of 500 to 700 persons per meal, the next size suitable for approximately 700 to 900 persons per meal, and the largest size for approximately 1,000 to 2,000 persons per meal, dependent upon the installation and type of service. For this type of installation, glasses usually are washed in a separate machine.

#### GROUP No. 4

This group is defined as the Multiple-Tank, Flat or Inclined-Dish, Conveyor-Type unit. These, of course, are large units and consist of two sub-groups:

*Sub-Group (a)*—This commonly is known as the flat bakelite or nylon belt machine, where the china lays flat on the conveyor. These machines usually consist of one or more recirculated, pumped wash sections, a recirculated, pumped rinse section, and a final curtain rinse.

These flat-type belt units normally are installed in the same type of establishment as those in Group No. 3. The mixed dish capacity at normal speeds is only approximately 600 to 900 persons per meal. As with the machines in Group No. 3, glasses and silverware are washed in a separate unit.

*Sub-Group (b)*—This sub-group is a relatively new addition to the dishwashing machine field. This is the inclined-dish, spray-type, con-

veyor unit, which might commonly be termed "Continuous Racking." It is a multiple-tank unit, through which passes a conveyor constructed with inclined wire loops or nylon pegs. The china is inclined at an angle on the conveyor at approximately the same angle as normally racked dishes. These units usually consists of a recirculated, pumped-water-scraping section, a recirculated, pumped wash section, a recirculated, pumped-rinse section, and a final hot water curtain rinse.

These large, continuous-racking type machines are of high capacity and are normally installed in large restaurants, hotels, institutions, and industrial feeding operations. They normally are built in sizes suitable for handling the mixed dishes for service of from 700 to 3,000 persons per meal. As is true in these large-type machines, glasses normally are washed as a separate operation.

In this grouping of spray-type units, there is an absence of any mention of the "Push-Through, Single-Tank, Curtain-Type Unit." Research work was carried out by NSF on this type of unit quite sometime ago. Since acceptable results could not be obtained, it was decided at the NSF Clinic held in Ann Arbor in June of 1948 that this unit should no longer be produced. All major manufacturers, therefore, dropped this machine from their manufacturing schedules.

#### REQUIREMENTS FOR GOOD DISHWASHING OPERATION

The dishwashing layout must be well planned to handle the anticipated volume in an orderly manner. Many times the physical layout is directly affected by the space allocated. Every installation should be planned to properly care for the following basic operations:

1. *Soiled Dish Tables*—A sufficient soiled dish loading space should be allowed. A quick drain, full soiled dish table width, with removable strainer, should be fabricated immediately adjacent the dishwashing machine. This drain prevents the entrance of liquid soil into the dishwashing unit.

2. *Scraping*—For the removal of unconsumed food, several methods of scraping are employed:

- a. Rubber scraping block, with

waste can below for disposal of unconsumed food waste.

b. Water Scrapping. This type of scrapping breaks down into various methods:

(1) Flush off by means of warm water streams, utilizing a special shower head and insulated, self-closing squeeze valve. For this method, the china is placed in the dish rack and the rack located over a large strainer-equipped sink.

(2) Flush off by means of warm water streams, utilizing a special shower head and insulated, self-closing squeeze valve in combination with a food waste disposer. For this method, the china is placed in dish racks and the rack located over a large recess in the soiled dish table, under which is located an electrically-driven, food-waste disposer.

(3) "Salvajor" Method. This is a trade-name of a device which combines water scrapping and soil collection. The dishes are held under a stream of water of sufficient force to flush off gross soil, with a minimum of splashing. The water is recirculated, with fresh water added constantly for dilution purposes. The large particles of food soil are trapped by screens, through which the return water passes. The "Salvajor" is an independent unit, which is placed in the soiled dish table ahead of the dishwashing machine.

(4) Mechanical Scrapping. This method is by means of a spray-type washing unit with a power-driven, recirculating pump. The water is recirculated in the same manner as the wash compartment of a spray-type dishwashing machine. This unit usually utilizes for its replenishing detergent water supply, the spill-over water from the wash tank of the accompanying dishwashing machine. The pre-wash device is usually a separate unit and is used in conjunction with the standard, *automatic dishwashing machine*. The racks are usually automatically conveyed through the water scrapping unit, thence through the dishwashing machine. This method is generally accepted today as the most modern and efficient method in better installations.

3. *The Dishwashing Machine* — It is imperative that the establishment be carefully studied and the dishwashing machine adequately

sized for the operation. Since the various types of dishwashing machines have been previously discussed, no further comment is necessary at this point; however, the necessity of ample hot water facilities should be considered.

The machine itself is provided with adequate heating means for the wash tank, or, in the case of multiple-tank machines, for all tanks employed. The fresh, hot water supply for the final rinse for the various types of dishwashing machines is always a problem and, too many times, is not given enough serious consideration. Since this hot water supply must come from the regular building supply, and since this supply is normally maintained at a temperature lower than lethal temperatures, a booster heater or booster recovery system is usually required. Booster heaters or booster recovery systems now are available for gas, steam, or electric heat. It is important in any installation planning that the heating and plumbing engineers carefully size these booster heaters or booster recovery systems for the particular size of machine being installed. All major dishwashing machine manufacturers provide data concerning rinse water consumption by their respective models.

4. *Clean Dish Tables* — Clean dish tables of sufficient size should be provided, allowing ample space for air drying of the china prior to unloading. When dishes are washed and rinsed at lethal temperatures, air drying in well-ventilated dish pantries can be accomplished in 30 to 45 seconds. With this time as a known factor, the clean dish table can be sized accordingly to suit the particular machine.

5. *Miscellaneous Factors* — There are several other general factors which make for a good installation.

To prevent breakage and abuse, and to permit more rapid handling, rack returns of the sliding or roller type should be employed wherever practicable. Proper storage for the racks should also be provided during the down-time of the dishwashing operation. All dish pantries should be well ventilated, ceilings sound-proofed, if possible, and well lighted. To reduce the noise level of the dish tables, there is available an inexpensive paint-on type sound deadener available.

It is recommended by all dish machine manufacturers that a well designed detergent dispenser be installed on the recirculated, pumped-wash unit. There are several dispensers available from the detergent manufacturers which will closely control the detergent feed.

Since all dishwashing machines are marketed through kitchen equipment houses, the fabrication of soil and clean dish tables and other appurtenances, as well as installation, is, therefore, a part of the kitchen equipment house's function. All well-established, kitchen equipment houses employ capable kitchen engineers who specialize in planning good dish pantry layouts and operations. Specialty men work extremely close with these kitchen engineers.

As in all other food service units, it is realized that improvements must constantly be made in food machine products. No industry can stand still—one either goes forward or soon falls by the wayside. In recent years, too much stress has been placed on streamlining in some types of products. It certainly is not necessary to make a food machine appear as though it is going 60 miles per hour in a given direction. Rather than stress streamlining in our food machine design, the motto "MAKE IT EASY TO CLEAN AND EASY TO KEEP CLEAN" should be uppermost in the minds of our design engineers.

## DETERGENT SANITIZERS

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