



Compendium of practice for Commercial Dishwashing

Section 02

Planning and organisation



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1. Necessity for planning

The following sections should clarify efficient and hygienic planning aspects of commercial dishwashers and sculleries for planners and users.

Well thought-out planning is the only way to ensure optimal processes and efficient working.

Generally, it should be noted that the applicable legal provisions, regulations, standards (e.g. DIN SPEC 10534) and guidelines must be observed.

60 to 80 percent of ongoing costs in a scullery are staff costs. Thus, it is particularly important that the entire dishwashing system, dishwashing technology and tangential equipment is optimally planned and integrated into the overall workflow to ensure working in an effective and time-efficient manner.

2. Organisation and room planning

Every organisation consists of individual functional areas that must each flow seamlessly into the other.

The following aspects must be perfectly coordinated during planning:

- Type of operation
- Food preparation method
- Transportation of the wash item
- Circulation areas and routes
- Size of the scullery
- Commercial dishwashers
- Water treatment

- Dosing technology
- Process chemicals (treatment agents)
- Wash times
- Washware

Furthermore, aspects of air-conditioning and ergonomics must be taken into account with regard to the staff.

The wash item cycle

The wash item passes through a cycle of separate clean and unclean sides, which are systematically displayed below:

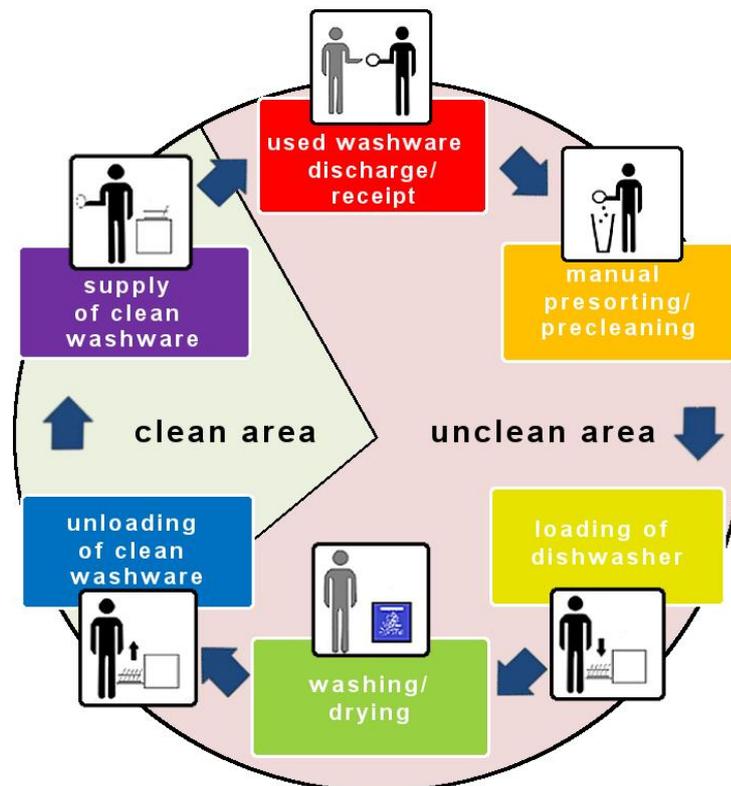


Figure 1: Functional areas in the wash item cycle
Source: Hobart



The fundamental objective is to minimise the paths and transportation times of wash items from food preparation to diners and then back to the dishwasher.

To avoid the recontamination of clean wash items, the paths of used and cleaned wash items should not cross – ideally, by physical separation of clean and unclean areas. (see *Compendium of practice for Commercial Dishwashing Section 11 “Hygiene”*)

Acceptance of used wash items and pre-cleaning

Used wash items can be returned to the scullery via clearing tables, conveyors and / or open or closed containers / trolleys.

The method of returning used wash items should be designed for maximum capacity of the operation. Thus, sufficient capacity depending on quantity and type of wash items should be configured. The scullery (staff, machinery, processes etc.) should be configured according to the quantity of wash items and the available timeframe. In addition to wash items, food residue, paper, napkins and other waste are disposed of in the scullery. Waste should be separated into individual groups.

In particular, the paths for disposing of food residues and waste must be observed.

Return of wash items and loading the dishwasher

The drying time of food residues onto wash items should be limited as much as possible to prevent microbial growth and to facilitate cleaning. Depending on the machine type and / or instructions of the dishwasher manufacturer, pre-sorting and loading can take place after pre-cleaning. It is advisable to sort cutlery in cutlery holders and to pre-treat them in a heated cutlery soaking trolley using a detergent that will not generate foam in the commercial dishwasher.

In conventional programmable machines, the wash items should be hand-rinsed under cold water to minimise soak ingress into the machine.

A uniform workflow must be guaranteed, even at maximum load.



Drying

Depending on the machine design, drying can be performed in the dishwasher. For dishwashers without integrated drying, sufficient space with suitable storage area should be provided for the drying process, and it must be noted that the drying time for dishes is at least 2 minutes. The drying time for drying the inside of glasses can also be considerably longer. Operating staff should be instructed that for hygiene reasons, wash items should not be dried by hand to prevent recontamination.

Resupply

The operator / planner must ensure that recontamination of the wash item is avoided up to the point of resupply. Sufficient storage facilities must be provided for clean wash items.

3. Determining the performance and size of the dishwashing system

A dishwasher is properly designed when its function, performance and equipment take into account the requirements of the operation and can be efficiently inserted into the concept of the establishment.

The commercial dishwashers referred to in this data sheet are distinguished by:

Processes

- Hand-loaded programmable machines and water-change machines (front-loading, rack, pass-through machines)
- Dishwashers with transport system (flight-type and rack conveyor dishwashers)



Application

- Dishwashers
- Glass washing machine
- (Ware) Washers for kitchenware / containers

3.1. Facts that determine the machine size and type

Primarily, the following information is required for selecting a dishwasher:

- Requirements for the cleaning performance
- Consideration of the catering system
- Utilisation rate
- Operational requirements
- Number, type and handling frequency / reuse of wash items
- Type of wash item return system
- Scheduled machine cycle time
- Capacity reserve



For theoretical performance indicators necessary for comparison, it must be noted that these are lessened by practical factors such as:

- Configuration
- Range of wash items
- Type of machine
- Staff
- Type-specific particularities

This is defined by the utilisation rate.

The resulting practical utilisation rates are defined as follows:

Front-loading machines	0.60	to 0.75
Rack pass-through machines	0.70	to 0.80
Rack conveyor and flight-type machines	0.75	to 0.90
Water-change machine	0.20	to 0.30

The allowance of a capacity reserve can buffer extraordinary operating loads.



The utilisation rate of the dishwasher is also influenced by the type of dish return. This can be performed:

- via clearing table
- via open / closed trolley and container
- via conveyor system

It is advisable to consult the checklists for determining the performance of the respective dishwasher type, as prepared by the dishwasher manufacturer.

3.2. Checklists for determining performance

Example for determining the performance of a programmable machine or a rack conveyor dishwasher.

Number of diners: _____

Duration of preferred operating time of the dishwasher (wash time): _____

Wash item type	Number	Configuration option per rack*	Dish racks
Trays 460 x 344 / 400 x 300		approx. 8	
Trays 530 x 325 / 530 x 370		approx. 8	
Plates up to 150 mm \varnothing		approx. 24	
Plates up to 250 mm \varnothing		approx. 16	
Plates > 250 mm \varnothing		approx. 8	
Three-part platters		approx. 8	
Soup bowls up to 150 mm \varnothing		approx. 10	
Side dish bowls up to 150 mm \varnothing		approx. 24	
Dessert or salad bowls up to 150 mm \varnothing		approx. 24	
Cups up to 90 mm \varnothing		approx. 20	
Cups up to 110 mm \varnothing		approx. 16	
Portion coffee pot		approx. 16	
Portion milk pot		approx. 100	
Cutlery items		approx. 80	
Other wash items**			
Dish racks + capacity reserve			
Number of dish racks		Total	

* The corresponding manufacturer information must be observed. The indicated capacity (settings) per rack (rack size 500 x 500 mm) relates to the average wash item.

** special facilities



Calculating the machine size:

$$\frac{\text{Calculated number of racks}}{\text{Wash time (h) x capacity level}} = \text{performance required (dish racks/h)}$$

It is recommended that glasses are washed separately in a glass washing machine.

Example for calculating the performance of a flight-type machine

Number of diners: _____

Duration of preferred operating time of dishwasher (wash time): _____

Wash item type	Number	Configuration option per m conveyor*	length conveyor (meters)
Trays 460 x 344		approx. 36	
Trays 530 x 325 / 530 x 370		approx. 18	
Plates up to 150 mm \varnothing		approx. 64	
Plates up to 200 mm \varnothing		approx. 48	
Plates up to 300 mm \varnothing		approx. 36	
Warming dishes up to 300 mm \varnothing		approx. 24	
Soup bowls up to 150 mm \varnothing		approx. 24	
Side dish bowls up to 150 mm \varnothing		approx. 24	
Dessert or salad bowls up to 150 mm \varnothing		approx. 24	
Cups up to 90 mm \varnothing		approx. 40	
Cups up to 110 mm \varnothing		approx. 22	
Cutlery items		approx. 200	
Insulated trays **		approx. 12	
Cover for insulated tray		approx. 12	
Other wash items ***			
m conveyor + capacity reserve			
m conveyor length (meter)			Total

* The number of wash items per m conveyor depends on the distance between the conveyor sections and the width of the conveyor belt (the information below refers to standard conveyor belts measuring approx. 600 mm in width).

** only applies to hospitals and care homes.

*** special facilities.



Calculating the machine size:

$\frac{\text{Calculated m conveyor}}{\text{Wash time (min) x utilisation rate}}$	=	necessary conveyor speed of the dishwasher in m/min
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It is recommended that glasses are washed separately in a glass washing machine.

4. Water and energy supply

A corresponding water and energy supply is required to operate the dishwasher. The manufacturer's specifications must be observed.

4.1. Water

There are specific requirements in terms of water quality, as this has a crucial influence on the entire washing result. Tap water in accordance with the German Drinking Water Ordinance (TrinkwV) or European Drinking Water Directive does not necessarily meet the requirements for automatic dishwashing as regards spotless drying. Hardeners in the water must be avoided to prevent deposits in the machine and on wash items.

For example, if the water hardness is greater than 3 °dH and / or 0.54 mmol/CaCO³ (millimoles calcium carbonate per litre), a water treatment system must be installed.

As water softening alone cannot reduce the total mineral salt content in the water, if the mineral salt content is too high, partial or complete desalination of the water must be carried out to achieve an optimum washing result. Information on optimal water quality is available in the *Compendium of practice for Commercial Dishwashing, Section 05 "Water quality"*.



4.2. Energy

The process reliability of the dishwasher is always dependent on sufficient energy supply. Therefore, dishwashers should not be factored into energy optimisation systems. The operator must ensure that respective valid hygiene requirements as regards washing temperatures and contact times are observed.

Depending on the design, dishwashers can be heated with electrical energy, vapour, hot water or gas.

Always observe the instructions of the dishwasher manufacturer when configuring the on-site energy supply!

5. Ventilation

VDI 2052 “Ventilation equipment for kitchens” requires sufficient aeration and ventilation of the dishwashing scullery. EN 16282 Equipment for commercial kitchens – Components for ventilation in commercial kitchens.

In particular cases, the instructions of the dishwasher manufacturer must be observed when designing the ventilation system. In addition to the thermal load and emissions of the machine, the thermal output through the wash items must also be taken into account.



6. Process chemicals (treatment agents / detergents)

Treatment agents (detergent, rinse aid and possibly additional products) are required to operate a dishwasher. In particular, it must be clarified what type of treatment agents should be used. These should be chosen based on the contamination and material of the wash items. Information on selecting the correct treatment agent is available in the *Compendium for practice for Commercial Dishwashing, Section 06 "Process chemicals"*. Furthermore, it must be clarified whether a centralised or decentralised supply is intended. Sufficient storage facilities and possibly supply lines must be provided for the treatment agents. The selected storage facilities must ensure that the treatment agents are not kept and stored within direct proximity of medicines, foodstuffs and animal feed, including their additives. The Federal Water Act must be observed.

7. Waste water

Every commercial dishwashing system has one or more waste water connections. The waste water drains must be sized according to requirements and laid with a gradient.

In addition to the instructions of the dishwasher manufacturer, the requirements stipulated by DIN 1986 "Drainage systems for buildings and property" must also be observed.

As regards the requirements for fat separators, the respective local waste water regulations as well as EN 1825, Parts 1 and 2, plus DIN 4040-100 must be observed.



8. Optimisation potential for operating costs

Suitable systems in the machine to save energy, process chemicals and water can reduce operating costs and thus protect the environment.

These include, e.g.,

- Heat recovery systems and heat pumps
- Water-saving systems
- Process chemical-saving systems
- Thermal insulation
- Capacity detection systems
- Dishes detection systems

9. Planning examples

9.1. Restaurant and banquet

Example layout I:

Rack conveyor dishwasher

A high-performance and compact solution in confined spaces, whereby the dishes are automatically transported through the dishwasher in racks.

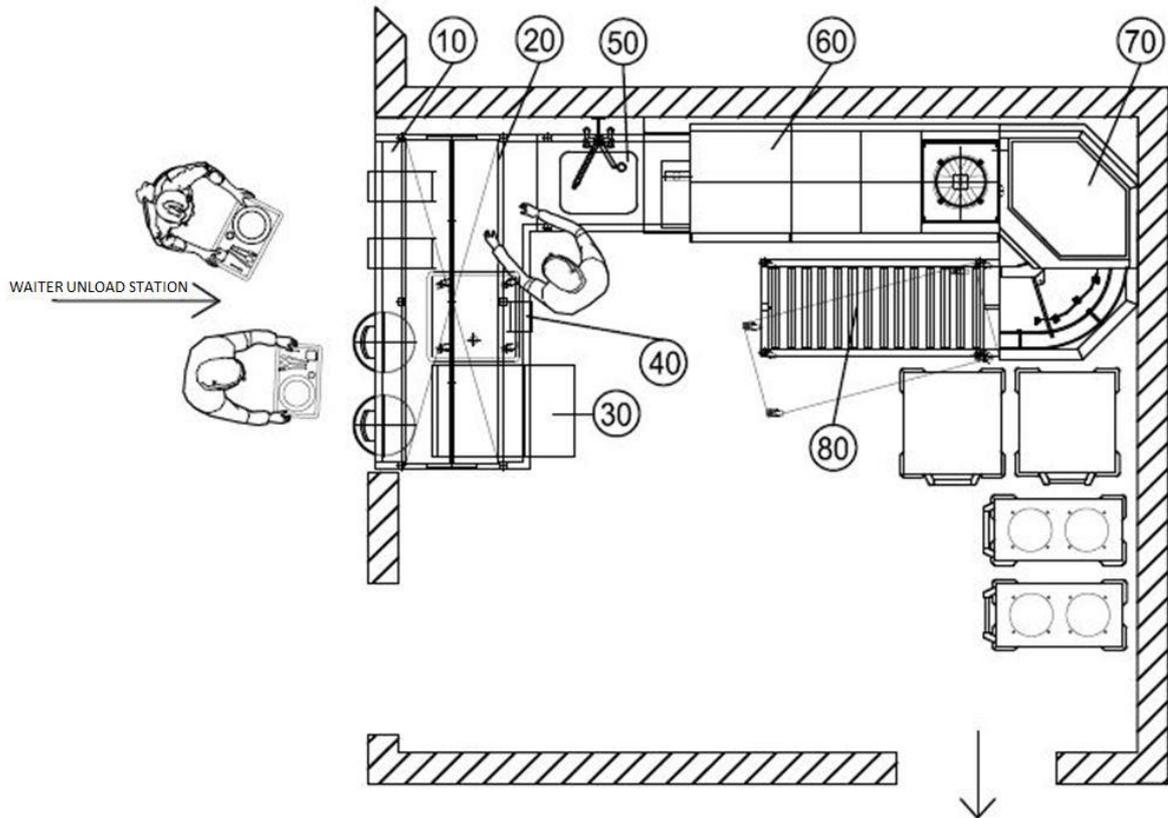


Figure 2: Planning example: Restaurant and banquet with rack conveyor dishwasher
Source: Hobart

System components:

- 10 Clearing and sorting table with beverage sinks
- 20 Double-sloping shelf
- 30 Automatic glass washing machine
- 40 Cutlery-soaking trolley with chute
- 50 Feed table with sinks and pendulum spray
- 60 Dishwasher
- 70 180° curve with drying
- 80 Outlet roller table, moveable and rotatable

9.2. Canteens, refectories, nursing homes

Example layout II:

Semi-automatic systems

Flight-type dishwasher, combi. cutlerytray dishwashers, return via a tray return conveyor

Extremely high-output system, whereby diners place trays with dishes directly on a continuous return conveyor.

Semi-automated dishwashing systems are used increasingly in larger supply facilities. It is not possible to display all the options in this section. The complexity makes it necessary to find an ideal solution with specialist planners.

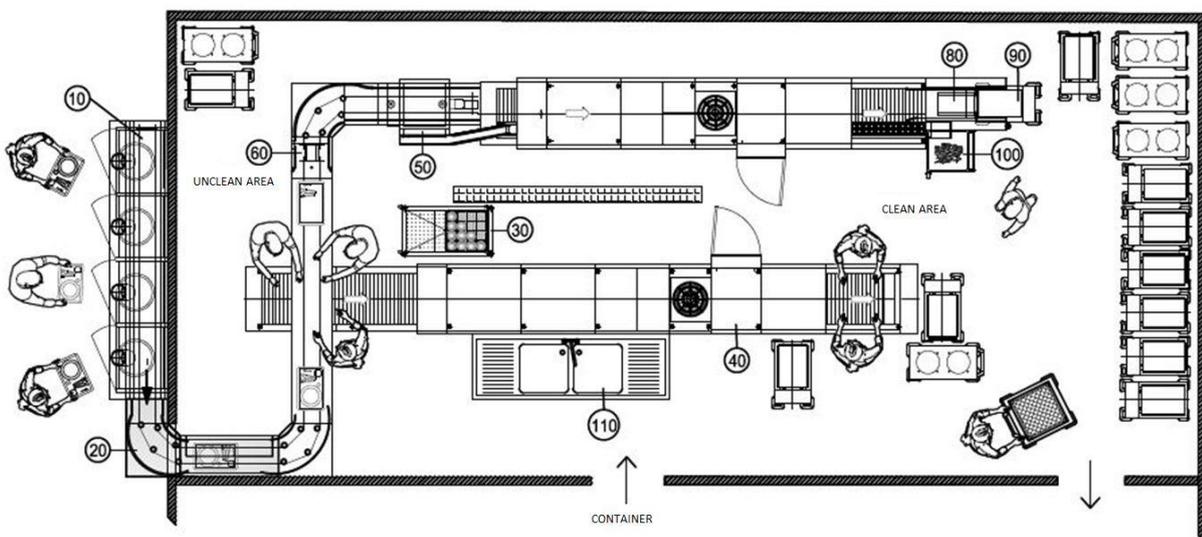


Figure 3: Planning example of scullery in a canteen with flight-type dishwashers
Source: Hobart



System components:

- 10 Tray return conveyor with waste chutes for serviettes
- 20 Sound-absorbing tunnel
- 30 Sorting table for small parts, movable
- 40 Dishwasher and tank dishwasher
- 50 Cutlery lifting magnet
- 60 Tray feed system
- 70 Comb. cutlery and tray dishwasher
- 80 Tray stacking device
- 90 Tray stacker
- 100 Cutlery collection trolley, movable
- 110 Double-bowl sink

9.3. Hospitals

Example layout III:

Flight-type machine, comb. tray / cutlery dishwasher and example for planning an area for central dosing technology, return via trolley / container and tray conveyor belt

In hospitals, meals must be brought to patients. This requires the use of meal trolleys. In particular, the necessary areas for these trolleys must be considered in area planning. Furthermore, the unclean and clean areas must be separated for hygiene reasons, e.g., by installing a separating wall.

Semi-automated dishwashing systems are used in larger supply facilities. It is not possible to display all options in this section. The complexity makes it necessary to find an ideal solution with specialist planners.

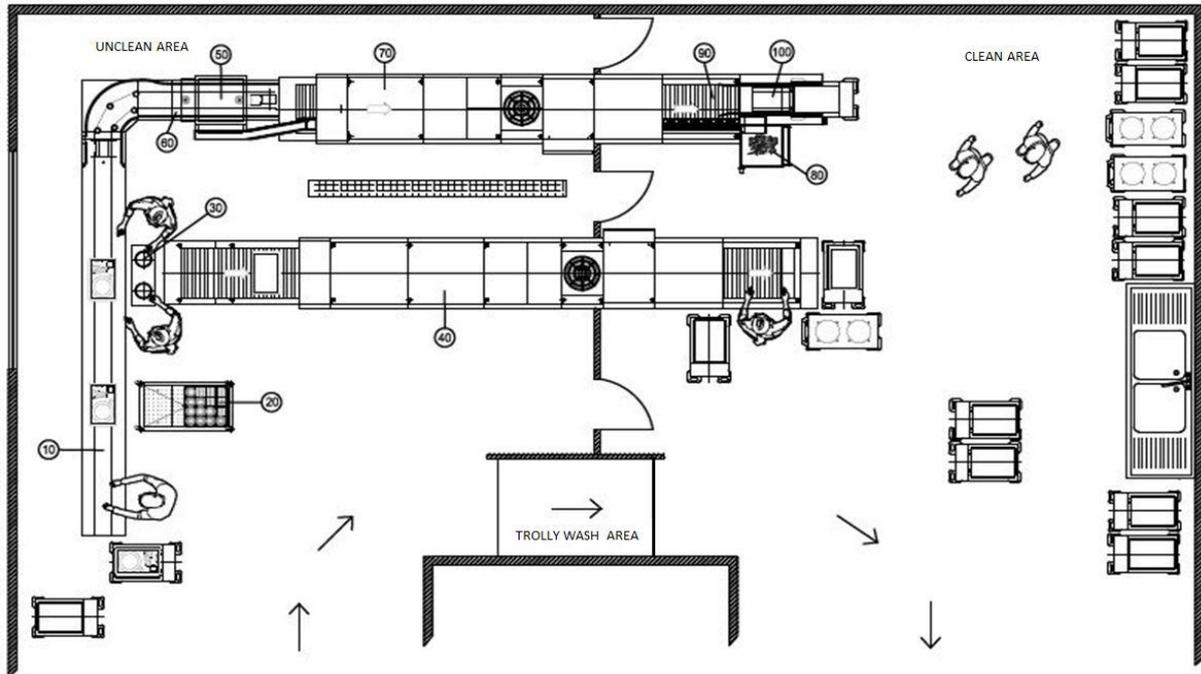


Figure 4: Planning example of a dishwashing system in a main hospital kitchen
Source: Hobart

System components:

10	Clearing and sorting conveyor	60	Tray feed system
20	Sorting table for small parts, movable	70	Comb. cutlery and tray dishwasher
30	Waste chutes	80	Table for the cutlery collection container
40	Dishwasher	90	Tray stacker
50	Cutlery lifting magnet	100	Tray stacker



This compendium of practice, which has been drawn up by experts, should remind the reader that commercial machine washing cannot be successfully conducted on a superficial level or without the corresponding input of all persons involved in the cleaning process.

Only the understanding of technical processes, the resulting interrelations and the cooperation of all participants, particularly the dishwasher operator and staff, as well as having regular maintenance of the dishwasher, the dosing equipment and the water treatment system by the manufacturer, can produce the cleaning results expected by the user.

Consistent cooperation between the dishwasher, detergent and dosing equipment manufacturers, as well as the manufacturers of wash items, guarantees constant and optimal adaptation to practical requirements for the benefit of customers and the environment.