



# Practical handbook Commercial dishwashing

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Section 11

**Hygiene**

## Contents

1. Hygiene requirements for mechanical commercial dishwashing machines / DIN standards .....	3
2. Important parameters that influence hygienic washing results in automatic dishwashing.....	5
3. Requirements for the washrooms .....	7
4. Requirements for the washing parameters.....	11
5. Requirements for the wash item .....	15
6. Requirements for cleaning products.....	16
7. Tasks of the operator .....	16
8. Necessary checks before and during operation of the dishwasher .....	17
9. Necessary tasks following the end of operating time .....	18
10. Need for a thorough cleaning of the dishwasher and wash items .....	18
11. Regular maintenance and functional checks of the machine .....	18
12. Checking the hygienic status of the wash items and the cleaning process .....	19

## 1. Hygiene requirements for mechanical commercial dishwashing machines / DIN standards

Diners in the catering trade, hotel business, refectories / canteens, service stations, care homes, hospitals, etc., all demand hygienic perfection when it comes to dishes and cutlery.

The surface of all washed items should be in a condition that protects the diner from any health impairments. This applies to those in poorer physical condition and healthy diners alike. In addition to compliance with general hygiene regulations for food preparation such as the Food Hygiene Regulation (EC) No 853/2004 and (EC) No 853/2004 and DIN 10516), there is also a range of special provisions for commercial dishwashing, which, like in other sectors, are covered and explained in DIN standards.

In Germany, hygiene requirements and tests have so far been described in DIN standards 10510, 10511, 10512, 10522 and the preliminary standard DIN Spec 10534, and in other countries there were also local guidelines or specifications for e.g. temperatures in the dishwasher.

DIN EN 17735 is the first European standard to specify the hygiene requirements for the operation of commercial dishwashers and the procedures for the corresponding tests on dishwashers, and contains guidelines for the hygienic and proper operation, care and maintenance of dishwashers.

With the publication of the German standard DIN 10544 "Food hygiene - Commercial dishwashers - Supplementary hygiene requirements and testing" in addition to DIN EN 17735 "Commercial dishwashers - Hygiene requirements and testing", all essential contents of the standards DIN 10510, 10511, 10512 and DIN Spec 10534 are now covered. These have therefore now been withdrawn.

**Overview of the applicable standards for commercial dishwashing:**

**DIN EN 17735**

***"Commercial dishwashers - hygiene requirements and testing"***

**DIN 10544**

***"Food hygiene - Commercial dishwashers - Supplementary hygiene requirements and tests"***

**DIN 10522**

***"Food hygiene - Commercial cleaning of reusable boxes and reusable containers for unpackaged foodstuffs - Hygiene requirements, testing"***

**DIN SPEC 91510**

***"Requirements for the hygienic reprocessing and recycling of reusable plastic packaging" (expected to be published in early 2025)***

These standards represent state-of-the-art. They are non-legislative acts, but nevertheless represent a set of guidelines for management staff in food preparation in order to guarantee hygiene safety during commercial dishwashing.

The standards developed apply to commercial dishwashers. The standards mentioned are not applicable to dishwashers for domestic use and for washer-disinfectors for the reprocessing of medical devices and for industrial use.

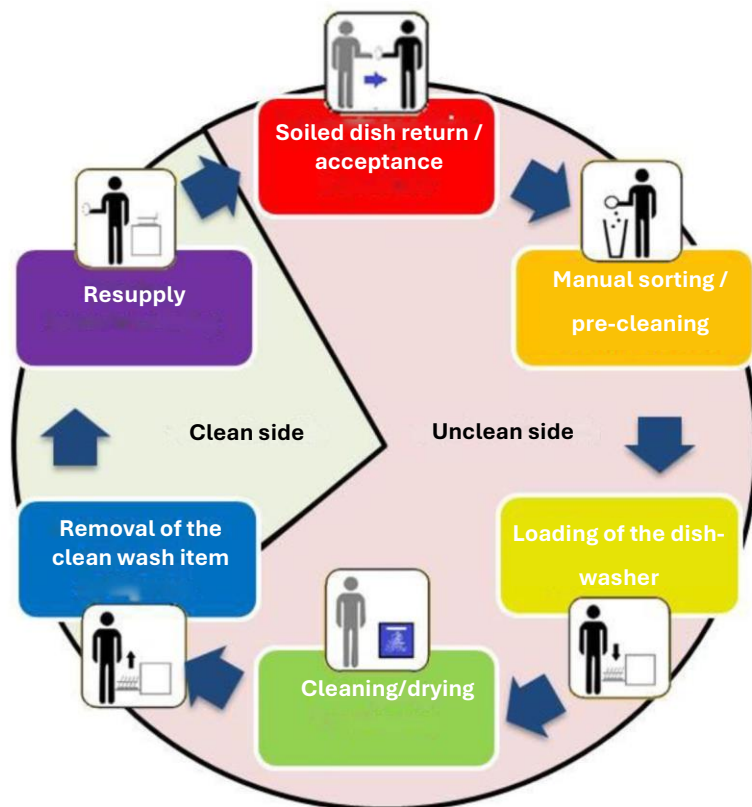
## 2. Important parameters that influence hygienic washing results in automatic dishwashing

Every clean and the resulting cleanliness and hygiene of the wash item are influenced by the interplay of the following factors:

- Type of wash item and item holder
- Dry-on time
- Type and extent of contamination
- Pre-cleaning
- Temperature
- Contact time
- Mechanics
- Quality and volume of water
- Process chemicals (treatment agents)
- Rinse aid
- Drying
- Restocking or storage

The wash item passes through a circuit of separate clean and unclean sides.

The following diagram illustrates the individual functional areas of the wash item circuit:



**Figure 1: Functional areas in the wash item circuit**  
Source: Hobart

The dry-on time of food residues onto dishes should be limited as much as possible to prevent microbial growth and to facilitate cleaning.

Once the contaminated wash item has been returned to the unclean area, the wash item should be pre-cleaned depending on the degree of contamination. Pre-sorting and loading is performed according to the machine type and / or instructions of the machine manufacturer. The wash item can be moved into the clean area after cleaning.

The wash item can be dried both inside and outside the machine. If necessary, corresponding drying areas must be provided on the clean side. Only clean and dry wash items may be stored in clean areas, ready for reuse.

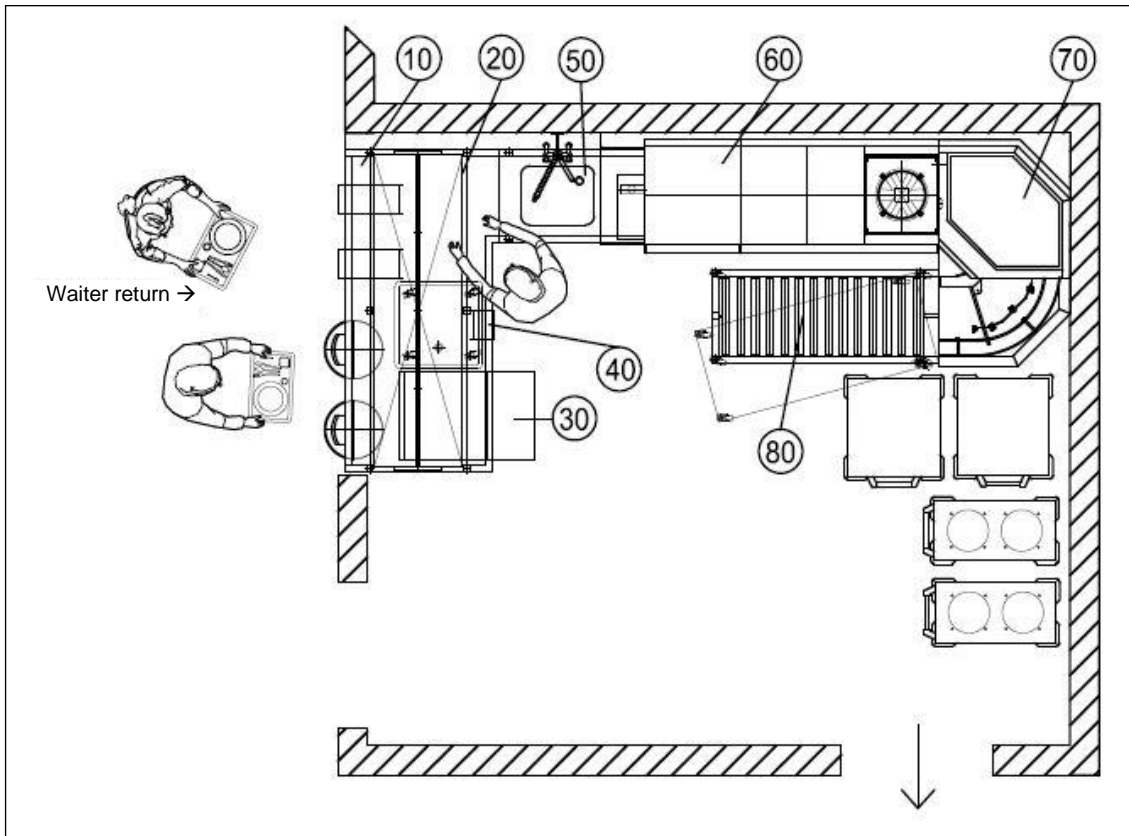
Damp wash items may not be stacked unless constructive measures enable total drying of the wash items! Standing water and damp cloths / wipes can become contaminated and thus constitute hygiene risks! The commercial dishwasher and the entire dishwashing area must be cleaned as required, but at least once per day.

### **3. Requirements for the washrooms**

Sculleries must be designed and equipped to ensure that they meet the relevant hygiene regulations for food preparation.

Upon purchasing a commercial dishwasher, the supplier and operator should discuss the circumstances and requirements on-site in order to achieve a hygienically flawless cleaning result.

A correct functional layout and consistent adherence to clean and unclean areas are ideal prerequisites for hygienic washing and re-provision of wash items. Thus the operation of the machine and staff deployment must be organised accordingly.



**Figure 2: Planning example for restaurant and banquet with rack conveyor dishwasher**  
Source: Hobart

In kitchens the sculleries must be separate from the food preparation and distribution areas. The clean and unclean sides must be kept separate to avoid recontamination. The paths of contaminated and clean wash items must not cross.



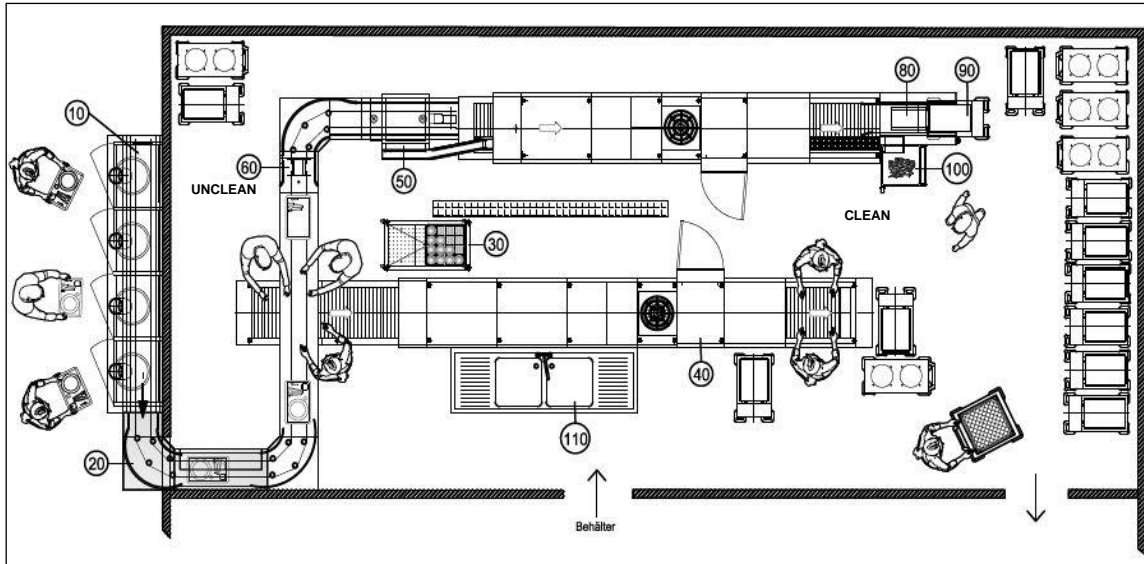


Figure 3: Planning example of the washing-up area in a canteen with conveyor dishwashers  
Source: Hobart

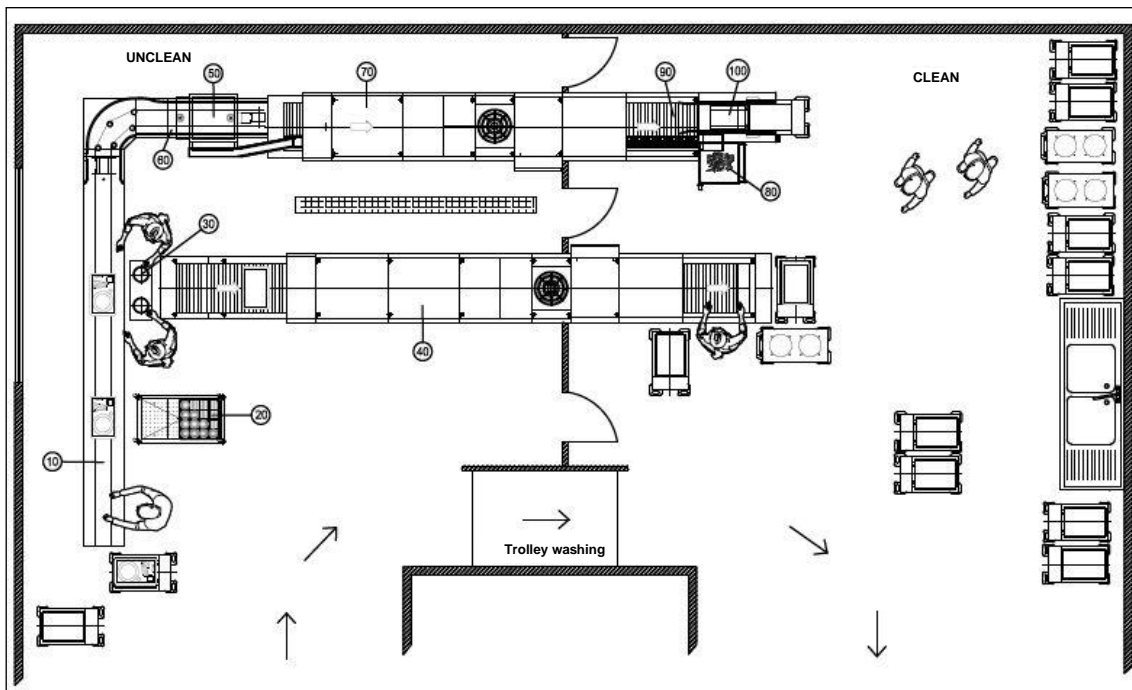


Figure 4: Planning example of a dishwashing system in the central kitchen of a hospital  
Source: Hobart

For the operation of single-tank and glass washers, loading the machine and removing cleaned items must be kept separate to avoid recontamination of the cleaned items.

The aforementioned information also applies to wash systems for cleaning reusable boxes and reusable containers for unpackaged foodstuffs.

The air intake system and exhaust air system must be designed to ensure that the room climate does not place undue burden on dishwashing staff. The air used to dry the wash item must be free of bacteria. Thus, it is important that regulations for air-conditioning systems for kitchens (RLT, VDI 2052) are observed by operators and / or planners.

The floor must be non-slip, and the entire room including equipment (e.g. floor grating, floor drainage / drainage channels) must be thoroughly cleaned and disinfected.

The hygienically clean wash items may only be removed with clean hands and / or clear gloves. Re-contamination must be avoided! Soiled dishes and clean dishes should be handled by different staff.

Therefore, hand wash basins and facilities for washing, disinfecting hands and hygienically drying hands should be provided at suitable locations, e.g., in close proximity to the dishwasher (in accordance with Regulation (EC) No 852/2004, Annex II, Section 1, Point 4.

#### 4. Requirements for the washing parameters

- Cleaned wash ware must be visually clean. No residues should be visible to the naked eye.
- Such a result can only be achieved if the parameters of temperature, mechanics, chemistry and time are optimally coordinated.
- The detergent concentration must remain consistent across the entire cleaning process and be sufficiently high (manufacturer's instructions). A uniform, direct flow of the detergent and rinse aid must be guaranteed.
- Wash item, dry-on level, heating time and temperatures, as well as the type of contamination, have a crucial influence on the cleaning process • The operator must take this into account by selecting the correct programme (e.g. transportation speed, programme duration or type).
- It is important that the wash item is placed in the optimum position in the wash item holder and that it remains in this position.
- Significant input of soiled material increases the risk of recontamination of clean dishes. Thus, a thorough pre-cleaning should be performed.
- Larger conveyor dishwashers should be equipped with a pump precleaning system and corresponding soiled-material strainer.
- For smaller machines, pre-rinse basins and hand sprays must be provided for thorough, manual pre-cleaning. • The hygienic water quality of the fresh water rinse must correspond to that of drinking water.
- Detailed requirements for the technical and functional equipping of the machine can be found in the standards DIN EN 17735, DIN 10544 and DIN 10522.

**DIN EN 17735**

***"Commercial dishwashers - hygiene requirements and testing"***

Range	Temperatures in °C	Measuring point
<b>Freshwater Pre-cleaning*</b>	Appr. 35	
<b>Pre-cleaning pump</b>	40 to 50	Pre-cleaning tank
<b>Detergent circulation tank</b>	60 to 65	Tankwater
<b>Pump rinsing</b>	60 to 70	Rinse tank
<b>Fresh water rinse</b>	80 to 85	Boiler

In the informative section, DIN EN 17335 provides a recommendation for these temperatures and points out that it is permissible to fall below these temperatures, if the hygienic requirements specified in the standard are met. The use of special process chemicals and procedures may be necessary for this.

Exceeding the specified maximum temperatures can be tolerated.

Scientific studies in recent decades have shown that contact times of at least 2 minutes in multi-tank dishwashers and at least 90 seconds in single-tank dishwashers (program machines) and temperatures as listed above ensure thorough removal of food residues and microorganisms. Alternatively, shorter contact times and lower temperatures can be compensated for to a certain extent by selecting and adjusting process chemicals as required.

### **DIN 10544**

#### **"Food hygiene - Commercial dishwashers - Supplementary hygiene requirements and tests"**

This standard is applicable to commercial dishwashers that fall within the scope of DIN EN 17735 "Commercial dishwashers - Hygiene requirements and testing". DIN 10544 supplements the content of European EN 17735 with the following points:

- Type test for cleaning drinking vessels (e.g. glasses, cups ...)
- Extraordinary inspection of dishwashers (to support operators)
- Testing the cleaning of cutlery on special wash ware carriers
- Cleaning of reusable packaging for distribution to and use by end consumers in the out-of-home catering sector

DIN 10544 is therefore not only aimed at manufacturers, but also at the operators of commercial dishwashers with information on additional tests.

As the shelf life and usability of a drinking glass are significantly influenced by the temperature, the AK GGS recommends not to exceed the temperature of 60 °C of the detergent solution and to limit the temperature of the rinse aid solution to  $65 \pm 2$  °C.

In special circumstances, e.g. where there is an increased risk of infection, higher temperatures must be used in glasswashers or the use of disinfectant components is recommended.

**DIN 10522**

**"Food hygiene - Commercial automated warewashing of reusable crates and reusable containers for unpackaged food - Hygienic requirements, testing"**

Range	Temperatures* <u>without</u> disinfectant or Oxidation component in the alkaline Cleaner solution	
	°C	
Cleaning tank	60 to 65	Cleaning tank
Fresh water rinse	80 to 85	Boiler

\* No temperature specification for detergent and rinse aid solution for chemical disinfection

Due to the different areas of application and different hygiene requirements for the wash ware, it is not possible to define a generally valid contact time for such dishwashers.

## 5. Requirements for the wash item

The term “wash item” refers to dishes, cutlery, trays, containers for transporting unpackaged foodstuffs and items that are used in food preparation and distribution.

These items can be made of different materials, but all must be suitable for commercial automatic dishwashing.

See Compendium of practice for Commercial Dishwashing:

Section 07 "Porcelain wash items"

Section 08 "Metal wash items"

Section 09 "Glass wash items"

Section 10 "Plastic wash items"

In particular, for hygiene reasons, damaged wash items must be replaced regularly; this applies, in particular, to glasses and cups with damaged rims.

Dimensionally stable and temperature-resistant plastic items are suitable as long as the surface of these is smooth, free of hairline cracks and visible signs of use. Damaged parts should be replaced regularly.

Cutlery and cooking utensils are made primarily from high-quality stainless steel. If visible damage such as heat cracks or pitting (e.g. on knife blades) occurs, the corresponding parts must be replaced.

An important aspect to consider for flawless cleaning results is not only the material of the wash item, but also the shape.

The wash item must be shaped in such a way that the entire surface can be reached. Therefore, items with deep indentations, e.g., in bowls and cups must be avoided when choosing tableware items. Any water remaining must be able to run-off easily.

## 6. Requirements for cleaning products

The choice of cleaning products and the concentration of these largely depends on the soiling, the degree of drying, the type of wash ware to be cleaned, the dishwasher, the available contact time and the water quality.

The detergent must be able to remove contamination, disperse itself in the detergent solution and prevent deposit formation. Detergent components can set the water hardness, prevent excessive foam generation, have an anti-corrosive effect and support the disinfection action

The process and drying behavior of the cleaned wash item is determined by the rinse aid and the surface quality of the wash item.

The dose of detergent, rinse aid and disinfectant (where necessary) according to each individual case are important prerequisites for cleanliness and the hygienic condition of the wash item (see Compendium of practice for Commercial Dishwashing, Section 06 "Process chemicals" and Section 04 "Dosing technology")

## 7. Tasks of the operator

The operator is responsible for the entire cleaning result and must ensure the following:

General cleanliness must be maintained in the entire wash area (clean and unclean sides).

The staff working in the wash area work in food preparation and must therefore observe the applicable food and hygiene regulations (see Regulations (EC) No 178/2002 and Regulations (EC) No 852/2004). Therefore, an understanding of cleanliness and hygiene must be conveyed in regular training sessions (in accordance with Regulations (EC) No 852/2004, Section XII and DIN 10514 – Food Hygiene – Hygiene Training Sessions).



The following points must be observed to achieve a flawless cleaning result:

- The wash items should be cleaned as soon as possible after use.
- Long dry-on times must be avoided.
- A good pre-cleaning is absolutely necessary.
- Where possible, load pre-sorted wash items into the machine.
- Pre-soak cutlery if possible.
- Cleaned wash items may only be stored dry.
- Manual drying should only be performed in exceptional cases and only with disposable cloths / wipes.

## 8. Necessary checks before and during operation of the dishwasher

All **nozzles** must be free of foreign bodies (toothpicks, etc.).

All **drains** must be closed tight and free of foreign bodies.

The **strainer** and **filter** must be kept clean and designed / mounted in the intended place.

**Spraying curtains** are subject to heavy wear and can only fulfil their purpose if they are mounted at the correct place and are still in a usable condition. As wear parts, they must be replaced from time to time. The operating temperature of the detergent solution and the rinse aid solution, as well as the necessary detergent concentrations must be reached before the cleaning process can begin. The necessary temperatures and detergent concentrations must be maintained during the entire cleaning process. The correct wash program (conveyor speed or program type) must be configured. It must be checked whether sufficient detergent, rinse aid and disinfection components, if necessary, are available in the reservoirs.

The perfect function of the **dosing units** must be checked regularly.

In the case of heavy contamination, the **detergent solution** must be changed during the wash time. The visual cleanliness of the wash item must be checked continuously.

## 9. Necessary tasks following the end of operating time

The machine must be thoroughly cleaned after the end of each operation. This includes emptying the tanks and thoroughly cleaning the inside, the strainer system, the inlet and outlet areas, the partition screens and the spraying system, according to the instructions of the machine manufacturer. The area around the machine must also be cleaned thoroughly, the wash area must be aired, and the machine must be left open.

## 10. Need for a thorough cleaning of the dishwasher and wash items

If there are visible deposits inside the machine and / or on the wash item, the machine and wash item must be thoroughly cleaned immediately. The causes of deposits must be ascertained and rectified accordingly. The suitable treatment agent for the basic cleaning is selected based on the type of deposit and material of the wash item.

**Deposits constitute a hygiene risk because microorganisms can collect and multiply in the deposits in the machine and on the wash item!**

## 11. Regular maintenance and functional checks of the machine

The operational and functional safety of the commercial dishwasher must be guaranteed through permanent functional checks and regular maintenance according to the machine manufacturer.

**Appropriate maintenance contracts are advisable.**

If faults are detected that cannot be rectified by the operator, a service must be requested immediately.

## 12. Checking the hygienic status of the wash items and the cleaning process

### Visual inspection

Visual cleanliness is a prerequisite for a hygienically flawless condition of the wash item. Drops remaining at the contact points and residual moisture inside hollow items can be tolerated. Sufficient time must be allowed for drying the wash item.

### Microbiological testing

**The performance of microbiological tests is described in the standards.**

A targeted microbiological test of wash item surfaces can be performed using contact slides (swab tests). This test allows conclusions to be drawn about the general hygienic condition of the wash item.

No more than 5 CFU<sup>1</sup>/10 cm<sup>2</sup> should be found. If this number is exceeded, a thorough examination of all parameters must be carried out.

In addition to the contact slide tests, the colony count in the detergent solution of the last tank must also be determined. A sample of approximately 100 ml of detergent solution must be taken from the **last detergent circulation zone before the pump rinse** in the case of multi-tank machines **and** directly from the circulated tank water in the case of program machines.

The limit value is 500 CFU/ml.

For multi-tank dishwashers in risk areas, an additional test with the defined bioindicators should be carried out. If the machine is converted or modified, an extraordinary test must be carried out.

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<sup>1</sup> CFU = Colony Forming Unit

The exceeding of the limit values and an insufficient reduction in the test organisms of the bioindicators may indicate incorrect operation, possibly also insufficient capacity of the dishwasher.

Deviating requirements exist for reusable boxes and reusable containers (see DIN 10522).

Non-standard hygienic inspections of commercial dishwashers, e.g., with closed germ carriers, are not suitable as they do not include the highly significant mechanical removal of germs and merely rely on the active content of disinfectant, contact time and temperature.

### **Overview of the test types:**

#### **DIN EN 17735 - Commercial dishwashers - hygiene requirements and testing**

- Type test
- Test after installation
- Periodic test (at least every six months)
- Daily check
- Extraordinary test

#### **DIN 10544 - Food hygiene - Commercial dishwashers - Supplementary hygiene requirements and tests**

- Type test for cleaning of drinking vessels
- Daily test
- Periodic testing
- Extraordinary test
- Check of the cleaning of cutlery on special wash ware carriers (e.g. cutlery conveyor)

**DIN 10522 - Food hygiene - Commercial dishwashing of reusable crates and reusable containers for unpackaged food - Hygiene requirements, testing**

- Type test
- Acceptance test after installation
- Routine test in ongoing operation

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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.

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