

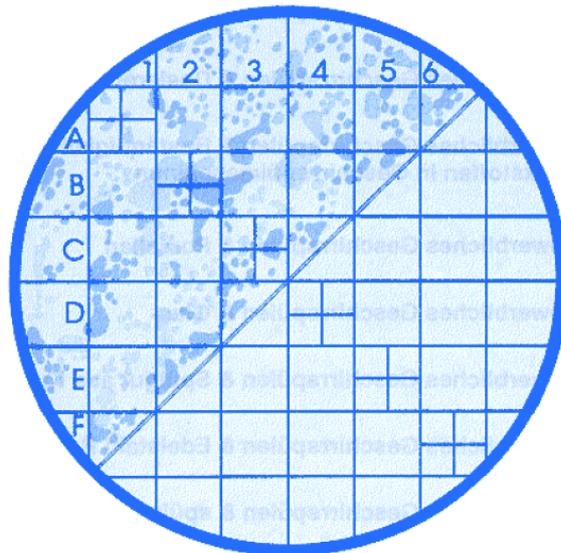


Commercial dishwashing

&

hygiene

(Technical information sheet No. 14)



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INTRODUCTION

Every meal participant is entitled to fully hygienic dishes and cutlery.

This means that the surfaces of all items of wash ware have to be in a condition that precludes any adverse effects on the health of meal participants. This does not only apply to hospitals and care homes where people are in less good physical health, but also to meal participants of communal catering in canteens, refectories and motorway services as well as in gastronomic establishments.

A working party, in which members of the VGG team as well as hospital and food hygienists are represent, was therefore set up to examine issues of hygiene. From this group, experts were also chosen to draw up the DIN standards which had been commissioned by the Federal Ministry of Health.

In the course of this work, the following four standards were developed:

- DIN 10510 - “Food hygiene – Commercial dishwashing with multitank transport dishwashers – Hygiene requirements, procedure testing”**
- DIN 10511 - “Food hygiene – Commercial glasswashing with glasswashing machines – Hygiene requirements, testing”**
- DIN 10512 - “Food hygiene – Commercial dishwashing with one-tank dishwashers – Hygiene requirements, type testing”.**
- DIN 10522 - “Food hygiene - Commercial cleaning of reusable boxes and reusable containers for unpackaged foodstuffs - Hygiene requirements, testing”.**

This technical information sheet provides important information on links between chemical/physical factors and hygiene.

It deals with structural planning and the organisation of the wash-ware cycle, the deployment of staff, day-to-day operations and the training of technical staff.

1. What are the key parameters affecting hygiene in automated warewashing?

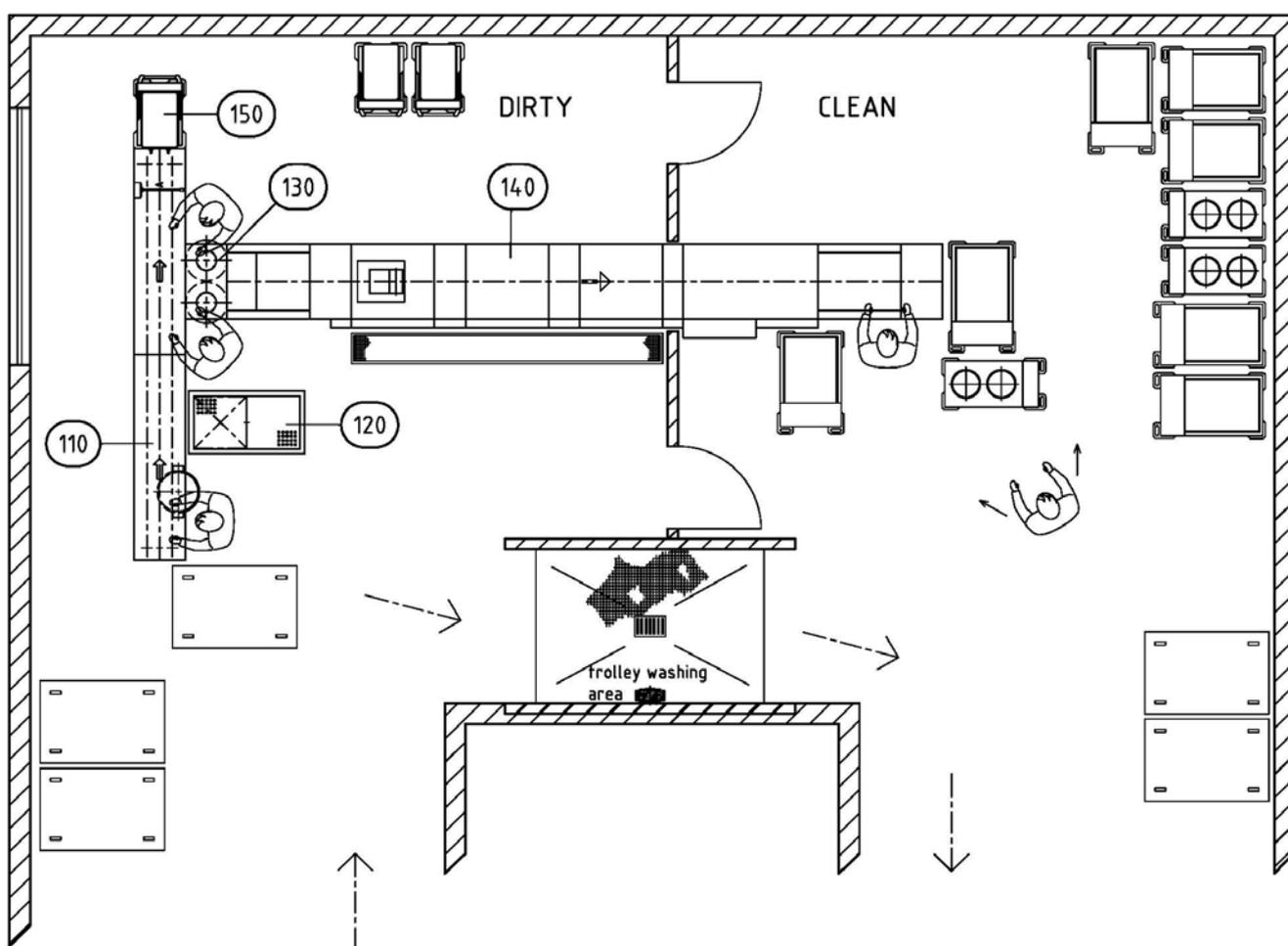
Every cleaning process, and the resulting cleanliness and hygiene of the wash ware, is affected by the interaction of the following factors:

- type of wash ware and wash-ware carrier
- dry-on time
- type and amount of soiling
- pre-cleaning
- temperature
- contact time
- mechanics
- water quality and quantity
- agents
- rinsing
- drying.

2. What structural requirements should be observed?

In kitchens with multitank dishwashers, the washing areas should be separated from those for food preparation and distribution. To prevent any re-soiling of the wash ware, the kitchen must be divided into a **clean** and a **dirty** side. The transport pathways of soiled and cleaned wash ware should not be allowed to cross.

Example of the arrangement of a central warewashing area in a hospital:



- 110 = stripping and sorting conveyor
- 120 = sorting table for small parts, mobile
- 130 = waste chutes
- 140 = dishwashing machine
- 150 = tray stacker

When operating one-tank warewashers and glasswashers care should also be taken to ensure that the loading of machines and the unloading of wash ware are carried out separately so as to prevent recontamination of wash ware.

The points stated above apply analogously to warewashers for cleaning reusable boxes and reusable containers for unpacked food.

The aeration and ventilation equipment shall be designed in such a way that no undue strain is placed on the warewashing staff by the condition of the air in the room. The air for drying the wash ware shall be germ-free. It is important here that the VDI Guidelines for Ventilation Equipment for Kitchens (RLT, VDI 2052) are adhered to by users and planners.

The floor covering shall be non-slip and the entire room, including equipment (e.g. walkway, grills and waste drains) easy to clean and to disinfect.

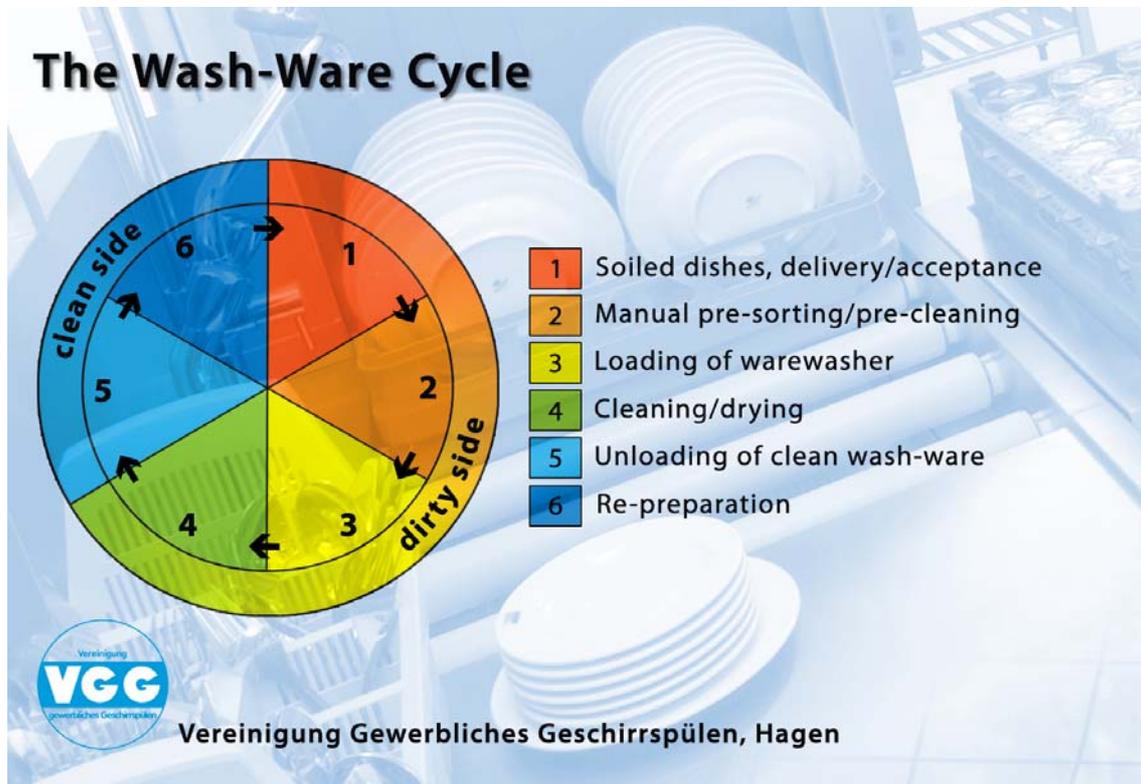
The fully hygienically cleaned wash ware shall be taken out only with clean hands or clean gloves. Re-soiling shall be avoided! The insertion of soiled wash ware and removal of clean wash ware should be carried out by different staff members.

Hand basins and means for washing hands and for hygienically drying hands should be available at suitable locations, e.g. close to the warewasher (in accordance with Regulation (EC) No. 852/2004, Annex II, chapter 1, item 4).

3. How should the wash-ware cycle be organised?

The wash ware passes along a cycle comprising clean and dirty areas, which are separated from one another.

The diagram below illustrates the separate functional areas in the wash-ware cycle:



Commercial automated warewashing procedures that conform to the series of standards DIN 10510, DIN 10511, DIN 10512 and DIN 10522 are suitable for achieving fully hygienic wash ware. The dry-on time for residues should be as short as possible in order to limit germ multiplication and facilitate cleaning.

After used wash ware has been returned to the dirty side, the wash ware has to be pre-cleaned. Depending on the type of machine and in accordance with the specifications of the machine manufacturer, wash ware is pre-sorted and loaded.

After cleaning, the wash ware is taken out on the clean side. Drying of the wash ware can take place both inside and outside the machine. Appropriate standing space for drying may possibly have to be provided in the clean area. Only **clean and dry** wash ware may be stored in clean areas until it is re-used.

Note:

1. Damp wash ware shall not be stacked unless the system is designed for it so as to enable the wash ware to fully dry subsequently!

2. Standing water and damp cloths are breeding grounds for germs and therefore present a hygiene risk!

The commercial warewasher and the entire warewashing area shall be cleaned at least once a day as required.

4. What requirements shall be met by warewashing areas?

Warewashing areas shall be fitted out in terms of design and equipment in such a way that they meet the relevant hygiene requirements for food-processing establishments.

To achieve fully hygienic warewashing results, the requirements shall be agreed upon between supplier and operator at the time of purchase of a commercial warewasher.

A functionally appropriate room layout and systematic observance of rules governing clean and dirty areas provide a sound basis for washing wash ware in a fully hygienic manner and making it available for use again. At the same time, the operation of the machine and the deployment of staff shall be organized appropriately.

5. What requirements shall be met by commercial automated warewashing?

Cleaned wash ware shall be visibly clean. No residues shall be discernible to the naked eye.

Such results can be achieved only if the parameters of temperature, mechanics, chemistry and time are optimally coordinated.

The detergent concentration shall be stable and sufficiently high (to manufacturer's specifications) over the entire warewashing process. It shall be ensured that the detergent and rinse aid solution are applied evenly and directly.

The wash ware, the degree of drying-on of food residues, the length of time and temperatures at which it has been kept warm, and the type of soiling all have a decisive influence on the warewashing process.

The operator shall take these into account when selecting the correct programmes (e.g. conveyor speed, programme duration or type).

It is important that the wash ware is always placed in an optimum position in the wash-ware carrier and that it remains in this position.

A heavy soil input increases the risk of recontamination of wash ware that has already been cleaned. It shall

therefore always be ensured that thorough pre-cleaning takes place.

Larger conveyor warewashers should be equipped with a prewash zone and appropriate soil strainers. In smaller machines, a facility for thorough manual pre-cleaning with a pre-wash basin and hand-held shower should be provided.

The hygiene standard of the water for the fresh water rinse has to match that of potable water.

Detailed requirements for the technical and functional features of the machine are to be found in the standards DIN 10510, DIN 10511, DIN 10512 and DIN 10522.

DIN 10510 – Multitank transport dishwashers		
Area	Temperatures without disinfection component	Temperatures with an adequate quantity of a disinfection component in the detergent solution
	°C	°C
Fresh water pre-wash	up to 40	25 to 40
Pre-wash zone	40 to 50	40 to 50
Wash tank	60 to 65	55 to 65
Auxiliary rinse	60 to 70	60 to 70
Fresh water rinse	80 to 85	80 to 85

Scientific studies have shown that contact times in multitank dishwashers of approx. 2 minutes and temperatures as listed above ensure the thorough removal of food residues and microorganisms. Shorter contact times and lower temperatures can be compensated to a certain extent through appropriate selection and adjustment of the chemical parameters, i.e. the detergents and disinfectants.

DIN 10511 - Glasswashers

For hygiene reasons, the temperature in the wash tank shall be at least 55°C. Since the durability and usability of a drinking glass is substantially affected by the temperature, the temperature of the detergent solution should not substantially exceed 60°C. The temperature of the rinse aid solution should be 65 (± 2)°C.

Contact times of 90 seconds are deemed to provide a sound basis for achieving fully hygienic warewashing

results.

Under special circumstances, e.g. where there is an increased risk of infection, glasswashers have to be operated at higher temperatures and the use of disinfection components is recommended.

DIN 10512 - One-tank dishwashers		
Area	Temperatures where there is no disinfection or oxidation component in the alkaline detergent solution °C	Temperatures where there is an adequate disinfection or oxidation component in the alkaline detergent solution °C
Wash tank Fresh water rinse	60 to 65 80 to 85	55 to 65 80 to 85

Contact times of 90 seconds are deemed to provide a sound basis for achieving fully hygienic warewashing results.

DIN 10522 - Warewashers for reusable containers

Area	Temperatures* where there is no disinfection or oxidation component in the detergent and rinse aid solution °C	Measurement location
Wash tank Fresh water rinse	60 to 65 80 to 85	Wash tank Boiler
*In the case of chemical disinfection, no temperature is specified for detergent and rinse aid solution		

Due to the different areas of use and different hygiene requirements for wash ware, no universally valid contact time can be defined for such warewashers.

6. What requirements shall be met by the wash ware?

The term “wash ware” covers dishes, cutlery, trays, containers for transporting unpacked food and items which are used in the preparation and distribution of meals.

These items may be made of different materials, but shall in all cases be suitable for commercial automated warewashing.

See the following VGG technical information sheets:

["Commercial dishwashing & wash ware made of porcelain \(china\)"](#)

["Commercial dishwashing & wash ware made of metal"](#)

["Commercial dishwashing & wash ware made of glass"](#)

["Commercial dishwashing & wash ware made of opal glass"](#)

["Commercial dishwashing & wash ware made of plastic"](#)

For hygiene reasons, in particular, damaged wash ware should be replaced regularly; this applies particularly to glasses and cups with damaged rims.

Plastic parts which retain their shape and are temperature-stable are suitable, provided their surface is smooth, with no hairline cracks or visible signs of use. Here, too, the regular replacement of damaged parts is recommended.

Cutlery and cooking utensils are produced mainly from high-grade stainless steels. If visible damage, such as heat-induced cracks or pitting corrosion (e.g. on knife blades), occurs, the items concerned should be replaced.

To obtain fully hygienic warewashing results, not only the material, but also the shape of the wash ware is important.

The wash ware shall be shaped so as to enable water to be applied fully over its entire area. In selecting wash ware, items with deep indentations, e.g. in the case of bowls and cups, should be avoided. Residual water shall be able to drain away easily.

7. What requirements shall be met by agents?

The selection of agents and the concentration at which they are used essentially depend on the soiling, the degree to which it has dried on, the type of wash ware to be cleaned, the warewasher, the contact time and the water quality.

The detergent shall have the capacity to remove soiling, disperse it in the detergent solution and prevent the build-up of deposits. Agent ingredients can set water hardness, prevent excess foaming, inhibit corrosion and promote the disinfecting effect.

The draining and drying behaviour of the cleaned wash ware is determined by the rinse aid and the nature of the surface of the wash ware

The dosing of detergent, rinse aid and, possibly, a

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disinfection component to suit the particular individual case is an important factor in determining the cleanliness and hygienic condition of the wash ware (see technical information sheets "[Commercial dishwashing & cleaning agents](#)" and "[Commercial dishwashing & dosing](#)").

8. What requirements shall be met by the operator?

The operator is responsible for the overall warewashing result and shall, among other things, ensure the following:

Attention shall be paid to general cleanliness within the entire warewashing area (clean and dirty areas).

Staff in warewashing areas are working in a food establishment and shall therefore observe the current food and hygiene regulations (see Regulation (EC) No. 178/2002 and Regulation (EC) No. 852/2004).

To this end, an understanding of cleanliness and hygiene shall be taught through regular training courses (in accordance with Regulation (EC) No. 852/2004, chapter XII).

In order to achieve perfect warewashing results, the following points, in particular, should be noted:

- The wash ware should be cleaned as soon as possible after use.
(Long dry-on times should be avoided).
- Thorough pre-cleaning is absolutely essential.
- Wash ware should be pre-sorted before being conveyed to the machine.
- Where possible, cutlery should be pre-soaked.
- Cleaned wash ware shall be stored only when dry.
- Manual drying should be carried out only in exceptional cases and disposable cloths shall be used.

9. What checks shall be carried out before and during operation of the machine?

All **nozzles** shall be free of foreign bodies (e.g. toothpicks, etc.).

All **drains** shall seal tightly when closed and be free of foreign bodies.

The **strainers and filters** shall be kept clean and inserted/mounted at the points provided for them.

Splash curtains are subject to heavy wear and fulfil

their purpose only if they are hung at the correct points and are still in a usable condition. Being subject to wear and tear, they have to be replaced from time to time.

The operating temperature of the detergent solution and of the rinse aid solution and the required agent concentrations shall be reached before washing can commence.

The required temperatures and agent concentrations shall—be maintained throughout the warewashing process.

The correct wash programme (conveyor speed or programme type) should be set.

Checks shall be made as to whether there is sufficient detergent, rinse aid and, where applicable, disinfection component in the supply bins.

- The proper functioning of the **dosing equipment** shall be checked regularly.

- The **detergent solution** may possibly have to be changed during the wash period if heavily soiled.

- **The visual cleanness of the wash ware should be checked constantly.**

10. What tasks shall be carried out after the end of the operating period?

After the end of each operating period, the machine shall be cleaned thoroughly. This includes emptying the tanks and thoroughly cleaning the interior, the strainer systems, the inflow and outflow areas, the dividing curtains and the spray system in accordance with the instructions of the machine manufacturer. The area surrounding the machine shall also be cleaned thoroughly, the wash room aerated and the machine left open.

11. When should the ware-washer and the wash ware be stripped?

If visible deposits appear in the interior of the machine and/or on the wash ware, then a stripping of the machine and of the wash ware should be carried out immediately. The causes of the deposits should be determined and eliminated accordingly.

Selection of the appropriate agent for stripping will depend on the type of deposits and the type of material of which the wash ware is made.

Note:

Deposits present a hygiene risk because microorganisms can become established in the deposits in the machine and on the wash ware and multiply.

12. How can the operational reliability of the commercial warewasher be ensured?

The operational and functional reliability of the commercial warewasher can be ensured by ongoing monitoring of its functions and regular maintenance in accordance with the specifications of the manufacturer of the machine.

Appropriate maintenance contracts are recommended.

If faults are identified which cannot be cleared by the operator, technical service help should be requested in all cases.

13. How can the hygiene status of the wash ware and of the warewashing process be checked?

Visual check

For the condition of wash ware to be deemed fully hygienic, it is essential that it is visually clean. Water droplets left on wash ware support points and residual moisture in the interior of hollow items can be tolerated. Adequate time shall be allowed for the wash ware to dry.

Microbiological check

The performance of microbiological checks is described in the standards DIN 10510, DIN 10511, DIN 10512 and DIN 10522.

An orientating microbiological check of the surfaces of the wash ware can be carried out by means of so-called "contact slide tests". This test allows conclusions to be drawn as to the general hygiene status of the wash ware.

To conform to DIN 10510, DIN 10511 and DIN 10512, no more than 5 cfu¹/10 cm² should be found on the surface. If this number is exceeded, it should be assumed that the hygiene status is critical. A thorough investigation of all parameters is then imperative.

In addition to the contact slide tests, it is also necessary to determine the number of colonies in the detergent solution in the final tank.

Max. 200 cfu/ml is considered the acceptable limit and 500 cfu/ml a hazardous limit.

¹ = colony-forming units

In risk areas with multitank dishwashers, a test with open bio-indicators as described in DIN 10510 should additionally be carried out. Where there have been modifications or changes to the machine, an 'exceptional' inspection' should be carried out.

Exceeding the acceptable and hazardous limits as well as an inadequate reduction in the test organisms of the bio-indicators are signs that a dishwasher is operating defectively, and possibly has insufficient capacity.

There requirements for reusable boxes and reusable containers (see DIN 10522) differ from these requirements.

14. What types of inspection for attesting that a commercial warewasher is functioning hygienically are described in the standards?

DIN 10510 – Multitank transport dishwashers

- Procedural inspection
- Inspection after installation
- Daily inspection
- Periodic inspection
- Extraordinary inspection

DIN 10511 - Glasswashers

DIN 10512 - One-tank dishwashers

- Type testing
- Daily routine inspection
- Procedural inspection during practical operation

DIN 10522 - Warewashers for reusable containers

- Type testing
- Acceptance test after installation
- Routine inspection during operation

Hygiene checks on commercial warewashers that differ from the standards, e.g. using closed germ carriers instead of open ones, cannot be used, as they do not record the very substantial mechanical germ removal and are dependent only on the level of active disinfection agent and the impact time and the temperature.

15. What special hygiene requirements have to be met by hospital kitchens and centralized catering kitchens?

From the leading hospital hygienists' point of view, the hygiene requirements for hospital catering kitchens shall in principle also be applied to all large kitchens used for communal catering. In this respect, it is important to bear in mind that pathogenic microorganisms can also pass from "healthy" persons onto wash ware and food and in this way be

transmitted to other meal participants.

**Technical advice provided by
the member companies of the
VGG**

This technical information sheet, which has been drawn up by experienced practitioners, is intended to draw the attention of the reader to the fact that commercial automated warewashing cannot be carried out successfully if it is approached superficially and without the appropriate involvement of all those participating in the warewashing process.

Only an understanding of the technical processes and of the interdependencies that these entail, teamwork on the part of all those involved, in particular the operator of the warewasher and his/her staff, and regular maintenance of the warewasher, dosing equipment and water treatment system by the manufacturer will produce the warewashing results expected by the user.

Consistent cooperation between warewasher, agent and dosing equipment manufacturers as well as manufacturers of wash ware will ensure constant and optimum adaptation to practical requirements, to the benefit of the customers they share and of the environment.

Enquiries regarding this technical information sheet "Commercial dishwashing & hygiene" should be addressed to

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