Compendium of practice for Commercial Dishwashing

Section 01

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All terms printed in *italics* are explained under the keyword in the corresponding section.

Access height *(Durchfahrhöhe)*

is the usable height of the access opening of the dishwasher.

Access width *(Durchfahrbreite)*

is the usable width of the access opening of the dishwasher.

Active chlorine *(Aktivchlorträger)*

Chlorine compounds that release “active oxygen” during the cleaning process, which due to their oxidation capability in the *detergent solution* develop a disinfecting, bleaching and cleansing effect.

Active oxygen *(Aktivsauerstoffträger)*

Oxygen compounds that release “active oxygen” during the cleaning process, which due to their oxidation capability in the detergent solution develop a disinfecting, bleaching and cleansing effect.

Additives *(Additive)*

Additives are individual components that can be added as required to the wash cycle along with the detergent used. The additives support, e.g., the cleansing effect, set water hardness or have a defoaming action.

Alkali residues *(Alkali-Rückstände)*

Alkali residues on the *wash item* can be caused by two factors:

Residues of the *detergent solution* on the wash item, which were not rinsed off by the *fresh water rinse*.
They can be measured by determining the *pH-value (pH-value > 7).*

Water with higher levels of hardness can also react alkaline (*pH-value* > 7) after softening and heating in a boiler.

An expert must establish which of these two cases applies.

Alkaline carry-over *(Laugenverschleppung)*

refers to the undesirable carry-over of *detergent solution* beyond the zone limits in the dishwasher, particularly towards *fresh water rinse.* This impairs the entire cleaning process.

Alkalis *(Alkalien)*

are a primary component of *detergents,* e.g., silicates, soda, caustic soda and caustic potash solution. They have cleansing and / or anti-corrosion properties.

AOX (adsorbable organically combined halogens) *(adsorbierbare organisch gebundene Halogene)*

develop as a result of excess chlorine from *active chlorine substrates* when used with organic soil particles.

Auxiliary rinsing *(Pumpen-Klarspülung)*

is a rinse circulation connected upstream to the *fresh washer rinse* in conveyor dishwashers.

Basic cleaning *(Grundreinigung)*

describes the occasional or as required initial cleaning process of the *wash item* and/or the dishwasher using suitable process chemicals (*treatment agents)*. Initial coatings from the wash item production or which have developed during food preparation or through the use of, e.g., starch, protein or lime are removed. The corresponding specifications for the product application must be observed!

Biodegradability *(Biologische Abbaubarkeit)*

organic substances such as surfactants are used as nutrients by bacteria, producing CO_2 (carbon dioxide), H_2O (water) and other mineral end products as well as biomass. These types of processes take place in waste water treatment plants and in receiving waters (e.g. streams and rivers). The surfactants used in detergents and rinse aids meet statutory requirements regarding biodegradability.

Bioindicator (germ carrier) *(Keimträger)*

standardised test body which has been contaminated with a standardised soil and test bacteria and which is used for checking the cleaning and disinfection performance of dishwashers.

Blowing zone *(Ausblaszone)*

refers to the optional drying zone where water residues are blown-out from cavities.

These include the rims around Gastronorm containers or the bottom of cups or glasses. This process is performed with either heated or non-heated air.

BOD (biochemical oxygen demand) *(Biochemischer Sauerstoffbedarf)*

The BOD value is an index for the volume of oxygen consumed by micro-organisms for biodegradation and is a measure of the degradable organic matter in the waste water treatment plant.

Bypass pipe *(Umgehungsleitung)*

in multi-tank machines, a pipe through which collected *rinse aid solution* can flow to a front tank, e.g., into the *pre-cleaning tank* whilst avoiding the *detergent circulation tank.*

Capacity reserve *(Kapazitätsreserver)*

is a scheduled buffer and / or reserve of the dishwasher capacity in the event of additional, exceptional operating loads (e.g., increased volume of wash items during a special event)

Carbonate hardness *(Karbonathärte)*

also referred to as transient or temporary hardness, describes the presence of calcium and magnesium carbonates in water. The carbonate hardness can have a negative impact on the cleaning result, e.g., through the build-up of lime deposits. Therefore, most *detergents* contain special *phosphates* or *complexing agents* that prevent lime precipitations.

Caustic alkalis *(Ätzalkalien)*

are very corrosive alkalis (hydroxides of alkaline metals).

Central connection *(Zentralanschluß)*

refers to the merging of all supply and discharge lines at central points so only one connection is required.

Central dosing station *(Zentraldosierung)*

The supply of several *commercial dishwashers* with process chemicals (*treatment agents)* from one location at which the dosing equipment and storage containers are combined.
The dishwashers and the central dosing station are usually located in separate areas.

Chlorides *(Chloride)*

are salts, e.g., table salt (sodium chloride), which can damage stainless steels through pitting. As the danger of this destruction depends, for instance, on the concentration of chlorides, the total chloride content in water is essential to the cleaning process.

Chrome molybdenum steel *(Chrom-Molybdän-Stahl)*

is chrome-nickel steel stabilised by molybdenum with higher corrosion resistance.

Chrome-nickel steel *(Chrom-Nickel-Stahl)*

is the most commonly used material in commercial dishwashers (see *Compendium of practice for Commercial Dishwashing Section 08 "Metal wash items"*). Is also used to manufacture cutlery.

Chrome steel *(Chromstahl)*

is occasionally used for panels for commercial dishwashers. Its corrosion-resistance is lower than that of chrome-nickel steel (see *Compendium of practice for Commercial Dishwashing Section 08 "Metal wash items").* Is also used to manufacture cutlery.

Clean and unclean side *(reine und unreine Seite)*

The unclean side comprises the areas "return of used wash items", "manual pre-sorting / *pre-cleaning*" and "dishwasher loading". The clean side comprises the areas following the hygienic cleaning process "unload the clean wash item from the dishwasher" and "resupply".

Cleaning *(Reinigung)*

in the cleaning process, a detergent solution comprising water and detergent is applied to the soiled wash item using pump units. In doing so, food scraps are loosened by the mechanical, thermal and chemical action.

Cleaning performance / result *(Reinigerleistung / -ergebnis)*

describes the level of cleaning and / or cleanliness of the wash item after the wash cycle / program sequence. I.e. how much soiling remains on the wash item.

Cleaning system *(Spülsystem)*

The cleaning system comprises all pipes, nozzles, jet pipes that are used to apply detergent solution to the wash item. A distinction is made between rigid, rotating and swivelling systems.

COD (chemical oxygen demand) *(Chemischer Sauerstoffbedarf)*

The COD value is an index (assessment basis) to characterise the degree of organic soil load in waste water.

Commercial dishwashers *(Gewerbliche Spülmaschinen)*

are dishwashers that are specially designed for commercial use. They differ considerably from household dishwashers. Various different designs exist. (see Compendium of practice for *Commercial Dishwashing, Section 03 "Commercial dishwashers"*).

Complexing agents *(Komplexbildner)*

are chemical substances that deactivate the *hardeners* in the water.

Conditioning agents (water treatment) *(Konditionierungsmittel / Wasserbehandlung)*

include phosphates, silicates (inhibitors), etc. They protect the pipes of the water pipe systems. Adding this substance increases the total salt content of the water. This can lead to spots and streaks on the wash item.

Conductivity control *(Leitfähigkeitsregelung)*

is a regulatory process which is used, e.g., to guarantee the target *detergent concentration*. The conductivity is proportional to the detergent concentration and is measured in µS/cm (micro-Siemens/cm). The conductivity of the *detergent solution* is measured using a sensor. If the detergent concentration falls below a specific value, the dosing device is triggered.

Consumer goods *(Bedarfsgegenstände)*

are such that come into contact with food.

Contact plate method *(Abklatschverfahren)*

Microbiological evaluation method to determine the germ load on hygiene-relevant surfaces. These procedures, e.g., with agar, are suitable for testing smooth surfaces with low roughness (unevenness).

Contact time *(Einwirkzeit)*

time during which the *detergent solution* and / or temperature has contact with the wash ware. This parameter is defined in the DIN standards 10510 to 10512, as well as 10522 and DIN spec 10534.

Container *(Gebinde)*

describes a storage container, e.g., canister or cartridge, in various sizes for the safe storage and transportation of process chemicals / treatment agents.

Contamination of the detergent solution *(Schmutzbelastung der Reinigerlösung)*

refers to all soil particles; soluble / insoluble, emulsifiable / dispersible impurities of the *detergent solution*. The contamination influences the cleaning result and the foam formation.

Corrosion *(Korrosion)*

is an irreversible chemical or electrochemical reaction of a material with substances from its surroundings that damages the material. (e.g. impact of high concentrations of chlorides / table salt, saline water from defective softeners)

Cutlery pre-soaking *(Besteckvortauchen)*

see *cutlery soaking* detergents or Soaking agents.

Pre-cleaning of cutlery items in an soaking bath before actual cleaning in the dishwasher. This prevents further drying-on of food residues on cutlery items and pre-soak dried-on good residues on cutlery items. Cutlery pre-soaking can counteract corrosion on cutlery. Special cutlery cleaning agents are available (see *Compendium of practice for Commercial Dish-washing Section 08 "Metal wash items"*).

Cutlery soaking detergents *(Bestecktauchreiniger)*

special detergent that is used to pre-soak items of cutlery using the soaking method. Cutlery soaking detergents are low-foaming and generate no foam when carried-over into the dish-washer. The use of special cutlery soaking detergents loosens encrusted and / or dried-on food residues before machine-cleaning and thus increases the cleaning performance.

Decoration rapid firing *(Dekor-Schnellbrand)*

is a firing process for the decoration on porcelain tableware.

Degree of German hardness (°dH) *(Grad deutscher Härte)*

is the standard unit of measurement particularly in Germany for the *total hardness* of water.

Demineralisation system (desalination unit) *(Entminderalisierungsanlage (Entsalzungsanlage))*

works in accordance with the *ion exchange principle* or the *reverse osmosis process.* Ions are removed from the untreated water using this system.

Deposits *(Ablagerungen)*

on the *wash item* and in the machine are, e.g., lime, food and / or starch residues, protein and other coatings (see *Compendium of practice for Commercial Dishwashing, Section 11 "Hygiene*").

Detergent *(Reiniger)*

Detergents are available in solid and liquid form. They allow the spotless removal of food residues from *wash items* and counteract *recontamination* from the *detergent solution*. (see *Compendium of practice for Commercial Dishwashing Section 06 "Process chemicals").*

Detergent circulation tank (detergent tank) *(Reiniger-Umwälztank (Reinigertank))*

zone or tank in which the food residues are loosened by circulation of the *detergent solution* (see *Compendium of practice for Commercial Dishwashing Section 03 "Commercial dishwashers*").

Detergent concentration *(Reiniger-Konzentration)*

is the amount of *detergent* per litre of tank water. It is indicated in g/l or ml/l.

Detergent solution *(Reinigerlösung)*

is water enriched with *detergent*. It is located in the *detergent circulation tank*.

Direct spraying process / direct spraying system *(Direktbesprühungsverfahren / Direktsprühsystem)*

This is a process of applying a highly concentrated solution of a special *detergent* to the *wash item.* A short contact time is enough to soak and degrade coatings, e.g., starch.

Discolouration *(Anlauffarben)*

are blue, brown, purple or rainbow discolourations on stainless steel surfaces. They can be caused by substances in water and contact with food, or through thermal impact. These discolourations do not constitute corrosion like *pitting* or rust; however, they often generate uncertainty among users and, in the very least, are perceived as undesirable.

Dish conveyor belt *(Geschirrtransportband)*

is a continuous belt configured for the *wash item* in flight-type dishwashers to accept, position and transport the wash item through the dishwasher.

Dishes *(Geschirr)*

Dishes is a collective term for containers and receptacles used to prepare, cook, present and serve food. This includes plates, cups, saucers and bowls made of various materials (*wash item*).

Dishwasher suitability / dishwasher-proof *(Spülmaschinenfestigkeit / spülmaschinenfest)*

A wash item is defined as “dishwasher-proof” if it has been tested based on two DIN standards and rated as such. Dishwasher-proof dishes and cutlery are labelled with a corresponding symbol.

In contrast, a wash item can be designated “suitable for dishwashers” based on the own experience of the respective wash item manufacturer. There is no binding definition for this designation.

It states whether a wash item is suitable for cleaning in a dishwasher based on its physical and chemical properties.

Dishwashing detergent *(Spülmittel)*

see *process chemicals (treatment agents)*

Disinfection *(Desinfektion)*

process of killing microorganisms to a level that impairs neither health nor the quality of the food.

Disinfection components *(Desinfektionskomponenten)*

are chemical products with a disinfecting action, which can be present in the detergent or added separately.

Dispersion *(Dispergieren)*

is an even, stable distribution of fine, solid particles in liquid. In automatic cleaning, an even distribution is achieved through the water circulation and the use of *surfactants, phosphates* and *complexing agents.* Dispersion is an important prerequisite for producing hygienic cleaning results (see *soil dispersing capacity*).

Dosing *(Dosieren)*

in commercial washing refers to the addition of *treatment agents / process chemicals*. In principle, a distinction is made between manual and automatic dosing.

Dosing devices / equipment / systems / dosing system / technology *(Dosiergeräte / -einrichtungen / -anlagen; Dosiersystem /-technik)*

enable the automatic dosing of process chemicals (*treatment agents*).
(see *Compendium of practice for Commercial Dishwashing Section 04 "Dosing technology").*

Dry-on time *(Antrocknungszeit)*

This is the period between the use and cleaning of the wash item. The *wash item* is often pre-warmed before contact with food or is kept warm along with the food during long transport routes. Therefore, tough dried-on edges can occur particularly with stuck-on food. Even with the frequently used method of directly heating the food on the dish, tough dried-on food is to be expected. The longer the drying period, the more difficult the cleaning in the dishwasher.

Drying *(Trocknung)*

describes the removal of the *rinse water film* adhering to the *wash item* by:

- Blowing
- Draining
- Evaporation.

This should leave the surface of the wash item spotless and shiny. The drying process is accelerated by adding a *rinse aid* to the rinse water.

Drying in manually-loaded programme automation is normally performed outside the dishwasher by way of free evaporation with the help of the heat retained by the wash item during the cleaning sequence or through an active drying process that is integrated into the programme sequence. In rack conveyor and flight-type machines, the drying sequence normally takes place in its own *drying zone.* In water-change machines, the drying sequence takes place predominantly in the machine.

Drying level *(Antrocknungsgrad)*

hardness grades that indicate how strong the food residues have dried on the wash item. The drying level depends on the drying time, ambient conditions such as temperature and humidity, as well as the food constituents.

Drying performance / result *(Trocknungsleistung / -ergebnis)*

describes the level of drying of the wash item after the wash cycle / program sequence. I.e. how much moisture remains on the wash item.

Drying zone *(Trockenzone)*

is part of a rack conveyor or flight-type dishwasher that performs *drying*.

EC safety data sheet *(EG-Sicherheitsdatenblatt)*

contains detailed information on the safe handling of dangerous preparations / mixtures, e.g., *process chemicals* / *treatment agents*. It is produced by the product manufacturers.

Empty alert *(Leerstandsmeldung)*

The term characterises acoustic and / or optical alarm signals that indicate that a *treatment agent* storage tank / container is empty.

Emulsification *(Emulgieren)*

is the finest distribution of oils and greases in aqueous solutions, e.g., the *detergent solution*. Emulsification is an important prerequisite for producing hygienic wash results (see *soil dispersing capacity*).

Euronorm tray *(Euro-Normtablett)*

is a serving tray with the external dimensions 530 x 370 mm, in accordance with DIN 66075 Part 4.

Evaporation residue *(Abdampf-Rückstand)*

The entirety of the substances contained in the residual water once the water has evaporated (vapourised). The higher the proportion of dissolved and undissolved solid substances in the water, the greater the evaporation residue. The more soak residue is present, the more visible the dried-on residues are on the wash item.

Exhaust air heat recovery (soak condensation) *(Abluft-Wärmerückgewinnung)*

Fans feed the exhaust air through a heat exchanger (condenser), which is cooled with water or coolant, and transfers heat to the cooling water or coolant. During the cooling process, the moisture in the *soak* condenses on the cold surfaces of the heat exchanger. The air discharged from the heat exchanger is colder and contains little absolute moisture. The cooling water of the heat exchanger is warmed and can be re-used, e.g., as pre-heated rinsing water. The heat exchanger can be part of a *heat pump*.

Extraneous rust *(Fremdrost)*

Extraneous rust refers to when stainless steel rusts due to the introduction of materials that trigger corrosion, e.g., scourers and other iron parts in the dishwasher. Extraneous rust can only be avoided by preventing the introduction of, e.g., iron particles from the inlet water pipe and during loading.

Fat separators *(Fettabscheider)*

are integrated into the building drainage systems to retain grease and oils from the *waste water*. These are measures to plan and reduce the waste water pollution of the dishwasher. (see *Compendium of practice for Commercial Dishwashing Section 02 "Organisation and planning of dishwashing systems" and Section 12 "Environment and sustainability")*

Filter / strainer systems, strainer pans, strainer baskets *(Siebsysteme, Siebkästen, Siebkörbe)*

catch large food residue to prevent these reaching the *detergent circulation* and to prevent excessive loading of the *detergent solution*.

Flight-type dishwasher *(Bandtransportspülmaschine)*

is a dishwasher in which the wash item is placed directly on a continuous belt and is automatically transported through the treatment zones of the dishwasher.

Food contact materials *(Lebensmittelbedarfsgegenstände)*

are such that come into contact with food.

Fresh water *(Frischwasser)*

Fresh water is the water that is fed, e.g., into the dishwashing system.

Fresh water pre-cleaning *(Frischwasser-Vorabräumung)*

is a process to remove loose soiling in order to prevent excessive loading of the *detergent solution*. The pre-cleaning is performed in the machine itself or manually using spraying devices.

Fresh water rinse *(Frischwasser-Klarspülung)*

is the last rinse cycle with *rinse aid solution* before *drying*. This ensures that the *wash item* is free of soil particles and *detergent solution*.

Full desalination *(Vollentsalzung)*

see *demineralisation system,* reverse osmosis

Gastronorm size *(Gastronorm-Maß)*

is defined in DIN EN 631 and / or series of standards DIN 66075. These sizes must be observed when dimensioning the *access width* and *height* of the dishwasher

The most important sizes: Bowls and baking sheets
Basic size 1/1 = 530 x 325 mm
Largest size 2/1 = 650 x 530 mm
Smallest size 1/9 = 176 x 108 mm
Gastronorm containers can be up to 200 mm deep according to this standard.

Gastronorm tray *(Gastronorm-Tablett)*

is a serving tray with the external dimensions 530 x 325 mm (GN 1/1), in accordance with DIN 66075 Part 3.

Glass corrosion *(Glaskorrosion)*

is irreversible destruction of the glass surfaces caused by material abrasion that manifests itself primarily as cloudiness. The tendency towards glass corrosion is determined largely by the composition of the glass itself and by the manufacturing process.

Glass damage *(Glasschäden)*

refers to the destruction of glass items due to *glass corrosion*, mechanical influences and / or rapid temperature changes. Particularly damaging is when glasses are placed inside each other (see *Compendium of practice for Commercial Dishwashing Section 09 "Glass wash items").*

Glass decoration *(Glasdekor)*

This refers to coloured decoration that is applied using various methods. The selected method determines the durability of the decoration.

Glass washing machine *(Gläserspülmaschine)*

is a commercial dishwasher especially for cleaning glasses (see DIN 10511).

Hardeners *(Härtebildner)*

are the entirety of all calcium and magnesium ions dissolved in water (see *Total hardness, carbonate hardness, non-carbonate hardness*).

Heat pump *(Wärmepumpe)*

is a unit that optimises the *heat recovery process* and thus reduces the energy consumption of the dishwasher.

Heat recovery *(Wärmerückgewinnung)*

- *exhaust air heat recovery*
- *waste water heat recovery*
- *heat pump.*

Heat retention capacity *(Wärmespeichervermögen)*

is a material-specific property of the wash item, which determines how well the wash item can withstand heat from the cleaning process. *Porcelain* and metal have a high heat retention capacity; *dishes* made of plastic or stainless steel have a low heat retention capacity. The heat retention capacity plays an important role in the perfect *drying* of the wash item.

Hot-air drying *(Heißlufttrocknung)*

is a drying zone integrated into the dishwasher, in which heated air is used to *dry* the *wash item*.

Hygiene *(Hygiene)*

serves to protect the health and prevent the spread of disease. (see *Compendium of practice for Commercial Dishwashing Section 11 "Hygiene*").

Inglaze decoration on porcelain dishes (china ware) *(Inglasurdekor auf Porzellangeschirr)*

In *rapid-firing decoration* and / or *sharp-fire decoration*, the tint is applied to fired and unfired glazing, and these are absorbed and fused with the glazing in the subsequent firing at high temperatures. Inglaze and sharp-fire decoration are highly resistant.

Interfacial tension (Grenzflächenspannung)

is an interaction that occurs upon the contact of two media, e.g., *rinse aid solution* and *wash item*. The lower the interfacial tension of the rinse aid solution, the better the surface wetting of the wash item, and drop formation is also avoided (*wetting*).

Ion exchange principle *(Ionenaustauscherprinzip)*

According to this principle, ions in the water that impair the cleaning process and are therefore undesirable are exchanged for other ions (*total hardness*).
This happens with the help of special ion exchange resins.

Lime *(Kalk)*

is a chemical compound of the elements calcium, carbon and oxygen.

Load *(Beschickung / Beladung)*

The wash items comprise dishes made of different materials, cutlery, utensils, cookware, etc., which are loaded in the dishwasher.

Logbook *(Betriebsbuch)*

documents or book in which all operational and hygiene data of the dishwasher are recorded.

Machine performance *(Maschinenleistung)*

is a theoretical indicator used to compare dishwashers, which is determined based on standard plates and indicated in plates per hour. In principle, loading and unloading times are not taken into account. In flight-type dishwashers, it is calculated by multiplying the capacity of a specific conveyor length by the respective conveyor speed. For rack conveyor dishwashers, the number of the washable standard plates in a rack is multiplied by the theoretical potential rack output of the machine. For manually-loaded programmable machines, the machine performance is determined by multiplying the number of washable standard plates in a rack by the theoretical potential number of programme sequences per hour. For manually-loaded single-tank undercounter dishwashers and single-tank hood dishwashers,

“DIN EN IEC 63136 (VDE 0705-136) – Electric dishwasher for commercial use – Test methoeds for measuring the performance” provides specific measurement procedures for performance characteristics.

Maintenance (service) *(Wartung)*

refers to the regular maintenance performed by specialist staff authorised by the manufacturer, e.g., by the customer service department of the manufacturer. The conclusion of maintenance contracts for dishwashers is advisable.

Manual washing-up liquid *(Handspülmittel)*

refers to *treatment agents* used in manual *dishwashing*, which usually contain high-foaming cleansing substances (*surfactants*). Even the smallest residues develop high levels of foam in the dishwasher, impair the cleaning results and are therefore not suitable for use in the context of *commercial dishwashers*.

Material compatibility *(Materialverträglichkeit)*

is the compatibility of two substances that do not inflict damage on the other.

Metallic abrasion *(Metallabrieb)*

exhibits dark discolourations on the surface of the wash item, which are caused by contact with metallic parts whose hardness is lower than that of the wash item. For plastic wash items, the metal abrasion is caused by carry-over.

Monoblock knives *(Monoblockmesser)*

Monoblock knives have single-forged handles and blades. Most 13 % chromium steels are processed with various carbon contents (up to 0.40 %) (see *Compendium of practice for Commercial Dishwashing Section 08 "Metal wash items").*

Non-carbonate hardness *(Nichtkarbonathärte)*

is also referred to as persistent or permanent hardness. Non-carbonate hardness consists of calcium and / or magnesium salts that form no insoluble water coatings (e.g. lime) when the water is heated.

Onglaze decoration on porcelain *(Aufglasurdekor auf Porzellan)*

Hereby the colour is applied to the fired glaze and fused with the glaze in a subsequent firing. As the colour pigments in onglaze decoration are on the glazing, the glaze decoration is more sensitive than inglaze or underglaze decoration. Porcelain with onglaze decoration is now rare in the hotel and commercial kitchen industry.

Opal glass *(Opalglass)*

Opal glass is the name for hardened glass dishes in the colours white or ivory. In addition to the basic substances, a fluorine bond is used for the manufacture. It is used for cookware due to the high thermal shock resistance (-90 °C to + 80 °C).

Operating time *(Spülzeiten)*

are entire process times during which the dishwasher is operated per day / shift.

Overflow *(Überlauf)*

process water consumed during operation of the machine flows into the *waste water* pipe through this opening.

Partial desalination *(Teilentsalzung)*

water treatment process to reduce the *total salt content* by partially removing hardness-producing calcium ions and magnesium ions according to the *ion exchange principle.*

Passive coating *(Passivschicht)*

a protective coating that prevents or significantly slows the corrosion of metal surfaces. Ventilation encourages the formation of the chrome passive coating of the containers normally used for commercial dishwashers. Therefore, containers should be emptied regularly.

Peak load *(Spitzenbelastung)*

increases the dishwashing capacity during the primary washing time.

Permanent hardness *(Permanente Härte)*

see non-carbonate hardness

pH value *(ph-Wert)*

is a measure of the acidic and / or alkaline effect, e.g., of a *detergent.* pH values are indicated on a scale between 0 and 14, whereby neutral water assumes a pH value of 7. Liquids with a pH value below 7 are acids; liquids with a pH value above 7 are alkalis.

Phosphates *(Phosphate)*

Phosphates are highly effective formula ingredients in cleaning agents and detergents. They are characterised by their water hardness-binding and soil-bearing properties (see *Compendium of practice for Commercial Dishwashing Section 11 “Environment and sustainability*").

Physical “water softening" *(Physikalische “Wasserenthärtung”)*

physical water softening devices that are based on the principle of magnetism and / or electromagnetic radiation are not suitable for commercial washing, as the chemical composition of the water and the hardeners is not amended.

Pitting (pitting corrosion) *(Lochfraß / Lochkorrosion)*

deep circular signs of damage (rusting) predominantly in *stainless steel.* Pitting is caused predominantly by *chlorides*, which amend the surface structure of the material. Chlorides can enter the machine through water, food residue or carried-over *regeneration salt.* Pitting can occur both on the machine and on stainless steel *wash items* such as cutlery (see also *extraneous rust*).

Plastics *(Kunststoffe)*

Plastics are distinguished into thermoplastics and thermosetting plastics based on their physical properties.

Depending on their degree of solidity, thermoplastics possess a linear or slightly branched molecular structure.

Due to this structure, thermoplastics are malleable at higher temperatures. The initial flexible shape is solid and stable once the shaped part has cooled, provided the temperature recommendations of the manufacturer are observed.

Thermosetting plastics are hard and possess a close and branched molecular structure. Hardening occurs during the shaping. No further shaping is possible by warming. (see *Compendium of practice for Commercial Dishwashing Section 10 "Plastic wash items"*).

Porcelain *(Porzellan)*

is a glazed, ceramic material used to make *dishes*. It is characterised by its hardness and hygienic surface, as well as high chemical and mechanical resistance, which contribute to long serviceability. Porcelain also has excellent wetting properties and a high heat retention capacity. (see *Compendium of practice for Commercial Dishwashing Section 07 "Porcelain wash items"*).

ppm

stands for parts per million (millionth part), 1 ppm corresponds to 0.0001 % or 1000 ppm correspond to 0.1 %.

Pre-cleaning *(Vorabräumung)*

Before the *wash item* is loaded into the machine, it is normally soiled with food residues, napkins, toothpicks, etc. These impurities may not be introduced into the detergent circulation tank; as otherwise, the *detergent solution becomes too dirty*. Targeted pre-cleaning can significantly reduce the detergent consumption of the dishwasher and the waste water load.

The pre-cleaning can be performed by:

1. wiping off or pouring out the unclean matter
2. or rinsing the wash item.

Pre-cleaning zone *(Pumpen-Vorabräumung)*

is the first circulation tank in multi-tank conveyor dishwashers, in which coarse food residues are removed from the *wash item* with *detergent solution*. No *detergent* is added directly to this zone; instead, the detergent solution is reused by the previous wash cycle. The water is only partially changed. The washing temperature is lower than in the *detergent circulation tank*. Pre-cleaning zones are normally equipped with extensive filter / strainer systems. There is normally an *overflow* in the tank of the pre-cleaning zone.

Pre-dosing *(Vordosierung)*

is the *detergent* dosing during the filling process before the wash cycle starts. Pre-dosing ensures that the necessary *detergent concentration is present* before the wash cycle starts.

Pre-rinse aid *(Vorklarspülung)*

see auxiliary rinsing

Pre-sorting *(Vorsortierung)*

is the sorting of individual wash items to enable item-specific cleaning.

Pressure boost pump *(Drucksteigerungspumpe)*

increases the site-fed flow pressure to a value required to operate the appliance.

Pressure reducer valve (pressure control valve) *(Druckminderungsventil)*

restricts the flow pressure of the site-fed water in order to remain under the maximum permitted value.

Process chemicals *(Prozesschemikalien)*

are products used in commercial washing for cleaning, disinfection, rinsing, pre-soaking cleaning and descaling.

Programmable machines *(Programmautomaten)*

are commercial single-tank dishwashers with a pre-set programme sequence. The programme varies according to the working method in front-loading machines and rack pass-through dishwashers.

Programme period / Programme duration *(Programmlaufzeit / Programmdauer)*

is the time measured from the start of the programme (excluding any delay period programmed by the user) until the displayed programme end.

Programme sequence *(Programmablauf)*

is the sequence of programme steps that are pre-determined in the dishwasher, which the manufacturer has indicated as suitable for cleaning the specific wash item.

Rack conveyor dishwasher *(Korbtransportspülmaschine)*

The racks loaded with wash items are automatically transported through the machine.

Racks *(Spülgutträger)*

are removable load carriers such as racks, conveyor belts, frames and devices that hold the wash item so it can be optimally cleaned in the dishwasher.

Recontamination *(Rekontamination)*

is the resoiling / recontamination of the hygienically clean *wash item* before use.

Recontamination (during the cleaning process) *(Wiederanschmutzung (während des Spülprozesses))*

occurs when loosened food particles re-contaminate previously cleaned *wash items*. Recontamination is caused by:

- incorrectly used cleaning systems,
- incorrectly used or defective filter / strainer systems
- insufficient *pre-cleaning*;
- insufficient dosage or incorrect *detergent*;
- insufficient volume of *regeneration water* from the *fresh water rinse*;
- *foaming*;

(see *Compendium of practice for Commercial Dishwashing Section 11 "Hygiene"***)**

Regeneration (of the detergent solution with fresh water) *(Regeneration (der Reinigerlösung mit Frischwasser))*

This takes place during the cleaning process through the inlet water usually from the *fresh water rinse*. An insufficient volume of *regeneration water* impairs the cleaning result.

Regeneration (of the ion-exchange systems) *(Regenerieren (der Ionenaustauscheranlagen))*

Each ion-exchange system has a specific capacity depending on the *water hardness*. Thereafter, the ion-exchange resin is exhausted. The system must be regenerated by adding special regeneration salts.

Regeneration salt (Regeneriersalz)

special ultra-pure sodium chloride to *regenerate* the ion-exchange resin. Unlike normal cooking salt, regeneration salt contains no additives, e.g., anti-caking agent as these block the ion-exchange resin and subsequently destroy it. The grain size indicated by the machine manufacturer must be used.

Regeneration water *(Regenerationswasser)*

see *regeneration*

Reverse osmosis *(Umkehrosmose)*

is a special process for the full desalination (see *demineralisation system*) of water, whereby the saline water is pressed through a membrane at high pressure. In this filtration process, only desalinated water can pass through the membrane.

Rinse aid *(Klarspüler)*

is added to *fresh water* to reduce the *interfacial tension* in order to achieve optimal *wetting* of the cleaned *wash item* (*rinse water film*).

Rinse performance / result *(Klarspülleistung /-ergebnis)*

describes the assessment of the cleaning process of a dishwasher regarding the rinse aid. The objective is a spotless, shiny surface of the wash item. Residues of dried-on water and / or residues of calcium and magnesium cause undesirable spots, streaks and runs on the wash item.

Rinse aid solution *(Klarspülerlösung)*

is *fresh water* mixed with *rinse aid* and is used in the *fresh water rinse*. The manufacturer's specifications for use must be observed!

Rinse cycle *(Klarspüler)*

Detergent solution residues and loosened soil particles are rinsed off with the rinse aid solution during a separate rinse process. The addition of rinse aids also supports the wash item drying by reducing the surface tension of the water.

Rinse water film *(Klarspülwasserfilm)*

is any cohesive film of *rinse aid solution* on the surface of the cleaned *wash item* as a prerequisite for an optimal draining behaviour and drying result.

Rinse zone *(Klarspülzone)*

is the area of a rack conveyor or flight-type dishwasher that performs the *fresh water rinse*.

Rust *(Rost)*

see *corrosion*

Scale *(Kesselstein)*

is a solid deposit, e.g., on the heating elements of the boiler and / or tank that were used and long-term filled with water. Scale comprises mainly calcium carbonate and magnesium carbonate.

Scaling *(Verkalkung)*

are *lime deposits* in the machine and / or on the *wash item*.

Scullery / kitchen *(Spülraum / Spülküche)*

is the room or area where the dishwasher is located.

Silver *(Silber)*

is a precious metal that is used to manufacture tableware and cutlery. Food residue and specific chemicals cause discolouration.

Sinner's circle *(Sinnerscher Kreis)*

is an action mechanism that organises and performs cleaning sequences in the commercial dishwasher. The Sinner's circle assumes that four parameters determine the success of the cleaning. The parameters are transferred through the water. The parameters are chemicals, temperature, time and mechanics. The Sinner's circle is named after the chemist Herbert Sinner.

Soaking agents *(Tauchreiniger)*

are special *detergents* that are used outside the machine in pre-soaking basins. Different detergents are used depending on the application.

Soften / Softening *(Enthärten / Enthärtung)*

Refers to the removal of *hardeners* from the water. Here, the *ion exchange principle is applied*.

Soil dispersing capacity *(Schmutztragevermögen)*

is the ability of a *detergent solution* to *disperse* or *emulsify* food residues to ensure that they cannot resettle on the cleaned *wash item* surface.

Soil strainer *(Schmutzfangsiebe)*

see *filter system*

Splash-water protected *(Spritzwassergeschützt)*

is a device that meets the requirements of the test defined in EN 60529 for protection class IPX4. However, machines of protection class IPX4 may be sprayed externally with neither a water hose nor a pressure washer.

Spray curtain (spray screen) *(Spritzvorhang)*

are curtains that screen the access openings (*access height)* above the *dish conveyor* and / or the rack conveyor device in conveyor machines at the inlet and outlet, and between the individual circulation tanks and rinse zones. The spray curtain should prevent *alkaline carry-over* between the individual tanks and zones, as well as the escape of *soak.*

Spray shadows *(Sprühschatten)*

are areas of the *wash item* surface that are not directly and / or not at all treated with *detergent* and / or *rinse aid solution*.

Splash-proof *(Strahlwassergeschützt)*

is a device that meets the requirements of the test defined in EN 60529 for protection class IPX5. Even if a dishwasher is “spray-proof”, this may not be externally sprayed with a water jet or pressure washer.

Stainless steel *(Edelstahl rostfrei)*

refers to steels that are alloyed with 12 % chrome or higher and that may also contain nickel, molybdenum and other alloy components. The ratio of the individual components influences the corrosion resistance. Other properties such as hardenability or magnetisability also change.

Starch built-up (accumulated starch) *(Stärkeaufbau)*

is a type of soiling that can occur if high-starch foods (e.g. sauces, mashed potato, etc.) are served on pre-heated plates. If the *contact time* between the *detergent solution* and soiled wash item is too short and / or the temperature of the detergent solution is too low and / or the *detergent concentration* is too weak, the dishwasher cannot remove the soiling, and accumulated build-up occurs. The starch soiling can be made visible using an iodine solution.

Streaks and smears *(Streifen und Schlieren)*

on the *wash item* can be caused by
various factors:

1. incorrect dosing of process chemicals (*treatment agent)*;
2. defective, incorrectly suspended or entirely missing *spraying curtains;*
3. *transfer of the alkaline solution*;
4. interlacing of *detergent solution* in the *fresh water rinse;*
5. drops of condensation in the *drying zone*. The aforementioned irregularities will also be considerably more visible as the *total salt content* of the water concerned increases.

Substances (Tenside)

are cleansing substances that support cleaning and rinsing and / or *drying*.

Surface tension *(Oberflächenspannung)*

The surface tension is a characteristic feature of liquids. Intermolecular forces affect all liquids. For particles on the surface, however, these forces only work on the interior of the liquid. The liquid is compressed along its entire surface.

Surfactants in rinse aids reduce the surface tension of the water and facilitate the soil removal from the wash item.

Suspension / suspend *(Suspension / suspendieren)*

A suspension is an even, fine distribution of solid particles in liquid.

Tank machines *(Tankmaschinen)*

In these types of machines, the different programme stages are performed chronologically, the detergent solution is stored in a tank, and fresh water is added only for the rinse process. Therefore, there is no physical separation in a zone (tank).

Thermoplastics *(Thermoplaste)*

see *plastics*

Thermosetting plastics *(Duroplaste)*

see *plastics*

Titration *(Titration)*

is an analysis procedure, e.g., to determine the *detergent concentration*.

Total connection value *(Gesamtanschlusswert)*

is the maximum electrical output to be supplied and secured for electrical systems, e.g., *commercial dishwashers.* The total connection value must not be confused with consumption data.

Total hardness *(Gesamthärte)*

comprises *carbonate* and *non-carbonate hardness,* and in practice, is normally indicated in *Degree of German hardness* (°dH). (*Compendium of practice for commercial Dishwashing*, *Section 05 "Water quality"*).

Total mineral content *(Gesamtsalzgehalt)*

defines the sum of all salts dissolved in water (evaporation *residue*).

Hard glass *(Gehärtetes Glas)*

see *opal glass*

Transport speed *(Transportgeschwindigkeit)*

is the speed at which the *wash item* is transported through a rack conveyor or flight-type machine (see *commercial dishwashers*) and is measured in racks/h and / or m/min. The transport speed can be adjusted across several levels or infinitely (see *Compendium of practice for Commercial Dishwashing Section 03 "Commercial dishwashers"*).

Treatment agent *(Behandlungsmittel)*

see *process chemicals*

Underglaze decoration on porcelain dishes *(Unterglasurdekor auf Porzellangeschirr)*

Here, the tint is applied directly on the fired ware and glazed.

Untreated water *(Rohwasser)*

refers to untreated fresh water for the commercial dishwasher.

Vapour *(Wrasen)*

consists of damp, warm air that can develop during the dishwasher operation and partially escapes.

Vapour condensation *(Wrasenkondensation)*

exhaust air heat recovery

Vapour extraction unit *(Wrasenabsauganlage)*

extracts the *vapour* from the machine using a fan and discharges it.

Wash cycle *(Spülzyklus)*

describes a complete cleaning process as defined in the selected programme, comprising a sequence of programme stages (wash, rinse, dry, etc.) and include the operational processes that take place once the programme has ended.

Wash item *(Spülgut)*

refers to materials and kitchen utensils that come into contact with food and reusable boxes / containers that can be washed in a commercial dishwasher. The shape and material must be suitable for machine cleaning.

Examples of wash items are plates, stoneware, cutlery, kitchen utensils, glasses, pans, containers, boxes and trays made of materials such as porcelain, plastic, glass, stainless steel and silver, as well as coated materials.

Waste water *(Abwasser)*

Water which is drained during and / or after the cleaning process.
It is contaminated with process chemicals (*treatment agents)* and food residues.

Waste water heat recovery *(Abwasser-Wärmerückgewinnung)*

A heat exchanger extracts heat from the waste water, and this is used, e.g., to heat the cold inlet water.

Water blending *(Verschneidung von Wasser)*

describes the mixing of water of different qualities / processing stages.

Water hardness (total hardness) *(Wasserhärte (Gesamthärte))*

describes the total volume of *hardeners* in the water. They develop from calcium ions and magnesium ions.

They are measured in mmol alkaline earths (calcium / magnesium)/l. In practice, the hardness is measured in *Degree of German hardness (°dH).* Water hardness is the cause of lime deposits.

Water quality (contents) *(Wasserqualität (Inhaltsstoffe))*

Various types and volumes of salts and gases (particularly carbon dioxide = “carbonic acid”) are dissolved in *fresh water*. Distinction is made between soft, medium and hard water (*water hardness*) depending on the volume of dissolved calcium and magnesium salts. Water also contains many other constituents. Information on water quality can be obtained from the water supply company.

Water safety devices *(Wassertechnische Sicherungseinrichtung)*

are safety precautions to prevent water from being sucked from the dishwasher back into the drinking water network, e.g., in the event of a water pipe rupture. They must meet the current regulations.

Water treatment *(Wasseraufbereitung)*

is a process of improving the *water quality* using suitable measures such as *softening, partial desalination* or *full desalination* of the water. Thus negative impacts on the wash result can be avoided, and the machine service life extended.

Water-change (water-change machines) *(Wasserwechsel (Wasserwechselmaschinen)*

Water-change machines are commercial dishwashers with fresh water for each cleaning and rinsing step. In water-change machines, the racks are generally fixed on pull-outs, similar to household dishwashers. In principle, two load carriers are always washed simultaneously.

The different programme stages such as detergent circulation and rinse aid are performed consecutively. However, there is no physical separation in different zones.

Water-saving systems *(Wassersparsysteme)*

are control mechanisms in flight-type and rack conveyor machines that minimise the fresh water consumption, by interrupting the *fresh water rinse* when there are no *wash items* in the fresh water rinse area while the dishwashing system is running.

Wetting *(Benetzung)*

is the tendency of liquids to distribute themselves more or less evenly on different material surfaces. An optimal wetting is achieved if the water runs evenly from the surface of the cleaned wash item as a cohesive film. The greater the interfacial tension between the liquid and the solid surface, the lower the wetting. The addition of rinse aid in the rinse water uses surface-active surfactants to reduce the interfacial tension and improves wetting.

Wetting capacity *(Benetzbarkeit)*

see *wetting*

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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