



# Compendium of practice for Commercial Dishwashing

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Section 10

**Plastic wash items**



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## 1. Types of plastic used in commercial dishwashing and their properties

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.

The following are used predominantly for the manufacture of consumer goods from plastic:

### Thermoplastics

ABS (polyacrylonitrile-butadiene-styrene), e.g. Terluran®, Novodur®

ASA (polyacrylonitrile-styrene-acrylate ester), e.g. Luran-S.®

PA (polyamide)

PC (polycarbonate), e.g. Makrolon®

PE (polyethene), e.g. Hostalen-G®, Lupolen ® as well as LDPE = low density and HDPE = high density

PES (polyethersulfone), e.g. Ultrason E®

PET (polyethylene terephthalate), e.g. Vestan®, Hostadur®

POM (polyoxymethylene), e.g. Hostaform®, Ultraform®

PP (polypropylene) e.g. Hostaplen-PP®, Vestyron®

PSU (polysulfone), e.g. Ultrason S®

PTFE (polytetrafluorethylene), e.g. Teflon®

SAN (polystyrene acrylonitrile), e.g. Luran®, Vestoran®



## Thermosetting plastics

GFRP glass-fibre reinforced polyester resin

MF (melamine), e.g. Resopal®, Ricolit®

Plastics have the following properties, compared with porcelain and glass:

- considerably lighter and more scratch-resistant
- more shock-proof and break-proof
- quieter
- lower heat retention capacity

## 2. Recommendations for the purchase of plastic wash items

When purchasing plastic consumer goods to be used in the commercial sector, ensure that

- the wash item is made of suitable material
- the shape of the item is suitable for the dishwasher.

In particular, ensure that

- there are no sharp-edged transitions and no blind spot (spray shadows), e.g., deep indentations on the back and the recesses for food on the front do not have too steep or even vertical walls. Both cases create spray shadows, which prevent impeccable cleaning.
- the wash item is designed in such a way that the detergent and rinse aid solution can drain away properly. The shape of other dishes should be designed to ensure that no puddles can develop when the dishes are on the conveyor or in



the dish rack, or when the hollow is facing downwards on the conveyor (e.g. as with bowls). This would considerably impair the rinse aid action.

- generally, the surface is largely smooth.

Coloured wash items can be easily cleaned.

Please note the manufacturer's information.

Painted, printed or other finely-applied decoration will not withstand long-term stress, unless the decoration is protected by another resistant coating.

In melamine dishes, the decorative film is impregnated with melamine resin and also protected by the surface glaze.

### **3. Plastics and their resistance in the cleaning process**

In principle, plastics cannot be termed dishwasher-proof.

In some plastics, problems can be caused by the low thermal resistance and others due to insufficient chemical resistance. For higher temperatures (>65 °C) and longer action times (>2 minutes), e.g., thermal disinfection, a shorter service life of the wash item should be expected.

Dishwasher-proof plastics include

- Polypropylene
- Polyoxymethylene
- Melamine

- Glass-fibre reinforced polyester resin with a melamine footprint (not for thermal disinfection)
- Polyethylene terephthalate

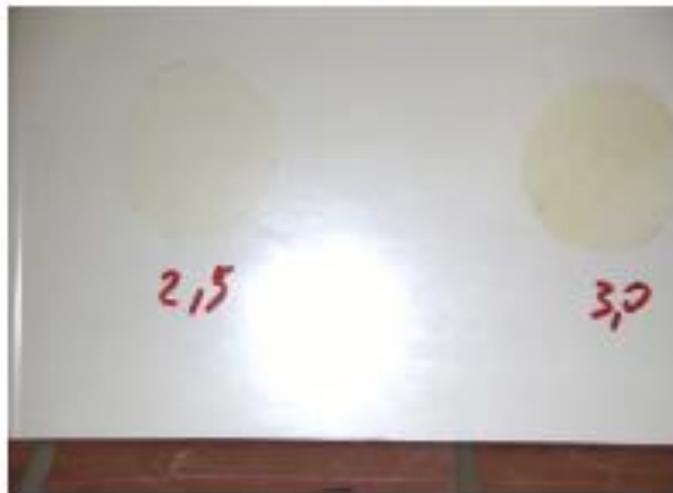
Surface damage (scratches, matting, fading, etc.) can be caused by mechanical strain during use, which can impair appearance and hygiene.

A typical example is plastics made of acrylonitrile-butadiene-styrene and polyamide. Furthermore, these plastic items are alkali-sensitive and can be damaged by the use of intensive cleaners. Therefore, they are not able to withstand the high-alkali thorough cleaning.

Certain plastics such as polycarbonate or polysulfone can be prone to stress cracks, depending on the material.



**Figure 1: Stress cracks**  
Source: Ecolab



**Figure 2: Discolourations on melamine dishes**  
Source: Ecolab

In plastic dishes with surface damage, the material can become discoloured upon contact with food.

Especially with melamine dishes, contact with cleaners that contain chlorine can cause yellow discolouration.

In principle, the information of the wash item and detergent manufacturers should be observed.



## 4. Tips for the optimal usage conditions of plastic wash items

In particular, ensure that

- a suitable detergent and rinse aid is used
- plastic dishes are lighter than other dishes
- the wash item is arranged in the machine in such a way to prevent them being toppled or flipped over.

Turned or flipped items are unsuitable for cleaning, as the fresh water rinse cannot reach the hollows in which detergent solution collects. Therefore small, light items should be arranged in special racks with a corresponding cover.

In principle, please do not place plastic wash items that have become distorted on the conveyor belt or in the dish rack.

In general, plastics are more difficult to dry and take longer to dry due to the low thermal capacity and conductivity.

Due to the poor wetting capacity, the correct rinse aid should be used for the fresh water rinse, e.g., in the correct dosage.

Brand new plastic wash items have poorer wetting capacity than used plastic wash items.

Please wait until items are completely dry before stacking to prevent the formation of germs through residual moisture. If drying at room temperature is insufficient, make provision for corresponding drying equipment.

When purchasing plastic dishes, ensure that sufficient ventilation is available for these dishes when stacked. This can be achieved using stacking knobs or ventilation gaps.

For hygiene reasons, but also on aesthetic grounds, severely scratched wash items, or items with surface damage or worn decoration must be replaced from time to time.



Dishes made of certain plastics have a particular tendency to absorb natural food colourants or odours.

Therefore, for hygiene reasons plastic items must be cleaned immediately after use!

Lipstick marks are particularly difficult to remove due to the specific surface quality of the plastic items.

A suitable cleaner in a sufficient concentration must be used.

For higher temperatures (> 65 °C) and longer action times (> 2 minutes), e.g., thermal disinfection, a shorter service life of the wash item should be expected.

Ensure that

- the plastic wash item is not placed on hot surface, hotplates, etc.
- sharp-edged or rough utensils (e.g. knives, sponge scourers, spatulas, etc.) are not used to clean coarse soiling from the item as the surface of plastic has little scratch-resistance, and the scratches constitute deep indentations in the material, in which micro-organisms can colonise or stains can form.

While plastic items made of melamine are considerably less scratch-prone, under strong mechanical strain, these have a tendency to chip, which creates a rough surface structure in which food residue and micro-organisms can settle.

If dishes slide along stainless steel surfaces or other metal surfaces, the contact points of the plastic can become rough and discoloured (metal abrasion). When stacked, such discolouration can also be transferred to the side of use. This discolouration cannot be removed in the dishwasher.

Despite the breaking strength, plastic trays made of glass-fibre reinforced plastic or laminated melamine paper are prone to chip around the edge under excess strain.



In summary, this means that plastic wash items must also be handled carefully, just like porcelain and glass, despite its high breaking strength.

## 5. Note on the thorough cleaning of plastics

Plastic wash items are roughened by mechanical influences, e.g., surface scratches. Thus food and beverage residues can easily penetrate the scratches and leave discolourations, which often cannot be removed. Like other materials, plastic wash items should be cleaned thoroughly as required when deposits and / or discolourations are observed.

For melamine, the dish should be cleaned thoroughly with active oxygen bleaching cleaners.

In doing so and in soak cleaning, extreme action times with strong acidic or alkali product solutions should be avoided. The wash item must complete the cleaning process without interruption. The wash item may not remain exposed to the detergent solution for an extended period, e.g., overnight.



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.