

# Commercial dishwashing

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## wash ware made of plastic

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**What are plastics?**

Based on their physical properties, plastics are subdivided into **thermoplastics** and **thermosets**.

Depending on their degree of solidity, **thermoplastics** possess a linear or slightly branched molecular structure. On account of this structure, thermoplastics are malleable at higher temperatures. Once the moulded part has cooled, the initially plastic shape is solid and stable, provided the temperature recommendations of the manufacturer are observed.

**Thermosets** are hard and possess a tightly meshed and branched molecular structure. Curing takes place during moulding. Thereafter, no further deformability by heating is possible.

In the manufacture of consumer goods from plastic, the following plastics are used primarily:

- **Thermoplastics**

- **ABS** (Poly(acrylonitrile-butadiene-styrene)), e.g. Terluran<sup>®</sup>, Novodur<sup>®</sup>
- **ASA** (Poly(acrylonitrile-styrene-acrylester)), e.g. Luran-S<sup>®</sup>
- **PA** (Polyamide)
- **PC** (Polycarbonate), e.g. Makrolon<sup>®</sup>
- **PE** (Polyethylene), e.g. Hostalen-G<sup>®</sup>, Lupolen<sup>®</sup> and
- **LDPE** = low density and **HDPE** = high density
- **PES** (Polyethersulfone), e.g. Ultrason E<sup>®</sup>
- **PET** (Polyethylene terephthalate), e.g. Vestan<sup>®</sup>, Hostadur<sup>®</sup>
- **POM** (Polyoxymethylene), e.g. Hostaform<sup>®</sup>, Ultraform<sup>®</sup>
- **PP** (Polypropylene) e.g. Hostalen-PP<sup>®</sup>, Vestyron<sup>®</sup>
- **PSU** (Polysulfone), e.g. Ultrason S<sup>®</sup>
- **PTFE** (Polytetrafluorethylene), e.g. Teflon<sup>®</sup>
- **SAN** (Poly(styrene-acrylonitrile)), e.g. Luran<sup>®</sup>, Vestoran<sup>®</sup>

- **Thermosets**

- **GFK** Glass-fibre-reinforced polyester resin
- **MF** (Melamine), e.g. Resopal<sup>®</sup>, Ricolit<sup>®</sup>

<p><b>What properties do plastics have?</b></p>	<p>In comparison to porcelain and glass, plastics exhibit the following properties:</p> <ul style="list-style-type: none"> <li>* significantly lighter and more susceptible to scratching</li> <li>* more shock-proof and break-proof and quieter</li> <li>* lower heat storage capacity</li> </ul>
<p><b>What has to be borne in mind when purchasing consumer goods made of plastic with regard to automated warewashing?</b></p>	<p>When purchasing consumer goods made of plastic for the canteen kitchen, care must be taken to ensure that</p> <ul style="list-style-type: none"> <li>- the wash ware is made of a suitable material;</li> <li>- the shape of the piece itself is suitable for a warewasher.</li> </ul> <p>Particular note must be taken to ensure that</p> <ul style="list-style-type: none"> <li>- there are no sharp-edged transitions and no blind spots (spray shadows);</li> </ul> <p>e.g. there are no deep undercuts on the back and the recesses for food components on the front are not fashioned with walls that are too steep or even vertical. In both cases, spray shadows form that do not allow the wash ware to be cleaned fully;</p> <ul style="list-style-type: none"> <li>- the wash ware is designed so that the detergent and rinse aid solution can drain off well.</li> </ul> <p>in the case of other pieces of crockery, too, the shape is fashioned such that when they are standing on the belt or dish rack or, as e.g. in the case of bowls, lying face down on the belt, no pools of water can form anywhere. This would significantly impair the rinsing effect.</p> <ul style="list-style-type: none"> <li>- the surface is always largely smooth.</li> </ul>
<p><b>How warewasher-safe are plastics?</b></p>	<p>Plastics can not in all cases be called warewasher-safe.</p> <p>With some plastics problems occur due to the lower heat storage capacity and with others due to their lack of chemical resistance (see VGG technical information sheet <a href="#">"Commercial dishwashing &amp; the resistance of materials in dishwashers"</a>). At higher temperatures (&gt;65°C) and longer impact times (&gt;2 minutes), e.g. for thermal disinfection, wash ware can be expected to have a shorter service life.</p> <p>The more warewasher-safe plastics include</p> <ul style="list-style-type: none"> <li>* polypropylene</li> </ul>

- \* polyoxymethylene
- \* melamine
- \* glass-fibre-reinforced polyester resin with a melamine base (not for thermal disinfection).
- \* Polyethylene terephthalate.

Mechanical stresses during use can cause damage to the surface (scratches, matting, lightening, etc.) which impairs the wash ware visually and with regard to hygiene.

Typical examples of this are plastics made of acrylonitrile-butadiene-styrene and polyamide. These plastics are also alkali-sensitive and when used may be attacked by heavy-duty detergents. They are not therefore able to cope with highly alkaline stripping.

Certain plastics, such as e.g. polycarbonate or polysulfone, may, depending on the material, have a tendency to form stress cracks.



The material in plastic dishes with damaged surfaces may discolour upon contact with food.

Melamine dishes, in particular, can be expected to exhibit a yellow discolouration on contact with chlorinated detergents.

	<p>Attention should always be paid to the information provided by the wash-ware and agent manufacturers.</p>
<p><b>Do particular aspects have to be borne in mind for automated commercial warewashing?</b></p>	<p>Care must be taken to ensure that an appropriate detergent and rinse aid are used;</p> <ul style="list-style-type: none"> <li>- dishes made of plastic are lighter than other dishes;</li> <li>- the wash ware is arranged in the machine so as to prevent items from falling over or from being swirled around;</li> </ul> <p>Overtured items or items being swirled around are awkward for cleaning as the cavities filled with detergent solution can not then be reached by the fresh water rinse. Small, light pieces should therefore be arranged in special racks with an appropriate cover.</p> <p>With wash ware made of plastic, care should always be taken <b>not</b> to distort the shape of such items when placing them on the conveyor belt or in the dish rack.</p>
<p><b>What has to be borne in mind when drying plastic?</b></p>	<p>On account of their low heat capacity and thermal conductivity, plastics are generally more difficult to dry, and more time is required for drying them.</p> <p>Due to their poor wettability, suitable rinse aids, in appropriate dosages where applicable, have to be added to the fresh water rinse.</p> <p>Brand new wash ware made of plastic is less readily wettable than that which has already been in use for some time.</p> <p>Care should be taken to ensure that only fully dried items are stacked so as to prevent germs from forming in residual moisture. If drying is inadequate at room temperature, appropriate drying equipment may possibly have to be provided.</p> <p>When purchasing plastic dishes, care should be taken to ensure that adequate ventilation is available for them when stacked. This can be achieved by means of stacking knobs or ventilation gaps.</p>
<p><b>How hygienic are plastics?</b></p>	<p>For reasons of hygiene, but also on aesthetic grounds, it is necessary from time to time to replace items of wash ware which are heavily scratched or have had their decoration and surface altered.</p> <p>Dishes made of certain plastics have a particularly marked tendency to absorb natural food colorants and flavourings.</p>

	<p><b><u>For reasons of hygiene, plastic items should therefore be washed immediately after use!</u></b></p> <p>Lipsticks can be especially difficult to remove as a result of certain surface characteristics of plastics.</p> <p>A suitable and sufficiently concentrated detergent should be applied.</p> <p>At higher temperatures (&gt;65°C) and longer impact times (&gt;2 minutes), e.g. for thermal disinfection, wash ware can be expected to have a shorter service life.</p>
<p><b>Can decorated and coloured wash ware made of plastic be cleaned in warewashers without any problems?</b></p>	<p>Washware of coloured material can be cleaned without any problems.</p> <p>Attention should be paid to the information provided by the manufacturer.</p> <p>Colourings that have been painted on, printed on or otherwise applied as a thin layer will not withstand the stresses for a long period, unless the decoration is protected by further resistant layer.</p> <p>In the case of melamine dishes, the decorative film is impregnated with melamine resin and additionally protected by the surface glaze.</p>
<p><b>Can wash ware made of plastic be stripped?</b></p>	<p>Plastic wash ware is roughened on the surface by mechanical influences, e.g. scratches, so food and drink residues can easily penetrate these and leave behind a stain which often can no longer be removed. With plastic wash ware, as with other wash ware materials, stripping is necessary if deposits and/or stains are observed.</p> <p>Melamine requires stripping with stripping agents containing active oxygen in order to bleach the dishes.</p> <p>When stripping and soaking, excessively long impact times with strongly acidic or strongly alkaline product solutions should be avoided. The wash ware has to pass through the warewashing process without interruption. The wash ware must not be left exposed to the action of detergent solutions for a prolonged period, e.g. over night.</p>
<p><b>Outside the warewasher, what</b></p>	<p>Care must be taken to ensure that</p>

<p><b>is it important to note in the case of wash ware made of plastic?</b></p>	<ul style="list-style-type: none"> <li>- The washware made of plastic is not placed on hot surfaces, hotplates, etc.</li> <li>- it is not cleaned of coarse soiling using sharp-edged or rough equipment (e.g. knives, sponge scourers, spatulas, etc.) as the surface of plastic has little scratch-resistance and the scratches constitute deep indentations in the material which microorganisms can colonize or in which stains can form.</li> </ul> <p>While plastic items made of melamine are significantly less scratch-prone, they are susceptible to chipping over small areas, which likewise give rise to a rough surface structure in which food particles and microorganisms can establish themselves.</p> <p>If dishes slide along stainless steel surfaces or other metal surfaces, roughening and discoloration (metal abrasion) may occur on the plastic at the contact points . From there, this can then also be transferred during stacking to the used surfaces. Such discoloration cannot be removed in the warewasher.</p> <p>Despite their resistance to breaking, plastic trays made of glass-fibre-reinforced plastic or melamine/paper-based laminate are also liable to chipping on the edges if too heavily loaded.</p> <p>In summary, despite its high breaking strength, wash ware made of plastic has to be handled just as carefully as porcelain and glass.</p>
<p><b>Technical advice provided by the member companies of the VGG</b></p>	<p>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.</p> <p>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 personnel, and regular maintenance of the warewasher, dosing equipment and water treatment system by the manufacturer will produce the washing results expected by the user.</p> <p>Consistent cooperation between warewasher, agent and dosing equipment manufacturers as well as manufacturers of water treatment equipment and wash</p>

	<p>ware will ensure constant and optimum adaptation to practical requirements, to the benefit of the customers they share and of the environment.</p> <p>Enquiries regarding this technical information sheet "<i>Commercial dishwashing &amp; wash ware made of plastic</i>" should be addressed to</p> <p><b>Arbeitsgemeinschaft Gewerbliches Geschirrspülen, Feithstraße 86, D-58095 Hagen, Germany Phone: +49 (0)2331/ 377 544 – 0, Fax: +49 (0)2331/ 377 544 – 4, E-mail: <a href="mailto:info@vgg-online.de">info@vgg-online.de</a>.</b></p>
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