Poor washing results

Reasons and solutions

Service Manual: H7-00-01

Origin: © Henkel KGaA

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1. Scratches and chatter marks on glassware

Scratches can appear singly or may be distributed over the glass; they can also be so concentrated that they form a white mark or ring.

Chatter marks are scratches that are not obvious to the human eye when viewed normally. However, under a microscope, fissures which lie along a scratch like scales can be seen. Scratches are always the result of a mechanical impact on the surface of glass.

As a result, there is hardly a tumbler in daily use which has no scratches. When washed by machine, scratches and chatter marks mainly result when glasses are loaded into the machine and knock against one another or against other hard objects or make contact with each other in the dishwasher basket. In this case ring-shaped scuff marks frequently result when glasses also rotate during the wash programme.

Scratch-like traces on glass are made worse when they are washed in the dishwasher. Initially they are not visible to the naked eye but they become more clearly visible the more dishwasher programmes are used.

The following is the reason for this:

Water and water-based rinsing solutions penetrate the scratches or fine fissures so that glass particles which are already loose break out. This process is mainly promoted by the drop in temperature between a hot washing cycle and a cold intermediate rinse cycle.

2. Pinholes and bubble-like changes to glass

In contrast to individual scratches and chatter marks, scratches, pinholes and bubble-like changes are an accumulation of small scratch-like traces, countless pinprick-shaped dots and ruptures on the surface of the glass which look like pilling on cloth.

It is typical here that these irregularities occur at the same time.

A trained eye can often recognise them on unwashed glasses. They become clearly visible after only a few washing cycles, usually after the first washing programme.

This indicates damage to the surface of the glass which must have occurred during the manufacturing process or during transport to the consumer. This damage is soon worsened when the glass is washed by machine.

3. Irreversible clouding and iridescent deposits on glass

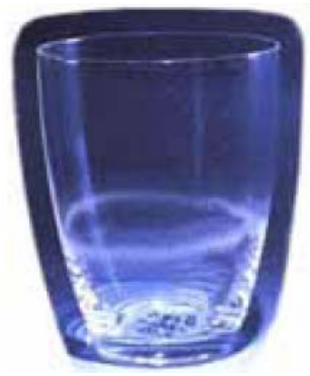
Frequent machine washing normally has no adverse effect on glass as long as it is dishwasher-proof. Exceptions are glasses which are decorated with colour or gold, as well as old and very valuable glassware. It is generally not suitable for the dishwasher. The surface of these glasses may change when they are washed in a dishwasher. This will then result in irreversible cloudiness or iridescent deposits.

These changes on the surface of glass are irreparable. If such changes occur a special-care dishwasher detergent and a damp cloth may be used to test whether they are the result of corrosion or lime deposits.

If the cloudiness cannot be removed, then the cause is the chemical sensitivity of the glass due to the manufacturing process used. If the problem is caused by lime deposits, the clouding can be removed by hand with a damp cloth or by rinsing the glasses in the dishwasher with a care product.

4. Hidden defects on the glass

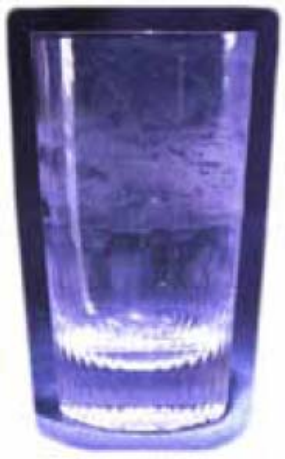
This heading covers all the effects such as clouding and iridescence which may sometimes only become apparent after frequent washing. The manufacturing process plays an important role here.



Examples of this are the cooling cracks. These are frictions in glass which appear when glass has been formed but has not undergone a defined, slow cooling process. These defects, "frozen" in the glass, only become apparent with daily use, for example when an initially completely intact glass suddenly breaks on the rim during use, a glass bowl breaks in half with a clean break or the thick base of a tumbler cracks.

5. Symmetric clouding in glass

During the production process blown glasses are provided with a cap which is scored with diamonds and then broken off.

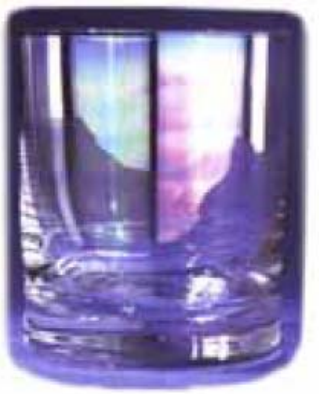


The sharp rim which results needs to be rounded. This can be done by melting the rim with a hot gas flame or by surface grinding. During this process the rim is rounded by means of grinding and then smoothed by polishing it. This process and the method used are decisive for the later behaviour when the glasses are washed in a dishwasher.

The process of end glazing the rim may result in symmetrical clouding below the rim. Cylindrical grinding does not lead to the formation of a ring. Only in very rare cases can this be seen before a glass has been used.

Symmetrical clouding is however a typical defect in glass and can emerge after glass has been washed in a dishwasher. A handle that has been attached with insufficient thermal treatment may also lead to symmetrical clouding.

6. Iridescence on glass



In most cases this is similar to the play of colours on mother-of-pearl. However, only brown, green or blue discolouration may occur. Glasses will still be perfectly transparent. They nevertheless give the impression of being slightly dark. These changes are caused by very thin layers which have slowly developed through washing in the dishwasher.

This discolouring is caused by layers rich in silicate. It has not yet been clearly determined whether the silicate comes from the glass composition itself, from the detergent or from both sources.

Yearlong experience gives rise to speculation that the iridescence only occurs when low-alkaline detergents with a high silicate content are used.

This iridescence is not observed when a high-alkaline product or a low-alkaline product without silicate is used. Potash crystal, lead crystal and soda-lime glasses which have been rinsed a thousand times with low-alkaline, silicate-free detergent show no signs of corrosion even after such frequent washing.

7. Stainless steel rusts (panel and casing)

4016 stainless chromium steel may not be cleaned or come into contact with non-oxidised acid solutions which contain seawater and its salt-chloride content. Possible causes of rust on 4016 chromium steel are standard, commercially available "sponge cloths". They are dyed and stainless steel can begin to rust because of the residual salt in them.

8. Stainless steel discolours (panel and casing)

Localised discolouration may be caused by:

- mustard
- onions
- sauerkraut
- rhubarb

9. Pitting on stainless steel

The most commonly occurring form of corrosion is pitting also called pitting corrosion, since, as the name suggests, it acts on the material in a corrosive manner. The blades of knives are especially affected. In steel with a high alloy content, pitting only occurs as a result of manufacturing flaws in the material. It usually starts with small, pinprick-like holes which cannot be seen by the naked eye. As pitting progresses areas the size of a square centimetre may be ruined. The areas affected by pitting corrosion are hollowed, look dark grey in colour and have a grainy structure.

The cause of this corrosion is a fault or corrosion of the protective coating or more specifically the passivated stainless steel surface.

The main reasons for this development are the acidic leftovers of vegetables, fruit, fruit juice and milk products which remain on the surface of the steel.

However, it is not only acid that can corrode stainless steel. Cooking salt is a particular danger. It is almost always found in drinking water and food leftovers. It is therefore important that after filling the salt container of the softening equipment no salt remains on the bottom of the tub or in any part for the dishwasher for a long period of time. On the other hand, the use of alkaline products such as the detergent or its alkaline solutions will not cause pitting on stainless steel surfaces.

10. Extraneous rust or rust film on stainless steel

These are rust particles from external sources which have settled on the surface of non-corrosive steel. This notably occurs when grips or handles on pots and pats are fastened with screws made of material which is not rust-free.

Places where screws are fixed onto pots or pans which can then no longer be seen on the finished product are particularly nasty. The parts to be enamelled are hung onto these tabs so that they are not coated with the protective enamel layer, caused them to rust in use.

Enamelled pots and pans made of sheet steel in which the enamel coating has flaked in places may begin to rust and this rust then spreads. Sources of extraneous rust are also frequently dishwasher baskets whose plastic covering has become damaged so that the metal wire underneath rusts. On rare occasions rust can also be caused by tap water. Rust may also be caused when items made of steel which is not rust-proof, for example old knife blades, are also washed in the dishwasher.

11. Pitting on stainless steel

Complaints are often made about rust, especially on knife blades, when it comes to pitting corrosion.

Sometimes complaints are about only small dots of rust or small rings (diameter of approx. 1 mm).

These small dots are like pinpricks in the centre of these rust rings that can generally not be detected with the naked eye but which do become apparent with a magnifying glass. This is an initial stage of pitting.

12. Crevice corrosion or contact corrosion on stainless steel

This is understood as a form of corrosion which occurs as crevices for example in fissures and cracks in a material, but mainly in crevices in which two different materials make "contact" with one another.

The classic example in this case when using a dishwasher is the crevice on a knife where the stainless steel blade meets the handle. The materials which may come into contact here are on the one hand a low alloy steel and on the other hand a knife handle made of nickel silver, a copper-nickel alloy with a 90 or 100 silver coating or a handle made of high-alloy 18/10 chrome nickel steel.

The various materials differ in their electro-chemical properties, so that a galvanic element can develop. During this electro-chemical reaction, the less noble metal becomes corroded at the point of contact. Chloride ions have an adverse effect here too. Contact corrosion is frequently triggered by damage to the layer of coating, the oxide film. The first signs of crevice corrosion are dark discolouration and rust spots at the point of contact.

13. Stress corrosion cracking and hardening crack corrosion on stainless steel

Inter-granular corrosion and deformation-induced corrosion are exclusively due to errors in the processing of steel. In most cases these errors have an effect on the crystal lattice structure of the material.

In a resistant steel alloy with an austenitic lattice, areas develop with a martenistic or ferritic structure with a low corrosion resistance level. In this case the steel corrosion is only triggered by cooking salt.

At the same time it is a classic example of interaction when using a dishwasher. Stress cracks or hardening cracks mainly occur on knife blades in the area of saw grinding and start from the back of the knife and move towards the blade. In this case alkaline cleaning agents generally have a corrosion reducing effect.

14. Heat tinting on stainless steel

This affects cooking pots made of stainless steel. During the cooking process, certain foods (cauliflower, celery, kohlrabi, mushrooms, potatoes, noodles, boiled fish or savoy cabbage) cause discolouration on the surface of the steel through the occurrence of brown, blue or mother-of-pearl iridescent colours shades.

These heat tints are thin coatings which cling to the steel and are caused by the reaction between hydroxide ions (OH ions) and minerals such as magnesium, silicic acid and phosphor compounds.

They are harmless in physiological terms.

15. Iridescent coatings on stainless steel

Stainless steel pots shimmer in rainbow colours. A thin layer, for example of residual food, breaks the incident light.

These colour phenomena are also occasionally seen in the interior or on the inside of the dishwasher door. They have the same origin as the iridescence on stainless steel saucepans.

Remedy: wash the iridescent stainless steel pots with a special-care dishwasher detergent.

Another cause is the quality of the material used for making the dishwasher tub or a stainless steel cooking pot. Under certain conditions impurities in the stainless steel alloy, for example titan, may lead to heat tinting. Washing with a special-care dishwasher detergent may be a remedy here too.

16. Silver tarnishing

It is a generally known fact that silver tarnishes when it is not in use. It is only a question of time before it develops dark, brownish, blue-to blue-black spots or becomes discoloured all over and tarnished.

The reason for this is the exceptional sensitivity of the surface of the silver towards sulphurous gasses which are to be found in the ambient air.

Mere traces of hydrogen sulphide in the air, which we cannot detect with our sense of smell, are sufficient to tarnish silver. At air room temperature a reaction already takes place between hydrogen sulphide and silver whereby argentite is formed and then leads to the above-mentioned dark discolouration.

Silver also tarnishes in the same way when it comes into contact with the remains of food which contains sulphurous substances, for example, egg yolk, mayonnaise, mustard, onions, pulses, fish, especially fish brine and marinades. This is why a silver spoon should not be used when eating a boiled egg.

Because of its high copper content of 200 parts to 1000, 800 silver can tarnish to a gold to light brown colour. It is therefore less suitable for machine rinsing. However, if it is subsequently electro-silver plated, it naturally reacts the same as 90 or 100 silver plating.

Due to the above-mentioned highly sensitive reaction between silver and sulphurous compounds, it is not possible to avert tarnishing.

Silver polish containing substances which are said to have a protective effect can, if at all, only marginally delay tarnishing.

Since these protective layers are only very thin the protective effect is only temporary.

17. Silver in the dishwasher

The conditions under which silver can be washed in the household dishwasher are generally more unfavourable than washing by hand. The chances of silver tarnishing will be strengthened by the following:

Food remains: Sulphurous food remains that are already on the cutlery can sometimes have an effect on the surface of the silver for a long time before it is washed in the dishwasher, since, in contrast to hand washing which usually takes place immediately after a meal, dishwasher s are not turned on until they are full.

Washing temperatures: During a wash, dirty rinsing water in the dishwasher comes into contact much longer and at much higher temperatures, from 50°C to 65°C, with silver than when hand washing. The reactivity of silver is reinforced at higher rinsing temperatures. High temperatures in a dishwasher promote the chemical processes that lead to tarnishing.

Wash duration: Due to the intensive washing process in the machine, the surface of silver is totally degreased and hence becomes more sensitive to external influences.

Oxidising agents in the dishwasher detergent: Oxidising agents based on active chlorine and oxidation bleach also have an effect on the process. Observations made so far indicate that detergents containing active oxygen have a stronger tarnishing effect than those containing active chlorine.

Alkalinity (pH levels) of dirty rinsing water: Physical-chemical analyses have shown that when alkalinity is higher, the danger of silver tarnishing through food remains in the dirty rinsing water, for example mustard, is reduced.

When washing by hand the drying process ultimately exerts a polishing effect, which naturally is not present when washing by machine. Silver items to be rinsed must always be prevented from making direct contact with detergent. If they are not rinsed immediately, the detergent will remain on the surface for some time and these places on the surface will develop blue to black stains which are very difficult to remove and can usually only be removed mechanically.

18. Cleaning tarnished silver

There is no significant difference between silver tarnishing in a drawer during normal use or during washing in the dishwasher, which means that it is unimportant whether it is a question of deposits of silver oxide, silver sulphide, silver chloride or metallic silver. Discolouration must be removed from silver by hand, using a mildly abrasive silver cleaner. This generally ensures that the desired patina of ornate silver items remains undamaged.

For the care of silver and also for removing tarnishing, liquid or paste silver care products, silver cleaning cloths, silver soaps or silver cotton wool should be used. Under no circumstances should scouring powder or similar cleansers with strong abrasive additives be used.

19. Residues

Residues (often of sandy texture) in glasses, cups or other hollow bodies mean that scraps of food that are present are not rinsed away since they remain in the spray shadow.

Take care that the dishwasher is correctly loaded. High, slim glasses should not be loaded in the corners of the dishwasher basket. The water must be able to reach all the dishes and the rotating spray arm must be able to move freely.

Or scraps of food have been deposited which were not previously on the surface. Check whether the filter is dirty and clean it if necessary. Or too little detergent may have been used. Check the dosage table on the packaging.

20. Mat coating on plates

This may be starch coating (see illustration) from potatoes, noodles and from thickened sauces. However, it is also possible that it is caused by food remains from denatured protein (see illustration). These coatings are best removed in a 65°C cycle with a 30 ml dosage of detergent.

Starch deposits containing iodine solutions on spoons with and without protein remains

21. Tea stains

Black tea made with hard water forms a skin when left to stand and this can remain on the inner surface of the cup.

These tea stains are only removed when the interaction between the individual ingredients in the detergent is correctly balanced.

This applies in particular to Somat detergent. Stubborn tea stains are best removed in a 65°C washing cycle and with a 30 ml dose of detergent since the bleaching system can then develop its full effect.

22. Spinach remains

When dishes with spinach remains are washed, these remains are often found on other items in the dishwasher at the end of the wash cycle (see illustration). The reason for this is that the pumped water distributes the loose spinach through the whole dishwasher. A property of spinach is that it sticks well to smooth surfaces. In such cases the only thing that helps is pre-washing by hand.

23. Fat remains

Fat remains build up in the sieve and the dishwasher only when very greasy dishes are frequently washed in the wash programme at less than 50°C, frequently also without using a pre-wash programme.

Remedy: Clean the dishwasher with a 65°C programme or a cooking pot programme and 30 ml of detergent or a special-care detergent. After this rinse at least once a week with a 65°C programme. In extreme cases such fat remains may block the water level control, resulting in an expensive repair to the dishwasher.

24. Poor shine

Stripes, water droplets or lime stains appear, especially on glasses and cutlery, when there is no rinse aid in the rinse aid dispenser or when the dose of rinse aid is set too low. In this case the rinse aid dispenser must be refilled or the rinse aid dosage must be set higher.

Glasses with stains and stripes/salt remains = poor rinse-aid results.

25. Salt remains

The white deposits on washed items have a salty taste. This is caused by salt from the regeneration box.

Either the lid of the salt dispensing box is not closed tightly so that brine can escape into the inside of the dishwasher. In this case close the lid tightly.

Or the lid has a fine crack through which brine escapes into the inside of the dishwasher. The lid will need to be replaced with a new one in this case.

26. Lime deposits

Water has not been softened enough and/or too little detergent has been used.

Check the salt level and refill regularly with Somat special salt.

Always use the amount of detergent specified in the instructions. Or adjust the softening agent to a higher hardness level.

Immediate remedy: Run a wash programme with an empty machine and a special-care detergent. This will remove the lime deposits.