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Recommendation for the Quality Assessment of Glass Cleaning Agents / Glass Cleaners

The German Cosmetic, Toiletry, Perfumery
and Detergent Association (IKW), Home Care Department

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The German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW), Home Care Department, Frankfurt am Main, Germany (status: 31 January 2022)

Translation / Original: German

1. Foreword

IKW member companies make their expert knowledge of the products they manufacture available to the general public; this is done in the form of quality assessment recommendations.

The recommendations for the quality assessment are elaborated in working groups and are intended to enable a qualified testing of the relevant products by the manufacturers and test institutes. Quality characteristics are described that need to be fulfilled by the products concerned in order to achieve the effects expected by consumers and manufacturers.

1.1 Mandate

As the Quality standard for the testing of cleaners for windows (and smooth surfaces) of 1983 describes a method for naturally soiled window surfaces and is outdated, and as the methods described in the Recommendation for the quality assessment of the product performance of all-purpose cleaners [1] of 2014 are not suitable for a differentiation of glass cleaners, the present Recommendation for the quality assessment of glass cleaning agents/glass cleaners was developed.

1.2 Sustainability

The companies working within the framework of IKW want optimal quality standards for their products. Their aim is a consistent orientation to sustainability as a guiding principle, preparing to successfully face the future in a constantly changing world.

This commitment to sustainability as a guiding principle is built up on experiences expressed in numerous exemplary initiatives. Taking as starting points the declarations of Rio 1992, "92 plus 10" of Johannesburg and the Agenda 21, sustainability is understood as a balanced linking of economic, social and ecological aspects, with a view to meeting the needs of the present without compromising the ability of future generations to meet their own needs.

The member companies of the German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW) have long been committed to sustainability under the umbrella of the association

and sister federations. This commitment has already resulted in several established industry-specific initiatives, such as:

- Dialogue platform FORUM WASCHEN [2],
- IKW Report on sustainability in the detergents, maintenance and cleaning products industry [3],
- A.I.S.E. Charter for Sustainable Cleaning ("Charter 2020+") of the International Association for Soaps, Detergents and Maintenance Products (A.I.S.E.), Brussels [4],
- Voluntary agreements

Furthermore, the member companies are also committed within initiatives of raw material and supplier industries, for example:

- The "Responsible Care" initiative of the chemical-pharmaceutical industry and the chemicals trade in Germany [5],
- "Chemie3", the sustainability initiative of the German Chemical Industry Association (VCI), the Mining, Chemical and Energy Industrial Union (IG BCE) and the German Federation of Chemical Employers' Associations (BAVC) [6]

The constant further development of initiatives and products with sustainability as the guiding principle ensures the future viability of the detergents, maintenance and cleaning products industry in a constantly changing world. The social and societal benefits of these products in terms of hygiene and value-preservation are undisputed. The products make a significant contribution to today's standard of living and health and to the conservation of resources, for example by extending the service life of objects.

With this in mind, quality assessment recommendations encourage company staff to act responsibly toward humans and the environment in product development and manufacture. They also serve consumers who can expect efficient, safe and environmentally sound products.

Quality assessment recommendations must not impair such developments. Consequently, for each product only one overall result is valid to determine whether the product meets the quality recommendations or not. Emphasis on isolated test criteria is not admissible and may be misleading.

1.3 Assessment of the test results

The recommendations describe which qualities are relevant to a given product and how such qualities can be measured. It should be noted that every finished product has a certain efficacy spectrum in its intended use; this spectrum is largely determined by consumer expectations as to each individual quality characteristic – so that in each product some characteristics are deliberately emphasised while others will be less important. Moreover, the desired combination of product properties is subject to constant change, depending on the latest technical possibilities and new consumer habits.

1.4 Statutory requirements

With regard to composition, packaging and labelling, inter alia, the following statutory requirements must be observed in their existing versions or to the extent that they still apply, respectively:

- German Code on Foodstuffs, Consumer Items and Animal Feed (Lebensmittel-, Bedarfsgegenstände- und Futtermittelgesetzbuch – LFGB)
- German Chemicals Act (Chemikaliengesetz – ChemG)
- German Dangerous Substances Ordinance (Gefahrstoffverordnung – GefStoffV)
- Chemicals Prohibition Ordinance [Chemikalienverbotsverordnung – ChemVerbotsV]
- German Detergents and Cleaning Products Act (Wasch- und Reinigungsmittelgesetz – WRMG)
- German Ordinance on Pre-packaged Products (Fertigverpackungsverordnung – FPV)
- German Ordinance on the Transport of Dangerous Goods by Road (Gefahrgutverordnung Straße – GGVS)
- German Ordinance on the Transport of Dangerous Goods by Rail (Gefahrgutverordnung Eisenbahn – GGVE)

– as well as the following legislation by the European Union which serves as basis for the German ordinances or to which reference is made:

- Detergents Regulation (EC) No 648/2004
- REACH Regulation (EC) No 1907/2006
- Regulation on Classification, Labelling and Packaging (EC) No 1272/2008 (“CLP Regulation”)
- Biocidal Products Regulation (EU) No 528/2012
- Regulation (EU) No 2019/1148 on the Marketing and Use of Explosives Precursors

1.5 Voluntary Agreements

Moreover, the following voluntary agreements [7] apply, amongst others, to IKW member companies which can be relevant for glass cleaning agents / glass cleaners:

- Ban on volatile chlorinated hydrocarbons (CHC) in Detergents and Cleaning Products (1987)
- Recommendation concerning the Packaging Imprint on Residual Emptying (1992)
- Ban of Musk Xylene (1993)
- Ban of the Use of Alkylphenol Ethoxylates (APEO) (1986)
- Ban on Ethylenediaminetetraacetic Acid (EDTA) (1991)
- Ban on Triclosan (2001)

2. Introduction

Glass cleaning agents/glass cleaners are specially developed for cleaning glass surfaces and smooth and washable surfaces in private households on which there is mainly light soiling. Outdoors, these are dust, soot and insect residues; indoors mostly grease or sebum, nicotine, dust and also insect residues (e.g. on windows, mirrors, glass doors). Glass cleaning agents/glass cleaners are detergents according to their product claim

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in conjunction with Article 2 of the Detergents Regulation (EC) No. 648/2004 and require labelling, inter alia, according to Annex VII of the Detergents Regulation. Furthermore, a list of ingredients must be made available on the internet.

Overall, they are not suitable for cleaning solvent-sensitive surfaces such as spectacle lenses, screens, TV sets or wooden surfaces.

They are usually used to clean hard surfaces with ready-to-use products as a spray application. Likewise, the ready-to-use solution can be prepared with a concentrate (solid or liquid) as instructed by the manufacturer.

Glass cleaning agents/glass cleaners generally consist of one or more surfactants, water-soluble solvents (e.g. ethanol, glycol ether) and complexing agents, as well as additives such as fragrances and colourants and, in some individual cases, preservatives. Most of these formulations are pH-neutral or alkaline. For the quality assessment of the products, it is desirable to have a test method that is as simple, reproducible and close to practice as possible, both for external comparative tests and for product development. This method should be based on consumer behaviour and the usual types of dirt.

For the development of such a method, a working group was set up inside the German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW), consisting of experts from cleaning product manufacturers, raw material producers and test institutes.

3. Aim

The mandate of the working group was to develop a recommendation for the quality assessment of glass cleaning agents/glass cleaners for private households. The recommendation is to enable qualified testing by the manufacturers themselves and by independent testing institutes, meeting following criteria:

- ✓ Practical relevance
- ✓ Accuracy and reproducibility
- ✓ Differentiability
- ✓ as simple as possible to carry out

4. Course of action of the working party

4.1 Product performance: Cleaning performance

The main focus is the assessment of the cleaning performance of glass cleaning agents/glass cleaners. In order to create consumer-oriented and practice-relevant conditions, the cleaning performance is tested on two different types of soiling:

- Dirt deposits outdoors (“outdoor dirt”)
- Dirt deposits indoors (“indoor dirt”)

4.2 Product performance: Residue formation

The basis for the evaluation of residue formation is implementation based on the determination of residue formation (streak/drop formation) according to the IKW Recommendation for the quality assessment of all-purpose cleaners. However, in contrast to the determination of residue formation in the IKW Recommendation for the quality assessment of all-purpose cleaners, no distinction is made between streak and drop formation.

4.3 Product performance: Material care

The basis for the evaluation of material care is the stress cracking corrosion test with small plastic sticks from various materials based on German standard DIN 53449-3 [Testing of plastics; evaluation of environmental stress cracking (ESC): bend strip method] [8].

5. Test principle

The product performance is determined using the following measurements:

- Cleaning performance (“outdoor dirt” and “indoor dirt”)
- Material protection on plastics
- Residue formation

For the further characterisation of glass cleaning agents/glass cleaners, the respective pH value is determined without assessment.

6. Description of method

The method is suitable for the differentiation of ready-to-use glass cleaning agents/ glass cleaners.

6.1 Product characterisation

It is recommended to document the consistency and pH value of the glass cleaning agents/glass cleaners, however, this is not part of the quality assessment.

6.2 Cleaning performance

6.2.1 Scope of the test method

This test method serves to assess the cleaning performance of glass cleaning agents/glass cleaners for hard surfaces in the removal of greasy or dusty dirt. The test method imitates the removal of everyday deposits outdoors (e.g. dust, soot and insect residues) and indoors (grease or sebum, nicotine and dust).

6.2.2 Test Method – Overview

The cleaning performance of glass cleaning agents/glass cleaners is tested using two types of test soils which are applied to mirror tiles, then heated and, after an ageing process, finally removed and evaluated in a wiping process to assess the respective cleaning performance.

The natural wiping process in practice, which consumers carry out in private households when using glass cleaning agents/glass cleaners, is imitated with the help of a wiping device. The decisive factor for the performance of the cleaner is the cleaning result achieved in removing the dirt after a defined number of strokes, as well as cleaning with as little residue as possible. To determine statistically significant differences between various glass cleaning agents/glass cleaners, a statistical evaluation method (e.g. Tukey test) with a confidence interval of 95% is applied.

The evaluation of residue formation as another relevant test characteristic is carried out as a sum parameter for streak and drop formation, resorting to reference formulations.

Testing of material care is carried out according to the stress cracking corrosion tests on plastic sticks following DIN 53449 T 1-3 [8].

6.2.3 Equipment, materials and ingredients

Materials and equipment for the tests

(see [Annex A](#) with supply sources):

- Commercial grade mirror tiles (size: 30cm x 30cm)
- Sheen PG 903 scrub tester (supply source 1a), TOC Sheen Scrub (supply source 1b), Elcometer 1720 (supply source 1c)
- Non-rusting steel pin (supply source 2)
- Rack and pinion press type 5 (supply source 3)
- Plastic test sticks (supply source 4)
- Cleaning cloths (supply source 5)
- Analytical scales (0.01 gramme measurement precision)
- Hot cabinet (e.g. Memmert UFE 600)
- Airbrush pistol (e.g. Badger 150 M) or use of a DC atomizer

- Ultrasound bath or disperser (e.g. IKA ULTRA-TURRAX)
- Commercial grade baking paper or commercial grade aluminium foil for soil type B (indoor dirt)

Mixtures for the pre-treatment of mirror tiles:

- Alkaline cleaning product (e.g. machine dishwashing detergent)
- Ethanol for cleaning

Ingredients of soiling

(see [Annex B](#) with supply sources)

Soiling type A ("outdoor dirt"):

- Hexadecyl palmitate
- Paraffin oil
- Kaolin 6060
- Soot
- Isopropanol (isopropyl alcohol)

Soiling type B ("indoor dirt"):

- Fat or sebum (e.g. Spangler's Synthetic Sebum or WFK 09 D Synthetic Sebum Fat; see [Annex B](#))
- Sasol Wax 7835
- Soot
- Kaolin 6060
- Aerosil 200

Ingredients for the formulation of the reference cleaner

(see [Annex C](#)):

- Cocamidopropyl betaine
- Propylene glycol n-butyl ether
- Isopropyl alcohol
- Demineralised water

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Ingredients for the reference formulation to evaluate residue formation (see [Annex D](#)):

- Sodium lauryl sulphate (e.g. Texapon K12)
- Fatty alcohol polyglycol ether, C11 oxo-alcohol, 6-15 EO (e.g. Genapol UD 080)

6.2.4 Pre-treatment of mirror tiles and cloths

Pre-treatment of mirror tiles

As new mirror tiles are usually coated with a protective coating at the factory, each new mirror tile must undergo pre-treatment before use. The pre-treatment consists of alkaline pre-cleaning, which makes the tile suitable for testing.

Pre-treatment is carried out as follows:

- Remove the plastic film from the mirror tile; this surface serves as the test side.
- First wash the new mirror tile with an alkaline cleaner (in the bath or, as an alternative, in a dishwasher).
- Then rinse with demineralised water, followed by final cleaning with 96% ethanol.
- Let the mirror tile rest for approx. 1 hour before further use.

Note: It is recommended that each mirror tile be re-used only as long as there is no visible damage, change to the surface or discernible surface inhomogeneity. In particular, scratches can result in some individual areas of inhomogeneous dirt distribution and affect the variance in testing.

Cloths

For the determination of the cleaning performance, preferably the cleaning cloths described in [Annex A](#) (supply source 5) are used without pre-treatment (e.g. laundering).

6.2.5 Production of soil

Soil type A ("outdoor dirt") / Composition, see [Annex B](#):

The ingredients are homogenised in the following ratio at approx. 50 to 60°C in an ultrasonic bath or using a disperser:

- 0.90 g n-hexydecyl palmitate (melting point ca. 50-55°C)
- 0.20 g paraffin oil
- 1.10 g Kaolin 6060

- 0.05 g soot
- 80 g isopropanol

The amount of paraffin oil used can be slightly adjusted to influence the solidity of the dirt. Increasing the share results in softer dirt.

The required amount of isopropanol is placed in a suitable vessel. Then, during heating, the addition of the other ingredients can begin. After reaching the target temperature, sufficient stirring continues for another 30 minutes until the mixture is completely homogenised.

Subsequently, the dirt should be homogenised by ultrasonic bath treatment (ca. 30 min) or, as an alternative, using a disperser (at least 5,000 rpm, ca. 10 min).

No further storage or aging of the dirt is needed.

Soil type B ("indoor dirt") / Composition, see [Annex B](#):

40 g of Spangler's Synthetic Sebum or Synthetic sebum fat (WFK 09 D) are melted together with 20 g of Sasol Wax 7835 at 80°C in a porcelain mortar. 5 g of soot, 30 g of Kaolin 6060 and 5 g of Aerosil 200 are pre-mixed and added to the melted compound in the mortar. The mixture is worked into a homogeneous paste using a pestle.

Note: If necessary, reheat the mortar and pestle including the dirt mass in the hot cabinet to 80 °C, in order to facilitate processing.

The homogeneous paste is formed into a cylindrical pin and wrapped with commercial grade baking paper or commercial grade aluminium foil for practical handling (see [Figure 1](#)).

6.2.6 Application of soiling

Soil type A ("outdoor dirt"):

Before use, the dirt should be treated by ultrasonic bath for at least 30 minutes and stirred for at least 1 hour at a temperature of at least 40°C. As an alternative to the ultrasonic bath, a disperser can be used with at least 5,000 rpm and for at least five minutes.

Note: Continuously temper the dirt solution (ca. 40-50 °C) and stir sufficiently.



Fig.1 Soil type B is formed into a pin (left), wrapped with a paper/foil (middle), and applied in stripes onto the mirror tile (right) (image source: SONAX GmbH).

Then spray the dirt evenly onto the cleaned mirror tiles by airbrush (spray distance ca. 10-20 cm). The application area should be ca. 28 cm x 8 cm. To prevent the dirt solution from running, spraying should be done in 2-3 work steps.

The required application quantity is 0.10 - 0.12 g (dry weight).

The soiled mirror tiles are stored in a hot cabinet at 75°C for at least 30 minutes to homogenise the dirt layer. After that, let the mirror tiles rest for at least 24 hours at room temperature.

It is advised against using tiles that have been stored under different conditions for a test series.

If the mirror tiles are placed outside a climatic chamber, ensure that they lie perfectly flat and are not exposed to direct sunlight or other sources of heat.

Start the cleaning test after 24 hours. If stored under the conditions described above with controlled temperature/humidity, the mirror tiles can be used for a maximum of three days after preparation.

Soil type B ("indoor dirt")

With the help of the dirt pin, apply a quantity of dirt of 0.2 to 0.3 g to the mirror tile over a total area of 28 cm x 5 cm by moving the pin evenly in a cold state.

Then bake the vertically positioned mirror tile for at least 1 hour at 80°C, with the "dirt track" being in a horizontal direction.

Before using it in the wiping test device, store the mirror tile in a horizontal position for at least 24 hours at 20 to 25°C room temperature and defined room humidity.

6.2.7 Implementation of the cleaning performance test

Four glass cleaning agents/cleaners can be tested on the same mirror tile. Thus, a batch of eight tiles enables the testing of four glass cleaning agent/cleaners with eight repetitions. The soiled mirror tiles are cleaned with a Sheen scrubber.

The suitable number of strokes for the scrubber is determined in a pretest, using the reference cleaner (formulation see [Annex C](#)). At a scrubbing speed of 20 strokes per minute (1 stroke = back and forth movement), the reference cleaner should achieve cleaning value 4 (corresponding to ca. 40% cleaning performance) with at least eight strokes, ideally with 10 to 25 strokes. If this cannot be achieved using soil type A (outdoor dirt), the solidity of the dirt should be slightly adjusted by the amount of paraffin oil used (see [6.2.5](#)).

The position of the glass cleaning agents/cleaners is to be chosen randomly over the entire mirror tiles in such a way that each product is tested at least once in each position on the cleaning machine.

Since glass cleaning agents/cleaners contain mainly volatile solvents in their formulations, the cleaning test should not be interrupted, if possible – in order to avoid false results. Any evaluations should be carried out with as few interruptions as possible.

Place the soiled mirror tile in the Sheen scrubber. The device should be set to 20 strokes/minute and the cleaning cloths attached to the test arms or cloth holders using the tenter frames.

For each of the positions to be cleaned, quickly apply 5 ml of undiluted product (glass cleaning agent/cleaner) directly and evenly to the cloth using a pipette.

After applying all the test products, place the bridge in position with the cloths. Set the meter to "zero" and switch on the cleaning device.

Each cloth can be used only once.

After reaching the number of strokes determined in the preliminary test, the cleaning result is visually evaluated by at least three trained or experienced persons. If a product already achieves a cleaning performance greater than 90% before this, the number of strokes needed for this is noted down. A maximum of 10 points can be awarded.

Number of strokes	5	10	15	20	25	30
Cleaning performance in %	10%	20%	30%	50%	70%	100%
Evaluation scale in points	1	2	3	5	7	10

Tab. 1 Presentation of the test results based on an example test of the cleaning performance of glass cleaning agents/cleaners with a total of 30 strokes until a cleaning performance of over 90% is achieved.

The end point of complete removal of the test soil can be evaluated visually and "by contact" by gently touching the soiled mirror tile to ensure that no soil is left.

Note: Preferably, a reference cleaner whose results are already known should be included in the test in parallel with the test product. This allows the tenacity of the soiling to be examined and the suitability of the soiled mirror tile to be validated.

6.2.8 Cleaning of mirror tiles after the test

After completion of the cleaning test, the soiled mirror tiles are cleaned with an alkaline cleaner and then rubbed dry with ethanol 96%. A period of rest of at least one hour should be observed before reuse.

6.2.9 Statistical evaluation

The data are evaluated in a variance analysis (ANOVA - Analysis Of VAriance) based on e.g. the Tukey test with a confidence level of 95%.

6.2.10 Presentation of the cleaning performance result

The result can only be presented in connection with the relevant test conditions, as the cleaning performance achieved depends on the number of scrubbing operations. Cross-comparisons of grades from different tests are not permitted.

6.3 Residue formation

Another relevant test characteristic is the residue formation of each glass cleaning agent/cleaner.

Analogous to the determination of the cleaning performance, up to four glass cleaning agents/cleaners can be tested on the same mirror tile. Thus, a batch of eight tiles enables testing of four glass cleaning agents/cleaners with eight repetitions.

The position of the cleaners is to be chosen randomly over the entire mirror tiles in such a way that each product is tested at least once in each position on the cleaning machine.

First, a clean and dust-free mirror tile is placed in the Sheen scrubber. The device is set at 20 strokes/minute and the washed cleaning cloths are attached to the test arms/cloth holders using the tenter frames.

For each of the tracks to be tested, quickly apply 5 ml of product directly and evenly on the cloth using a pipette.

After applying all the products, position the bridge with the cloths and wipe one stroke (back und forth movement).

Now remove the mirror tile and store it for one hour. This is followed by an inspection of the mirror tiles for residues of the cleaners in a visual inspection by at least three testers. Only whole grade levels are permitted in the individual evaluation by the testers; in-between grades are possible by averaging at a later stage.

The following evaluation scale is used for the above (scale 0-3):

- 0 No residues
- 1 Minor, barely visible residues (stripes/drops)
- 2 Medium, visible residues (stripes/drops)
- 3 Major, clearly visible residues (stripes/drops)

Reference formulation for the evaluation of residue formation for evaluation grade 2 (see [Annex D](#)).

6.4 Material care

Material protection of the glass cleaning agents/cleaners is tested in stress cracking corrosion tests with small plastic sticks based on German standard DIN 53449 T 1-3 [7].

A non-rusting steel pin (supply source 2) according to DIN 6325 (Tol.: m6, 3x10 mm) is pressed in the test sticks into which a hole has been drilled (drill 2.7 and reamer 2.9 H7), using a

device (e.g. rack and pinion press type 5 (supply source 3). Make sure that the pin is inserted vertically (see [Figure 2](#)).

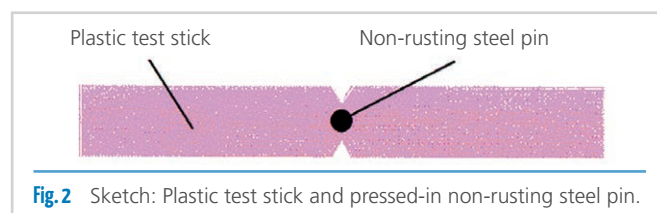


Fig.2 Sketch: Plastic test stick and pressed-in non-rusting steel pin.

The test sticks (supply source 4) are dipped briefly in the concentrated cleaner to be tested. Adhering cleaner is not removed. Dipping is repeated after 24 hours. Every 24h the dipping process is repeated; there are seven dipping processes in total. The occurrence of stress cracks is evaluated after defined periods of time (24h after the first dipping process and after seven further dipping processes) and documented in tabular form.

It is recommended to carry out the first dipping process on a Monday and to proceed as follows:

- Monday, 9 am: first dipping process
- Tuesday, 9 am: evaluation after first dipping process, followed by second dipping process
- Wednesday, 9 am: third dipping process
- Thursday, 9 am: fourth dipping process
- Friday, 9 am: fifth dipping process
- Saturday, Sunday: break
- Monday, 9 am: sixth dipping process
- Tuesday, 9 am: seventh dipping process
- Wednesday: 9 am: evaluation

The following plastics can be tested (supply source 4).

- PC = Polycarbonate Makrolon 3103 FBL 55/115
- PMMA = Polymethyl methacrylate Plexiglas 8N
- PS = Polystyrol 168N crystal clear

Depending on the result of this test, it is advised against frequent or permanent application on certain plastics. The selected materials are subject to change and can be adapted to new trends.

Evaluation of stress cracking corrosion (material care) (cp. [Table 2](#) and [Figure 3](#)):

- 1 = No change
- 2 = Start of crack / small crack
- 3 = Continuous crack
- 4 = Burst

Assessment

If there are visible traces on the surface, it must be found out whether they can be removed by polishing with a soft cloth. If those traces can be removed with a soft cloth, there is no attack on material.

Appraisal with evaluation after		Cleaner
1 dipping process	7 dipping processes	
1	1	recommended
1 or 2	2	recommended
1 or 2	3	suitable
3	3	suitable with some reservations
1 to 3	4	suitable with some reservations
4	4	not suitable

1 = No change, 2 = Start of crack/Small crack, 3 = Continuous crack, 4 = Burst

Tab. 2 Appraisal scheme for the evaluation of the material care of glass cleaning agents/cleaners.

Evaluation of material care

Test sticks are inspected, in an independent assessment, by an experienced person with no knowledge of the respective product. The evaluation of material care should be performed and assessed separately for each tested plastic material.

Description of the result for material care

The result can be described only in connection with the relevant test conditions. Cross-comparisons with grades from different tests are not permissible.

6.5 Recommended weighting of test scores and overall result

The overall grade of a glass cleaning product/cleaner is determined by means of the weighting shown in the following table (Table 3):

Note: The weighting of test criteria as shown above to obtain an overall assessment has the character of a recommendation based on the relevant product properties.



Fig. 3 Assessment of stress cracking corrosion for selected types of plastics.

	Cleaning performance		Residue formation	Material care
	"Outdoor dirt"	"Indoor dirt"		
Weighting / Share in overall assessment	30%	30%	30%	10%

Tab. 3 Weighting of the test parameters "cleaning performance", "residue formation" and "material protection" to determine the overall result for a glass cleaning agent/cleaner.

In fact, weighting is up to the testers and can be determined freely at their discretion.



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7. Supply sources of materials and equipment

- (1a) Multi-track scrub tester, Sheen PG 903, Sheen Instruments Ltd., Unit 4, St. Georges Ind. Est., Richmond Road, Kingston KT2 5 BQ, UK, phone +44 208 541 43 33, fax: +44 208 549 33 74
- (1b) CFT TQC SheenCFT Equipment B. V., Stoomloggerweg 11, 3133 KT Vlaardingen, The Netherlands (can be obtained in Germany through Olbrich knowhow, In der Erborst 11-13, 58675 Hemer)
- (1c) Elcometer 1720, Elcometer Instruments GmbH, Ulmer Str. 68, 73431 Aalen, Germany
- (2) Pin - Zylinderstift DIN 6325, 3x10 Tol: M6, article no. 2520310, Fa. Würth Reinhold-Würth-Straße 12-17, 74650 Künzelsau, Germany, phone +49 7940 15-0, fax +49 7940 15-1000, email: info@wuerth.com
- (3) Rack and pinion press type 5 – Zahnstangenpresse, Schmidt Technology GmbH, Feldbergstraße 1, Postfach 14 65, 78112 St. Georgen/Schwarzwald, Germany, phone +49 7724 899-0, fax +49 7724 899-101, email: info@schmidttechnology.de
- (4) Test plastic sticks - Kunststoff-Prüfstäbe: Kunststofftechnik Buzzi GmbH, Vor Heubach 4, 77761 Schiltach, Germany, phone +49 7836 96 830, fax +49 7836 96 832, e-mail: info@kst-buzzi.de
- (5) Cleaning cloths - Reinigungstücher, article no. 02010100, Wecovi GmbH, Groendahlscher Weg 87, 46446 Emmerich, Germany, phone +49 2822 688 46, fax +49 2822 531 84

8. Members of the Working Group:

Patrick Achermann, Stefan Adam, Corinna Böhme, Svea Braak, Claudia Figulla-Kroschel, Nicole Forstner, Cornelia Führer-Hölzler, Rachid Ihizane, Stefan Karsten, Thorsten Kessler, Thilo Kunst, Zena Malocho, Anthony Million, Anke Ophüls, Manfred Pitsch, Gesche Rauch, Brigitte Rosenthal, Thomas Rübener, Sara Wagner-Leifhelm, Dilek Yilmaz

References:

- [1] IKW, SOFW-Journal 06-2015, IKW Recommendation for the Quality Assessment of the Product Performance of All-Purpose Cleaners 2014: https://www.ikw.org/fileadmin/IKW_Dateien/downloads/Haushaltspflege/HP_EQ_AZR_2017_E.pdf
- [2] <https://www.forum-waschen.de/>
- [3] <https://www.ikw.org/haushaltspflege/nachhaltigkeit/nachhaltigkeitsberichte>
- [4] <https://www.charter2020.eu/>
- [5] <https://www.vci.de/themen/nachhaltigkeit/responsible-care/uebersicht.jsp>
- [6] <https://www.chemiehoch3.de/>
- [7] https://www.ikw.org/fileadmin/IKW_Dateien/downloads/Schoenheitspflege/SP_HP_Freiwillige-Selbstverpflichtungen.pdf
- [8] Beuth Verlag GmbH, Burggrafenstraße 6, 10787 Berlin; www.beuth.de
- [9] CSPA Cleaning Test Method DCC-09, „Glass Cleaners“

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Annexes

Annex A: Materials and Equipment

Scrubber: Sheen PG 903, CFT TQC Sheen or Elcometer 1720

Mirror tile (do-it-yourself store quality): size 30cm x 30cm

Airbrush: Badger model 150, nozzle M

Hot cabinet: e.g. Memmert UFE 600, Memmert GmbH + Co. KG, Äußere Rittersbacher Straße 38, 91126 Schwabach, Germany

Cleaning cloth: GD 140 gr/m² nonwoven, article no. 02010100

Annex B: Ingredients of soil types

Soil type A ("outdoor dirt"): The following ingredients are homogenised in the following proportions at ca. 50 to 60°C in an ultrasonic bath or using a disperser:

- 0.90 g n-hexydecyl palmitate (melting point ca. 50-55°C)
- 0.20 g paraffin oil
- 1.10 g Kaolin 6060
- 0.05 g soot (purchase through e.g. Alfa Aesar, Carbon black, acetylene, 100% compressed, 99.9+ %, <https://www.alfa.com/en/catalog/045527/> or 47250 Flammruss, Lampenschwarz, <https://www.kremer-pigmente.com/elements/resources/products/files/47250.pdf>)
- 80 g isopropanol

Soil type B ("indoor dirt"): (Center For Testmaterials B.V. - CFT, Stoomloggerweg 11, 3133 KT Vlaardingen, The Netherlands, Tel. +31 10 460 39 55, <https://www.cftbv.nl>, E-Mail: info@cftbv.nl or wfk Testgewebe GmbH, Christenfeld 10, 41379 Brüggen-Bracht, Germany, Tel. +49 2157 871977, Fax +49 2157 90657, www.testgewebe.de, info@testgewebe.de)

- 40 g fat or sebum, see below
- 30 g Kaolin 6060
- 20 g Sasol wax 7835
- 5 g soot (purchase through e.g. Alfa Aesar, Carbon black, acetylene, 100% compressed, 99.9+ %, <https://www.alfa.com/en/catalog/045527/> or 47250 Flammruss, Lampenschwarz, <https://www.kremer-pigmente.com/elements/resources/products/files/47250.pdf>)
- 5 g Aerosil 200

Fat or sebum for soil type B:

100 grammes of "Spangler's Synthetic Sebum": formulation according to CSPA Cleaning Test Method DCC-09, „Glass Cleaners" [9]:

- 10g Palmitic acid
- 5g Stearic acid
- 15g Coconut oil
- 10g Paraffin wax melting point 54-56 oC (e.g. sasol wax 5403)
- 15g Cetyl palmitate
- 20g Olive oil
- 5g Squalene
- 5g Cholesterol
- 10g Oleic acid
- 5g Linoleic acid

or 40 grammes of "Synthetic sebum fat" (purchase through Center For Testmaterials B.V. - CFT, Stoomloggerweg 11, 3133 KT Vlaardingen, The Netherlands, Tel. +31 10 460 39 55, <https://www.cftbv.nl>, E-Mail: info@cftbv.nl or wfk Testgewebe GmbH, Christenfeld 10, 41379 Brüggen-Bracht, Germany, Tel. +49 2157 871977, Fax +49 2157 90657, <https://testgewebe.de>, E-Mail: info@testgewebe.de)

Annex C: Formulation of the reference cleaner

Ingredient / Active Substance	CAS no.	Active content in raw material (w/w)	Adding of raw material* (w/w)	Ingredient / Active Substance (w/w)
Cocamidopropyl betaine	147170-44-3	38	0,45	0.171
Propylene glycol n-butyl ether	5131-66-8	100	1	1
Isopropyl alcohol	67-63-0	100	6,5	6.5
Water demineralised	-	100	ad 100	100

Homogenise all components in the quantities as stated above.

* Add the raw material "as is" ("tel quel"), taking into account the defined active content in column 3 of the table. If raw materials with other active contents are used, the addition of the raw materials must be adjusted so that the content of the active substance in the reference cleaner corresponds to the value in column 5.

Annex D: Reference formulation for the evaluation of residue formation

("medium, visible residues / stripes or drops" corresponds to evaluation scale 2)

Ingredient	Content of active substance in the reference formulation (w/w)
Genapol DU 080 (Clariant GmbH)	0.5
Texapon K12 P (BASF SE)	0.5
Water demineralised	ad 100

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