

# IKW Recommendation for the Quality Assessment of Winter Windscreen Cleaners for Windscreen Washer Systems (Version 2005)

## Foreword to these Recommendations

### 1. Objective

### 2. Environment

### 3. Assessment of test results

### 4. Legal provisions and voluntary agreements (packaging & labelling)

### 5. Further development

#### 1. Objective

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 recommendations. The IKW charged the expert committee 'Cleaning and Maintenance Products' (Fachausschuss Putz- und Pflegemittel – FP) to develop the recommendations presented here. The FP is composed of experts from competitor companies. This ensures the neutrality of the committee. Quality recommendations enable a qualified testing of products by the companies themselves and by consumers and test institutes. Quality standards are laid down that need to be fulfilled by the products concerned in order to meet expectations of consumers and manufacturers.

#### 2. Environment

The defined objective is directly connected with efforts of cleaning and maintenance products manufacturers to

achieve optimal quality standards for their products.

For the cleaning and maintenance products industry, achieving this goal is an integral element of the international Responsible Care initiative ('Verantwortliches Handeln für die Zukunft'). This initiative stands essentially for the commitment to continually improve the protection of health and the environment, including the work toward a sustainable and future-oriented development. Another goal is the economical and efficient use of natural resources in line with the following definition: 'Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.'

With this in mind 'Recommendations for quality assessment' serve to encourage company staff to act responsibly vis-à-vis humans and the environment in product development and manufacture. They also help fulfil consumer expectations in terms of efficacy, safety and environmentally sound products.

#### 3. Assessment of test results

Quality standards determine which qualities are relevant to a given product and to what extent these qualities must be present. It should be noted that every finished product has a certain spectrum of quality characteristics largely determined by consumer expectations so that in each product some characteristics are deliberately emphasized while others seem less important. Moreover the desired combination of product properties is subject to constant change, depending on the latest technical possibilities and

new consumer habits. Quality recommendations must not impair such developments. Consequently for each product only one overall result is valid to determine whether the product comes up to quality requirements or not. Emphasis on isolated test criteria is not admissible and may be misleading.

#### 4. Legal provisions and voluntary agreements

Where applicable, inter alia the following statutory requirements in their valid versions must be observed with regard to composition, packaging and labelling:

- German Foodstuffs and Commodities Act (Lebensmittel- und Bedarfsgegenständegesetz - LMBG)
- German Chemicals Act (Chemikaliengesetz - ChemG)
- German Dangerous Substances Ordinance (Gefahrstoffverordnung - GefStoffV)
- German Chemicals Prohibition Ordinance (Chemikalienverbotsverordnung)
- German Detergents and Cleaning Products Act (Wasch- und Reinigungsmittelgesetz - WRMG)
- German Surfactants Ordinance (Tensidverordnung - TensV)
- German Ordinance on Pre-Packaged Products (Fertigverpackungsverordnung - FPV)

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- Detergents Regulation (EC) No 648/2004
- 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)
- Voluntary agreements:
  - Use of child-resistant packaging
  - Ban of chlorinated organic solvents
  - Ban of alkyl phenol ethoxylates (APEO) of 14 January 1986

## 5. Further development

The expert committee 'Cleaning and Maintenance Products' is aware that the further development of products as such and changes in inputs and consumer habits may necessitate a further development of these recommendations.

The here presented quality recommendations replace recommendations for windscreen cleaners in the version of 1978, taking into account the changed market situation.

**Definition**

Windscreen cleaners for windscreen washer systems in vehicles (in the following 'windscreen cleaners' for short)

are products which are added – possibly diluted with water as intended – into the windscreen washer system of a motor vehicle. They serve to clean the front windscreen and possibly the rear windscreen while the windscreen wipers are in operation, and they might also serve to clean the headlights.

Generally, winter windscreen cleaners are aqueous alcohol and/or glycol solutions with additions of surfactants and possibly complexing agents which enable the cleaning of windscreens also at temperatures below freezing point.

These products are traded in plastic bottles and plastic canisters.

	Characterization	Testing / Description
1.	Product Name, including brand name	---
2.	Manufacturer and/or distributor	---
3.	Field of use (as stated by manufacturer)	Checking of correctness of statements, to the extent that they are not covered by the subsequent tests.
4.	Testing of the product in the condition as supplied	
4.1	Exterior condition	Sensory test (homogeneous, clear, turbid etc)
4.1.1	Colour	Sensory test
4.1.2	Odour	Sensory test
4.1.3	Use concentration	Unless specified otherwise, tests are performed with the windscreen cleaner in diluted form, as recommended by the manufacturer for anti-freeze protection to $-10^{\circ}\text{C}$ . Unless specified otherwise, the diluent is water ( $20^{\circ}\text{dH}$ , »hard water« according to gemäß DIN EN 12 829 [1]) (dH = deutsche Härte/ German hardness).
		Note: »Anti-freeze protection to $10^{\circ}\text{C}$ « means that the windscreen cleaner mixture is still liquid at this temperature at least and can be applied through common/commercial grade windscreen washer nozzles.
4.1.4	Reaction (pH value)	The pH value is determined (using an electronic pH meter) in the use concentration at $20^{\circ}\text{C}$ (cp. 4.1.3). The diluent is fully desalinated water.
4.1.5	Freezing point	Freezing points as stated by the manufacturer in mixing with water are determined according to ASTM D 1177-94 [2].
4.1.6	Flash point	The flash point determination, which is important for the labelling of the windscreen cleaner, is made according to DIN 51 755 (Abel-Pensky) [1] [2].
4.1.7	Viscosity	The determination of the kinematic viscosity according to DIN 51 562, part 1.1 [1] [22] is to be made in the use concentration (see 4.1.3).
4.1.8	Assessment	Results from tests under 4.1.1 to 4.1.7 are to be listed non-judgementally, because these properties are product-specific. Only if deviations from the manufacturer's statements are noted can this be mentioned negatively.
4.2	Polycarbonate compatibility	Testing for stress cracks in polycarbonate bending strips: The test is performed based on DIN 53 449 [1].
4.2.1	Test specimen	Uncoated polycarbonate bending strips [3] (55 mm x 165 mm x 3 mm)  The quality of the test specimens depends on the batch used. Therefore the comparative testing of windscreen cleaners must be performed only with polycarbonate test specimens from one and the same batch.

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	Characterization	Testing / Description
4.2.2	Preparation of test specimens	Prior to testing, the supplied test specimens are to be initially stored for at least 4 days at room temperature. If necessary, they are subsequently wiped with a cellulose tissue free from softeners and fluff that does not scratch the windscreens – in order to remove residues of separating agents from the production process. In case of heavier dirt, additionally cleaning over a short time with a small quantity of petroleum ether (boiling range 40-80°C) or isopropyl alcohol is permitted.
4.2.3	Implementation	<p>The winter windscreen cleaners are tested in a use concentration recommended by the manufacturer for anti-freeze protection to -10°C (cp. 4.1.3).</p> <p>Definition: »Test unit« means the test specimen clamped in the test apparatus.</p> <p>The test unit is brought to a temperature of 80 °C in the oven over ca. 1 hour. Then the test unit is removed from the oven, and the windscreen cleaner is immediately applied as follows: Lengthwise a filter paper* (3 cm x 4 cm) is placed centrally on the still warm test specimen and impregnated with 0.2 ml of diluted product. This application is repeated twice in intervals of 5 minutes each. After the third application, the test specimen is returned into the oven. The filter paper can be removed ca. 5 minutes later. Test duration: 48 hours.</p> <p>*e.g. Schleicher &amp; Schuell, Dassel, Weißband-Rundfilter, aschefrei, Ref.-Nr. 300112 [4].</p>
4.2.4	Assessment	<p>After removal of the test specimen from the oven and cooling down to room temperature, the test specimen is unclamped and the corners of the tested area are marked with a felt pen. Then residues of the windscreen cleaner mixture are removed from the test specimen under running water, and the test specimen is dried with an absorbent cellulose paper tissue which is free from fluff and does not scratch the windscreen. This is followed by a visual assessment against the light and against a dark background, in respect of starting cracks, matting or breakage. If necessary, this can be done using a reflected light microscope.</p>
4.3	Coating compatibility	
4.3.1	Test specimen	Commercial grade glass specimen holder (dimensions: at least 26 mm x 76 mm)
4.3.2	Conditioning of test specimens	<p>Preparation: The specimen holders are decreased with acetone and covered with coating by brief dipping into Stadox 2 K-Standocryl automotive coating, mixed – in the ratio prescribed by the manufacturer (Stadox GmbH, [5]) – with 2 K MS Rapid hardener. The specimen holders are dried at 60 °C over the period stated by the manufacturer.</p> <p>0.2 ml of test product are applied, in the maximally admissible use concentration stated by the manufacturer (dilution with fully desalinated water). After 2 hours of storage at 20 ± 2 °C the liquid is dried in to such an extent that the test substance is applied a second time and in the same quantity at the same spot, after further 2 hours of drying a third time in the same quantity at the same spot.</p>

	Characterization	Testing / Description
4.3.3	Assessment	The assessment is made visually after an impact time of 24 hours at room temperature. For this purpose, product residues are rinsed off with running water and the specimen holder is dried.
5	Cleaning performance	<p>Examinations of winter windscreen cleaners are subdivided in 3 tests (see 5.1.1):</p> <p>Removal of            (1) Hydrophobing soiling (test soiling I) with spraying            (2) Hydrophobing soiling (test soiling I) without spraying            (3) Salt soiling (test soiling II)</p> <p>Test (2) is optional, but its implementation is urgently recommended for the sake of a complete assessment of the cleaning performance. Consequently, the outcome of a complete assessment of winter windscreen cleaners consists of two - but preferably three - separate individual results which describe the different properties of windscreen cleaners. Therefore, these results must not be assessed in one overall summary evaluation.</p> <p>The scattered light (direct glare) caused by hydrophobing soiling in wet wiping is equally safety relevant as scattered light caused by crystallizing salt or renewed icing-up.</p>
5.1.1	Definitions	<p>The terms used in the following text are defined within this recommendation.</p> <p><u>Test:</u> An individual determination of the cleaning effect of a windscreen cleaner.</p> <p><u>Examination:</u> Several consecutive tests from statistical aspects. Examinations are possible for:            * Hydrophobing soiling,            * Salt soiling</p> <p><u>Examination series:</u> An examination series is the summary of one examination each for every windscreen cleaner. Usually examination series are repeated with a changed sequence of windscreen cleaners.</p> <p><u>Water:</u> Unless expressly stated otherwise in the text, »hard water« 20° dH according to DIN EN 12 829 [1] is to be used.</p> <p><u>Wiping cycle:</u> A complete, single to-and-fro movement of the wiper without spraying on of windscreen cleaner.</p> <p><u>Windscreen cleaner adding:</u> During a complete to-and-fro movement of the wiper, windscreen cleaner is applied onto the windscreen through the washer nozzles.</p> <p><u>Wash cycle:</u> One adding of windscreen cleaner followed by at least three wiping cycles.</p>

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	Characterization	Testing / Description
5.1.2	Equipment used in the examination and video documentation of tests	
5.1.2.1	Particulars on equipment used in the examination	<p>a) If a vehicle is used to examine the windscreen cleaners: State make, name of model and construction year.</p> <p>b) If own constructions are used: Enclose detailed description, with photos if possible</p>
5.1.2.2	Required accessories	<ul style="list-style-type: none"> <li>- Stabilizing power supply unit, direct current (5 – 15 V/at least 20 A), adjust voltage at the supply unit to 13.5 V (<math>\pm</math> 0,5 V)</li> <li>- Thermometer (-30 °C to + 30°C)</li> <li>- Spring balance (0 – 20 N)</li> <li>- Windscreen wiper adjuster (Scheibenwischer-Einstallgerät, e.g. Hazet Nr. 4851-1 [6]) to measure and correct the angle between wiper blade and windscreen</li> <li>- Hygrometer</li> </ul>
5.1.2.3	Test stand properties	<ul style="list-style-type: none"> <li>- The assessment is to be made in the C field-of-view.</li> <li>- The nozzles must be adjusted according to the manufacturer's instructions, and the impact points of the cleaning jets must be marked to enable of a control of whether the position of the impact points changes.</li> <li>- Determine with water and state the volume of the amount of liquid applied per wash cycle at 20°C.</li> <li>- Measure with the spring balance and state the press-on pressure at the end of the windscreen wiper arm.</li> <li>- Measure the angle between wiper blade and windscreen or adjust it according to the vehicle manufacturer's instructions, respectively.</li> <li>- Note down the number of wiping cycles after adding the windscreen cleaner (see 5.2.1)</li> </ul> <p><b>Fig. 1</b> FMVSS 104 Fields-of-view (blue: »A-field«; green: »B-field«; red: »C-field«. 99% of the C-field must be wiped by the windscreen wipers, 94% of the B-field, and 80% of the A-field)</p>  <p><b>Fig. 2</b> Spray areas (blue: impact areas of the wiping water at a standstill of the vehicle; red: impact areas of the wiping water when driving at a speed of ca. 60 to 80 km/h)</p> 

	Characterization	Testing / Description
5.1.2.4	Preparation of the test stand	<ul style="list-style-type: none"> <li>- Adjust the tension at the power supply unit to 13.5 V (<math>\pm</math> 0.5 V) at the wiper motor.</li> <li>- The temperature of the windscreen cleaner mixture to be tested must correspond to the test stand temperature chosen for the test (admissible deviation <math>\pm</math> 1 °C) and must be controlled directly before the start of the cleaning test.</li> <li>- Measure and state air humidity.</li> </ul>
5.1.2.5	Video documentation of cleaning effect	<p>One or two lamps are placed opposite the outside of a windscreen, ca. 1 to 3 m away from the windscreen. The lamp(s) simulate(s) the light from an oncoming vehicle. The power of a typical lamp is 60 to 100 W; the lamp is to provide a constant lighting performance throughout the entire test duration. The C field-of-view must be completely lighted.</p> <p>A video camera is placed at the inside of the windscreen; a standard camcorder is sufficient but black/white video cameras can be used, too. The distance to the inside of the windscreen is typically that between the driver and the windscreen. But - to be able to assess the largest possible section of the windscreen - the camera should not be placed too closely to the windscreen. It is important to deactivate aperture/time automatics of the camera. An exposure time of 1/100 s should not be exceeded. The focus of the camera should be adjusted to the windscreen. With a colour camera, a white balance must be performed before implementing the test.</p> <p>To suppress blinding by the direct incidence of light from the video lamps, black opaque blinds are stuck on the inside of the windscreen. Size and form of these blinds are chosen in such a way that the direct light is just stopped out. If a different type of blocking-out material is selected, it should be placed as closely as possible to the inside of the windscreen.</p> <p>It is best to perform the tests in a darkened room. It is also possible to use a matt-black background instead. However, then problems in the scattered light assessment cannot be fully excluded.</p> <p>Furthermore, it is important that the windscreen is clean on the inside and that 'spraying' is adjusted in such a way that the fed-in water causes the least possible optical impairment.</p>
5.1.3	Cleaning of the windscreen washer system and the feeders	<p>When changing the winter windscreen cleaner, the container for the windscreen cleaning liquid must be rinsed several times with a mixture of ethanol and fully desalinated water (volume ratio 1:1); the same applies for the feeders and nozzles.</p> <p>Subsequently the container is filled with the windscreen cleaner to be tested in the concentration to be tested, and then the feeders are rinsed thoroughly with this liquid.</p>
5.1.4	Cleaning and pretreatment of the windscreen	<p>A windscreen free from scratches and damage caused by falling stones must be used.</p> <p>Before each test the windscreen must be cleaned with utmost thoroughness and pretreated, e.g. inter alia to remove residues of previously tested windscreen cleaners. The following mixture serves to clean the windscreen (<i>silicolloid slurry</i>):</p>

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	Characterization	Testing / Description																								
		<p>Sillicolloid P 87 [7]                    20.00 %            Caustic potash solution, 45%       1.00 %            Citric acid                                0.55 %            Fully desalinated water               78.45 %</p> <p>The following steps are necessary for the pretreatment and cleaning of the windscreen:</p> <ol style="list-style-type: none"> <li>1. 1/2 hour watering of the windscreen with softened water</li> <li>2. Basic cleaning with ether sulphate solution (6%, with a sponge)</li> <li>3. Watering and removing of the water with a manual wiper</li> <li>4. Application of the silicolloid slurry / let dry superficially / polish off as much as possible</li> <li>5. Application of silicolloid slurry / remove the still moist slurry with a manual wiper and wipe off while watering</li> <li>6. Wipe dry the windscreen with Molton cloth</li> <li>7. Briefly water the windscreen (rinse off the last residues of slurry)</li> <li>8. Briefly test with drizzle for hydrophobic patches; if there are hydrophobic patches, repeat steps 5-8</li> <li>9. Rinse off the windscreen and dry it with one wiping cycle of the windscreen wiper</li> <li>10. 5 minutes of watering with a running windscreen wiper system, then wipe dry in one wiping cycle</li> </ol> <p>Next, the test soiling (see 5.1.6) must be applied rapidly after exactly after 30 s (see 5.1.7).</p> <p>Before any testing of a different windscreen cleaner, steps 2-10 must be repeated.</p>																								
5.1.5	Wiper rubbers	<p>New wiper rubbers must be used for each examination series (see 5.1.1). Before each test they are wiped with a cloth moistened with slurry (see 5.1.4) (special attention must be giving to adhering dirt), rinsed with fully desalinated water, and dried with a cellulose tissue or a similar material.</p>																								
5.1.6	Test soiling mixtures	<p><b>Test soiling mixture I:</b></p> <p>Hydrophobing soiling for the testing of winter windscreen cleaners</p> <table border="0" style="width: 100%;"> <tr> <td>Dowanol PnP (Propylen glycol-n-propyl ether)</td> <td style="text-align: right;">10.00 %</td> <td style="text-align: right;">[8]</td> </tr> <tr> <td>Crystal oil 21</td> <td style="text-align: right;">2.00 %</td> <td style="text-align: right;">[9]</td> </tr> <tr> <td>Dioctyl phthalate</td> <td style="text-align: right;">0.01 %</td> <td></td> </tr> <tr> <td>Silicone oil AK 1000</td> <td style="text-align: right;">0.10 %</td> <td style="text-align: right;">[10]</td> </tr> <tr> <td>Printex L</td> <td style="text-align: right;">0.05 %</td> <td style="text-align: right;">[11]</td> </tr> <tr> <td>White oil (Ingrapal W505)</td> <td style="text-align: right;">0.50 %</td> <td style="text-align: right;">[12]</td> </tr> <tr> <td>2-propanol</td> <td style="text-align: right;">86.99 %</td> <td></td> </tr> <tr> <td>Dimethyl dioctadecyl ammonium chloride</td> <td style="text-align: right;">0.35 %</td> <td style="text-align: right;">[13]</td> </tr> </table> <p><i>Manufacture:</i> Take downanol and crystal oil, dissolve dioctyl phthalate, silicone oil and white oil, then stir in Printex L. Finally, add 2 propanol and dissolve dimethyl dioctadecyl ammonium chloride. After dissolving, homogenize with Ultaturrax [14] for 1 min.</p> <p><i>Please observe:</i> The soot (Printex L) settles; shake or stir before use.</p> <p>Test soiling mixture I can be used for maximally one week.</p>	Dowanol PnP (Propylen glycol-n-propyl ether)	10.00 %	[8]	Crystal oil 21	2.00 %	[9]	Dioctyl phthalate	0.01 %		Silicone oil AK 1000	0.10 %	[10]	Printex L	0.05 %	[11]	White oil (Ingrapal W505)	0.50 %	[12]	2-propanol	86.99 %		Dimethyl dioctadecyl ammonium chloride	0.35 %	[13]
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		<p><b>Test soiling mixture II</b></p> <p>Salt soiling for the testing of winter windscreen cleaners.</p> <table> <tr> <td>Common salt (NaCl)</td> <td>10.0 %</td> </tr> <tr> <td>Calcium chloride, water-free (CaCl<sub>2</sub>)</td> <td>0.5 %</td> </tr> <tr> <td>Magnesium chloride, water-free (MgCl<sub>2</sub>)</td> <td>0.5 %</td> </tr> <tr> <td>Fully desalinated water</td> <td>ad 100 %</td> </tr> </table>	Common salt (NaCl)	10.0 %	Calcium chloride, water-free (CaCl <sub>2</sub> )	0.5 %	Magnesium chloride, water-free (MgCl <sub>2</sub> )	0.5 %	Fully desalinated water	ad 100 %
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5.1.7	Application of test soiling mixtures	<p>The test soiling mixtures are applied on the cleaned windscreen (see 5.1.4).</p> <p>The applied quantity of test soilings I and II is determined by weighing back and documented. Test soilings I and II are dried at ambient temperature, i.e. 0°C to 5°C, for 15 minutes.</p> <p><b>Test soiling mixture I:</b></p> <p>5 g ± 0,5 g of test soiling mixture I are sprayed on the windscreen (see 5.1.4). The test soiling mixture can be applied either with a hand spray bottle or an electric spray gun (e.g. Wagner-Spritzpistole Typ 400 SE [15]).</p> <p><b>Test soiling mixture II:</b></p> <p>Circa 10 g ± 0.5 g of test soiling mixture II are applied with a spray gun [15] in portions on the full area of the windscreen and dried. In between, drying with a cold air blower is necessary to avoid that the soiling runs off.</p> <div data-bbox="963 1155 1458 1462" data-label="Image"> </div> <p><b>Fig. 3 Salt soiling</b></p>								
5.2	Carrying out of the examinations									
5.2.1	Preliminary remarks	<ol style="list-style-type: none"> <li>1. An examination (see 5.1.1) consists for each windscreen cleaner of at least two time-connected tests.</li> <li>2. A complete examination series with all windscreen cleaners should be repeated twice, each time with a changed sequence of the windscreen cleaners.</li> <li>3. The windscreen cleaners must be anonymized for the test persons to achieve the best possible degree of neutrality.</li> <li>4. The number of washing cycles in each test should be limited to 10.</li> <li>5. Initially, every test is assessed individually. The assessment of an examination follows the usual methods of mean value calculation. In the summary assessment of several examinations from various examination series performed consecutively, it must be ensured that the sequence of the windscreen cleaners does not influence the examination result. If this is the case, further examination series must be implemented for the purpose of clarification.</li> </ol>								

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	Characterization	Testing / Description
		<p>6. The assessment of the removal of the layer causing scattered light must include a video documentation/control (see 5.1.2.5); additional statements on the assessment by the human eye are permitted and desirable.</p> <p>7. The use concentration is that described under 4.1.3.</p>
5.2.2.	Carrying out of the examination of winter windscreen cleaners and documentation of their performance	
5.2.2.1	Removal of hydrophobing soiling under spraying	<p><u>Preliminary remark:</u> Since the evaporation rate of water droplets causing scattered light depends on temperature and air humidity, constant test conditions are a prerequisite for an informative comparison. Therefore, it is recommended to carry out these part-examinations in a climatized room with documented high air humidity. In a comparative assessment the taking into account – as a corrective measure – of possibly highly fluctuating humidity and temperature conditions during the performance of the test is considered very difficult and, consequently, not recommended.</p> <p><u>Implementation:</u> The method is implemented at temperatures of 0°C to 5°C. Temperatures of under 0°C are not feasible, because permanent spraying is essential in this examination.</p> <p>The windscreen with test soiling mixture I, intended to simulate a fatty soiling of the windscreen (wax in car wash plants, diesel soot etc), initially undergoes 10 wiping cycles under permanent spraying with fully desalinated water, in order to homogenize the soiling. Then the washing cycles are performed. Washing cycles are performed until the C field-of-view is clean, <b>maximally 10</b>. The tests are documented by video recording (see 5.1.2.5).</p> <p>During the tests the windscreen must undergo permanent spraying (at least 2 l/min/windscreen; the spraying process must not impair the visual assessment). This can be achieved e.g. with spray guns or rain rakes. Dry wiping – also partial dry wiping – must be avoided.</p> <div data-bbox="997 1541 1469 1872" data-label="Image"> </div> <p><b>Fig. 4</b> Avoiding scattered light due to hydrophobing soiling</p> <p><u>Time of assessment:</u> The assessment takes place at the end of each wiping cycle. In terms of time, the assessment is made immediately after the round of wiping over the observation sector (counterlight range). The efficacy of the windscreen cleaner must <b>not</b> be assessed immediately after its adding.</p>

	Characterization	Testing / Description
		Experience shows that the windscreen cleaner can cause a temporary masking of the soiling due to the surfactants, giving a deceptive picture of perfect cleaning. Usually this masking is removed by a low number of wet wiping cycles, and residual soiling becomes evident over the scattered light. Consequently, an assessment immediately after the adding of the windscreen cleaner would not reflect the real situation of driving in the rain.
5.2.2.2.	Removal of hydrophobing soiling without spraying	<p><u>Preliminary remark:</u> See 5.2.2.1</p> <p>It is urgently recommended to carry out this examination without spraying. This is the only way to observe possibly remaining veils which can be caused by product residues on the windscreen; they can considerably impair safety in road traffic.</p> <p><u>Implementation:</u> Implementation takes place at temperatures of 0°C to 5°C for test soiling I, examinations with test soiling II are carried out at -10°C.</p> <p>The windscreen with test soiling mixture I, intended to simulate a fatty soiling of the windscreen (wax in car wash plants, diesel soot etc), initially undergoes 10 wiping cycles, in order to homogenize the soiling. Then the washing cycles are performed. Washing cycles are performed until the C field-of-view is clean. The tests are documented by video recording (see 5.1.2.5).</p> <p><u>Time of assessment</u> The assessment takes place at the end of each wiping cycle. In terms of time, the assessment is made immediately after the round of wiping over the observation sector (counterlight range). The efficacy of the windscreen cleaner must <b>not</b> be assessed immediately after its adding.</p>
5.2.2.3	Removal of salt soiling	<p><u>Preliminary remark:</u> To examine the removal of salt soiling, the winter windscreen cleaner mixture is mixed, according to the manufacturer's instructions, for an anti-freeze protection of -10 °C (see 4.1.3). The airstream when driving should be simulated by a blower and correspond to a speed of at least 50 km/h.</p> <p><u>Implementation:</u> Without spraying, at -10oC so many washing cycles are carried out until the salt soiling is removed.</p> <p><u>Time of assessment:</u> See 5.2.2.2</p>
5.2.2.4	Protection against renewed icing-up	<p><u>Preliminary remark:</u> To examine renewed icing-up, the winter windscreen cleaner mixture is mixed, according to the manufacturer's instructions, for an anti-freeze protection of -10°C (see 4.1.3). The airstream when driving should be simulated by a blower and correspond to a speed of at least 50 km/h.</p> <p><u>Implementation</u> Without spraying, one washing cycle is performed at -10 °C. It is observed whether renewed icing-up occurs.</p>

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	Characterization	Testing / Description
		<u>Time of assessment:</u> See 5.2.2.2
5.3	Assessment of protection against resoiling	If the product claim of a cleaner includes protection against resoiling, after a completed examination (5.2.2.1) test protection can be applied again without previously cleaning the windscreen with slurry pursuant to 5.1.4. Then the examination (5.2.2.1) is carried out once more.
5.4	Assessment	<p>Hydrophobing soiling: The number of washing cycles necessary to bring about a clean C field-of-view free from scattered light.</p> <p>Salt soiling: The number of washing cycles necessary to bring about a clean C field-of-view free from scattered light.</p> <p>Renewed icing-up: Does renewed icing-up occur in the examination?</p>
6	Literature and supply sources	<p>[1] DIN standards: Beuth Verlag GmbH, Burggrafenstraße 6, 10787 Berlin Germany</p> <p>[2] ASTM D 1177-94 (September 1994), can be obtained from the foreign standards service (Auslandsnormen Service) at Beuth Verlag GmbH, Burggrafenstraße 6, 10787 Berlin, Germany</p> <p>[3] IKW, Karlstraße 21, 60329 Frankfurt am Main, Germany</p> <p>[4] Whatman plc, 27 Great West Road, Brentford, Middlesex TW8 9BW UK</p> <p>[5] Standox GmbH, Christbusch 45, 42285 Wuppertal, Germany</p> <p>[6] HAZET-WERK, Güldenwerther Bahnhofstr. 25, 42857 Remscheid, Germany</p> <p>[7] Sillikolloid P87 (Hoffmann Mineral GmbH &amp; Co. KG, 86633 Neuburg, Germany)</p> <p>[8] Dowanol PnP (Dow Chemical, <a href="http://www.dow.com/facilities/europe/germany/index.htm">www.dow.com/facilities/europe/germany/index.htm</a>)</p> <p>[9] Kristallöl 21 (Deutsche Shell AG, 68309 Mannheim, Germany)</p> <p>[10] Silikonöl AK 1000 (Wacker-Chemie GmbH, 84489 Burghausen, Germany)</p> <p>[11] Printex L (Degussa AG, 60287 Frankfurt/Main, Germany)</p> <p>[12] Ingrapal W505 (Fuchs Mineralölwerke GmbH, 68145 Mannheim, Germany)</p> <p>[13] Dimethyldioctadecylammoniumchlorid: Fluka; Sigma-Aldrich Chemie GmbH, München, Germany, phone. +49 / 89 / 65 13-0, fax -11 69</p> <p>[14] Ultra-Turrax T 25 (Janke &amp; Kunkel GmbH &amp; Co. KG, 79219 Staufen, Germany)</p> <p>[15] J. Wagner Consumer Products GmbH &amp; Co., Besselstraße 28, 68219 Mannheim, Germany</p>

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