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Recommendations for the Quality Assessment of Household Laundry Detergents

Part A: Cleaning Performance I – Stain Removal

The German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW), Home Care Department, Frankfurt am Main, Germany

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Translation / Original: German

1. Preamble

The companies represented within the German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW, Industrieverband Körperpflege- und Waschmittel) provide their expertise on the products they manufacture available to the public in the form of recommendations for quality assessment.

These recommendations are developed by working groups to enable qualified testing of relevant products by manufacturers and test institutes. They describe quality characteristics that the products must fulfil to meet consumer and manufacturer expectations.

2. Sustainability

The companies within the IKW strive to achieve optimal quality standards for their products. They aim to ensure their future viability through consistent adherence to the guiding principle of sustainability: Sustainability is understood as the balanced integration of economic, social, and environmental aspects to meet current needs while preserving opportunities for future generations.

This commitment to sustainability is built on experiences reflected in numerous exemplary initiatives.

The member companies of the German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW) have long been engaged under the umbrella of the association and its sister organisations in sustainability efforts. These efforts have led to several recognised industry-specific initiatives, such as:

- Dialog-Platform FORUM WASCHEN [i],
- IKW-Sustainability Report for the Washing, Maintenance, and Cleaning Products Industry [ii],
- Sustainable Washing and Cleaning Industry Initiative "Charter" by the International Association for Soaps, Detergents and Maintenance Products (A.I.S.E., Brussels) [iii].

Additionally, members participate in initiatives from the raw materials and supplier industries, such as:

- "Responsible Care" Initiative of the chemical-pharmaceutical industry and chemical trade in Germany [iv],
- "Chemie³" Sustainability Initiative by the German Chemical Industry Association (VCI), the Industrial Union for Mining, Chemicals, and Energy (IG BCE), and the German Employers' Association for Chemistry (BAVC) [v].

The societal value of washing, maintenance, and cleaning products, particularly in terms of hygiene and preservation, is indisputable. These products significantly contribute to current living and health standards as well as resource conservation, for instance, by extending the lifespan of items such as textiles and washing machines.

In this sense, the recommendations for quality assessment on one hand serve the purpose to help company employees develop and manufacture products responsibly towards people and the environment, and on the other hand reassure consumers that they can expect effective, health-friendly, and environmentally compatible products.

The recommendations describe how relevant product characteristics can be evaluated and assessed. It is important to note that each product has a designated scope of action tailored to consumer expectations. Certain features of a product may be deliberately highlighted while others are less emphasised. The desired combination of features constantly evolves with new technical possibilities and changing consumer habits.

3. Regulations and Voluntary Agreements

Regarding composition, packaging, and labelling, the following regulations, in their current version and as applicable, should be observed:

- German Food, Consumer Goods, and Feed Code (LFGB)
- Chemicals Act (ChemG)
- Hazardous Substances Ordinance (GefStoffV)
- Chemicals Prohibition Ordinance (ChemVerbotsV)
- Detergents and Cleaning Agents Act (WRMG)

- Packaging Ordinance (FPV)
- Ordinance on the Transport of Dangerous Goods by Road, Rail and Inland Waterways
- Additionally, the following European Union regulations, which form the basis of these German regulations or to which they refer, are applicable:
  - 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) 2019/1148 on the marketing and use of explosives precursors

Furthermore, voluntary agreements relevant to detergents apply to IKW member companies [vi].

4. Objectives

In 2022, the IKW working group "EQ Detergents" was tasked by the IKW Detergents Committee to develop revised recom-mendations for the quality assessment of household laundry detergents. This revision should align with existing European testing procedures and consider current consumer needs and behaviour. The testing procedure for detergents with mini-mum performance requirements, as developed by the Detergents Europe (fomerly Association Internationale de la Savonnerie, de la détergence et des produits d'Entretien A.I.S.E., Brussels), was considered: https://www.detergentseurope.eu/science-research/detergent-test-protocol/. These recommendations for quality assessment do not address the ecological or resource efficiency of detergents. Additionally, no minimum cleaning performance levels for detergents are specified, as this was deemed neither feasible nor useful by the working group members.

The recommendations for quality assessment (EQ, German "Empfehlungen zur Qualitätsbewertung") for household detergents aim to include the following testing criteria:

- Cleaning Performance
  - Stain Removal
  - Whiteness maintenance
  - Whiteness (as optical impression)
- Textile Care:
  - Colour Care
  - Dye Transfer
  - Tear and Burst Strength
  - Surface Care

This Part A of the EQ specifies the testing method for stain removal. The testing methods for other criteria will be published in subsequent parts of the EQ. For a comprehensive evaluation of detergents, all parts of the EQ are required **(Table 1)**.

	Recommendations for Quality Assessment of Household Laundry Detergents
Part A	Cleaning Performance I: Stain Removal
Part B	Cleaning Performance II: Graying and Whiteness
Part C	Textile Protection I: Colour Care, Fabric Care, Tear and Burst Strength
Part D	Textile Protection II: Dye Transfer

Tab. 1 Titles of the Parts of EQ for Household Laundry Detergents

The testing methods should be reproducible, robust, differentiating, relevant to household use, and implementable with reasonable effort.

5. Introduction to Part A (Cleaning Performance I: Stain Removal)

Part A of these recommendations for quality assessment includes testing methods to evaluate the cleaning performance of household laundry detergents for textiles. These detergents are dosed and used in washing machines with a standardised load of 4.5 kg of dry fabric [1], as per Annex VII, Section B of the Detergents Regulation (EC) No. 648/2004 (commonly referred to as "heavy-duty detergents"). For these EQ the product type [2] is subdivided into two types of detergents, regardless of product form (e.g., liquid, solid, or pre-dosed detergents):

- Detergents for white textiles (often called "Vollwaschmittel" or "Universalwaschmittel" in Germany)
- Detergents for coloured textiles (often called "Colorwaschmittel" or "Buntwaschmittel" in Germany)

For evaluation purposes, only detergents of the same type (i.e., exclusively detergents for coloured laundry or exclusively detergents for white laundry) should be compared. The manufacturer's instructions regarding the intended use of the detergent (e.g., "detergent for coloured laundry") are decisive for the classification.

Additionally, there is a separate product type of light-duty detergents for delicate fabrics, which is not covered in Part A of these recommendations [3].

However, Part A may serve as the foundation for evaluating other detergent categories and product types with adjusted testing methods.

[1] Contrary to the requirements of the Detergents Regulation, a load of 3.6 kg was chosen for this test method for reasons of consumer relevance (see Chapter 6.1).

[2] Product type definition according to Decision (EU) 2017/1218 of 23 June 2017 establishing the EU Ecolabel criteria for laundry detergents.

[3] Household laundry detergents which are dosed and washed according to standard washing machine loads of 2.5 kg dry fabric in accordance with Annex VII.

In Part A of these recommendations for quality assessment, the following washing parameters are defined:

- Washing machine program
- Machine load
- Composition of test textiles and ballast load
- Ballast soil

For this Part A of the recommendations, the testing procedure for evaluating detergents' performance (both heavy-duty and light-duty detergents) and washing aids, as developed by the A.I.S.E., was considered [4]. Additionally, the following international standards are referenced for specific aspects:

- **DIN EN 60456:** "Washing machines for household use - Methods for measuring the performance" for load composition.
- **ASTM Standard D4265-21:** "Standard Guide for Evaluating Stain Removal Performance in Home Laundering" for the evaluation of individual stains.

6. Testing Criteria: Cleaning Performance – Stain Removal

General Notes:

The evaluation of tests is complex and should therefore only be conducted by individuals familiar with laboratory testing of textile detergents. Multiple repetitions are required for statistical analysis.

Products to be tested should be provided to evaluators in an anonymised manner.

The authors recommend regular cleaning of washing machines using washing machine cleaners with a pH value <7. The cleaning interval strongly depends on the detergents used, washing temperature, selected programs and water hardness in the test series. Ideally, a cleaning cycle should be performed after each test series.

Any deviations from the parameters and evaluation systems specified in the recommendations for quality assessment must be documented.

Test stains, ballast loads, ballast soil, and equipment cannot be sourced from the IKW office.

6.1 Preparation and Execution of the Wash Test

To evaluate the stain removal test, either the absolute remission values after washing (Y-values) or the difference in remission values before and after washing (Delta-Y values) may be determined [5]. When using Delta-Y (ΔY) values, each stain must be measured prior to washing.

Stains should not be pre-treated, even if this is recommended on the detergent packaging.

For this test method, the sum of the ballast load, stain monitors, and ballast soil results in a washing machine load of 3.6 kg. This load quantity reflects current consumer behaviour well [6]. The detergent dosage in gram is based on the instructions on the packaging for a 4.5 kg dry laundry load with "normally soiled" textiles and medium water hardness, in accordance with the Detergent Regulation (EC) No. 648/2004 [7]. Specifications and information on test stains, ballast textiles, measuring devices, equipment, chemicals, and suppliers are listed in **Annex 3**.

6.1.1 Test stains

a) Standard Stains

For Part A, "standard stains" are recommended. These are standardised stains applied in a circular or planar format on a standardised fabric and they are commercially available.

The following measurement methods are available for standard stains:

- **Automated Image Analysis:** Faster and simpler compared to reflectance measurements, digitizable, and storable.
- **Reflectance Measurement / Photometer:** Digitizable and storable.
- **Visual Evaluation:** Subjective, requiring trained personnel.

It is crucial for the entire test series that the same measurement method is consistently used.

To finalise the selection of test stains, various commercially available standard stains were validated in round-robin tests using selected liquid and solid detergents for white and coloured laundry. Based on the evaluation of all results regarding ranking, differentiation, and reproducibility, the stain selection in **Annex 1** was established.

In some cases, two options for a stain type (e.g., chocolate milk: "C-S-45" or "wfk 90 MF") may be selected. These options may lead to differences in rankings for individual stains

[4] Laundry Detergent Testing Guidelines, A.I.S.E (April 2023): https://www.detergentseurope.eu/science-research/detergent-test-protocol/ (called up: October 2026)

[5] This statement was verified and confirmed from a statistical point of view in a round robin test.

[6] T. Kimmel, K. Pauels: Abschlussbericht Untersuchung des Einflusses der Größe einer Dosierhilfe auf die dosierte Menge von Waschmitteln (call up: October 2024), Hochschule Niederrhein (2024): https://www.ikw.org/fileadmin/IKW_Dateien/downloads/Haushaltspflege/2023_12_17_Abschlussbericht_IKW-Dosierstudie_Korrigiert.pdf

[7] Household laundry detergents which are dosed and washed according to standard washing machine loads of 4.5 kg dry fabric in accordance with Annex VII (B) of Detergent Regulation (EC) No 648/2004.

but do not significantly alter the overall result when considering all stains collectively [8]. This was statistically confirmed in additional tests.

For execution, a stain monitor with 23 test stains sewn onto a fabric carrier may be used (see **Figure 1**). Details on obtaining the stain monitor are provided in **Annexes 1** and **3**. A stain monitor has 24 slots, with one position left empty or used for other purposes. The groups of stains and the number of stains per group have been established such that the stain set, consisting of 23 stains, already reflects the weighting of consumer relevance. The selection of stain types was also aimed at achieving maximum differentiation and reproducibility.



Fig. 1 Stain monitor consisting of 23 standard stains and a white fabric sewn onto a fabric carrier. *(Image Source: Center for Test Materials - CFT)*

b) Individual Stains

In addition to standard stains, "individual stains" can be used. These are primarily applied in circular shapes on fabrics prewashed with a test detergent. To evaluate effects resulting from previous washes with the same detergent (e.g., "Soil Release Effects"), it is recommended to conduct tests with a suitable selection of individual stains applied to test fabrics prewashed with respective test detergent. Regarding this aspect, consumer habits are better reflected by individual stains than by standard stains.



Fig. 2 Ballast load consisting of pillowcases and huckaback towels. *(Image Source: wfk-Testgewebe GmbH)*

The following measurement methods are available for individual stains:

- **Visual Evaluation:** Subjective, requiring trained personnel.
- **Automated Image Analysis:** Generally faster and simpler than reflectance measurements, digitizable, and storable.
- **Reflectance Measurement / Photometer:** Digitizable and storable.

The applicability of individual stains was not examined by the IKW working group "EQ Detergents" due to the lack of standardisation. General guidelines on the preparation, use, and evaluation of individual stains are included in **Annex 2**. Those individual stains are serving as an addition to the standard stains within Part A of this EQ.



Fig. 3 Four SBL soil ballast fabrics. *(Image Source: wfk-Testgewebe GmbH)*

6.1.2 Load Composition

If deviations from the following parameters occur, they must be documented.

Details for sourcing materials are provided in Annex 3:

- Total Load Weight: 3.6 kg (including ballast load, soil ballast, and stain set), based on DIN EN 60456 without bed sheets [9].
- Ballast Load (Cotton Fabric): Flat fabrics, such as towels and pillowcases (e.g., 15 huckaback towels and 7 pillowcases, depending on weight; see **Figure 2**).
- Before each test series, ensure that the ballast load is as free from residues as possible: Perform two washes with standard detergent (ECE) and one wash without detergent in the 60 °C cotton program.
- Ballast Soil: Four soil ballast fabrics ("Soil Ballast Load" - SBL) per wash cycle (see **Figure 3**). SBL from different manufacturers listed in **Annex 3** showed no significant differences in test results during round-robin trials. How-

[8] See chapter 7.2 "Evaluation and Assessment of Results"

[9] Due to their size, bed sheets should be avoided as they cannot be ideally mixed with other laundry in the washing machine, and this can therefore lead to greater variations in the result.

ever, it is recommended to use SBL soil ballast fabrics from the same manufacturer within a single test series.
- One Stain Monitor per Wash Cycle: Consisting of 23 test stains fixed on a carrier.
- The stain monitor and soil ballast must not come into direct contact.

6.1.3 Washing Machine Parameters

If deviations from the following parameters occur, they must be documented.

When multiple washing machines are used simultaneously, they must be identical in design. The machines should be used alternately. Between uses, the empty machines should be rinsed with a wash cycle without detergent, using cold water. Identical parameters must be maintained throughout the entire test series.

The method was validated based on the following parameters:
- **Water Hardness:** 14 °dH ± 2 °dH (medium hardness).
- **Calcium/Magnesium Ratio:** 3:1.
- **Program:** 40 °C cotton program [10] without prewash (test wash program).
- **Wash Time:** 60–75 minutes washing time during the main wash cycle.
- **Heating System:** Maintains stable washing temperature.
- **Sensor Technology:** None (e.g., no foam detection, no load sensors), to ensure a constant water volume for the main wash (approximately 15 litres).
- **Spin Speed:** Maximum of 1,600 rpm.

6.1.4 Test Execution

If deviations from the following parameters occur, they must be documented.

1. **Pre-Test Preparation:** Start the test day with a conditioning run using a ballast load in the test wash program without detergent. This ensures the machine is preheated, the ballast load is moistened, and any residual water is used up.
2. **Loading Scheme:** The machine must be loaded in the same manner for every cycle (see Section 6.1.2). The stain monitor and soil ballast must not come into direct contact.
3. **Detergent Dosage:** Use the dosage recommended for 4.5 kg of dry laundry for "normally soiled" textiles at medium water hardness, as per the manufacturer's instructions.
4. **Dosage Location:** Follow the manufacturer's recommendations (e.g., detergent in the dispenser drawer).
5. **Wash Program:** Recommended is the 40 °C cotton cycle.
6. **Drying:** After washing, the stain monitor should be air-dried on a line without any temperature treatment (e.g., no ironing, mangling, or tumble drying).
7. **End-of-Day Procedures:** Ballast loads should not be left in laundry baskets. Use a dryer for drying and perform a conditioning run with the ballast load the following morning.
8. **Repetition:** A minimum of six test repetitions is required, with alternating machine loads. Between cycles and at the end of the day, rinse the machines using a short wash program with cold water and no detergent.
9. **Consistency:** Ensure that the same ballast load is consistently assigned to each test detergent throughout the repetitions.

7. Test results for Stain Removal

The evaluation and subsequent assessment of stain removal performance are conducted using instrumentation supported by statistical methods. The interpretation of the measurement results takes the following key factors into account:
- Statistical Analysis
- Perceptibility to Consumers

Adherence to defined measurement parameters and proper documentation are essential for test execution.

7.1 Determination of Measurement Values

If deviations from the following measurement procedures occur, they must be documented.

In the round robin trials conducted for the EQ, the difference in remission values of test stains before and after washing (Delta-Y values) was used as the parameter for stain removal **(Figure 4)**. Using standard optical measuring devices (e.g., CFT Mach5 or Datacolor ELREPHO 1000), Y-values were determined.

Measurements must be taken against a white background, with the following conditions **(Figure 5)**:
- Lens Aperture: Preferably large (ideally 30 mm).
- UV Filter: At 400 nm or 420 nm.
- Gloss Exclusion: No gloss reflection.

[10] The washing temperature used corresponds well to the average washing temperature of around 42 °C used in Europe; see e.g. "A.I.S.E.'s pan-European habits survey 2020": https://aise.eu/priorities/science-research/consumer-research/ (call up: November 2024)

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Fig. 4 Stain monitor before (left) and after (right) washing. *(Image Source: Center for Test Materials - CFT)*

For smaller lens apertures, at least three measurement points are recommended for a homogeneous coverage of the stain.

7.2 Evaluation and Assessment of Results

If deviations from the following evaluation and assessment methods occur, they must be documented.

The mean values and standard deviations for each stain and test product are calculated from the measurement values obtained in Section 7.1. Clear outliers (e.g., identified via outlier tests based on one-way ANOVA) should be removed, and the outliers replaced with the mean of the remaining values.

When interpreting results, ensure that the measured differences exceed statistical deviations. For consumer perceptibility, a difference in Y-values of at least 2 units is visually noticeable (to trained observers).

For assessing stain removal as per this method, it is recommended to determine the ranking of the tested products based on the entire stain set, following the evaluation macro "A.I.S.E. protocol for comparative laundry detergent testing". This involves statistically comparing stain removal results of all detergents tested across the full stain set, summarising statistically significant advantages, disadvantages, and equivalencies.

From the calculated frequencies of statistically significant advantages or equivalencies, a ranking can be derived. Rankings can be based on Y-values (post-wash) or Delta-Y values, with both parameters yielding comparable rankings.

The Excel evaluation table as well as guidance on how to use the table can be accessed via the following website: *https://aise.eu/priorities/product-stewardship/detergents/detergent-test-protocol/*

Other evaluations may be conducted depending on the research question (e.g., cleaning performance for specific types of stains).

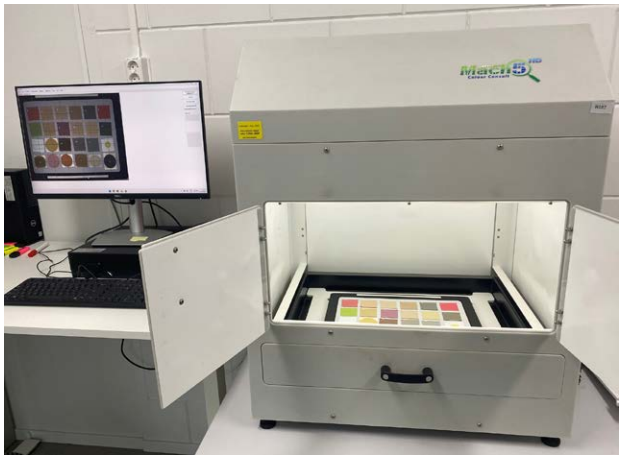


Fig. 5 Measurement setup for determining Y-values of test stains. (Image Source: Center for Test Materials - CFT)

8. Members of the working group

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[i] https://www.forum-waschen.de/ (called up: February 2025)

[ii] https://www.ikw.org/haushaltspflege/nachhaltigkeit/ikw-nachhaltigkeitsbericht (called up: February 2025)

[iii] https://www.sustainable-cleaning2020.com/home/what-is-the-charter (called up: February 2025)

[iv] https://www.vci.de/themen/nachhaltigkeit/responsible-care/uebersicht.jsp (called up: February 2025)

[v] https://www.chemiehoch3.de/ (called up: February 2025)

[vi] https://www.ikw.org/haushaltspflege/wissen/freiwillige-vereinbarungen-und-selbstverpflichtungen-der-hersteller-von-wasch-pflege-und-reinigungsmitteln-im-ikw (called up: February 2025)

Annexes

Annex 1: Selected standard stains for test monitor.

			Option 1			Option 2		
Stain Group	Nr.	**Stain Type**	**Item number**	**Substrate**	**Manufacturer**	**Item number**	**Substrate**	**Manufacturer**
Chocolate	1	Chocolate Milk	C-S-45	Woven Cotton	CFT	wfk 90 MF	Woven Cotton	WFK
	2	Chocolate Ice	C-S-68	Woven Cotton	CFT			
Cosmetics	3	Make-up	WE5FM2	Knitted Cotton	2M Equest	C-S-17	Woven Cotton	CFT
	4	Lipstick	wfk 20 LS	Woven Poly/Cotton	WFK			
Fatty Stains	5	Used Fat (vegetable)	KC-H187	Knitted Cotton	CFT	WEL-124kc	Knitted Cotton	2M Equest
	6	Used Fat (Beef)	WE5BBPC2	Woven Poly/Cotton	2M Equest			
	7	Lard (coloured)	C-S-62	Woven Cotton	CFT			
	8	Motor Oil	wfk 10 RM	Woven Cotton	WFK	C-01s	Woven Cotton	CFT
Fruits	9	Fruit Juice	C-S-15	Woven Cotton	CFT	wfk 10 WB	Woven Cotton	WFK
	10	Red Wine	KC-H026	Knitted Cotton	CFT	WE5RW	Knitted Cotton	2M Equest
	11	Tomato	WE5TP	Knitted Cotton	2M Equest	KC-H079	Knitted Cotton	CFT
Fat/Starch Complex	12	Cereal	E-163	Woven Cotton	Swissatest			
	13	Gravy	C-S-82	Woven Cotton	CFT	C-H017	Woven Cotton	CFT
	14	Salad Dressing	C-S-406	Woven Cotton	CFT			
	15	Curry (Sauce)	KC-H194	Knitted Cotton	CFT			
Hot Drinks	16	Tea	wfk 10 J	Woven Cotton	WFK	C-S-97	Woven Cotton	CFT
	17	Coffee	KC-H109	Knitted Cotton	CFT	WE5EC	Knitted Cotton	2M Equest
Chlorophyllic Stains	18	Grass	WE5SG	Knitted Cotton	2M Equest	C-S-07	Woven Cotton	CFT
Outdoor Stains	19	Grass/Mud	WE5GM	Knitted Cotton	2M Equest			
Body Soils	20	Sebum	wfk 10 D	Woven Cotton	WFK	WEL160kc	Knitted Cotton	2M Equest
	21	Collar Stain	C-S-98	Woven Cotton	CFT			
	22	Body Grime	wfk BG-MRF12	Knitted Poly/Cotton	WFK	KPC-H263	Poly/Cotton	CFT
	23	Blood	E-111	Woven Cotton	Swissatest	C-S-01	Woven Cotton	CFT
Clean	24	Cotton	CN-17	Woven Cotton	CFT	wfk 10 A	Woven Cotton	WFK

Annex 2: Guidelines for the Preparation, Use, and Assessment of Individual Stains.

To evaluate effects from previous washes with the same detergent (e.g., "Soil Release Effects"), it is recommended to complement the test with a suitable selection of individual stains applied to test fabrics pre-washed with the respective test product. This process requires significant expertise. The removal of various stain types can be influenced by the properties of the test fabric. Depending on the research question, test fabrics with different fibre compositions (e.g., cotton, polyester/cotton blends, polyester) and different fabric types (e.g., woven or knitted fabrics) can be used for tests with individual stains.

To remove residues from finishing agents, new test fabrics should be pre-washed with a standard detergent without optical brighteners (e.g., ECE detergent, see **Annex 3**).

The quantity of test fabric required for the intended test series should be cut into individual pieces/monitors and pre-washed at least three times with the respective test detergent. The washes should be conducted at medium water hardness, using the dosage recommended for "lightly soiled" textiles.

Freshly prepared stain substances should be applied to the prepared test fabrics as described above. Ensure that at least four repetitions of a stain set are prepared for each test detergent. The preparation of selected individual stains can follow the ASTM method D4265-21, Annex A.1 and A.2. The drying and ageing of individual stains should occur under identical conditions for all test detergents (e.g., consistent temperature and humidity levels) and preferably shielded from direct light exposure. After an ageing period (typically seven days), the washing tests to evaluate cleaning performance can be conducted. The pieces/monitors should be used promptly after ageing.

For individual stains, evaluation should ideally be conducted visually by at least two trained evaluators. Visual assessment generally reflects consumer experience effectively. Evaluation should occur under defined conditions (e.g., daylight D65, neutral/grey background) using a suitable grading scale. For example, the AATCC Stain Release Replica (see ASTM method D4265-21, Section 9) or another appropriate grading standard can be used.

The cleaning performance for each stain is visually graded on a scale ranging from "completely removed" to "highly visible/barely changed."

Annex 3: Sources for Test Stains, Fabric Carriers, Ballast Load, Ballast Soil , Detergents, Measurement Equipment, and Washing Machines.

Test Stains, Ballast Load, Ballast Soil, Standard Detergents

Stain Monitor as per **Annex 1**

- MON-IKW 2024 (35 cm x 45 cm fabric carrier with 24 test stains, each 5 cm x 5 cm): Center for Test Materials (CFT), Stoomloggerweg 11, 3133 KT Vlaardingen, Netherlands. Phone: +31 10 460 39 55, Email: info@cftbv.nl, Website: www.cftbv.nl
- wfk IKW-MON-2024“ (45 cm x 35 cm mit 24 Testflecken 5 cm x 5 cm): wfk – Testgewebe GmbH, Christenfeld 10, 41379 Brüggen-Bracht, Germany. Phone: +49 2157 871977, Telefax: +49 2157 90657, E-Mail: info@testgewebe.de; www.Testgewebe.de

Single Stains as per **Annex 1**

- Center for Test Materials (CFT), Vlaardingen, Netherlands (details above).
- Swissatest Testmaterialien AG, Mövenstrasse 12, CH-9015 St. Gallen, Switzerland. Phone: +41 71 311 80 55, Email: info@swissatest.ch, Website: www.swissatest.ch
- wfk – Testgewebe GmbH, Brüggen-Bracht, Germany (details above).
- 2M Equest Limited, Registered Office: Unit 55, Derwentside Business Centre, Consett Business Park, Villa Real, Consett, England, DH8 6BN. Phone: +44 (0) 207 170 6030, Email: enquiries@2m-equest.com

Ballast Load (DIN EN 60456, "Household Washing Machines – Measuring Performance"):

- CFT-IEC T12 Huckaback Towels and CFT-IEC T13 Pillow Cases: Center For Testmaterials (CFT); Stoomloggerweg 11, 3133 KT Vlaardingen, Netherlands. Phone: +31 10 460 39 55; E-Mail: info@cftbv.nl; www.cftbv.nl
- Huckaback Towels wfk T12 (Order No. 99102) and Pillow Cases wfk T13 (Order No. 99103): Both items are also available pre-washed three times with ECE detergent: wfk – Testgewebe GmbH, Brüggen-Bracht, Germany (details above).
- Cotton Pillowcases (Article: 353) and Towels (Article: 351) meeting EN/IEC 60456: Swissatest Testmaterialien AG, St. Gallen, Switzerland (details above).

Ballast Soil (SBL Soil Ballast Sheets):

- SBL-CFT: Center For Testmaterials (CFT); Stoomloggerweg 11, 3133 KT Vlaardingen, Netherlands. Phone: +31 10 460 39 55; E-Mail: info@cftbv.nl; www.cftbv.nl
- wfk SBL-2004: wfk – Testgewebe GmbH, Christenfeld 10, 41379 Brüggen-Bracht, Germany. Phone: +49 2157 871977, Telefax: +49 2157 90657, E-Mail: info@testgewebe.de; www.Testgewebe.de

Standard Detergent ECE: e.g.

- wfk ECE-2 Colourfastness Detergent (phosphate-free, 1998 formula) (Order No. 88031): wfk – Testgewebe GmbH, Brüggen-Bracht, Germany (details above).
- W-ECE-2: Center For Testmaterials (CFT); Stoomloggerweg 11, 3133 KT Vlaardingen, Netherlands. Phone: +31 10 460 39 55; E-Mail: info@cftbv.nl
- 601 ECE Colourfastness Reference Detergent 77 (ISO 105-C06, ISO 105-C02, without optical brighteners): Swissatest Testmaterialien AG, St. Gallen, Switzerland (details above).

Measuring devices and Washing machines

Optical Measuring Devices for Determining Y-Values:

- Datacolor ELREPHO 1000: Datacolor Germany - Datacolor GmbH, Elbestraße 10, D-45768 Marl, Germany. Phone +49 2365 5109 0; Telefax + 49 2365 5109 39
- MACH 5: Center For Testmaterials (CFT); Stoomloggerweg 11, 3133 KT Vlaardingen, Netherlands. Phone: +31 10 460 39 55; E-Mail: info@cftbv.nl
- DigiEye: VeriVide Limited, Quartz Close, Warrens Business Park, Enderby, Leicester LE19 4SG, UK. Phone: +44 (0)116 284 7790 Email: sales@verivide.com, enquiries@verivide.com
- CM 3600A / CM 3610A, Konica Minolta Business Solutions Deutschland GmbH; Europaallee 17, D-30855 Langenhagen, Germany; Phone: +49 511 74040; https://www.konicaminolta.de

Washing Machines:

- Standardised Household Washing Machines for Laboratory Use: e. g., Miele W1935WPS, Miele WCI360WPS and upon request from other manufacturers available or if applicable Household Washing Machines.

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