

EU Ecolabel protocol for testing for stain removers
Version 22/06/2016

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Abbreviations

HDD	Heavy duty detergent	DTI	Dye transfer inhibition
CSD	Colour safe detergent	SBL	Soil ballast load
LDD	Light duty detergent	PC	Sodium percarbonate
SR	Stain remover	TAED	Tetra acetyl ethylene diamine
BDW	Basic degree of whiteness	PVP	Polyvinylrrolidone
CM	Colour maintenance	CO	Cotton
PA	Polyamide	PES	Polyester
PES/CO	Polyester/cotton	WO	Wool
SI	Silk		

0. Background

This test protocol serves as a proof to show compliance with the criterion "fitness for use" of the Commission [Decision xxx/EC](#) establishing EU Ecolabel criteria for Laundry detergents. The product shall be fit for use, meeting the needs of consumers.

The test is for products that fall under the scope of the product group "Laundry detergents". This means, this protocol focuses on stain removers as specified in the section 2.1 "Range of application".

1. Test criteria

The intention is that the test should show that stain removers make a positive contribution to the washing result. This is achieved by performing a wash test for the standard reference and comparing this result with the result of an equivalent wash test for the standard reference with a stain remover added. The wash test shall be passed for all soil types that the product is claimed to have an effect on. If no specific types of soils are specified on the product at least five different soils must be tested and the reasons for the choice of these soils must be stated.

2. Materials and conditions

The test institute must be able to prove the compliance with all test conditions laid down in the following paragraphs. The documentation of the compliance with all test conditions shall be part of the test report (section 5 Results and reporting).

2.1 Range of application:

In the context of the EU Ecolabel, this performance test can be applied to stain removers (SR) for clothing, for soaking as a wash enhancer or for pre-washes or other equivalent functions. Pre-treatment stain removers include stain removers used for direct spot treatment of textiles (before washing in the machine) but don't include stain removers dosed in the washing machine and stain remover dedicated to other uses besides pre-treatment.

2.2 Washing machine types:

Programmable electronic [Miele](#) household washing machines which fulfil the following requirements

Table 1. Washing machine and wash programmes specifications

	Cotton wash program (at 30C, 20C ¹ , 15C ²)	Delicate program ³ (at 30C, 20C ¹ , 15C ²)
Duration main wash	50-70 min	30-40 min
Total program duration	100-120 min	55-65 min
Water quantity main wash	15±2 l	20±2 l
Total water quantity	55±5 l	64±5 l
Number of rinse cycles	3	3
Final spin speed	1200rpm	600rpm

¹for cold water products

²most of the older machines do not offer cold water programs. Those machines which offer cold water programmes normally heat up the entering water to 21C, which can be used for products that claim to be effective at 20C. For test runs at 15C the heating elements of the washing machine have to be disconnected to prevent the heat up

³some newer washing machines offer an equivalent synthetic program

2.3 Water conditions:

Water hardness: $2,5 \pm 0,2$ mmol CaCO_3 /l. the Ca/Mg ration will be $3 \pm 0,5$

Water inlet temperature: $20,0 \pm 2,0$ C, but not for those product that claim to be effective at lower temperature. The water inlet temperature for products which are effective at lower temperature shall be $15,0 \pm 0,2$ C

The amount of water shall be controlled along the washing process, if possible.

The water hardness and the water inlet temperature shall be reported for the test product and reference detergent or stain removal

2.4 Ballast load:

Cotton ballast load: the base load of cotton shall consist of cotton pillowcases and cotton huckaback hand-towels conforming to the following specifications. The values are for new (unwashed) textiles.

Table 2. Cotton Ballast load

	Pillowcases	Hand-towels
Type	Bleached cotton 1/1 plain weave	Bleached cotton wave-huckaback
Mass per unit area	185 ± 10 g/m ² of finished fabric	220 ± 10 g/m ² of finished fabric
Warp	33 ± 1 tex	19 ± 1 threads/cm of 36 ± 1 tex
Weft	363 ± 1 tex	13 ± 1 threads/cm of 97 ± 1 tex
Pieces	Pieces of 1600mm x 800 mm $\pm 2\%$ folded in half and sewn along the three open edges thus forming double thickness (finished size: 800x800 mm ²) the shrinkage shall be less than 2% in a test according to ISO 6330	Length 1000 mm ± 50 mm Width 500 mm ± 30 mm

2.5 Stains sets

For non-specific products, the product must be tested on a minimum of five different stains. If the product claims a specific effect, the product must be tested on a minimum of five stains of the product claim. In any case, the reason for the choice of the stains must be given to the competent body (Section 5 Results and reporting).

Two sets of stains per wash cycle (in the same batch) should be used. Mark with a water resistant pen each stain as the Figure 1 Fix the stains on the loads with a plastic staple with a gun on the load, as the example in Figure 2 Alternatively, the stains can be stitched together beforehand to make a full test strip. Then, this strip must be fixed on a hand towel before washing.

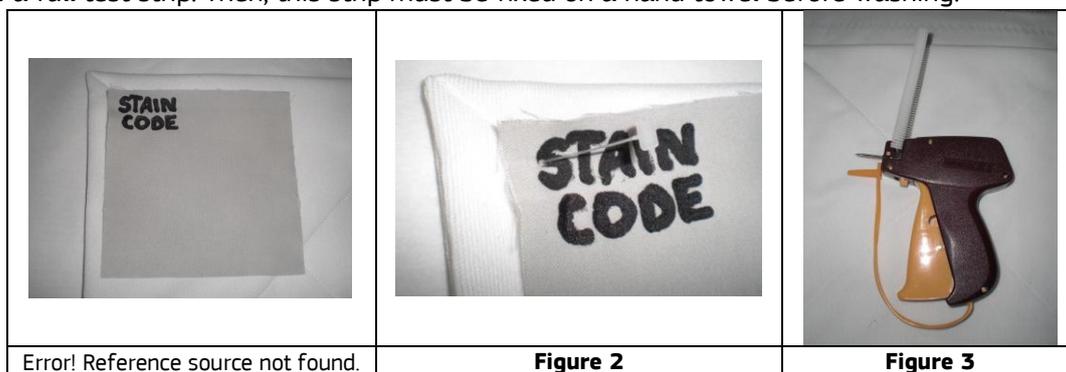


Figure 1-3. Marking of the stain sets

Table 3. Information on the different stains and suppliers

Stains	Fabric	Standard stains			Hand made	Type
Carbon black/ olive oil	CO	EMPA 101				Greasy
	PES/CO	EMPA 104				

	WO	EMPA 107				
Carbon black/ mineral oil	CO	EMPA 106	WFK 10M			Greasy
	PES/CO		WFK 20M			
	PES		WFK 30M			
Blood	CO	EMPA 111	WFK 10PBU WFK 90PBU		109KC	Enzymatic
	PES/CO		WFK 20PBU		109PC	
	PES		WFK 30PBU		109PE	
Aged blood	CO		WFK 10PBU WFK 90PB	CFT CS-01		Bleachable Enzymatic
	PES/CO		WFK 20PB	CFT PC-S-01		
	PES		WFK 30PB	CFT P-S-01		
Cocoa	CO	EMPA 112		CFT CS-02	038KC	Enzymatic
	PES/CO			CFT PC-S-02	038PC	
	PES			CFT P-S-02	038PE	
Red wine	CO	EMPA 114	WFK 10LIU WFK 90LIU	CFT CS-103	126KC	Bleachable
	PES/CO		WFK 20LIU	CFT PC-S-103	126PC	
	PES		WFK 30LIU	CFT P-S-103	126PE	
	WO		WFK 60LIU			
	SI		WFK 70LIU			
Aged red wine	CO	EMPA 122	WFK 10LI WFK 90LI	CFT CS-03		Bleachable
	PES/CO		WFK 20LI	CFT PC-S-03		
	PES		WFK 30LI	CFT P-S-03		
	WO		WFK 60LI			
	SI		WFK 70LIU			
More aged red wine	CO		WFK 90LI-X			Bleachable
Blood/milk/ink	CO	EMPA 116		CFT C-05		Bleachable Enzymatic
	PES/CO	EMPA 117		CFT PC-05		
	PES			CFT P-05		
Sebum/pigment	CO	EMPA 118	WFK 10D WFK 90D			Greasy
	PES/CO	EMPA 119	WFK 20D			
	PES		WFK 30D			
	WO		WFK 60D			
	SI		WFK 70D			
Lipstick	CO	EMPA 141/1 EMPA 141/2 EMPA 141/3	WFK 10LS	CFT CS-16 CFT CS-116	073KC	Greasy
	PES/CO	EMPA 141/1 EMPA 141/2 EMPA 141/3	WFK 20LS	CFT PC-S-16 CFT PC-S-116	073PC	
	PES		WFK 30LS	CFT P-S-16 CFT P-S-116	073PE	
	WO		WFK 60LS			
	SI		WFK 70LS			
Make up	CO	EMPA 141/1 EMPA 141/2 EMPA 141/3	WFK 10MU	CFT CS-17	075KC	Greasy
	PES/CO	EMPA 141/1 EMPA 141/2 EMPA 141/3	WFK 20MU	CFT PC-S-17	075PC	
	PES		WFK 30MU	CFT P-S-17	075PE	
	WO		WFK 60MU			
	SI		WFK 70MU			

Chocolate cream	CO	EMPA 160				Bleachable Enzymatic
Chocolate	CO		WFK 10Z	CFT CS-44	033KC	Enzymatic
	PES/CO		WFK 20Z	CFT PC-S-44	033PC	
	PES		WFK 30Z	CFT P-S-44	033PE	
	WO		WFK 60Z			
	SI		WFK 70Z			
Cocoa, temperature treated	CO		WFK 10MF WFK 90MF			Enzymatic
	PES/CO		WFK 20MF			
	PES		WFK 30MF			
Cocoa, not temperature treated	CO		WFK 10MFU WFK 90MFU			Enzymatic
	PES/CO		WFK 20MFU			
	PES		WFK 30MFU			
Corn starch	CO	EMPA 161	WFK 10R	CFT CS-26		Enzymatic
	PES/CO	EMPA 162	WFK 20R	CFT PC-S-26		
	PES		WFK 30R	CFT P-S-26		
Potato starch	CO			CFT CS-27		Enzymatic
	PES/CO			CFT PC-S-27		
	PES			CFT P-S-27		
Rice starch	CO			CFT CS-28		Enzymatic
	PES/CO			CFT PC-S-28		
	PES			CFT P-S-28		
Porridge	CO	EMPA 163			097KC	Bleachable Enzymatic
Grass	CO	EMPA 164		CFT CS-08	062KC	Bleachable Enzymatic
	PES/CO			CFT PC-S-08	062PC	
	PES			CFT P-S-08	062PE	
Pudding (mananase sensitive)	CO	EMPA 165				Bleachable Enzymatic
Tea	CO	EMPA 167	WFK 10J	CFT BC-03	117KC	Bleachable
	PES/CO	EMPA 168	WFK 20J	CFT PC-BC-03	117PC	
	PES		WFK 30J	CFT P-BC-03	117PE	
	SI		WFK 70J			
Tea for medium and high temperature	CO			CFT BC-01		Bleachable
	PES/CO			CFT PC-BC-01		
	PES					
Pigment/ lanolin	CO		WFK 10C			Greasy
	PES/CO		WFK 20C			
	PES		WFK 30C			
	WO		WFK 60C			
	SI		WFK 70C			
Pigment/ olive oil	CO		WFK 10B	125KC		Greasy
	PES/CO		WFK 20B	125PC		
	PES		WFK 30B	125PE		
	WO		WFK 60B			
	SI		WFK 70B			

2.6 Stains set size

(12x12) cm² (standard stains and colour maintenance and (5x5) cm² (hand-made).

2.7 Soil

Introduce 4 units of SBL 2004 per wash. The supplier of SBL 2004 of WFK (<http://www.testgewebe.de>). Fix the SBL's on the loads as the stains.

2.8 Wash loads

Each test series has to be started with a new wash load. This load consists of:

1. A clean all cotton ballast load for the normal cotton wash program to reach a total weight of 4,5 kg (see Table 2).

Table 4. Total cotton loads (kg)

Total load (kg)	Pillowcases	Hand-towel
4,5 kg ±0,1kg	12 units	Until weight

2. 5x2 stain removal monitors (2 replicates)
3. 4 pieces of soil ballast

The total load per wash including ballast load, SBL, cotton cloth and monitors will be 4,5 kg ±0,1kg.

2.9 Pre-treatment of cotton hand towels and ballast load

3 washes at 60C, normal cotton program without pre-wash. The basic powder, optical brightener-free, of ECE standard detergent for colour fastness (ISO 6330) of a dosage of 85g per 4,0 kg load is used (95,6 g of detergent per 4,5 kg load)

It is recommended to dry ballast load after pre-treatment. A standard dryer can be used.

2.10 Reference detergent

Table 5. Reformulation of the IEC A* reference detergent according to IEC 60456 formulation

Ingredient	% content	Tolerance (+/-)	CAS n.
linear sodium alkyl benzene sulfonate	11,4	0,5	25155-30-0
ethoxylated fatty alcohol C _{12/14} (7EO)	6,1	0,3	68439-50-9
sodium soap (tallow soap)	4,2	0,2	308075-99-2
foam inhibitor concentrate, 12% silicon on inorganic carrier)	5,1	0,3	68989-22-0
sodium aluminium silicate zeolite 4A (80% active substance)	36,7	1	70955-01-0
sodium carbonate	15,1	1	497-19-8
sodium salt of a copolymer from acrylic and maleic acid (sokalan CPS)	3,1	0,2	60472-42-6
sodium silicate (SiO ₂ :Na ₂ O = 3.3:1)	3,9	0,2	1344-09-8
carboxymethylcellulose	1,6	0,1	9004-32-4
phosphonate (25% active acid)	3,6	0,2	22042-96-2
protease	0,5	0,5	9014-01-1
sodium sulfote	rest	rest	7757-82-6

Homogenize powder detergent, better with a sample divider or if not shake the detergent gently. The ingredients shall be mixed prior to use. The maximum storage time after mixing is 7 days.

Dosage HDD: 70g IEC A*. Put detergent in dispenser machine device.

2.11 Test product for stain removers

The test product consists of a reference detergent with a stain remover added. The reference detergent is dosed as in 2.10. The stain remover is dosed according to the instructions provided on the product and taking onto account consumer habits.

2.12 Wash programme

30C, cotton normal program and final spin 1200rpm.

2.13 Procedures

- Pre-treatment of cotton and hand-towels and ballast load according to section 2.9.
- Washing: The following wash cycles are run, at least, 6 times with each product, using a new set of stains each time. For all the different products in .8). The wash cycles are run, at least, 6 times with each product, using a new set of stains each time.

Table 6, 5x2 different stains (according to 2.5) must be tested and 2 standard cotton cloths in the same wash (according to 2.8). The wash cycles are run, at least, 6 times with each product, using a new set of stains each time.

Table 6. Washing conditions

Product	Conditions
Stain remover + reference detergent (IEC A* according to 60456)	In this case the stain remover following the recommendations from the producer and wash adding 70g of reference detergent (Table 5)
Reference detergent (IEC A* according to 60456)	In this case wash adding only 70g of reference detergent (Table 5)
Water	Wash without chemical products (detergents and additives)

- Drying (no tumble drying) and flattering: 2 points (150C) without steam after each wash cycle just the stains

3. Methods

3.1 Test procedure

The stain sets monitors used for the evaluation must be from the same production lot. The appropriate amount is stored at low temperatures (according to the recommendations of the suppliers) under exclusion of light and oxygen. The material is cut into pieces of 12x2cm and stored until ready to use in the dark and cold.

Two test monitors of each kind are used for every single wash and fixed on different huckaback towel carrier fabrics with the marked right side upwards.

An extra set of four carrier fabrics will be used for the next wash cycle in order to dry the first set in the meantime.

The preparer carrier fabric with the test swatches are evenly distributed in the wash load and washed in the run programme while to washes at the same conditions using the reference detergent. After one wash they are removed from the machine. Afterwards the monitors are removed from the carrier and dried in the dark at ambient conditions lying flat on a sieve.

For the test, the whole procedure is repeated 6 times.

3.2 Reflectance measurement

Final Y-value measurement for stain removal determination can be described as follows:

- Measuring geometry: d/8°
- D65/10° observer
- With UV-filter (420 nm cut off) (the UV filter must in any case be adopted if 420 nm is outweighed by the optical brightener)

- Measuring diameter minimum 20 mm
- Gloss without
- Calibration measurements shall be carried out at the latest 8h after calibration with white tile and black trap

For each soil monitor the mean of the 48 measurements (2 samples per soil x 4 readings x 6 wash cycles) are calculated. Standard deviation ought to be calculated from 6 washes.

The mean value (Y) for the above measurements is taken for each stain test. The normalized wash result is achieved by subtracting the result for water from both the reference detergent and the test product.

4. Evaluation

The product will be considered to have a satisfactory performance, at temperature tested, if it achieves the following results:

The general normalized cleaning effect must be greater than 110% compared to the reference detergent and the result for all soil types must be better than for water.

5. Results and reporting

An excelsheet template can be found on the EU Ecolabel website to report the data of the performance test of laundry detergents. The filled in template together with the requirements of the laboratory to conduct the performance test shall be provided by the applicant.

[Link of the excel sheet](#)