



REVISED EU ECOLABEL PERFORMANCE TEST FOR STAIN REMOVAL

Version of 10/02/2011

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BACKGROUND

With the objective to review the existing EU Ecolabel laundry detergents performance test, the project named LADECO (LAundry DEtergent ECOLabel) was initiated at the end of 2009. Technological Center LEITAT was commissioned undertake the revision of this test protocol.

This test protocol serves as a prove to show compliance with Criterion 6 – Washing performance (fitness for use) of the Commission Decision 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 are used as stain removers 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 removers dedicated to other uses besides pre-treatment.

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 must 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.

TEST PROTOCOL

1. Materials and Conditions

1.1. Washing machine types:

Programmable electronic household washing machines which fulfil the following requirements:

	Cotton wash program (at 30°C, 20°C ¹ , 15°C ¹)	Delicate program ² (at 30°C, 20°C ¹ , 15°C ¹)
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	1200 rpm	600 rpm

Table 1. Wash cycle characteristics

¹For cold water products

²Some newer washing machines offer an equivalent synthetic program

Fuzzy logic type control shall be disabled.

Please note that most of the older washing machines do not offer cold water programs. Those machines which offer cold water programs normally heat up the entering water to 21 °C, which is useful for products which claim to be efficient at 20 °C. For test runs at 15 °C the heating elements of the washing machine have to be disconnected in order to prevent the heat up.

1.2. Water Hardness:

2.5 mmol/L ± 0.2 mmol/L calculated as CaCO₃ (250 ppm = 14 ± 0.5 °dH). The Ca/Mg ratio will be 3 ± 0.5.

1.3. Water Inlet Temperature:

(20.0 ± 2.0) °C.

Products which claim to be efficient at a wash temperature lower than 20 °C shall be tested at 15 °C. In this case, the water inlet temperature will be different to the wash temperature for tested product (15.0 ± 2.0 °C) and reference detergent (20.0 ± 2.0 °C).

The water inlet temperature shall be reported for the test product and reference detergent.

1.4. Amount of water:

If possible, to be controlled along the washing process (recommendation).

1.5. 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:

- *Pillowcases*: Bleached cotton 1/1 plain weave

Mass per unit area (185 ± 10) g/m² (of finished fabric)

Warp (33 ± 1) tex

Weft (363 ± 1) tex

Pieces of (1 600 mm x 800 mm) $\pm 2\%$ folded in half and sewn along the three open edges thus forming double thickness (finished size: (800x800) mm²) the shrinkage shall be less than 2% in a test according to ISO 6330.

- *Hand-towels* Bleached cotton weave-huckaback:

Mass per unit area (220 ± 10) g/m² (of finished fabric)

Warp (19 ± 1) threads/cm of (36 ± 1) tex

Weft (13 ± 1) threads/cm of (97 ± 1) tex

Size

Length (1000 mm \pm 50 mm)

Width (500 mm \pm 30 mm)

1.6. Stains set:

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.

You must to include 2 sets of stains/wash cycle (same batch). Fix the stains on the hand towels cotton wash load.

See annex 1 for information of different stains.



Figure 1. Stain market with a water resistant pen

Fix the stains on the loads using a plastic staple with a gun on the load, as show below:



Figure 2. Plastic staple



Figure 3. Plastic staple gun

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.

1.7. Stains Set Size:

(12 x 12) cm² (standard stains) and (5 x 5) cm² (hand made).

1.8. Soil:

You must to introduce 4 SBL 2004¹/wash. The objective of this soil is control the foam during the test.

Fix the SBL on the loads as done with the stains.

1.9. Wash Loads:

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

- a. A clean all cotton ballast load for the normal cotton wash program to reach a total weight of 4.5 Kg (see 1.5 for specs).

Total load (kg)	Pillowcases	Hand-towel
4.5 kg \pm 0.1 kg	12 units	Until weight

Table 2. Total cotton loads (kg)

¹ Supplier: wfk (<http://www.testgewebe.de>)

- b. 5x2 stain removal monitors (2 replicates)
- c. 4 pieces of soil ballast

The total load per wash including ballast load, SBL, cotton cloth and monitors will be 4.5 ± 0.1 Kg

1.10. Pre-treatment of cotton hand-towels and ballast load:

3 washes at 60°C, normal cotton program without pre-wash. The basic powder, optical brightener-free, of ECE standard detergent for color fastness (ISO 6330) of a dosage of 85g per 4.0Kg load is used (95.6 g of detergent per 4.5kg load).

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

1.11. Reference Detergent:

Reformulation of the IEC A* reference detergent according to IEC 60456 formulation (see annex 2)

1.12. Dosage for reference detergent:

Reference detergent: 70g. Put detergent in dispenser machine device.

1.13. Test product:

The test product consists of a reference detergent with a stain remover added. The reference detergent is dosed as defined in 1.12. The stain remover is dosed according with the instructions provided on the product and taking into account consumer habits.

1.14. Wash Program:

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

2. Procedure

2.1. Pre-treatment of cotton hand-towels ballast load:

See 1.10.

2.2. Washing:

You must test 3 different products:

1. Test product: Stain remover + reference detergent (IEC A* according to IEC 60456). In this case you must apply the stain remover following the recommendations from the producer and wash adding 70g of reference detergent (see annex 2).
2. Reference detergent (IEC A* according to IEC 60456). You must wash adding (only) 70g of reference detergent (see annex 2).
3. Water. You must wash without chemical products (detergents and additives).

For all these different products you must test 5x2 different stains (see 1.6.) and 2 standard cotton cloth (see 1.9.) in the same wash. The wash cycles are run, at least, six times with each product, using a new set of stains each time.

2.3. Drying and flattering:

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

3. Method

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 (12 x 12) cm² 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 prepared carrier fabric together 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 determinations.

Measuring geometry: d / 8°

D65 / 10° observer

With UV-filter (420 nm cut off)*

Measuring diameter: minimum 20 mm

Gloss: without

Calibration: Measurements shall be carried out at the latest 8 hours after calibration with white tile and black trap.

**The UV filter must in any case be adapted if 420 nm is outweighed by the optical brightener.*

For each soil monitor the mean of the 48 measurements (2 samples per soil x4 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. Limit values

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.

Annex 1.

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		109KC	Enzymatic	
			WFK 90PBU				
	PES/CO		WFK 20PBU		109PC		
	PES		WFK 30PBU		109PE		
Aged blood	CO		WFK 10PB	CFT CS-01		Bleachable	Enzymatic
			WFK 90PB				
	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	CFT CS-103	126KC	Bleachable	
			WFK 90LIU				
	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	CFT CS-03		Bleachable	
			WFK 90LI				
	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			

Table 3-1. Stains

STAINS	FABRIC	STANDARD STAINS			HAND MADE	TYPE	
Sebum/pigment	CO	EMPA 118	WFK 10D			Greasy	
			WFK 90D				
	PES/CO	EMPA 119	WFK 20D				
	PES		WFK 30D				
	WO		WFK 60D				
SI		WFK 70D					
Lipstick	CO	EMPA 141/1	WFK 10LS	CFT CS-16	073KC	Greasy	
		EMPA 141/2					
		EMPA 141/3		CFT CS-116			
	PES/CO	EMPA 142/1	WFK 20LS	CFT PC-S-16	073PC		
		EMPA 142/2					
		EMPA 142/3		CFT PC-S-116			
	PES		WFK 30LS	CFT P-S-16 CFT P-S-116	073PE		
	WO		WFK 60LS				
SI		WFK 70LS					
Make up	CO	EMPA 143/1	WFK 10MU	CFT CS-17	075KC	Greasy	
		EMPA 143/2					
		EMPA 143/3					
	PES/CO	EMPA 144/1	WFK 20MU	CFT PC-S-17	075PC		
		EMPA 144/2					
		EMPA 144/3					
	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					

Table 3-2. Stains

STAINS	FABRIC	STANDARD STAINS			HAND MADE	TYPE	
Cocoa, not temperature treated	CO		WFK 10MFU			Enzymatic	
			WFK 90MFU				
	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			CFT P-BC-01			
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				

Table 3-3. Stains

STAINS	FABRIC	STANDARD STAINS			HAND MADE	TYPE
Pigment/vegetable fat	CO		WFK 10PF		124KC	Greasy
	PES/CO		WFK 20PF		124PC	
	PES		WFK 30PF		124PE	
	WO		WFK 60PF			
	SI		WFL 70PF			
Pigment/vegetable oil/milk	CO		WKF 10PPM	CFT C-10		Greasy
	PES/CO		WFK 20PPM	CFT PC-10		
	PES		WFK 30PPM	CFT P-10		
	WO		WFK 30PPM			
Pigment/vegetable oil/low milk	CO			CFT C-12		Greasy
	PES/CO			CFT PC-12		
	PES			CFT P-12		
Cocoa/lanolin	CO		WFK 10F			Greasy
	PES/CO		WFK 20F			
	PES		WFK 30F			
Shoe polish	CO		WFK 10S		111KC	Greasy
	PES/CO		WFK 20S		111PC	
	PES		WFK 30S		111PE	
	WO		WFK 60S			
	SI		WFK 70S			
Coffee	CO		WFK 10K	CFT BC-02	041KC	Bleachable
	PES/CO		WFK 20K	CFT PC-BC-02	041PC	
	PES		WFK 30K	CFT P-BC-02	041PE	
	SI		WFK 70K			
Coca-cola	CO		WFK 10H	CFT CS-56		Bleachable
	PES/CO		WFK 20H	CFT PC-S-56		
	PES		WFK 30H	CFT P-S-56		
Carrot juice	CO		WFK 10O		027KC	Bleachable
Blackberry juice	CO		WFK 10BB	CFT CS-21	019KC	Bleachable
	PES/CO		WFK 20BB	CFT PC-S-21	019PC	
	PES			CFT P-S-21	019PE	
Blueberry juice	CO		WFK 10WB	CFT CS-15	023KC	Bleachable
	PES/CO		WFK 20WB	CFT PC-S-15	023PC	
	PES			CFT P-S-15	023PE	
Black currant juice	CO		WFK 10JB	CFT CS-12	021KC	Bleachable
	PES/CO		WFK 20JB	CFT PC-S-12	021PC	
	PES		WFK 30JB	CFT P-S-12	021PE	

Table 3-4. Stains

STAINS	FABRIC	STANDARD STAINS			HAND MADE	TYPE	
Red currant juice	CO			CFT CS-11		Bleachable	
	PES/CO			CFT PC-S-11			
				CFT P-S-11			
Used motor oil	CO		WFK 10GM			Enzymatic	Greasy
	PES/CO		WFK 20GM				
	PES		WFK 30GM				
Soot mineral oil	CO		WFK 10RM	CFT C-01		Greasy	
			WFK 90RM				
	PES/CO		WFK 20RM	CFT PC-01			
	PES		WFK 30RM	CFT P-01			
	WO		WFK 60RM				
Clay	CO		WFK 10TE			Bleachable	Greasy
	PES/CO		WFK 20TE				
	PES		WFK 30TE				
Egg	CO		WFK 10N	CFT CS-37	051KC	Enzymatic	
	PES/CO		WFK 20N	CFT PC-S-37	051PC		
	PES		WFK 30N	CFT P-S-37	051PE		
Egg, temperature treated	CO		WFK 10EG	CFT CS-35		Bleachable	Enzymatic
	PES/CO		WFK 20EG	CFT PC-S-35			
	PES		WFK 30EG	CFT P-S-35			
Ketchup	CO		WFK 10T		122KC	Bleachable	
	PES/CO		WFK 20T		122PC		
	PES		WFK 30T		122PE		
	SI		WFK 70T				
Red pepper (paprika)	CO		WFK 10P		090KC	Bleachable	
	PES/CO		WFK 20P		090PC		
	PES		WFK 30P		090PE		
Curry	CO		WFK 10U	CFT CS-34	044KC	Bleachable	
	PES/CO		WFK 20U	CFT PC-S-34	044PC		
	PES		WFK 30U	CFT P-S-34	044PE		
Soy sauce	CO		WFK 10V	CFT CS-58		Bleachable	
	PES/CO		WFK 20V	CFT PC-S-58			
	PES		WFK 30V	CFT P-S-58			
Spinach	CO		WFK 10SP	CFT CS-25		Bleachable	
	PES/CO		WFK 20SP	CFT PC-S-25			
	PES		WFK 30SP	CFT P-S-25			
Tomato beef sauce	CO		WFK 10SG			Bleachable	Greasy
	PES/CO		WFK 20SG				
	PES		WFK 30SG				

Table 3-5. Stains

STAINS	FABRIC	STANDARD STAINS			HAND MADE	TYPE	
Olive Oil/soot	CO			CFT C-02		Greasy	
	PES/CO			CFT PC-02			
	PES			CFT P-02			
Mayonnaise/carbon black	CO			CFT CS-05S		Greasy	Enzymatic
	PES/CO			CFT PC-S-05S			
	PES			CFT P-S-05S			
Mayonnaise	CO				080KC	Greasy	Enzymatic
	PES/CO				080PC		
	PES				080PE		
Olive oil	CO			CFT CS-04	087KC	Greasy	
	PES/CO			CFT PC-S-04	087PC		
	PES			CFT P-S-04	087PE		
Salad dressing/natural black	CO			CFT CS-06	104KC	Greasy	Enzymatic
	PES/CO			CFT PC-S-06	104PC		
	PES			CFT P-S-06	104PE		
Butterfat with colorant	CO			CFT CS-10	026KC	Greasy	Enzymatic
	PES/CO			CFT PC-S-10	026PC		
	PES			CFT P-S-10	026PE		
Apple juice	CO			CFT CS-13	P03KC	Bleachable	
	PES/CO			CFT PC-S-13			
	PES			CFT P-S-13			
Beef lard	CO			CFT CS-61		Greasy	
Tomato double applicated	CO			CFT CS-120		Bleachable	
Tomato Puree	CO			CFT CS-20	123KC	Bleachable	Enzymatic
	PES/CO			CFT PC-S-20	123PC		
	PES			CFT P-S-20	123PE		
Grass&Mud	CO				060KC	Greasy	Bleachable
	PES/CO				060PC		
	PES				060PE		
Organic Carrot& Potato Baby Food	CO				007KC	Bleachable	
	PES/CO				007PC		
	PES				007PE		
Mustard	CO				083KC	Greasy	
	PES/CO				083PC		
	PES				083PE		
Hamburguer grease	CO				064KC	Greasy	
	PES/CO				064PC		
	PES				064PE		

Table 3-6. Stains

STAINS	FABRIC	STANDARD STAINS			HAND MADE	TYPE	
Chocolate milk/carbon black	CO			CFT C-03		Bleachable	Enzymatic
	PES/CO			CFT PC-03			
	PES			CFT P-03			
Tapioca starch,colored	CO			CFT CS-29		Bleachable	Enzymatic
	PES/CO			CFT PC-C-29			
	PES			CFT P-S-29			
Red beet	CO			CFT C-BC-5		Bleachable	
	PES/CO			CFT PC-BC-05			
	PES			CFT P-BC-05			
Chlorophyl, vegetable oil	CO			CFT C-04		Greasy	Bleachable
	PES/CO			CFT PC-04			
	PES			CFT P-04			
Pigment oil, for industrial laundry	CO			CFT C-06		Greasy	
	PES/CO			CFT PC-06			
	PES			CFT P-06			
Pigment oil, >60°C	CO			CFT C-08		Greasy	
	PES/CO			CFT PC-08			
	PES			CFT P-08			
Pigment oil, <60°C	CO			CFT C-09		Greasy	
	PES/CO			CFT PC-09			
	PES			CFT P-09			
Strawberry	CO			CFT BC-06	114KC	Bleachable	
	PES/CO			CFT PC-BC-06	114PC		
	PES			CFT P-BC-06	114PE		

Table 3-7. Stains

CO	Cotton
PES	Polyester
PES/CO	Polyester/cotton
WO	Wool
SI	Silk

Table 4. Fabric references

Annex 2.**Reference detergent**

IEC A* reference detergent according to IEC 60456

INGREDIENTS	% Content in IEC 60456 Base Detergent	Tolerance (±)	Nº CAS
Basic Powder			
Linear sodium alkyl benzene sulfonate	11.4	± 0.5	25155-30-0
Ethoxylated fatty alcohol C12-14 (7 EO)	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 4 A (80 % active substance)	36.7	± 1.0	70955-01-0
Sodium carbonate	15.1	± 1.0	497-19-8
Sodium salt of a copolymer from acrylic and maleic acid (Sokalan CP5)	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 Sulfate	Rest	Rest	7757-82-6

Table 5. Reference detergent - formulation