



PROTOCOL

**Standard Test Method for
Measuring the Resoil Characteristics of
Upright Extraction Cleaners and Formulas**

Tested Formulas:

*EcoCompounds 15091601
(Carpet and Textile)*

Tested Competitive Name Brand:

BISSELL Pro-Heat 2X Deep Cleaner

PREPARED FOR

EcoCompounds Inc.
1536 Eastman Avenue, Suite A
Ventura, CA 93003

PERFORMING LABORATORY

Capco Analytical Services
1536 Eastman Avenue, Suite B
Ventura, CA 93003

PREPARED BY

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DATE

03/13/2017



Standard Test Method for Measuring the Resoil Characteristics of Upright Extraction Cleaners and Formulas

SPONSOR: EcoCompounds Inc.
1536 Eastman Avenue, Suite C
Ventura, CA 93003

TEST FACILITY: Capco Analytical Services
1536 Eastman Avenue, Suite B
Ventura, CA 93003

PURPOSE

The purpose of this study is to evaluate the soil retardancy by soiling a virgin carpet and measuring the additional soil deposition.

1. Scope

1.1 Test Procedure CSPA Designation DCC-03 with Supplement 1 (Cleaning) and Supplement 2 (Resoiling) was performed before starting this test.

1.2 This test method provides only a laboratory test for determining the relative re-soiling characteristics of respective household extraction cleaners or household carpet cleaning.

2. Documents

2.1 Test Procedure CSPA Designation DCC-02 (July 2011).

2.2 Test Procedure DCC-03 Supplement 1 (Cleaning).

2.3 Test Procedure DCC-02 Supplement 2 (Resoil)

3. Significance and Use

3.1 In order to provide a uniform basis for measuring the re-soiling characteristics, standardized test carpets and standardized test soil employed in this procedure.

4. Apparatus and Material

4.1 Materials:

- a. *Cylinder.* The cylinder is 16 1/2" long with a 1 1/4" inside diameter. It is made of a 1/4" PVC water pipe, permanently closed at one end and fitted on the other end with a removable cover having a 5/16" diameter iron rod extending through the center axis of the cylinder. One end of the rod is fixed in the center of the permanent end of the cylinder, while the other end protrudes through the center hole of the removable cover. The protruding end of the iron rod is threaded to accept a palm knob, which is during operation. The fixed end and the cover are 1/2" thick pieces of PVC material with a diameter of (1 1/2"). The centers are machined for weight reduction whereas there are four equal areas that are only 1/8" thick with a strong frame around the edges and an X frame through the center. The inner sides of the end caps are grooved to allow the tube to fit inside for creating a good seal. The end caps are used as the roller contact points for the complete drum. A 16" long by 5 1/2" wide strip of aluminum, bent along its width to the radius of the cylinder, and bent back 1/2" along each of its long edges, is slipped over the edges of the bracket strips to provide a continuous surface between edges of the carpet panel. A 1/2" gap is formed between bracket and cylinder wall enabling the carpet panel to be fastened inside the cylinder by tightening two cap bolts extending through the cylinder wall into the brackets. The bracket strip is slotted to permit a 1" circumference adjustment. The aluminum plate is covered with a material (rubber or dense foam 1/16" thick) to reduce noise during tumbling.
- b. *Soil Distribution Shaker.* Glass, 4 oz. wide mouth jar, (3" tall by 1.5" diameter) with lid (48mm) that has holes like a saltshaker. Shaker lid should have 48, 3/32" holes evenly spaced.
- c. *Ball Mill Roller,* U.S. Stoneware No. 753 (U.S. Stoneware, East Palestine, OH (www.usstoneware.com) or equivalent.
- d. *Milling Cylinders.* Burundum, 13/16" x 13/16", Gardner Part #ML-BGM 13/16", 18 pieces/lb. This procedure calls for 133 burundum cylinders per soiling cylinder.
- e. *Spectrophotometer,* X-rite CI 64



f. J6" Carpet Rake with 3 lb weight added. Analytical Services, Inc.

g. Shampoo Applicator. - BISSELL Pro-Heat 2 X Deep Cleaner models 8920-3, 11115C

h. Vacuum Cleaner. Shark Model NV70-26

8. Reagents.

- a. Artificial Soil (the composition of this soil has evolved slightly from the previously published version (DCC-03 4th edition) to provide more real life conditions, reproducibility and better performance separation):

Material	% by weight	200g typical batch
Peat Moss,	53.74	107.5g
Cement	24.04	48.1g
Kaolin Clay,	8.99	18.0g
Silica, 200 mesh	8.99	18.0g
Red Iron Oxide,	1.41	2.8g
Charcoal,	1.70	3.4g
Mineral Oil	1.13	2.2g

(1) Oven dry peat moss 12 hours at 75°C.

(2) Kaopolite Inc., 100 Mansell Court East, Suite 300, Roswell, GA, 30076, 888-567-6548.

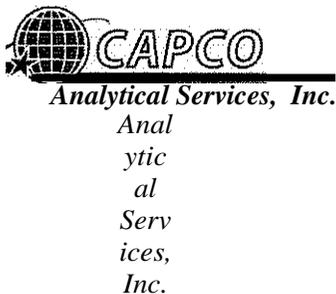
(3) Bayferrox Red 180M Iron Oxide Pigment, available from Bayer Chemicals, Pittsburgh, PA

(4) Hardwood charcoal, broken into ¼-inch pieces.

- b. Soil Preparation: The above ingredients were placed in a ceramic crock (by U.S. Stoneware) with 100 13/16" burundum cylinders and rotated on the ball mill roller for 15 minutes at 56 R.P.M. The dirt is screened after tumbling for larger parts of ungrounded peat moss through an 18-mesh screen. (NOTE: The amount of synthetic soil required to soil the carpeting to a depth of 16 delta E between virgin and vacuumed is experimentally determined)

9. Test Procedure

- 9.1 The carpet specimen is cut into 27-inch x 16-inch test swatches. The grain of the nap must be oriented toward the long dimension of the swatch.
- 9.2 The Virgin (unsoiled) carpet is vacuumed, raked, and is read with the spectrophotometer.
- 9.3 The carpet is soiled.
- 9.4 The soiled carpet is vacuumed with three sets of up & back strokes in each of four directions (in a zigzag pattern to cover the entire surface. Turn 90° after each set of three).
- 9.5 The carpet is then raked 5 times moving (or pulling with the rake) towards the numbered end using a speed of 5.4 in/sec with no forward strokes.
- 9.6 The carpet piece must be read immediately after it is raked. This is critical, as the carpet will change readings if not-read immediately. The vacuumed carpet sample is read using the spectrophotometer following the same procedure as described for a virgin carpet. Ten readings are taken per carpet. L*, a*, and b* values are recorded as "soiled" readings.
- 9.7 The shampooer must be brought to a premoistened condition to insure even application of shampoo to the carpet.
- 9.8 Clean the test carpet by using two wet strokes with the solution being sprayed onto the carpet and two dry strokes without spraying. Although two wet strokes, followed by two dry strokes is standard, any order sequence for these four total strokes may be performed. Each stroke is to be down the center of the carpet. If a particular model cannot be tested per the above step use owner's manual to determine the best possible way to insure a fair and comprehensive test.
- 9.9 A minimum of 3 carpets were tested for each unit under test.
- 9.10** Allow carpets to dry on the drying racks at normal room conditions (70°F±5°F and 50% humidity± 5%) for a minimum of **16 hours**.
- 9.11 After drying, the carpet is then raked 5 times using a speed of 5.4 in/sec with no backward strokes.



9.12 The carpet piece must be read with the Tumbler with the removable end of the cylinder toward the right (or front if using a front loading tumbler) and is rotated in the counter-clockwise direction (when viewed from the removable end) for 10 minutes at a tumbling speed of 56 RPM. Afterward, the soiling cylinder is flipped 180° and rotated in the clock-wise direction for another 10 minutes for a combined tumbling time of 20 minutes.

10. Resoil Rating

The average L*, a*, and b* values was compared by converting them to .II.E values. .II.E values measure the total brightness and color change and can be determined between any two points in the test sequence.

$$\begin{aligned} .II.E &= [(.II.L)^2 + (.II.a)^2 + (.II.b^2)]^{1/2} \text{ (between point 2 and point 1)} \\ .II.L &= L2 - L1 \\ .II.a &= a2 - a1 \\ .II.b &= b2 - b1 \end{aligned}$$

In the Excel spreadsheet the .II.E formula below was used.

$$.II.E = \text{SQRT} ((L1-L2)^2 + (a1-a2)^2 + (b1-b2)^2)$$

DCC-03 Supplement 2 (Resoil) gave the .II.E between the virgin carpet and the re-vacuumed carpet and provided an indication of the overall cleaning ability and re-soiling protection of the cleaner and/or cleaning of the formula being tested. Also, DCC-03 Supplement 2 (Resoil) provided the .II.E between the extracted carpet and the re-vacuumed carpet and gave an indication of the re-soil properties of the cleaner and/or the cleaning formula being tested. In both cases, a lower .II.E value was better.

11. Report

The performance of EcoCompounds Carpet and Textile cleaner to Bissell Deep Clean & Refresh, 2x was compared by using

.II.E values and % cleaned values. The conclusion was that EcoCompounds Carpet and Textile demonstrated a >1% more effective cleaning capability than Bissell Deep Clean and refresh.

See Attachment Exhibit A.

PROCEDURE FOR IDENTIFICATION OF THE TEST SYSTEM

Capco Analytical Services maintains Standard Operating Procedures (SOPs) relative to efficacy testing studies. Efficacy testing is performed in strict adherence to these SOPs which have been constructed to cover all aspects of the work including, but not limited to, receipt, log-in, and tracking receipt and use of chemical reagents. These procedures are designed to document each step of efficacy testing studies.

METHOD FOR CONTROL OF BIAS: N/A

STUDY ACCEPTANCE CRITERIA

Control Acceptance Criteria

The study controls must perform according to the criteria detailed in the study controls description section and in accordance with DCC-03 and its Supplements.



PROTOCOL CHANGES

If it becomes necessary to make changes in the approved protocol, the revision and reasons for change will be documented, reported to the Sponsor and will become a part of the permanent file for that study. Similarly, the Sponsor will be notified as soon as possible whenever an event occurs that may have an effect on the validity of the study.

Standard operating procedures used in this study will be the current effective revision at the time of the work. Any minor changes to SOPs (for this study) or methods used will be documented in the raw data and approved by the Study Director.

PRODUCT DISPOSITION

It is the responsibility of the Sponsor to retain a sample of the test substance(s). All unused test substance will be discarded following study completion unless otherwise requested by Sponsor.

RECORD RETENTION

Study Specific Documents

All of the original raw data developed exclusively for this study shall be archived at Capco Analytical Services. These original data include, but are not limited to the following:

1. All handwritten raw data for control and test substances including, but not limited to, notebooks data forms and calculations.
2. Any protocol amendments/deviation notifications.
3. All measured data used in formulating the final report.
4. Memoranda, specifications, and other study specific correspondence relating to interpretation and evaluation of data, other than those documents contained in the final study report.
5. Original signed protocol.
6. Certified copy of final study report.
7. Study specific SOP deviations made during the study.

Good Laboratory Practice Compliance Statement

This study meets the U.S. Environmental Protection Agency's good laboratory practice standards and requirements for 40 CFR § 160 with the following exception:

- Records concerning test substance characteristics (i.e., composition, purity, stability, strength, solubility) are maintained by the study sponsor
- Analysis concerning test substance characteristics (i.e., uniformity, solubility stability, etc.) after mixture with dilute were not conducted.

Study Completion Date: 03/13/2017

Company: Capco Analytical
Name: Franz Fernandez, Ph.D.
Title: Study Director

Company: Capco Analytical
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Title: Laboratory Technician