

# Procedure for Seal of Approval Deep Cleaning Systems

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## 1.0 Scope

- 1.1 This test practice utilizes the use of X-Ray Fluorescence (XRF) to measure the average percent removed by weight of compounds used to soil a test carpet. This test practice may be used to evaluate the effectiveness of a cleaning event, an event in a process of several events or the entire system.

## 2.0 Summary of Practices

### 2.1.0 Soil Removal Standard

- 2.1.1 Method: X-ray Fluorescence (XRF) is used to detect elements of each compound used to soil a control carpet, then to determine their concentrations after a cleaning process. XRF is a technique that detects elements by ionizing the constituent atoms and recording the characteristic energy signatures given off by the elements as they seek to regain greater stability.
- 2.1.2 Five compounds containing suitable elements for XRF detection were chosen with consideration given to particle size (Fe<sub>3</sub>O<sub>4</sub> at < 1 micron to ZnO at < 74 microns), hardness, solubility, and surface characteristics.
- 2.1.3 Each compound is first applied to nylon pellets at 6 grams of compound per 1000 grams of pellets (3g/1000 for Sr). Fifty grams of each of the five compound coated pellets are used to soil a 400 square-inch carpet following ASTM-D 6540. This test method uses a drum lined with the test carpet and is rotated a specified number of revolutions to uniformly distribute the synthetic soil into the carpet pile. Each soiled carpet is scanned using XRF to verify the starting concentration of each compound. All XRF scans are with the carpet on a conveyor such that in the 3-minute scan approximately 120 square inches of the 400 square inch carpet are analyzed. The soiled test carpet is then cleaned following the cleaning system procedures as specified by the cleaning system client. Three samples per test are used and the average percentage removed results reported.
- 2.1.3.a Soil Removal Standard - Percent of soil removed following the system providers supplied instruction.
- 55 - 69 % to obtain SOA Bronze Certification
  - 70 - 79 % to obtain SOA Silver Certification
  - 80 - 89% to obtain SOA Gold Certification
  - 90 - 100% to obtain SOA Platinum Certification



## 2.2.0 For Accelerated Re-Soiling Propensity of Pile Yarn Floor Covering

- 2.2.1 This test practice is intended to determine the effects of cleaning equipment, chemistry and technologies on the re-soiling properties of a specified floor covering. A clean control test carpet is cleaned according to the client's directions. The cleaned carpet is allowed to thoroughly dry then soiled per ASTM 6540. Additional control carpet is soiled per ASTM 6540-that has not been cleaned. The differential soil level between the cleaned sample(s) and control sample(s) is evaluated using an appropriate laboratory instrument (spectrophotometer) using the AATCC Gray Scale for Color Change.
- Equal to or better than water according to the AATCC Gray Scale.

## 2.3.0 For Determining Residual Moisture as a result of Deep Cleaning

- 2.3.1 This test practice is intended to determine the amount of moisture left in a carpet test specimen as a result of simulated cleaning with a hot water extractor or similar cleaning system and/or equipment.
- 2.3.2 The difference in specimen weight before and after cleaning is measured and reported as grams per square meter and ounces per square yard of residual moisture.
- Residual Moisture in carpet immediately after cleaning operation:

$$271 \text{ g/m}^2 (\leq 8 \text{ oz/yd}^2)^*$$

- 2.3.3 This method is applicable to liquid and pre-spray systems that use cleaning chemicals.

## 2.4.0 For Evaluating Surface Appearance Change due to Repeated Cleanings

- 2.4.1 This test practice provides a laboratory test for the measurement of surface appearance change of textile floor covering as a direct result of multiple cleaning passes in a controlled environment.
- 2.4.2 This test practice is applicable to all residential/commercial cleaning systems. Six cleaning cycles are applied to residential cut pile carpet for residential specific systems. Eleven cleaning cycles are applied to commercial loop pile carpet for commercial specific systems. Texture appearance change is visually rated using ASTM D7330 and CRI Grading Scales.
- Appearance Retention:
    - No more than one step appearance change in the deterioration of the carpet pile surface.

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\* When using pre-spray, allow up to 678 grams/m<sup>2</sup>(20.0 oz/yd<sup>2</sup>)



## 2.5.0 Colorfastness to Light

- 2.5.1 Cleaning chemical residues present on pile yarn floor coverings have been known to adversely affect dyes and accelerate color change. The level to which a chemical residue contributes to color change is determined by exposing a chemically treated standard test carpet with an untreated control sample to accelerated light in accordance with AATCC test Method 16.3. Accelerated color change in the treated test carpet is compared to the untreated test carpet after exposure.
- No Color Change between untreated control and treated specimen

## 2.6.0 For Determining the pH of Cleaning Chemicals Intended for Use on Carpets

- 2.6.1 Chemicals which are extremely acidic or alkaline have been known to adversely affect dyes, treatments and fibers. Chemicals with a more neutral pH are generally considered safer to use when cleaning carpets or rugs. The formula is tested by a standard pH meter following the manufacturers recommended dilution.
- pH between 4 and 10

## 2.7.0 For Determining the Presence of Optical Brighteners in Cleaning Chemicals

- 2.7.1 The presence of optical brighteners in carpet cleaning products has been known to adversely affect fiber color, appearance and long term performance. The cleaning agent is evaluated for optical brightener content using fluorescence.
- No Optical Brighteners

# 3.0 Apparatus and Materials

## 3.1.0 Apparatus

- 3.1.1 **Voltage-Regulator System**, to control the input voltage to the cleaning equipment. The regulator system shall be capable of maintaining the equipment's rated voltage  $\pm 1\%$ , and rated frequency having a wave form that is essentially sinusoidal with 3 % maximum harmonic distortion for the duration of the test.
- 3.1.2 **Reciprocating Conveyor (or equivalent)** to control the speed and path of the test equipment movements during the extraction process on the test carpet.

Note: A conveyor with a bed length of 14 ft (4.3 m) and width of 3 ft (0.915 m) has been found to be sufficient. The reciprocating conveyor shall be capable of maintaining specified test speeds between 0.5 ft. per second and 1.8 ft per second. A rigid 1/8" aluminum or steel plate is positioned on top of the conveyor with adequate length and width to support the test carpet and test specimen. The conveyor is equipped with brackets or attachment points to hold the test equipment stationary during testing.



- 3.1.3 **Weight Scales:** a scale having a capability of weighing specimens up to 100 grams with an accuracy of 0.01 grams, and a scale having a minimum 2000-gram capacity and an accuracy of 0.1 grams.
- 3.1.4 **Tachometer:** used to calibrate reciprocating conveyor and cycle speed in ft/sec.
- 3.1.5 **Control Vacuum Cleaner:** Agitator equipped upright vacuum with a minimum SOA/GL Bronze level certification.

### 3.2.0 Materials

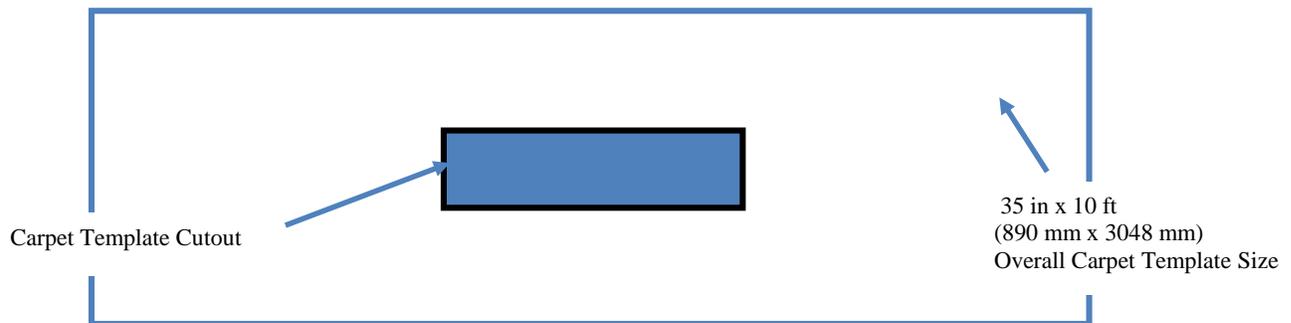
#### 3.2.1 Test Carpet Specifications

Residential Cut Pile <sup>†</sup>		Loop Pile <sup>†</sup>	
<b>Weight</b>	25 oz/sq yd ± 7%	<b>Weight</b>	30 oz/sq yd ± 7%
<b>Style #</b>	42B61	<b>Style #</b>	M6665
<b>Pile Height</b>	0.470 inch	<b>Pile Height</b>	0.123 inch
<b>Gauge</b>	1/8 <sup>th</sup>	<b>Gauge</b>	1/10 <sup>th</sup>
<b>Stitches/Inch</b>	8	<b>Stitches/Inch</b>	10
<b>Yarn</b>	Nylon	<b>Yarn</b>	SD Nylon
<b>Fluorochemical</b>	No	<b>Fluorochemical</b>	No

Table 1: All values are nominal values

- 3.2.2 **Test Carpet Template** is comprised of the same material as test material, and is a minimum of 4 inch (10 cm) wider than the head of the test vacuum. Pass direction changes shall be made on the template surface, not on the sample surface. The carpet template and sample shall be mounted to a rigid substrate panel using double sided tape.
- 3.2.3 Note: The template has the recommended dimensions of 35 in x 10 ft (890 mm x 3048 mm) with an opening 10 3/8 in x 39 1/2 in (263 mm x 1003 mm) cut in the center to accept the sample size referenced in 6.1.1. The carpet template and sample are mounted to the 1/8 in rigid panel using double-sided tape positioned on top of the conveyor belt.

#### Example of Carpet Template and Carpet Sample Assembly



<sup>†</sup> Test floor selected is dictated by the extractor's primary intended use

## 4.0 Conditioning

- 4.1 Test Room – Maintain the test room in which all conditioning and testing is performed at  $70 \pm 5$  °F ( $21 \pm 3$  °C) and  $50 \pm 5\%$  relative humidity.
- 4.2 All components involved in the test shall remain and be exposed in the test room for at least 16 hours prior to the start of the test.

## 5.0 Sampling

- 5.1 A minimum of three (3) carpet samples of the appropriate test carpet (based on the extractor's primary intended use) shall be tested for each cleaning system.

## 6.0 Procedure

- 6.1 Prepare pre-soiled test carpet as specified with CRI TM120
  - 6.1.a Prepare and store test carpet in a standard lab conditioned test room up to 72 hours in advance of testing. The recommended sample size is  $10 \frac{3}{8}$ " X  $39 \frac{1}{2}$ " (263 mm X 1003 mm).
- 6.2 Vacuum each test specimen with the control vacuum cleaner using four passes at a rate of 1.8ft/sec, prior to the application of the specified soiling media. Pre-soiled test specimens are preferred for this test practice.
- 6.3 Prior to cleaning, place the soiled carpet sample onto the weighing scale and record the initial start weight.
- 6.4 If a pre-spray process is employed, apply the cleaning chemistry in accordance to the manufacturers' dilution ratio, coverage, and dwell time recommendations. Return the test sample to the weighing scale and record the after pre-spray weight.
- 6.5 Mount the cleaning unit in place on the template approximately 1ft from the test sample. Configure the unit in accordance to the manufacturer directions for any adjustable settings. All adjustable settings shall be recorded and reported.
- 6.6 Confirm the manufactures recommended extraction rate and number of passes. Configure the conveyor system accordingly. The default number of passes and extraction rate is 2 wet and 2 dry passes at 1.0ft/sec on each pass unless otherwise specified by manufacturer.
- 6.7 Place the soiled carpet sample in an appropriate template of the same style of carpet so that a larger carpet sample is presented to the cleaning equipment, and the cleaning process does not encounter a transition height at any edge of the sample. If a pile lean is present on the test carpet, position the test sample with the pile lean facing the equipment so that the first pass is into the pile of the test sample with the final pass made in the direction of the pile lean. For reverse pull equipment, position the test sample with the pile lean facing away from the equipment so that the first and final pass is made in the same direction as the pile lean.
- 6.8 Energize the cleaning equipment  $60 \pm 10$  seconds at the recommended voltage  $\pm 1\%$  prior to initiating movement of the conveyor.



- 6.9 Initiate movement of the conveyor in the direction that is appropriate for the equipment type. Continue movement until the equipment has cleared the test sample and is on the template. Reverse direction of the conveyor and continue until the equipment has cleared the test sample and is on the template. Repeat the process until the specified number of passes have been completed.
- 6.10 Immediately remove the test sample from the template and place on the scale. Record the weight after extraction within 15 seconds.
- 6.11 Repeat the process 6.2 through 6.10 for each remaining sample. All three test samples are to be cleaned consecutively without changing the cleaning chemical when possible.

## 7.0 Report

- 7.1 Report the average residual moisture after extraction of the 3 test specimens express inoz/yd<sup>2</sup>.
- 7.2 Report number of wet and dry extraction passes and the speed of each pass.
- 7.3 Report the coverage rate of the pre-spray(s) when employed in the cleaning process.
- 7.4 Report the identification of the chemical being tested.
- 7.5 Report equipment identification and various equipment manual settings.
- 7.6 Record extraction wand type, width, number and size of spay tips.
- 7.7 Record operating pump pressure if available.
- 7.8 Record the dilution ratio, if applicable, of the chemical being tested.
- 7.9 Detail any deviation from the test practice.

