

## **Instructions for Use DetergiCheck™ Advanced Testing**

Users of proteolytic detergents in the healthcare setting need a method they can follow to verify on a periodic, routine basis the performance of their detergents. By using a commercially available reference test in their own validation testing, detergent manufacturers can provide their customers with a method for correlating detergent performance at the end-user site to results manufacturer achieves in validation testing. The methods described herein are meant first for the manufacturer (using a reflectometer) and a practical method the end-user can follow with a readily available tool, a flatbed scanner.

The DetergiCheck™ is a standardized test. It is cotton fabric impregnated with carbon black in a protein-rich mixture. The soil is water insoluble\* and thus will not be released without the presence of a proteolytic agent (e.g., enzymatic or high alkaline detergent). Conversely, in the presence of proteolytic agents, the protein is hydrolyzed thus releasing the carbon. The result is a “lightening” or “brightening” of the fabric. This lightening can be detected visually, but can also be measured by an electronic apparatus. For professional, laboratory testing, a common device is a reflectometer that measures light reflectance at 460nm and calculates the tristimulus–Y (luminance) value. At a detergent user location, one such apparatus is a flatbed image scanner (or similar device).

### **Method to be Employed by Detergent Manufacturer: Using a Reflectometer**

A reflectometer that measures light at 460nm is used. This device will measure the relative luminance (tristimulus – Y) value, which is a measure of the brightness of the test.

1. Using the reflectometer, measure and record the tristimulus-Y value at 460nm.
2. Place the DetergiCheck in the machine to be tested.
1. Place the DetergiCheck™ in the machine to be tested.
  - a. If testing the equipment:
    - i. Be sure to confirm and record:
      1. The proteolytic agent used;
      2. The concentration of the agent used;
      3. The exposure time to the proteolytic agent
      4. The water temperature
      5. The water quality.
    - ii. This will allow direct comparison if any changes in machine performance are noted, or if of the inputs are changed.
  - b. If testing detergent performance\*\*:
    - i. Be sure to confirm and record:
      1. The proteolytic agent used;
      2. The concentration of the agent used;

3. The exposure time to the proteolytic agent
4. The water temperature
5. The water quality
6. The equipment used
- ii. Alternatively, the test swatch can be placed in the detergent solution within a beaker with a stir stick. Be sure to record all conditions described above, including the speed of the stir stick.
3. After the wash cycle, remove DetergiCheck™ test and thoroughly dry.
4. Once dry, using the reflectometer, measure and record the tristimulus-Y value at 460nm.
5. To compare test results for a measure of the proteolytic effect, utilize the following formula:
  - a. Change in Reflectance =  $Y_{\text{after cycle}} - Y_{\text{before cycle}}$
  - b. Relative protolytic effect:  $P_{\text{effect}} = (Y_{\text{after cycle}} - Y_{\text{before cycle}})/Y_{\text{before cycle}}$

### **Method to be Employed by Detergent User: Using a Flatbed Scanner**

A typical flatbed color scanner associated with scanning and digitizing photographs, documents, etc. for storage and retrieval on a computer is a practical and relatively inexpensive method of measuring the change in brightness of the DetergiCheck™ test swatch. When used with image-capturing/editing software such as Adobe Photoshop®, the mean RGB value (red, green, blue) is a direct measure of the change in brightness (relative luminance) of the test. The steps to follow are:

2. Scan the DetergiCheck™ test swatch prior to the wash cycle.
3. Utilizing the photo editing software, select a solid section of the scanned image, and record the mean RGB value.
4. Place the DetergiCheck™ in the machine to be tested.
  - a. If testing the equipment:
    - i. Be sure to confirm and record:
      1. The proteolytic agent used;
      2. The concentration of the agent used;
      3. The exposure time to the proteolytic agent
      4. The water temperature
      5. The water quality.
    - ii. This will allow direct comparison if any changes in machine performance are noted, or if of the inputs are changed.
  - b. If testing detergent performance:
    - i. Be sure to confirm and record:
      1. The proteolytic agent used;
      2. The concentration of the agent used;
      3. The exposure time to the proteolytic agent
      4. The water temperature
      5. The water quality

6. The equipment used
  - ii. Alternatively, the test swatch can be placed in the detergent solution within a beaker with a stir stick. Be sure to record all conditions described above, including the speed of the stir stick.
5. After the wash cycle, remove the DetergiCheck™ test and thoroughly dry.
6. Once dry, scan the DetergiCheck™ test swatch.
7. Utilizing the photo editing software, select the same solid section of the scanned image as in step #2 and record the mean RGB value. An increase in the mean RGB value indicates the presence of a proteolytic agent, as the test has brightened.
8. To compare test results for a measure of the proteolytic effect, utilize the following formulas:
  - a. Change in Reflectance =  $RGB_{\text{after cycle}} - RGB_{\text{before cycle}}$
  - b. Relative proteolytic effect:  $P_{\text{effect}} = (RGB_{\text{after cycle}} - RGB_{\text{before cycle}}) / RGB_{\text{before cycle}}$

### **Additional Information: Drying the Test**

The DetergiCheck must first be allowed to completely dry prior to taking the reflectivity measurement (with either method). This can be done in one of three ways:

1. Method for Detergent Manufacturer: Use a drying press. This is a device that quickly dries fabric. Drying time can be in less than a minute.
2. Method for Detergent User: Air dry. Simply allow the test to dry in the ambient conditions. Drying time will vary, but can be an hour or more.
3. Method for Detergent User: Use a coffee-mug style warmer. These simple devices will gently heat the test and greatly speed drying time. Again the time will vary, but can be 10 minutes or more.

### **\* Checking for Water Solubility of the DetergiCheck**

Testing has demonstrated that the DetergiCheck is highly water insoluble. However, water conditions, mechanical agitation and other factors can vary greatly. It is recommended that if using for the purpose of comparing various configurations of detergent formulations or other cleaning parameters, the DetergiCheck is first tested in the planned conditions of testing with water alone. This can determine any change in the test due to water alone. Should testing indicate a brightening effect with water alone, please utilize the following formula's:

1. Change in Reflectance, Water only =  $Y_{\text{water}}$
2. Change in Reflectance =  $Y_{\text{after cycle}} - Y_{\text{water}}$
3. Relative proteolytic effect:  $P_{\text{effect}} = (Y_{\text{after cycle}} - Y_{\text{water}}) / (Y_{\text{water}})$

## \*\* Using Unsoiled Test to Calculated Detergency

Depending upon the object of the test, it may be desirable to compare use include as the baseline an unsoiled test. This is for to achieve an absolute measure of soil removal rather a relative measure:

1. Unsoiled (presoiled) Test Swatch =  $Y_{\text{unsoiled}}$
2. Soiled Test Swatch =  $Y_{\text{before cycle}}$
3. Washed Soiled Swatch =  $Y_{\text{after cycle}}$
4. Absolute protolytic effect:  $P_{\text{effect}} \% = (Y_{\text{after cycle}} - Y_{\text{before cycle}}) / (Y_{\text{before cycle}} - Y_{\text{unsoiled}}) / 100$

## References

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