



Staining and Cleaning of Leather and Plastic Roll Goods

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This procedure shall be used to determine the resistance of leather and plastic roll goods (PRG) to soiling after rubbing with black denim. If soiling does occur, this procedure will also be used to determine the cleanability.

1.2 Foreword. Not applicable.

1.3 Applicability. This procedure is applicable to leather and plastic roll goods used in seating and other trim applications and is used in conjunction with GMW3402.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 105-A03 ISO 12945-2
ISO 105-F09 ISO 12947-1

2.2 GM Standards/Specifications.

GMW3221 GMW6992
GMW3402

2.3 Additional References.

- EMPA Testmaterialien AG, Moevenstraße 12, CH-915 St. Gallen, Switzerland - Indigo sulfur black denim for soiling "128/1".
- Operator's Guide for Martindale Machine.

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard

shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Martindale abrasion tester or equivalent as described in ISO 12947-1 and ISO 12945-2 with the following parameters:

- Use a Lissajous figure with a stroke of $60.5 \text{ mm} \pm 0.5 \text{ mm}$.
- Use an additional weight of $595 \text{ g} \pm 7 \text{ g}$ to produce a pressure of approximately 12 kPa.

3.2.2 Weights supplied with the Martindale Machine shall be added to the apparatus. The 12 kPa weight shall be used.

3.2.3 Wool felt diameter $140 \text{ mm} \pm 3 \text{ mm}$ as described in ISO 12947-1.

3.2.4 Foam diameter $38 \text{ mm} \pm 3 \text{ mm}$ as described in ISO 12945-2 and ISO 12947-1.

3.2.5 Suitable cutting tools for preparation of test specimens.

3.2.6 Suitable cutting tools to cut the test specimens in half.

3.2.7 Mechanical convection oven capable of maintaining a constant temperature of $85 \text{ }^{\circ}\text{C} \pm 3 \text{ }^{\circ}\text{C}$ for 4 h.

3.3 Test Vehicle/Test Piece. Leather or plastic roll goods trim material

3.4 Test Time.

Calendar time: 2 days

Test hours: 4 hours heat age +
Martindale sample test
time

Coordination hours: 0 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

3.7 Cleaning Materials.

3.7.1 Cotton rubbing cloth, per ISO 105-F09.

3.7.2 Code 2 soap detergent solution as described in GMW3402 (0.5% by weight in distilled or deionized water). The soap should not have optical brighteners. The soap should dissolve in water producing a solution with a pH that is approximately neutral.

3.8 Staining Material. Indigo sulfur black denim for soiling "128/1", source EMPA Testmaterialien AG, Moevenstraße 12, CH-915 St. Gallen, Switzerland.

4 Procedure

4.1 Preparation.

4.1.1 A minimum of three test specimens shall be cut to approximately 150 mm $\pm$ 3 mm diameter. The Martindale cutter may be used to cut specimens.

4.1.2 A minimum of three pieces of Indigo sulfur black denim for soiling shall be cut to approximately 38 mm $\pm$ 3 mm diameter (see 3.8). The Martindale cutter may be used to cut specimens.

4.1.3 Install all fabrics following the instructions in the Operator's Guide for the Martindale Machine (or equivalent).

4.1.4 Install the weight labeled 12 kPa on the upper portion of the spindle.

4.1.5 Cut several pieces of cotton rubbing cloth per ISO 105-F09, approximately 150 mm x 150 mm (see 3.7.1).

4.2 Conditions.

4.2.1 Environmental Conditions. Condition the specimens and all other textiles needed for conditioning according to GMW3221, Code A.

4.2.1.1 Heat soiled test specimens for 4 h at 85 °C $\pm$ 3 °C in a mechanical convection oven. The time tolerance for the oven aging is +15 minutes.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Install the specimen with the wool felt (see 3.2.3) on the table of the Martindale device. Follow the instructions described in ISO 12945-2.

4.3.2 Install the black denim (see 3.8) over foam in the specimen holder of the Martindale device typically used for abrasion testing. Follow the instruction described in ISO 12945-2.

4.3.3 Install the 150 mm (diameter) test specimens into the Martindale device using the clamping rings. Use the Lissajous rubbing motion for sample testing and follow the instructions described in ISO 12945-2.

4.3.4 Place the spindles with the additional weights through the holes in the guide plate (see 3.2.2). Start the Martindale device for 1000 cycles.

4.3.4.1 After the required number of cycles, remove the soiled specimens. If soiling occurred, the soil should be apparent in the shape of a square. Cut the specimen diagonally through the square from corner to corner to form two identical halves.

4.3.5 Place both cut halves for each specimen in a mechanical convection oven for 4 h at 85 °C $\pm$ 3 °C. Specimens must be removed within 15 minutes beyond the 4 h exposure.

4.3.5.1 After completion of the heat age, remove the samples from the oven.

4.3.6 For each specimen, use only one half for cleaning and the remaining half for visual evaluation only (i.e., retain half the sample with after soiling, clean the other half).

4.3.7 Visual Evaluation. Condition one half of the test specimen to the requirements of GMW3221, Code A. Evaluate the level of staining using the Grey Scale for Assessing Staining (ISO 105-A03), and record the results. Unless otherwise specified, clean the remaining half of the specimen after a minimum of 1 h after heat aging.

4.3.8 Cleaning. Use a white rubbing cloth (see 3.7.1) to gently rub the soil from the outside of the soil to the inside. As the cleaning cloth becomes soiled, rotate to a clean area and continue gently rubbing. Use sufficient pressure to attempt to remove the soil without abrading or otherwise damaging the surface of the specimen. Clean the specimen until no color transfer is visible on the white rubbing cloth.

4.3.9 Condition the tested specimens for a minimum of 24 h to the parameters of GMW3221, Code A before visually evaluating them. Evaluate the specimen using illuminant D65 and following the guidelines in GMW6992. Evaluate the level of staining using the Grey Scale for Assessing Staining (ISO 105-A03), and record the results.

4.4 Summary of Test Method.

4.4.1 A test specimen is soiled using a Lissajous rubbing action with a black denim fabric and a 595 g $\pm$ 3 g, (12 kPa) weight.

4.4.2 The test specimen is mounted on a platform, the soiling material moves along a horizontal axis sliding against the test specimen.

4.4.3 The soiled specimen is cut in half along the diagonal of the square soil, and both pieces are placed in the oven to set for 4 h.

4.4.4 Half of each soiled specimen is cleaned. This is one of the halves of the original test sample.

4.4.5 The cleaned soiled area of the test specimen is evaluated for staining visually along with the original stained area.