GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW3405

Seam Fatigue for Automobile Textiles

1 Introduction

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 test procedure is used to determine the ability of automotive textile materials to resist seam fatigue failures when used in sewn assemblies.

1.2 Applicability. This procedure applies to textile materials that may be sewn into assemblies.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3221

2.3 Additional References.

- Ogawa Seiki Company, Limited based in Tokyo, Japan http://osc-tokyo-japan.sakura.ne.jp/.

3 Resources

3.1 Facilities. Not applicable.

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 Seam Fatigue Tester. Ogawa Seiki Model ATD-2 (available from Ogawa Seiki Company, Limited, see 2.3) or equivalent. The stroke length shall be 15 cm ± 1 cm. The number of cycles per minute shall be 30 ± 1. Measure the stroke length and the number of cycles per minute with no specimens in the machine.

3.2.2 Fifty (50) mm wide clamps.

3.2.3 Sewing Machine. Capable of producing a lock stitched seam with a stitch length of 5 mm/stitch; 10 stitches/50 mm.

3.2.4 Sewing Needle. Number twenty-three (23) or 160 metric equivalent round needle, unless otherwise specified by the appropriate GM engineer and recorded on the construction specification and test data report.

For part level approval the production intent needle shall be used.

3.2.5 Sewing Thread. Size 1022 decitex ± 111 decitex of nylon or polyester thread or the production intent sewing thread.

3.2.6 Metric scale or calipers.

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3.2.7 Apparatus for conditioning to the appropriate requirements as described in GMW3221 Code A, unless otherwise specified in the relevant materials specification.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time.

Calendar time:	2 d
Test time:	1 h
Coordination time:	24 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Personnel trained in accordance with the laboratory accreditation and Standard Operating Procedure requirements.

4 Procedure

This procedure evaluates seam fatigue using a series of loading and unloading cycles applied to a seam sewn in a textile material test specimen. The seam appearance and needle hole elongation is evaluated upon completion of the cycles.

4.1 Preparation.

4.1.1 Unless otherwise specified in the relevant material specification, conditioning shall be performed according to GMW3221 Code A.

4.1.2 Cut six (6) specimens each 100 mm × 100 mm with each cut edge either parallel or perpendicular to the machine direction of the material.

4.1.3 Place two (2) specimens face-to-face (show surface-to-show surface) with the machine direction of each specimen parallel to each other.

4.1.3.1 Using a lock stitch, join the two (2) specimens with a seam perpendicular to the material machine direction at a distance of 10 mm ± 1 mm from one (1) edge with a stitch length of 5 mm ± 0.5 mm. The ends of the sewn assembly can be backstitched for approximately 10 mm or a knot can be tied with the threads.

4.1.3.2 Cut each end of the sewn assembly 25 mm ± 1 mm from the edge and perpendicular to the seam line for a length of approximately 90 mm, being careful not to cut the seam threads. This test specimen is to be referred to as **Warp/Warp.**

4.1.4 Repeat the steps in 4.1.3 but sew the seam parallel to the material machine direction. This test specimen is to be referred to as **Weft/Weft**.

4.1.5 Repeat the steps in 4.1.3 but place the material machine direction of the two (2) specimens, perpendicular to each other and sew the seam on any side. This test specimen is to be referred to as **Warp/Weft.**

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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 Place a clamp on each end of the test specimen. The distance between the clamps clamped on the test specimen should be 120 mm ± 1 mm. The seam should be centered between the clamps.

Note: If the test specimen elongates to > 140 mm between the clamps during the test, it should be re-clamped to the 120 mm ± 1 mm original spacing.

4.3.2 Set the counter for the required number of cycles as specified in the relevant material specification and run the test. Test should be run at a speed of 30 cycles/minute ± 1 cycles/minute with the load weight of 3 kg ± 0.1 kg.

Note: Care should be taken to prevent the weight from touching the platform during testing. The weight must remain suspended.

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