



## **Seam Strength**

### **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 to determine the strength of seams for seating materials. Seam strength is defined as the tensile force necessary to tear apart a seam prepared under standard conditions.

**1.2 Applicability.** Upholstery materials (fabric, leather, plastic roll goods).

### **2 References**

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

#### **2.1 External Standards/Specifications.**

ISO 4915

#### **2.2 GM Standards/Specifications.**

GMW3221

### **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** A tensile testing machine having a variable rate of traverse and operating at 100 mm/minute  $\pm$  10% shall be used. The sewing machine shall be capable of lock stitching. It shall be equipped with clamps (one (1) stationary, one (1) moveable) the jaws of which shall be at least 75 mm wide and 25 mm deep. Instrumentation to record the force extension diagram although desirable is not mandatory.

**3.2.2 Sewing Equipment.** These shall be exactly as the anticipated production techniques for the test material concerned. Full details will be available from the appropriate engineer or will be shown on the engineering drawing or material specification. Typical equipment used at GM:

- Sewing machine: One (1) needle plain seamer, stitch type 301 according to ISO 4915, e.g., Duerrkopp, class 239-125.
- Sewing needle: Fa. Schmetz, needle system 134/35.
- Sewing thread: Nylon or Polyester.
- See Table 1 for combinations of needle size and thread size.

Table 1: Machine Needles and Threads

	Needle	Thread
Fabric	140 Nm, ball point	40/3 Nm (GM quality Tango)
	160 Nm, round point	(1022 ± 111) decitex
Plastic Roll Good	140 Nm, regular point	40/3 Nm (GM quality Tango)
	160 Nm, round point	(1022 ± 111) decitex
Leather	140 Nm, chisel point	40/3 Nm (GM quality Tango)
	140 Nm, round point	(1022 ± 111) decitex

**3.3 Test Vehicle/Test Piece.** From the available material, test pieces 200 mm ± 1 mm × 50 mm ± 1 mm shall be taken in warp and weft (or wales and courses) directions. For initial sample approval and arbitration purposes, sufficient test pieces for the performance of at least three (3) tests and for routine quality control, at least one (1) test shall be taken from all three (3) directions. Cutting dies or shears for preparation of the test pieces.

#### 3.4 Test Time.

Calendar time:	2 days
Test hours:	1 hours
Coordination hours:	24 hours

**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

**4.1 Preparation.** Each sewn test pack shall be prepared from two (2) test pieces, as defined in 3.3 and shown in Appendix A, Figure A1. In each direction, a test pack shall be sewn together (using equipment defined in 3.2) such that the seam, with 10 mm ± 0.5 mm seam allowance, running perpendicular to the longer dimensions of the test pieces, is obtained. A third test pack from test specimens in weft or courses direction shall be sewn together at an angle of 45 degrees ± 4 degrees from the direction where the test pieces have been taken from. (45 degrees sewn specimens are not required for plastic rolled goods (PRG)). After sewing, the seam shall be cut uniformly 10 mm ± 0.5 mm wide. The stitch point distance shall be 5 mm ± 1 mm. The thread shall extend 100 mm ± 20 mm on either side of the seam and knots tied at both ends of the thread immediately adjacent to the seam, but avoiding tension to the seam.

#### 4.2 Conditions.

**4.2.1 Environmental Conditions.** All tests shall be performed after conditioning per GMW3221 code A.

**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 Test Procedure.** One of the narrower unsewn ends of the test pack shall be gripped in the upper jaws of the tensile machine and the other end in the lower jaws, ensuring symmetry and that the tensile force will act perpendicular to the seam. The distance between the closest edges of the jaws shall be adjusted to approximately 100 mm just avoiding tension of the test pack. The test machine shall be started and the tensile force necessary to break the seam shall be determined. The test speed shall be 100 mm/minute ± 10 mm/minute.

## 5 Data

**5.1 Calculations.** Not applicable.

**5.2 Interpretation of Results.** The seam strength shall be expressed, with reference to this test method, as the tensile force, in N/5 cm seam width, required to break the seam. Individual values and arithmetic averages of multiple tests shall be rounded to the nearest N/5 cm seam width. The direction in which the test piece was cut shall also be noted.

**5.3 Test Documentation.** Report the seam strength in each tested specimen direction: Warp (Wales), Weft (Course) and 45 degrees to the Weft (Wales).

## 6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

## 7 Notes

### 7.1 Glossary.

**Nm:** Sewing thread titer, 100 Nm = 100 m weigh 1 g.

**mm:** Needle size unity in 1/100 mm.

### 7.2 Acronyms, Abbreviations, and Symbols.

**ISO** International Organization for Standardization

**PRG** Plastic Rolled Goods

## 8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW14145

## 9 Release and Revisions

This standard was originated in May 2005. It was first approved by the Global Textile Development Group Conference in May 2005. It was first published in September 2005.

Issue	Publication Date	Description (Organization)
1	SEP 2005	Initial publication.
2	APR 2011	5-Year-Refresh, NOT TO TEMPLATE (Worldwide Fabric Specification Team)
3	OCT 2016	Updated to current template. (Materials - Textiles/Trim Global Subsystem Leadership Team)

## Appendix A

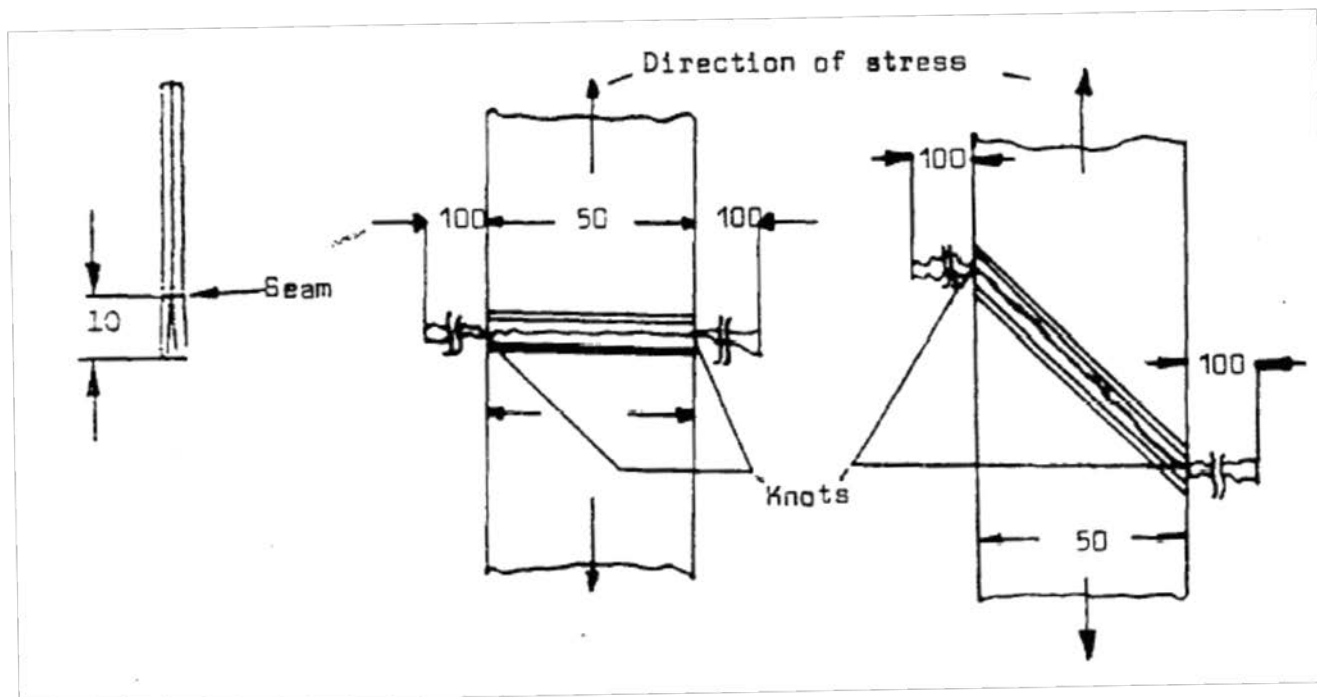


Figure A1: Test Sample