



Resistance of Materials to Cracking from Bending at Cold Temperature

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 procedure documents testing to determine if a material will withstand bending at cold temperature without cracking.

1.2 Applicability. This procedure applies to automotive trim materials such as plastic roll goods.

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

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 Mandrel (approximately 175 mm × 75 mm diameter). The mandrel may be hollow. Aluminum is recommended for corrosion resistance.

3.2.2 Cold chamber capable of maintaining $-30\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

3.2.3 Mechanical convection oven capable of maintaining $93\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

3.3 Test Vehicle/Test Piece. Carpet or similar flexible materials.

3.4 Test Time.

Calendar time:	12 days
Test hours:	4 hours
Coordination hours:	2 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. Cut four (4) specimens from the sample approximately 150 mm × 150 mm. Condition two (2) as-received specimens for a minimum of 24 h to the requirements of GMW3221 Code, A prior to testing.

4.2 Conditions.

4.2.1 Environmental Conditions.

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 Summary. The specimens cut from the sample shall be tested in the as- received condition. Additional specimens cut from the same sample shall be tested after having been oven aged. All of the specimens shall be tested for resistance to cracking when bent at cold temperature. The bending occurs as the specimens are slowly wrapped around a mandrel. The purpose of the test is to detect brittleness or cracking when the specimens are bent at cold temperature.

4.3.2 Oven age two (2) of the four (4) specimens for 168 h ± 0.5 h at 93 °C ± 2 °C in a mechanical convection oven.

4.3.3 Condition oven aged specimens for a minimum of 24 h to the requirements of GMW3221, Code A.

4.3.4 Place all four (4) specimens plus the mandrel in a cold chamber for a minimum of 4 h at -30 °C ± 2 °C.

Note: Gloves shall be worn while handling specimens and the mandrel in the cold chamber to prevent heat transfer to the specimens or the mandrel.

Note: One (1) as-received specimen shall be wrapped so that the face side of the specimen is in contact with the mandrel. One (1) as-received specimen shall be wrapped with the backside of the specimen in contact with the mandrel. Follow the same procedure using both oven aged specimens.

4.3.5 Slowly wrap each of the specimens individually around the mandrel as described in the **Note** above.

4.3.6 Evaluation. Examine each of the specimens for cracking, crazing, etc.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Report any cracking, crazing, etc., according to the evaluation criteria in the material specification. Report if the cracking occurred when the specimen was tested face side or backside to mandrel.

5.3 Test Documentation. Not applicable.

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. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols. Not applicable.

8 Coding System

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

Test to GMW14108