



Reclosable Fasteners

1 Scope

This specification covers the performance characteristics of textile and plastic reclosable fastening systems. The bonding and attachment of the reclosable fastening systems to various substrates is covered in other GM specifications. Those comments particular to the performance of the reclosable fasteners will be maintained within this specification.

1.1 Material Description.

1.1.1 Types. There are two (2) basic types of reclosable fastening systems covered in this specification:

- Type I is the stem interlock
- Type II is the hook and loop

1.1.2 Type I reclosable fastening systems consist of plastic stems or bristles, molded or otherwise formed on one (1) panel or member which interlock with a second panel or member of the same type stems or bristles. The stems or bristles generally have mushroom shaped heads but shape may vary with properties. Type I stems show a basically symmetrical and similar shape when viewed from all sides.

1.1.3 Type II reclosable fasteners consist of a two-part system. One (1) half consists of a series of hook like appendages which may be either woven, knitted or molded. The second half consists of a series of loops, either woven or knitted, which interlock by contact pressure with the first half. The hooks of Type II show a hook-like shape when viewed from one (1) face and generally only a thickness when viewed edgewise.

1.1.4 Some Type I/Type II combinations that are in use today are shown in Appendix A, Table A1. The type and combination are specified by suffixed added to the basic specification number. For example: GMW17585, Type II, HEL48/LNLU (see Table 1 for composition detail).

1.1.5 The combinations of reclosable fasteners shown in Appendix A, Table A1 are standard. Other combinations besides the ones listed shall be considered based upon actual testing and not extrapolated from data.

1.2 Symbols. Not applicable.

1.3 Applicability. This specification covers the performance requirements of reclosable fasteners. The fasteners are used for attaching interior components. Typical components include; headliner, side trim, carpet, trunk trim, cargo trim, etc.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

AATCC 8	ASTM D5170	ISO 105-B06	SAE J1885
AATCC 107	ISO 105-A02	SAE J883	SAE J2212
ASTM D5169			

2.2 GM Standards/Specifications.

GMW3059	GMW3221	GMW6992	GMW17556
GMW3116	GMW3232	GMW16597	

2.3 Additional References.

- blueSky Materials Database, contact the GM Lead Engineer for details/access.
- Instron Tensile Tester, available from <http://www.instron.us/en-us>

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.1.1 Chemical Requirements.

3.1.1.1 Composition.

3.1.1.1.1 The reclosable fasteners combination shall consist of a four-place classifier for the hook side, listed first, and a four-place classifier for the loop side. Type I systems shall show a four-place hook classifier for each side.

3.1.1.1.2 The use of the word hook in the description of manufacture shall apply to an asymmetrical shaped catching device, which when viewed frontwise, shows a hook side on one (1) half and a support/noncatching side on the other. The use of the word "tree" refers to a symmetrical shaped catching device which, when viewed frontwise, shows similar halves. Some typical tree shapes are T, arrowhead or dual-barb in appearance.

Note: Some quasi-mushroom shaped heads are available but do not meet Type I classification as they do not interlock with each other.

3.1.1.1.3 The classifier shall be constructed per Table 1.

Table 1: Composition

First Place	Second Place (Material)	Third Place (Manufacture)	Fourth Place (Hooks/Loops)
H = Hooks or Stems L = Loops	E = Polyester K = Peek N = Nylon O = Polyolefin P = Polypropylene R = Stainless Steel S = Steel U = Ultem X = Nomex Y = Stylen	K = Knitted L = Woven M = Molded Hook T = Molded Tree Q = Qausi-Mushroom	Hooks: density per square centimeter (cm ²) Loops: N = Napped U = Unnapped

Note: Example "GM17585, Type II, HEL48/LNLU":

Type II Hook "HEL48" = Hooks/Polyester/Woven with 48 hooks per square centimeter (cm²).

Type II Loop "LNLU" = Loops/Nylon/Woven/Unnapped.

3.1.2 Mechanical Requirements.

3.1.2.1 Dynamic Tensile Strength. Parts shall meet the tensile values listed in Appendix A, Table A1 when tested using a constant rate tensile test machine that ensures that the specimens are pulled at a true perpendicular angle to each other without peel. The rate of testing shall be 305 mm/minute. The test specimens shall be conditioned at 50% ± 5% Relative Humidity (RH) at 21 °C ± 2 °C. Mate the two (2) sides together to form a 25.4 mm × 25.4 mm overlap contact area. The values reported shall be the average of the peak strengths of five (5) samples.

3.1.2.2 Dynamic Shear Strength (ASTM D5169). Parts shall meet the shear values listed in Appendix A, Table A1 when tested as follows:

3.1.2.2.1 The samples be conditioned as in 3.1.2.1. Rate of testing shall be 305 mm/minute in the longitudinal direction. Side shear values are generally inclusive and do not represent real world conditions, therefore, this standard only requires longitudinal shear testing. The test specimen size shall be a 25.4 mm × 25.4 mm overlap contact area. The reported value shall be the average of the peak strengths of five (5) specimens. The two (2) sides of the test specimens shall be mounted onto the shear fixtures or other devices that are capable of being

mounted in a constant rate tensile puller. The samples are to be mated in the direction of longitudinal manufacture. Five (5) passes with a 5 kg roller (roller to be 58 mm wide by 120 mm in diameter) are to be used to secure the two (2) sides to each other. The samples are to be mounted in the tensile puller and fixture plates pulled at the rate listed above until separation occurs. Care should be taken that the fixtures are pulled wholly in the same plane.

3.1.2.3 Peel Testing (ASTM D5170). Peel tests, except in a very few instances, are not applicable to reclosable fasteners. Such values as are necessary for design considerations in unique applications should be determined from actual design application tests and specified on part drawing.

3.1.2.4 Cycle Testing.

3.1.2.4.1 Type I. Samples shall be mounted and placed in an Instron tensile tester (or equivalent) in a manner similar to the tensile test specimens detailed in 3.1.2.1. Specimens shall be conditioned as in 3.1.2.1. The tensile tester shall be cycled at a speed of 305 mm/minute for engagement and disengagement. Direct load disengagement shall be read from the machine and number of cycles to 50% of original disengagement shall be determined. The reported value shall be the average of five (5) specimens.

3.1.2.4.2 Type II. Samples must meet the listed minimum percentage of the original shear closure strength after 5000 cycles or as modified in Appendix A, Table A1 when tested using a Linear Life Cycle machine, or equivalent.

3.1.3 Physical Requirements.

3.1.3.1 Color and Pattern (if applicable) (GMW6992). Generally, reclosable fasteners are not visible and color requirements do not apply. Where color is specified, the color and pattern shall be as approved by the appropriate division textile releasing department to be an acceptable match to their released standard.

3.1.3.1.1 Plastic Materials. Refer to the plastic material specification on the engineering drawing or specification.

3.1.3.1.2 Textile Materials.

3.1.3.1.2.1 Color Crock (AATCC 8). When subjected to ten strokes on the crockmeter, the material shall show a minimum rating of four (4) when compared to the American Association of Textile Chemists and Colorists (AATCC) Chart for Measuring Color Transference.

3.1.3.1.2.2 Dye Stability (AATCC 107, 2 h at 50 °C). The material shall have a minimum rating of four (4) on the AATCC Chromatic Transference Scale using AATCC multifiber test fabric, Style 10 (edges cold cut only).

3.1.3.1.2.3 Colorfastness to Light Test per ISO 105-B06, Condition 5 to 112 kJ/m² or per SAE J1885/SAE J2212 to 75.2 kJ/m² at 340 nm exposure in a Xenon Arc apparatus or equivalent. A slight on-tone fade is acceptable. A rating ≥ 4 is required using the gray scale for color change per ISO 105-A02. A noticeable value (lightness) and/or Chroma (saturation) change with minimum hue change is acceptable. Evaluate specimens as specified in GMW6992. Reference polystyrene or blue wool is to be used to certify the xenon arc apparatus.

3.1.4 Additional Requirements.

3.1.4.1 Flammability (GMW3232). The material shall not burn or transmit a flame front across its surface at a rate of more than 101.6 mm/minute when tested as received and after accelerated aging. However, if a material stops burning before it has burned for 60 s from the start of timing and has not burned more than 50.8 mm from the point where timing was started, it shall be considered to meet this requirement.

Note: The reclosable fastener shall be tested as a composite when bonded.

3.1.4.2 Cold Resistance (Plastic Material Only). A test specimen no thicker than 2.54 mm and measuring 25 mm wide by 50 mm longer than necessary to make a 180 degree bend around the test mandrel shall be placed in a -30 °C cold box for 24 h. The test mandrel, a piece of 50 mm outside diameter (OD) steel tube by 150 mm long shall also be placed in the cold box. The test specimen shall be bent around the steel test mandrel while still in the cold box or within 5 s of removal. Samples will be judged to have failed if they crack, break or shatter.

3.1.4.2.1 If the required test specimen cannot be obtained from the production part, the test specimen size may be modified by agreement of the purchaser's engineering department and the seller.

Note: This test may be waived by the purchaser's engineering in case of non-standard plastic materials.