



Sealant, Anaerobic, Low Viscosity, Cup Plug

1 Scope

1.1 Material Description. A fluorescent yellow anaerobic dimethylacrylate polyester resin base liquid compound that solidifies by polymerization (not by solvent evaporation) into a tough plastic when confined between closely fitted metal surfaces. This material may be used on slightly oiled cadmium and zinc plated, black oxide, and phosphate and oil coated parts and still obtain satisfactory properties. For maximum properties, parts must be cleaned.

1.2 Symbols. Not applicable.

1.3 Applicability. This low viscosity, thixotropic material is intended for sealing cup plugs against engine coolant or oil. Material shall be capable of obtaining full retaining and/or locking strength with gap thickness to 0.03 mm diametral and seal with gap thicknesses to 0.10 mm using the ASTM D4562 or ISO 10123 static shear strength pin and collar tests. The material curing time may be substantially reduced with accelerators or heat. This document re-introduces a low viscosity cup plug sealant where tight press fit conditions exist.

1.3.1 Temperature Use Range. It is best suited for application where temperatures range from -54 °C to 150 °C. Low temperature performance is based on maintaining 50% or more of the original minimum static shear strength after 2 h exposure (measure in 30 s or less). The low temperature test is not required for this standard. The upper temperature limit is based on Table 3 aging requirements.

1.4 Remarks. The words must, shall or will as used in this document mean a mandatory requirement.

1.4.1. Application of the product outside its use category (retaining) as defined by GMW16800, 7.1.10.2 is strictly prohibited.

1.4.2 Preferential bonding to one surface (adhesive failure) can be an indicator of surface contamination or inactivity if the metal is different.

1.4.3 Use of automated application dispensing system equipment designed for this product provides a measured uniform liquid coating. Contact the product manufacturer for equipment recommendations.

1.4.4 Test Result Perspective. Steel pin and collar forms are used to establish and compare diametral gap limit, cure speed and strength between retaining compounds. Test this product on end use surfaces as the metal reactivity (1.4.7) and production surface cleanliness affecting cure speed and strength to gap may be different from the values in this specification.

1.4.5 Container Size. No anaerobic container is more than 1 Liter because pressure on the product in the container can cause curing. Do not transfer anaerobic into an unauthorized or contaminated container.

1.4.6 Dispensed Product Location on Detail Drawings (see Figure 1). Cup plugs are generally a press fit, add just enough to fill in the surface imperfections which is generally much less, than most dispense systems or a manual system would apply. If there is a slip fit, then sufficient product must be dispensed to allow filling the gap. Prints must show the product placement bandwidth. The applied anaerobic bead should be properly placed to minimize the insertion length. The dispensed product must not be pushed or plowed more than 3 mm to 4 mm to reach the fully installed position. The heat from the interference will help to accelerate the curing of the product and a "pre-cure" situation could occur. Continuing to press forward/inward could cause shearing or galling which could lead to leakage. Normally the sealant is applied to the bore or inside diameter of the parts.

1.4.7 Reactive Surfaces. Anaerobics bond with active metal ions and cure in the absence of air. The following are very reactive; brass, copper, manganese, followed by active; aluminum, bronze, iron, nickel and steel. Inactive metals are anodized aluminum, cadmium, chrome finishes, Inconel, magnesium, plated parts, galvanized steel, stainless steel, titanium and zinc. Small percentages of copper or other active metals are added to inactive compositions to promote anaerobic curing.

1.4.7.1 Parts Washer System Residue. Borate and nitrate cleaning residues will retard bonding and cure.

1.4.8 Design Resource Information. For those with access to the global document management (GDM) database, in the assembly, sealing and fastening bill of material (BOM) Level II, select best practices (standard parts and features), and open the commonly used parts folder where the cup plug BOM is located. Make sure your cup plug and bore fits the intended material and design direction.

2 References

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

2.1 External Standards/Specifications.

ASTM A108	ASTM D792	ASTM D3828	ASTM D5363
ASTM A380	ASTM D1084	ASTM D4562	ISO 10123

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW16800	GMW17332
GMW3420	GMW15735	GMW17205	

2.3 Additional References.

Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

3 Requirements

3.1 This material to be tested per the methods outlined in, see GMW16800, Retaining, Appendix A, Table A1. This includes test frequency requirements to be reported to the Powertrain Integration and Sealant Specialist Team based on timing from the initial product approval date (month/year (mm/yr)).

3.1.1 All table tests listing more than one method, the one in bold was used to generate that table data property.

3.1.2 Minimum Table Data Requirements. Table 1 and Table 2 are based on the minimum number of batches described in, see GMW16800, 5.3.2 Initial Approval. Conformance to Table 3 and storage/stability is based on one batch.

Table 1: Initial Qualification Requirements

Properties	Test Method	Values
Unpolymerized		
Flash Point	ASTM D3828	185 °C minimum
Specific Gravity	ASTM D792	1.10 sp.g ± 0.02 sp.g
Storage/Stability (Viscosity Increase)	GMW15735 cycle B, GMW16800 (4.7)	Meets all Table requirements 50% maximum
Toxicity/Health and Safety	GMW3059	Meets requirements
Polymerized		
Static Shear Strength (Pin and Collar), 24 h at 25 °C		
Steel (1008/1010 per ASTM A108)	ASTM D4562	15 MPa minimum
Aluminum (ASTM A380)		5 MPa minimum
Fluid Resistance (Pin and Collar Shear) (Aluminum ASTM A380)		
168 h at 150 °C in GMW17332 (0W20)	GMW16800 (4.16.5)	10 MPa minimum
168 h at 125 °C in 50v/50v mix of GMW3420 and potable water	GMW16800 (4.16.3)	5 MPa minimum
Corrosion to Metal (aluminum and steel)	GMW16800 (4.6)	None