



Synthetic Polyalkylene Glycol Lubricant

1 Scope

1.1 Material Description. This specification defines the minimum acceptable requirements for synthetic polyalkylene glycol (PAG) lubricants for use in GM mobile air conditioning systems designed for HFC-134a refrigerant. This specification applies only to PAG lubricants approved for use in service.

1.2 Symbols. Not applicable.

1.3 Applicability. This PAG lubricant is intended for service use only in the air conditioning systems of General Motors vehicles.

2 References

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

2.1 External Standards/Specifications.

ASHRAE STD 97	ASTM D445	ASTM D1744	ASTM D2670
ASTM D93	ASTM D974	ASTM D2270	ASTM D3233
ASTM D97	ASTM D1298		

2.2 GM Standards/Specifications.

GMW3059

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

3.1 Requirements on Delivery. No shipment shall be made by any supplier until representative initial production samples have been approved by engineering as meeting the requirements of this specification.

3.2 Chemical Requirements. This specification does not restrict the chemical structure of the polymer. Any proportion of the ethylene/propylene oxide units may be used in the base polymer. Starting or terminating groups or functionalities may vary as necessary to meet the requirements listed in this specification.

3.3 Physical Requirements. The lubricant shall meet the requirements shown in Table 1.

Table 1: PAG Lubricant Properties and Requirements

Properties	Requirement	Test Method
Viscosity at 100 °C	10 mm ² /s to 14 mm ² /s	ASTM D445
Viscosity at 40 °C	45 mm ² /s to 70 mm ² /s	ASTM D445
Viscosity Index	175 minimum	ASTM D2270
Specific Gravity at 20 °C	0.95 to 1.10	ASTM D1298
Flash Point	150 °C minimum	ASTM D93
Total Acid Number	0.5 (maximum) mg KOH/g	ASTM D974
Pour Point	Not above -30 °C	ASTM D97

Properties	Requirement	Test Method
As received, Water Content	1000 ppm maximum	ASTM D1744
Solubility in HFC-134a At 3% weight lubricant At 10% weight lubricant	60 °C minimum 50 °C minimum	See Solubility Curve in Appendix A, Figure A1
Sealed Tube Stability	Number of metal strips: Fe: 3, Cu: 2, Al: 2 0.5% maximum HFC-134a decomposition	ASHRAE STD 97

KOH = Potassium hydroxide

3.3.1 Purity. The lubricant shall be a clear, transparent liquid. There shall be no particulates or turbidity present. Ash content of the base stock (exclusive of additives) shall be less than 0.01% by mass.

3.3.2 Water Absorption. The rate of water absorption (21 days) for the fluid at 21 °C, 80% relative humidity (RH) shall not exceed 10 000 ppm when exposed in an open service container at a surface to volume ratio of 3:0.

3.4 Wear Performance. Wear testing shall be performed under an HFC-134a atmosphere.

3.4.1 Falex Test. The Falex Test shall be run per ASTM D2670 modified as follows:

3.4.1.1 Break in 60 s at 91 kg.

3.4.1.2 Test for 60 minutes at 136 kg.

3.4.1.3 Test should be run in an enclosed chamber with oil saturated with R134a refrigerant during the test.

3.4.2 Maximum Wear. The maximum wear for the following materials shall be as follows:

3.4.2.1 AISI 1137 Steel block/AISI 3135 Steel pin: 0.5 mm (maximum).

3.4.2.2 Alloy 390 Aluminum block/AISI 3135 Steel pin: 0.5 mm (maximum).

3.4.3 Falex Extreme Pressure Test. The Extreme Pressure Test shall be run per ASTM D3233. The minimum seizure load for the materials shown in 3.4.1 shall be 3000 N.

3.5 Storage Stability. The supplier shall test the lubricant for stability, and storage life in GM approved service containers (e.g., 60 days at 35 °C and 95% RH) shall result in no significant change in the properties shown in Table 1.

3.6 Performance Requirements. The material shall perform satisfactorily in application and service. Failure to do so shall constitute reason for rejection regardless of compliance with requirements of this specification.

3.7 Materials Compatibility. All materials shall be tested to ASHRAE STD 97 as shown in Table 1. In addition to the preceding, the lubricant shall not cause degradation of the materials or components in the Air Conditioning (A/C) system, (e.g., hoses and O-rings) that would impair their performance in the system.

3.8 Additional Testing. GM reserves the right to require any additional tests that may be deemed necessary to ensure satisfactory performance of candidate lubricants submitted for approval.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. All shipments of material or parts under contract or purchase order manufactured to this specification shall be equivalent in every respect to the initial samples approved by Engineering. There

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