



Synthetic Polyalkylene Glycol (PAG) Lubricant for R1234yf Refrigerant

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 HFO 1234yf refrigerant.

1.2 Symbols. Not applicable.

1.3 Applicability. This specification applies only to PAG lubricants approved for use in service.

2 References

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

2.1 External Standards/Specifications.

ASHRAE 97	ASTM D97	ASTM D974	ASTM D2270
ASTM D93	ASTM D445	ASTM D1744	ASTM D3233

2.2 GM Standards/Specifications.

GMW14270

2.3 Additional References.

- Part Number 9986364: PAG-PSD1
- Part Number 9986365: PAG-46
- Part Number 9986366: PAG-ND12
- Part Number 9273590: SP-A2
- Part Number 9986479: Zerol HD46

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.

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.

Table 1: PAG Oil Requirements

Properties	Requirements	Test Methods
Viscosity at 100 °C	8.5 mm ² /s to 11.5 mm ² /s	ASTM D445
Viscosity at 40 °C	46 mm ² /s ± 3 mm ² /s	ASTM D445
Viscosity Index	175 minimum	ASTM D2270
Flash Point	150 °C minimum.	ASTM D93
Total Acid Number	0.1 maximum mg KOH/g	ASTM D974
Pour Point	Not above – 35 °C	ASTM D97
Water Content, as received	700 ppm maximum	ASTM D1744
Solubility in R1234yf At 3% weight. lubricant At 10% weight lubricant	43 °C minimum 30 °C minimum	See Solubility Curve in Appendix A, Table A1
Sealed Tube Stability	Fe: IRON 3, Cu: Copper 2, Al: Aluminum 2 0.5% maximum R1234yf decomposition TAN < 3.0	ASHRAE 97

3.4 Falex Extreme Pressure Test. The Extreme Pressure Test shall be run per ASTM D3233 in the presences of R1234y. 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 97 as shown in Table 1. The lubricant shall not cause degradation of materials or components in the Air Conditioning (A/C) system that would impair their performance in the system.

3.7.1 Seal Tube Stability Testing. The test conditions included two (2) levels of moisture 200 Parts Per Million (ppm) and > 2000 ppm and two (2) aging temperature/time settings (190 °C/24 hours and 175 °C/14 days). The resulting Total Acid Number (TAN) shall be less than 3.0 mg KOH/g (Table 1).

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.