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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------|
| <b>NAVISTAR, INC.</b>                                                                                                                                                                                                                                                                                                                   |                                  |                                               |
| <b>Material, Parts, and Process Specifications<br/>(MPAPS)</b>                                                                                                                                                                                                                                                                          |                                  | NUMBER:<br><b>MPAPS B-6818</b>                |
|                                                                                                                                                                                                                                                                                                                                         |                                  | Former Designation: <b>TMS-6818</b>           |
| <b>TITLE:<br/>Refrigeration Lubricants</b>                                                                                                                                                                                                                                                                                              |                                  | CURRENT REV No.:<br><b>1608</b>               |
|                                                                                                                                                                                                                                                                                                                                         |                                  | DATE:<br><b>Aug. 2016</b>                     |
| WRITTEN/EDITED BY:<br><b>J. Goldschmidt</b>                                                                                                                                                                                                                                                                                             | APPROVED BY:<br><b>R. Goluch</b> | SUPERSEDES:<br><b>Rev. 0908 – August 2009</b> |
| <b>PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION</b>                                                                                                                                                                                                                                                            |                                  |                                               |
| <i>This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.</i> |                                  |                                               |

## 1.0 APPLICATION

This specification covers three types of lubricants suitable for use in mobile air conditioning systems. Two of these are compatible with the HFC-134a refrigerant and the third is compatible with the discontinued R-12 refrigerant. These lubricants are used for factory fill, assembly applications, and in service applications.

**1.1 Type I:** A mineral oil based lubricant compatible with R-12 refrigerant and commonly used as the compressor service oil in A/C systems using R-12 refrigerant. It is also commonly used as a lubricant for O-rings in the A/C fitting assemblies for both R-12 and HFC-134a refrigerant systems.

**1.2 Type II:** A Polyalester based synthetic lubricant that is compatible with HFC-134a refrigerant and is used only as a compressor oil in factory fill and service applications.

**1.3 Type III:** A Polyalkylene Glycol (PAG) based synthetic lubricant that is compatible with HFC-134a refrigerant and is used only as a compressor oil in factory fill and service applications.

## 2.0 SCOPE

This specification covers requirements for physical properties, source approval procedure, quality control, packaging and identification and approved sources of supply.

### 2.1 Restricted Chemical Substances

Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

## 3.0 REFERENCE DOCUMENTS

Unless otherwise specified, the latest issue of all referenced standards shall apply. The following Specifications, Standards, and Regulations are referenced in this specification.

|                                                  |            |            |
|--------------------------------------------------|------------|------------|
| Quality System Standard ISO 9001 or TS-16949     | ASTM D93   | ASTM D1298 |
| CFR Title 29, Part 1910                          | ASTM D97   | ASTM D2270 |
| NAVISTAR Supplier Packing and Shipping Std. D-13 | ASTM D445  | ASTM D6278 |
| NAVISTAR Engineering Design Std A-16             | ASTM D974  | ASTM E1064 |
| NAVISTAR MPAPS B-50                              | ASTM D1209 | ISO 3448   |

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|--------------------------------|-------------------------------------------|--------------------------|
| NUMBER:<br><b>MPAPS B-6818</b> | TITLE:<br><b>Refrigeration Lubricants</b> | REVISION:<br><b>1608</b> |
|--------------------------------|-------------------------------------------|--------------------------|

## 4.0 REQUIREMENTS

### 4.1 General

Lubricants purchased to this specification shall consist of suitably refined base stocks fortified with additional functional additives as may be necessary to meet the requirements of this specification.

4.2 Material supplied shall meet all requirements of this specification. A written report certifying conformance to all requirements shall be provided before submitting samples for evaluation. The vendor shall demonstrate compatibility of his lubricant with all applicable system materials, including but not limited to, elastomers\*, desiccants\*\*, plastics and coatings.

\* Elastomeric materials shall be obtained from the appropriate manufacturers. The materials shall include: MPAPS F-6021, Type V tube material, o-rings, and seal materials. Please contact Materials Engineering at Truck Development and Technology Center for more information.

\*\* Desiccant materials shall be obtained from UOP, Molecular Sieves, 25 E. Algonquin Road, Des Plaines, IL 60017-5017.

4.3 Material supplied shall be suitable for the use intended, be manufactured with good commercial practice, and shall exhibit no objectionable odor. No re-refined base stocks shall be used.

TABLE 1 PROPERTY AND PERFORMANCE REQUIREMENTS

| PROPERTY                                                     | Type I             | Type II   | Type III           | TEST DESIGNATION                                                               |
|--------------------------------------------------------------|--------------------|-----------|--------------------|--------------------------------------------------------------------------------|
| Approximate ISO Viscosity Number                             | 68                 | 68        | 68                 | ISO 3448                                                                       |
| Viscosity at 40° C Kinematic, mm <sup>2</sup> /s (cSt)       | 63-67              | 63-67     | 70-90              | ASTM D 445                                                                     |
| Viscosity at 100° C Kinematic, mm <sup>2</sup> /s (cSt)      | 6.5-7.5            | 12.5-15.5 | 14-19              | ASTM D 445                                                                     |
| Viscosity Index, min                                         | 46                 | 205       | 200                | ASTM D 2270                                                                    |
| Pour Point, °C, max                                          | -30                | -30       | -35                | ASTM D 97                                                                      |
| COC Flash Point, °C, min                                     | 195                | 200       | 200                | ASTM D 93                                                                      |
| Total Acid Number, mg KOH/g, max                             | 0.25               | 0.25      | 1.10               | ASTM D 974                                                                     |
| Specific Gravity @15° C                                      | .894-.896          | .996-.998 | 1.00-1.05          | ASTM D 1298                                                                    |
| Methylation, % min                                           | Report*            | 95        | Report*            | ASTM E 326                                                                     |
| Moisture, PPM, max                                           | Report*            | 500       | 1000               | ASTM E 1064                                                                    |
| Appearance                                                   | Clear              | Clear     | Clear              |                                                                                |
| Color, Platinum-Cobalt                                       | Report*            | <400      | Report*            | ASTM D 1209                                                                    |
| Upper Miscibility: 5% in HFC-134a, °C<br>10% in HFC-134a, °C | Report*<br>Report* | 54<br>51  | Report*<br>Report* | TBD<br>(May be extrapolated from solubility curve until a method is developed) |
| Shear Stability,<br>Viscosity Change, @ 40° C, % max         | Report*            | ±1.0      | Report*            | ASTM D 3945<br>Proc. B                                                         |

\* Specification limits for these properties have not been determined as yet. Test values shall be reported.

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