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**MIL-STD-3004-2
11 September 2018**

DEPARTMENT OF DEFENSE STANDARD PRACTICE

QUALITY ASSURANCE FOR PACKAGED FUELS, LUBRICANTS AND RELATED PRODUCTS

Part 2 of 2



AMSC N/A

FSC 91GP

MIL-STD-3004-2

FOREWORD

1. This Standard is approved for use by all Departments and Agencies of the Department of Defense (DoD).
2. The information in this Standard was extracted from MIL-STD-3004D w/Change 1, dated 28 Mar 2016, to facilitate the transfer of Quality Assurance (QA) policy responsibilities for Packaged Petroleum Products from Defense Logistics Agency (DLA) Energy to DLA Aviation. DLA Aviation also has responsibility for chemicals (packaged and bulk).
3. Certain provisions of this Standard are subject to international standardization agreements. When an amendment, revision, or cancellation of this Standard is proposed which would affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels, including departmental standardization offices, if required.
4. The tables in this Standard are numerous; therefore, they are located after the end of Section 6 but preceding the Appendices.
5. Unless specifically stated, all references to government documents and non-government publications shall refer to the most recent version or revision of that document or publication.
6. References to the Quality Assurance Representative (QAR) include Military Service personnel designated to perform these functions.
7. Regarding changes from previous issue, margin notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.
8. Comments, suggestions, or questions on this document should be addressed to DLA Aviation - VEB, ATTN: VEB, 8000 Jefferson Davis Hwy. Richmond, VA 23397-5616, or email: stdznmgt@dla.mil. Since contact information can change, verify the currency of this address information using the assess site <http://quicksearch.dla.mil/> which does not reside on a secure website.

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SUMMARY OF CHANGE

1. The purpose of establishing two stand-alone parts of MIL-STD-3004 is to separate responsibility between DLA Energy for Bulk Petroleum, Oils and Lubrication (POL) (Part 1) from DLA Aviation for Packaged POL (Part 2).
2. Changed the specification title by eliminating the word “SURVEILLANCE”.
3. Added additional specifications for Type II shelf-life commodities currently being used by the Services. Ensured all documents in Section 2, “Applicable Documents” are active, titles are correct, and identified in the document.
4. Added paragraphs 3.9 “Biobased materials.” and 3.27 “Environmentally preferable.”
5. Added paragraphs 4.8 “Toxic chemicals, hazardous substances, and ozone-depleting chemicals.” and 4.9 “Recycled, recovered, environmentally preferable, or biobased materials.”
6. Added Section 6, “NOTES”.
7. Various TABLES, added new testing characteristics ensuring final product compliance. Web addresses have been corrected reflecting current addresses.
8. TABLE IV, added the following; “Note 1. MIL-PRF-46167 has been superseded by MIL-PRF-2104 and is for reference only since the US military Tri-Services have not unanimously endorsed MIL-PRF-2104.”
9. TABLE V, deleted column with specification VV-G-632 and replaced it with its superseding specification, MIL-PRF-10924.
10. Added Appendix A, B, and C.
11. In section, “CONCLUDING MATERIAL” changed the DLA Review activity, Preparing activity, and Project Number.

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1. SCOPE

1.1 Scope. This Standard provides DoD Policy, general instructions, and minimum procedures to be used by the Military Services and the DLA in performing quality assurance/surveillance functions of U. S. Government-owned packaged fuels, lubricants, and related products worldwide at all locations except product procurement facilities that are covered by requirements contained in the contract. Requirements for procurement needs may be derived from this document as necessary. The information contained herein is appropriate to quality assurance where applicable. This Standard also contains intra-Governmental receipt limits. Copies of this Standard can be obtained through regular channels from ASSIST Online website: <https://assist.dla.mil/> or <http://quicksearch.dla.mil/>.

1.2 Applicability. Quality assurance (QA) is a planned and systematic pattern of all actions necessary to provide confidence that adequate technical requirements are established; products and services conform to established technical requirements; and satisfactory performance is achieved. "For the Government, Contract QA is a method to determine if a supplier of product and/or services fulfilled its contract obligations pertaining to products and/or services provided. It includes all actions required to ensure the Government is receiving the proper products and/or services. By common usage, Petroleum QA responsibility is fulfilled when the product and/or service is accepted by the Government and the product no longer belongs to the contractor or when the service is complete." Quality Surveillance (QS), as used herein and a subset of QA, is the aggregate of measures (blending, stock rotation, sampling, etc.) used to determine and maintain both the quality of product receipts and the Government-owned bulk petroleum POL products to the degree necessary to ensure that such products are suitable for their intended use. A vigilant QS program, implemented by properly trained personnel, is necessary to protect the original product quality and the interests of the Government. Policy and procedures discussed for QS on receiving Government-owned fuel POL applies to Military Service acceptance requirements for fuels purchased by DLA Aviation.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information, or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government Documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

INTERNATIONAL STANDARDIZATION AGREEMENTS (STANAG)

STANAG 1110 Allowable Deterioration Limits for NATO Armed Forces Fuels,
Lubricants and Associated Products

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STANAG 3149	Minimum Quality Surveillance for Fuels
STANAG 4714	Minimum Quality Surveillance for Lubricants and Associated Products
STANAG 7036	Methods of Detection and Treatment of Fuels Contaminated by Microorganisms

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

AIR AND SPACE INTEROPERABILITY COUNCIL (ASIC)

AIR STD FG 4021	Allowable Deterioration Limits for Stored Fuels, Lubricants, and Associated Products
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(Copies of this document are available online at <http://quicksearch.dla.mil>.)

FEDERAL SPECIFICATIONS

C-T-91	Tallow, Inedible
O-M-232	Methanol, (Methyl Alcohol)
O-E-751	Ether, Petroleum, Technical Guide
SS-G-659	Graphite, Dry, (Lubricating)
TT-I-735	Isopropyl Alcohol
VV-C-846	Cutting Fluids: Emulsifiable Oils
VV-D-1078	Damping Fluid, Silicone Base, (Dimethyl Polysiloxane)
VV-G-671	Grease, Graphite
VV-L-825	Lubricating Oil, Refrigerant Compressor, Uninhibited
VV-P-236	Petrolatum, Technical

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

COMMERCIAL ITEM DESCRIPTIONS (CID)

A-A-50493	Oil, Penetrating, (for Loosening Frozen Metallic Parts)
A-A-52624	Antifreeze, Multi Engine Type
A-A-58092	Tape, Antiseize, Polytetrafluorethylene
A-A-59004	Anti-Galling Compound, Thread Lubricating, Seizing Resistant, and Calcium Hydroxide Containing
A-A-59113	Lubricating Oil, Machine Tool Slideways
A-A-59132	Amyl Acetate, Technical
A-A-59137	Lubricating Oil, Breech Block, (for Naval Ordnance)
A-A-59173	Grease, Silicone
A-A-59197	Fatty Oil, (for Metal-Working Lubricants)
A-A-59255	Wax, Paraffin, Technical
A-A-59290	Hydraulic Fluid, Arresting Gear
A-A-59354	Hydraulic Fluids, Petroleum Base, for Machine Tools
A-A-59921	Cleaning Compounds, Aircraft Surface

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

DEPARTMENT OF DEFENSE SPECIFICATIONS

DoD-G-24508	Grease, High Performance, Multipurpose, (Metric)
DoD-G-24650	Grease, Food Grade, Food Processing Equipment, (Metric)

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DoD-G-85733	Grease, High Temperature, Catapult System
DoD-L-81846	Lubricating Oil, Instrument, Ball Bearing, High Flash Point
DoD-PRF-24574	Lubricating Fluid for Low and High Pressure Oxidizing Gas Mixtures
DoD-PRF-85734	Lubricating Oil, Helicopter Transmission System, Synthetic Base
MIL-A-53009	Additive, Antifreeze Extender, Liquid Cooling Systems
MIL-C-6529	Corrosion Preventive, Aircraft Engine
MIL-C-11796	Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-DTL-4339	Corrosion Preventive, Soluble Oil for Water Injection Systems, (NATO Code Number C-630)
MIL-DTL-5020	Liquid, Compass, Aircraft
MIL-DTL-17111	Fluid, Power Transmission
MIL-DTL-23549	Grease, General Purpose
MIL-DTL-25681	Lubricant, Molybdenum Disulfide, Silicone
MIL-DTL-46014	Lubricating Oil, Spindle
MIL-DTL-83767	Lubricating Oil, Vacuum Pump, Mechanical
MIL-DTL-83800	Propanediol, 1, 2-
MIL-DTL-85470	Inhibitor, Icing, Fuel System, High Flash, (NATO Code S-1745)
MIL-DTL-87177	Lubricants, Water Displacing, Synthetic
MIL-G-21164	Grease, Molybdenum Disulfide, for Low and High Temperatures, (NATO Code Number G-353)
MIL-G-25013	Grease, Aircraft, Ball and Roller Bearing, (NATO Code Number G-372, Metric)
MIL-G-25537	Grease, Aircraft, Helicopter Oscillating Bearing, (NATO Code Number G- 66, Metric)
MIL-G-81827	Grease, Aircraft, High Load Capacity, Wide Temperature Range
MIL-G-81937	Grease, Instrument, Ultra-Clean, Metric
MIL-H-19457	Hydraulic Fluid, Fire-Resistant, Non-Neurotoxic
MIL-H-22072	Hydraulic Fluid, Catapult, (NATO Code Number H-579)
MIL-H-81019	Hydraulic Fluid, Petroleum Base, Ultra-Low Temperature, Metric
MIL-L-15719	Lubricating Grease, (High-Temperature, Electric Motor, Ball and Roller Bearings)
MIL-L-19701	Lubricant, All-Weather, Semi-Fluid, for Aircraft Ordnance, Metric
MIL-L-23398	Lubricant, Solid Film, Air-Cured, Corrosion Inhibiting, (NATO Code Number S-749)
MIL-L-24131	Lubricant, Colloidal Graphite in Isopropanol
MIL-L-24478	Lubricant, Molybdenum Disulfide in Isopropanol
MIL-L-46000	Lubricant, Semi-Fluid, (Automatic Weapons)
MIL-L-46150	Lubricant, Weapons, Semi-Fluid, (High Load-Carrying Capacity)
MIL-PRF-680	Degreasing Solvent
MIL-PRF-2104	Lubricating Oil, Internal Combustion Engine Combat/Tactical Service
MIL-PRF-3150	Lubrication Oil, Preservative, Medium

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MIL-PRF-3572	Lubricant, Colloidal Graphite in Oil
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-PRF-6081	Lubricating Oil, Jet Engine
MIL-PRF-6083	Hydraulic Fluid, Petroleum Base, for Preservation and Operation
MIL-PRF-6085	Lubricating Oil, Instrument, Aircraft, Low Volatility
MIL-PRF-6086	Lubricating Oil, Gear, Petroleum Base, (NATO O-153, O-155)
MIL-PRF-7024	Calibrating Fluids, Aircraft, Aircraft Fuel System Components
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-7870	Lubricating Oil: General Purpose, Low Temperature, (NATO O-142)
MIL-PRF-8188	Corrosion-Preventive, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-9000	Lubrication Oil, Shipboard Internal Combustion Engine, High-Output Diesel
MIL-PRF-10924	Grease, Automotive and Artillery
MIL-PRF-12070	Fog, Oil
MIL-PRF-14107	Lubricating Oil, Weapons, Low Temperature
MIL-PRF-16173	Corrosion Preventive Compound, Solvent Cutback, Cold-Application
MIL-PRF-17331	Lubricating Oil, Steam Turbine and Gear, Moderate Service
MIL-PRF-17672	Hydraulic Fluid, Petroleum, Inhibited
MIL-PRF-18458	Grease, Wire Rope - Exposed Gear
MIL-PRF-21260	Lubricating Oil, Internal Combustion Engine, Preservative Break in
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, (NATO Code Number O-156)
MIL-PRF-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw
MIL-PRF-24139	Grease, Multipurpose, Water Resistant
MIL-PRF-25017	Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble, (NATO S-1747)
MIL-PRF-25567	Leak Detection Compound, Oxygen Systems
MIL-PRF-26087	Lubricating Oil, Reciprocating Compressor, Ground Support
MIL-PRF-27617	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant
MIL-PRF-32014	Grease, Aircraft and Instrument
MIL-PRF-32033	Lubricating Oil, General Purpose, Preservative, (Water-Displacing, Low Temperature)
MIL-PRF-38299	Fluid, Purging, for Preserving Fuel Tanks of Jet Aircraft
MIL-PRF-46002	Preservative Oil, Contact and Volatile Corrosion-Inhibited
MIL-PRF-46010	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting, (NATO Code S- 1738)
MIL-PRF-46147	Lubricant, Solid Film, Air Cured, Corrosion Inhibiting
MIL-PRF-46170	Hydraulic Fluid, Rust Inhibited, Fire Resistant, Synthetic Hydrocarbon Base, (NATO Code No. H-544)
MIL-PRF-46176	Brake Fluid, Silicone, Automotive, All-Weather, Operational and Preservative
MIL-PRF-52308	Filter-Coalescer Element, Fluid Pressure
MIL-PRF-53074	Lubricating Oil, Steam-Cylinder, Mineral

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MIL-PRF-63460	Lubricant, Cleaner and Preservative for Weapons and Weapons Systems
MIL-PRF-81322	Grease, Aircraft, General Purpose, Wide Temperature Range, (NATO Code G-395)
MIL-PRF-81329	Lubricant, Solid Film, Extreme Environment, (NATO Code Number S- 1737)
MIL-PRF-83261	Grease, Aircraft, Extreme Pressure, Anti-Wear
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, (NATO Code Number H-537, Metric)
MIL-PRF-83363	Grease, Transmission, Helicopter, (NATO G-396)
MIL-PRF-85336	Lubricant, All-Weather, (Automatic Weapons)
MIL-PRF-85570	Cleaning Compounds, Aircraft, Exterior
MIL-PRF-85704	Cleaning Compound, Turbine Engine Gas Path
MIL-PRF-87252	Coolant Fluid, Hydrolytically Stable, Dielectric
MIL-PRF-87257	Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile
MIL-PRF-87937	Cleaning Compound, Aerospace Equipment
MIL-S-17980	Sea Marker Packet, Inflatable Survival Equipment
MIL-S-53021	Stabilizer, Additive, Diesel Fuel
MIL-T-17128	Transducer Fluid, Sonar
MIL-W-12062	Wax, Petroleum, (Metric)
MIL-W-13945	Wax, Hydrocarbon, (for Ordnance Use)
MIL-W-20553	Wax, Desensitizing

(Copies of these documents are available online at <http://quicksearch.dla.mil/>.)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-290	Packaging and Marking of Petroleum and Related Products
MIL-STD-3004	Part 1, Quality Assurance/Surveillance for Bulk Fuels, Lubricants and Related Products

(Copies of these documents are available online at <http://quicksearch.dla.mil/>.)

2.2.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

US GOVERNMENT FORMS

DD FORM 250	Material Inspection and Receiving Report
DD FORM 1222	Request for and Results of Tests

(Copies of these documents are available online at <http://www.dla.mil/>.)

US GOVERNMENT STANDARD FORM

SF 368	Product Quality Deficiency Report
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(Copies of this document are available online at <http://www.gsa.gov/>.)

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2.2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)

ANSI/AGMA 9005 Industrial Gear Lubrication
(Copies of this document are available online at <http://www.agma.org>.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes
ANSI/NCSL Z540.3 Requirements for the Calibration of Measuring and Test Equipment
(Copies of these documents are available online at <http://www.ansi.org>.)

AMERICAN PETROLEUM INSTITUTE (API)

API MPMS Manual of Petroleum Measurement Standards
(Copies of this document are available online at <http://www.api.org>.)

ASTM INTERNATIONAL

ASTM D892 Standard Test Method for Foaming Characteristics of Lubrication Oils
ASTM D1298 Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
ASTM D3487 Standard Specification for Mineral Insulating Oil used in Electrical Apparatus
ASTM D4057 Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D5001 Standard Test Method for Measurement of Lubricity of Aviation Turbine Fuels by the Ball-on-Cylinder Lubricity Evaluator, (BOCLE)
ASTM D5006 Standard Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
ASTM D6078 Standard Test Method for Evaluating Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator, (SLBOCLE)
ASTM D6079 Standard Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig, (HFRR)
ASTM MANUAL 1 Significance of Tests for Petroleum Products
(Copies of these documents are available online at <http://www.astm.org>.)

ENERGY INSTITUTE (EI)

EI-1570 Handbook on Electronic Sensors for the Detection of

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EI-1581	Particulate Matter and/or Free Water During Aircraft Refueling Specifications and Qualifications Procedures for Aviation Jet Fuel Filter/Separators
EI-1598	Design, Functional Requirements and Laboratory Protocols for Electronic Sensors to Monitor Free Water and/or Particulate Matter in Aviation Fuel

(Copies of these documents are available online at <http://www.energyinst.org>.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 3170	Petroleum Liquids - Manual Sampling
ISO 4406	Hydraulic Fluid Power-Fluids - Method for Coding the Level of Contamination by Solid Particles
ISO 9001	Quality Management Systems Requirements
ISO 10012	Measurement Management Systems-Requirements for Measurement Processes and Measuring Equipment
ISO/IEC 17025	General Requirements for the Competence of Testing and Calibration Laboratories

(Copies of these documents are available online at http://www.iso.org/iso/catalogue_ics.)

SAE INTERNATIONAL

SAE AMS 1424	Deicing/Anti-Icing Fluid, Aircraft SAE Type I
SAE AMS 1428	Fluid, Aircraft Deicing/Anti-icing, Non-Newtonian (Pseudoplastic), SAE Types II, III, and IV
SAE AMS 1435	Fluid, Generic, Deicing/Anti-Icing Runways and Taxiways
SAE AMS 2518	Thread Compound, Anti-Seize, Graphite-Petrolatum
SAE AMS-G-4343	Grease, Pneumatic System
SAE AMS-G-6032	Grease, Plug Valve, Gasoline and Oil Resistant, (NATO Code Number G-363, Metric)
SAE AMS-M-7866	Molybdenum Disulfide, Technical, Lubrication Grade
SAE AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft
SAE AS8660	Silicone Compound, (NATO Code Number S-736)
SAE AS87132	Lubricants, Cetyl Alcohol, 1-Hexadecanol, Application to Fasteners
SAE J 1703	Motor Vehicle Brake Fluid
SAE J 1899	Lubricating Oil, Aircraft Piston Engine, (Ashless Dispersant)
SAE J 1966	Lubricating Oils, Aircraft Piston Engine, (Non-Dispersant Mineral Oil)
SAE J 2360	Automotive Gear Lubricants for Commercial and Military Use

(Copies of these documents are available online at <http://www.sae.org>.)

2.3 Order of Precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. DEFINITIONS

3.1 Acceptance. The act of an authorized Government representative by which the Government assumes for itself, or as agent of another, ownership of existing and identified supplies tendered, or approves specific services rendered, as partial or complete performance of the contract on the part of the contractor.

3.2 Acquisition Management Systems Control (AMSC) number. A control number assigned by the cognizant data management approval authority listed in SD-1, which indicates that a data item description (DID) or a defense specification or standard that cites DIDs has been cleared for use by the DoD.

3.3 Acquisition Streamlining and Standardization Information System (ASSIST). The ASSIST Online database is the official source for all Defense Standardization Program documents and contains the most current information on these documents prepared by DoD. It can be accessed at <https://assist.dla.mil/> or <http://quicksearch.dla.mil>. The ASSIST database lists defense and federal specifications and standards, defense handbooks, and commercial item descriptions (CIDs). Quality Product Lists (QPLs), adopted non-government standards (NGS) and other related standardization documents used by the DoD may be accessed at <http://qpldocs.dla.mil/>.

3.4 Additives. A material added to another, usually in small amounts, to impart or enhance desirable properties or to suppress undesirable properties.

3.5 Appearance. Color, clarity, or evidence of stratification and contaminants that may be observed by visual examination of sample.

3.6 Barrel (BBL). A volume of liquid petroleum product equal to 42 U. S. gallons (USG) (159 Liters (L)).

3.7 Batch. A specific quantity of product that is processed or utilized as a single unit and tested to meet test criteria and specifications.

3.8 Batch number. A unique number that is assigned by refinery, manufacturing/blending plant or intermediate terminal that provides traceability to specified quantity of product.

3.9 Biobased materials. A material made from substances derived from living (or once living) organisms.

3.10 Bleeding. The separation of liquid lubricant from lubricating grease for any cause.

3.11 Blending. The procedures by which predetermined quantities of two or more similar products are homogeneously mixed to upgrade one of the products or to produce an intermediate grade or quality.

3.12 Bulk petroleum products. Liquid petroleum product transported by various means

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and stored in tanks or containers having an individual fill capacity greater than 205 liters (about 55 gallons). (Exception: A 500 USG (1890 L) collapsible drum is considered a packaged item). Detailed procedures for Quality Surveillance Assurance for Bulk Petroleum Products are found in MIL-STD-3004 Part 1.

3.13 Burner fuel. Any petroleum liquid suitable for the generation of heat by combination in a furnace or firebox as a vapor or a spray, or a combination of both.

3.14 Calibration. The determination of the values of the significant parameters by comparison with values indicated by a set of reference standards.

3.15 Certificate of Analysis (CoA). A CoA is issued by a laboratory that is preferably not from the originating manufacture. A CoA will not be treated as a Refinery Certificate of Quality (RCQ).

3.16 Certificate of Conformance. A statement applied to the Material Inspection and Receiving Report by the Contractor indicating that the product being provided conforms to specification/contractual requirements. This statement is in lieu of a Government Inspection.

3.17 Clean (clear) and bright. The absence of visible solids, a cloud, a haze, an emulsion, or free water in the product (some specifications define this as Appearance, Workmanship, or as Workmanship, Finish and Appearance). Bright is the sparkle of clean, dry product in transmitted light.

3.18 Commingling. The mixing of two or more products of different ownership, type, or grade.

3.19 Contaminant. A foreign substance in a product.

3.20 Contaminated product. A product into which one or more grades of another product has been accidentally mixed, or a product containing foreign matter such as dust, rust, water, or emulsions to the extent it changes the characteristics of the product.

3.21 Dehydration. The removal of water.

3.22 Density. The density of a material is defined as its mass per unit volume. Density is typically reported at 15⁰C in kg/L or kg/m³. In some cases (for instance in the U.S. oil and gas industry), density is also defined as its weight per unit volume: although, this quantity is more properly called specific weight or relative density.

3.23 Deteriorated product. A product in which one or more characteristics have changed to a level of quality outside the limits of the applicable specification.

3.24 Dissolved water. Water in a solution which cannot be removed by mechanical means (e.g. filter/separator). The concentration of dissolved water varies with product temperature, the relative humidity of air contacting the product surface, and the chemical composition of the product.

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3.25 Downgrading. The procedures by which an off-specification or contaminated product (due to deterioration or contamination) is approved for use as a lower grade of the same or similar product or as a completely different product.

3.26 Entrained water. Water carried by a product which does not settle out readily. Entrained water can be removed by mechanical means (e.g. filter/separator).

3.27 Environmentally preferable. Products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production manufacturing, packaging, distribution, reuse, operation, maintenance or disposal of the product or service.

3.28 Equivalent tests. Test methods that provide analogous results and fully correlate with standard ASTM methods, but have not yet been formally accepted by ASTM. These test methods have been found to provide test results essentially identical to those produced by ASTM testing methods.

3.29 Federal Supply Class (FSC) codes. FSC codes are used to group products into logical families for management purposes. The four-digit fields are used to group standardization documents and their products into logical families.

3.30 Floc point. The temperature at which waxy materials in a lubricating oil separates from a mixture of oil and Freon (registered trademark of E. I. du Pont de Nemours & Company) R-12 refrigerant, giving a cloudy appearance to the mixture; also called Freon Floc Point. Generally used to evaluate the tendency of refrigeration oils to plug expansion valves or capillaries in refrigerant systems. Not to be confused with Cloud Point, the temperature at which wax precipitates from an undiluted oil.

3.31 Free water. Water in a petroleum product other than dissolved water. Free water may be in the form of droplets or haze suspended in the product and/or a water layer at the bottom of the container.

3.32 Gum. Description of resin-like, fuel insoluble deposits (contaminants) formed during the oxidative and thermal deterioration of petroleum fuels.

3.33 Homogeneity. A quality or state of being homogeneous or having a uniform composition. A product is considered homogeneous when its base components are mixed uniformly throughout (no stratification). A truly homogenous product is assumed when the API Gravity differs by no more than ± 0.3 degrees. This limit is established from the reproducibility in ASTM D 1298.

3.34 Identification tests. Selected tests applied to a sample to quickly determine the type or grade of the product represented or to determine if a quality has been altered by time or handling. See Type C test.

3.35 Inspect. To examine critically especially to detect flaws, errors, etc.

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3.36 Intra-Governmental receipt limits. The extent that properties of DoD-owned petroleum products may change beyond specification requirements and remain acceptable for receipt and issue within the DoD logistic system.

3.37 Light-Ends. The lower-boiling fractions of a fuel or oil.

3.38 Long-term storage. Product at a depot for a period longer than that indicated in Table VIII, which has not been recertified to at least a Type B-2 test.

3.39 Lubricity. The ability of a fluid to reduce the friction between two surfaces in motion.

3.40 Material inspection and receiving report (DD Form 250). The Government document identifying the contractor, product origin, product type, quality, quantity, and the destination of the product. The Wide Area Work Flow (WAWF) Receiving Report (RR) is the electronic equivalent of the DD Form 250. The DD Form 250 document is signed by the Government Representative.

3.41 Micron. One micron (μm , micrometer) is 1/1000 of one millimeter or 10^{-6} meter.

3.42 Mineral oil. Lubricating oils produced from petroleum sources with or without additives.

3.43 Off-Specification product. A product which fails to meet one or more of the physical, chemical, or performance requirements of the specification.

3.44 Packaged products. Petroleum products (generally a lubricant, oil, grease, or a specialty item) normally packaged by a manufacturer and procured, stored, transported, and issued in containers having a fill capacity of 500 USG or less.

3.45 Particle counting. A method for determining the level of dispersed particles, specifically dirt particles and water droplets in the range from 4 μm (c) to 30 μm (c). A cumulative channel count is collected and provided for each defined channel. Results are reported ISO Codes In Accordance With (IAW), ISO 4406.

3.46 Pre-Award Survey (PAS). An evaluation of a prospective contractor's capability to perform a proposed contract.

3.47 Product Quality Deficiency Report (PQDR). The PQDR is a report submitted by a customer or depot to report an off-specification product condition or an operational issue where the product is suspected of causing the problem. It is used to identify, report, and resolve conditions negatively impacting the war fighter. The PQDR process provides timely quality feedback to activities responsible for design, development, purchasing, production, supply, maintenance, contract administration, and other functions so that action can be initiated to determine cause, take corrective action, and prevent recurrence. Integrates deficiency analysis and resolution processes to identify root cause and prevent or mitigate recurrence within acquisition, quality, systems engineering, and overall life cycle management plans. It allows

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originating activities a means to obtain cost credit, replacement, and/or contractual remedy for procurement related quality deficiencies resulting from poor workmanship, nonconformance to applicable specifications, drawings, standards, processes or other technical requirements.

3.48 Qualified Product List (QPL). A list of products or families of products that have successfully completed the formal qualification process (including all specified periodic tests) that examines, tests and verifies that a specific product design meets all applicable specification requirements. The link to the QPL webpage is through Assist Online.

3.49 Qualified Product Database (QPD). This database consists of the officially approved electronic QPLs. Only those electronic QPLs published in the QPD are the official source for qualified products. The link to the QPD webpage is through Assist Online.

3.50 Quality. The composite of materiel attributes including performance, features and characteristics of a product, or service to satisfy a given requirement.

3.51 Quality Assurance (QA). A system of activities, the purpose of which is to provide to the producer and user of a product, measurement or service the assurance that it meets the defined standards of quality with a stated level of confidence and includes quality planning and quality control. A planned and systematic pattern of all actions necessary to ensure that adequate technical requirements are established; that products, quantity accountability, and services conform to these established technical requirements; and that satisfactory performance is achieved. It includes: Quality planning during specification development and review; Quality support to contracting and acquisition teams; Quality oversight of product and service providers to assure compliance to contracts and agreements; Quality Control (QC) operations for products and services incoming or in the Government supply chain; and, Quantity measurement and control activities. Contract QA is a method the Government uses to determine if products and/or services a supplier provided fulfilled its contractual obligations and includes all actions required to ensure compliance to contractual or agreement terms and conditions. Generically the term QA refers to all processes and procedures encompassing Quality planning/development, QA, QS, and QC.

3.52 Quality Assurance Representative (QAR). An organizational title assigned to the individual responsible for Government contract QA functions. QARs have cognizance over the procurement of product and/or services at contractor facilities (e.g. refineries, terminals, packaging plants, laboratories, and into plane sites). The Military Services may use other organizational titles for their personnel performing QA and QS functions.

3.53 Quality Control Plan (QCP). The written procedures developed by a contractor, encompassing contractor programs, processes and inspections, which assures the quality of services, quality and quantity of products, and conformance to other related contract requirements.

3.54 Quality notification. Quality notifications are product and services report customer/depot complaints on product purchased.

3.55 Quality Status List (QSL). A continually updated database that contains shelf-life

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test requirements and potential extension information, used exclusively by DoD activities to determine if Type II extendable shelf-life products and material have passed or failed suitable-for-use tests.

3.56 Quality Surveillance (QS). A subset of QA encompassing the program of inspections, sampling, testing, quantity measurement and control, and documentation established to monitor the quality/quantity of product being received, stored and issue within the Government supply chain.

3.57 Recertification Test (RT). A limited test analysis used to verify product quality.

3.58 Reclamation. Procedure to restore or change the quality of an off-specification or contaminated product so it will meet the specification of the original product or a lower grade product. The reclamation process, when properly applied, will result in down-grading, blending, purification, or dehydration.

3.59 Refinery Certificate of Quality (RCQ). The RCQ is produced at the point of manufacture and is the definitive original document describing the quality of a production batch of fuel.

3.60 Relative density (Specific Gravity). The ratio of the mass of a volume of a liquid at a specific temperature to the mass of an equal volume of pure water at the same or different temperature. Both reference temperatures will be explicitly stated. Common reference temperatures include 60/60°F, 20/20°C.

3.61 Release Certificate (RC). The Release Certificate is an operational document issued by the operator of the site handling/transferring the product that is linked to one or more laboratory test certificates.

3.62 Repeatability. Difference between two test results, obtained by the same operator with same apparatus under constant operating conditions on identical test material would, in the long term and correct operation of the test method, exceed the values given only in one case in twenty.

3.63 Representative sample. A portion extracted from a total volume that contains the constituents in the same proportions as are present in the total volume.

3.64 Reproducibility. Quantitative expression of the random error associated with operators working in different laboratories, each obtaining single results on identical test material when applying the same method.

3.65 Requiring installation. A military installation, organization, or facility authorized to requisition and receive material from designated distribution and storage points.

3.66 Sample. A portion extracted from a total volume which may or may not contain constituents in the same proportions that are present in that total volume.

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3.67 Sample tag. DD Form 2927, Petroleum and Lubricants Sample Identification Tag or DD1222, Request for and Results of Tests form used for identification of petroleum and lubricant samples.

3.68 Settling time. The time a product needs to remain undisturbed or un-agitated in a storage tank to reduce the static charge of the fuel and/or to allow water and sediment to be eliminated/reduced from the product.

3.69 Service Control Point (SCP). Military service agency that provides technical guidance on the use of commodities (bulk or packaged), equipment and infrastructure. The three SCPs are the Army Petroleum Center (APC), the Naval Supply Systems Command (NAVSUP) Energy, and the Air Force Petroleum Office (AFPET).

3.70 Shelf Life, Type I. A definite non-extendable period of shelf life.

3.71 Shelf Life, Type II. An assigned shelf-life period that may be extended after successful completion of inspection, testing, or restorative action.

3.72 Specification. A document prepared to support acquisition that describes essential technical requirements for material and the criteria for determining whether those requirements are met. Specifications can be classified as Federal, Military, Commercial, or Voluntary Standard. Specifications can be categorized as functional, design, or a performance specification. Petroleum specifications are usually a combination of functional and performance categories.

3.73 Specification limits. Boundaries or parameters that define acceptable performance for a characteristic expressed as a target maximum or minimum limit, or both an upper and lower limit (range).

3.74 Specific gravity. See relative density.

3.75 Super-Clean fluid. A fluid having a specified particulate contamination limit so low that the product is packaged in hermetically sealed containers under clean room conditions.

3.76 Synthetic petroleum product. Materiel not refined from petroleum sources; usually produced by chemical synthesis.

3.77 Testing. Analytical techniques using instruments, equipment, and other methods to predict fuel and lubricant test values using compositional data typically determined by chemistry methods.

3.78 Type A tests. Complete quality conformance specification acceptance tests.

3.79 Type B-1 tests. Partial analysis checking for the principal characteristics most likely to be affected in the course of moving the product.

3.80 Type B-2 tests. Partial analysis to verify stability of characteristics susceptible to

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deterioration due to age, environmental or storage conditions.

3.81 Type B-3 tests. Partial analysis for contamination; in particular, for controlling the re-injection of pipeline interface products.

3.82 Type C tests. Quick, simple, partial analysis to verify product quality and to ensure that no change has taken place. Type C tests can be referred to as identification tests.

3.83 Thief. A sampling apparatus designed so a liquid sample can be obtained from any specified point in the container.

3.84 Tolerance. Allowed variations within a specified standard.

3.85 Vapor Pressure (VP). The pressure exerted by the vapor of a liquid when in equilibrium with the liquid.

3.86 Verification tests. The testing performed by the supplier on samples verified (witnessed) by the QAR after the supplier has completed full specification testing and certified each shipping tanks as ready for acceptance. The scope of the testing is the minimum required to verify that the results presented by the supplier on their full specification test report in fact reflects the product being offered.

4. GENERAL REQUIREMENTS

4.1 Personnel competency. Personnel responsible for handling product shall be thoroughly trained and fully qualified to perform assigned responsibilities. They shall be aware of the hazards in handling fuels and lubricants, as well as the applicable safety and operating procedures.

4.2 Equivalent tests. The use of alternate test methods to measure physical properties of a petroleum product is allowed, provided that: the test results are presented in the format required in the specification; the test device has a demonstrated reliability and repeatability equal or better than called for by the ASTM method; and the device has been approved for use by the military services.

4.3 Calibrating test equipment. All laboratories shall ensure calibration of testing and measuring equipment is up to date and is to the accuracy necessary to ensure the equipment is within allowable tolerance limits. ISO 10012 shall be used.

4.4 Specifications. Each Joint Petroleum Office (JPO) and petroleum product laboratory shall maintain an up-to-date file of Government fuel and lubricant specifications (both Military and non-Government specifications and standards). It is not practical to include complete specification limits in this Standard, as specifications are subject to change with variations in product availability and technical developments. Limits cited in this Standard are for internal government use, not for procurement.

4.5 Government-Owned property. Contractors are obligated to adequately protect

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Government-owned property located on their premises for use on, or in connection with, a contract. The periodic inventory and reporting of such property is a contractual requirement. The amount of Government-owned petroleum products in pipelines will be reported as a separate item in stock reports.

4.6 Safety precautions. Throughout this Standard, there are general safety precautions and instructions that apply to petroleum handling and laboratory operations to ensure personal safety/health and the protection of Government property. Occupational Safety and Health Administration (OSHA), Department of Labor and standard commercial safety practices shall be observed.

4.7 Compliance with regulations and laws. Many petroleum products are considered hazardous materials and are regulated as such. Users of this Standard must be aware of regulations and laws governing the products that they are handling. In the event of a conflict between this Standard and a law or regulation, the law or regulation takes precedence.

4.8 Toxic chemicals, hazardous substances, and ozone-depleting chemicals. The use of toxic chemicals, hazardous substances, or ozone-depleting chemicals shall be avoided, if feasible. The desired performance requirements should be specified rather than the specific chemical or substance. If a toxic chemical, hazardous substance, or ozone-depleting chemical must be specified. The Environmental Protection Agency (EPA) maintains an online list of toxic chemicals and hazardous substances at <http://www.epa.gov/emergencies/tools.htm#lol> and should be consulted.

4.9 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

4.10 Test Method. Government laboratories shall maintain an up-to-date file of all test methods performed in the laboratory.

5. DETAILED REQUIREMENTS

5.1 Receipt of turbine fuel approved packaged additives. Packaged additives should be inspected upon arrival for correct identification, content, packaging and damage. Containers should be in good condition upon arrival, and the vendor should supply proper paper work. Packaged additives should be stored under cover, preferably in warehouses or open sheds. In the situation where storage must be outside, containers must be off the ground on pallets or dunnage and covered with tarpaulins for protection from the elements. Additives that are in drums should be stored on their sides with proper bracing and blocking if necessary. Bungs should be in horizontal position so leaks may be detected. Drums should never be stored in a vertical position outdoors as water will collect on the drum heads, and could seep through bungs. The proper packaging, storage, and stock rotation (in which the oldest material is issued first) will help to minimize losses due to deterioration.

5.2 Packaged products. This section covers receipt and storage of packaged petroleum

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products for direct delivery and stock locations, see MIL-STD-290, Packaging and Marking of Petroleum and Related Products. For sampling and testing requirements and the significance of testing detailed requirements, see ASTM D4057 Standard Practice for Manual Sampling of Petroleum and Petroleum Products.

5.3 Product receipt. Products are delivered under DLA-Aviation contract either by direct delivery from the contractor's facility to the customer, or from a depot storage facility.

5.4 Sampling. All samples shall be taken in accordance with standard procedures described in API MPMS, Chapter 8, Section 1/ASTM D4057, ISO 3170, or as prescribed by product specifications or contract requirements and ANSI/ASQ Z1.4.

5.5 Precautions. The precautions required to ensure a representative sample are many and depend on type of product being sampled, the type of container from which it is drawn and the sampling procedures employed. Each procedure is suitable for sampling a specific product under definite storage, transportation and container conditions. Warning: "All safety instructions shall be strictly observed".

5.6 Personnel to conduct sampling. Because improperly taken samples can completely invalidate a test, only trained and experienced personnel shall be assigned to sample the products. This cannot be overstressed; No amount of laboratory work will give reliable data on a product if the sample is not a true representation of that product.

5.7 Responsibility. This Standard shall in no way alter any assigned responsibility of the various activities outside the continental United States for submitting special samples to a designated laboratory or as directed by the cognizant headquarters.

5.8 Types of samples. A sample is a portion of a packaged petroleum product taken which represents that entire batch or delivery. The various types of samples are as follows:

- a. Tube or thief sample is one obtained with a sampling tube or special thief either as a core or spot sample from a specified point in the container.
- b. Batch or lot sample is one obtained from a collection of units of package products.

5.9 Sampling apparatus, containers, and procedures.

a. Approved type samplers shall be used as specified by ASTM/API procedures. All sampling apparatus and containers shall be thoroughly clean and dry, and special care shall be taken so no lint or fibrous material remains in or on them.

b. Apparatus and containers shall be flushed three times with 10 to 20 % of the volume of the sample container of the product being sampled to ensure the sample is not contaminated with the previous material unless otherwise specified in the test procedures. For each flush, the container shall be closed and shaken for 10 seconds and product replaced for the next flush. All cans shall be thoroughly flushed to ensure complete removal of soldering flux. Sampling apparatus shall be cleaned immediately after use and stored so it shall remain clean until next

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use.

c. Containers such as drums shall be sampled with a thief. In sampling drums and cans, care shall be taken to remove all foreign matter from the area near the enclosure before the plug is removed.

d. Close all sample containers tightly, immediately after taking the sample. Do not use sealing wax, paraffin, rubber gaskets, pressure sensitive tapes, or similar material to seal containers. Light sample containers shall be adequately crated to withstand shipment. To prevent leakage caused by thermal expansion of the product, do not fill any sample container above 80 % volume capacity.

e. The one-gallon sample can, National Stock Number (NSN) 8110-01-371-8315, is suitable for fuel products and the one gallon sample can, NSN 8110-00-178-8292, is suitable for grease products.

5.10 Size of samples.

a. Except for liquid units of issue greater than 1-gallon and semi-solids greater than 6.5-pound can or container, all samples shall be submitted in the original unopened container. When instructed to take a sample, the sample size shall be as follows:

b. Liquid

Unit of Issue	Sample Size
1. Less than 1 quart	1 gallon (USG)
2. 1-quart can	Four 1 quart cans
3. 1-gallon can	1-gallon can
4. Any unit of issue larger than 1 gallon	1 gallon

c. Semi-solid

Unit of Issue	Sample Size
1. Less than 1 pound	4 pounds
2. 1-pound can	Four 1-pound cans
3. 5 pound can or container	One 5-pound can or container
4. 6.5-pound can or container	One 6.5-pound can or container
5. Any unit of issue larger than 6.5 pounds	5 pounds

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d. For container sizes not listed in the tables above, contact the appropriate focal point for instructions.

5.11 Identification of samples. Identify each sample container immediately after sampling by securely attaching a completed DD Form 1222, Request for and Results of Tests.

Information on the form shall include the following:

- a. To, requesting activity
- b. From, Prime contractor and address
- c. Manufacturing plant name and address
- d. End item, National Stock Number
- e. Sample number
- f. Lot number with revision (if applicable)
- g. Reason for submittal
- h. Date submitted
- i. Material to be tested
- j. Quantity represented
- k. Specification & amendment and/or drawing number, revision for sample & date
- l. Purchased from or source
- m. Shipment method
- n. Date sampled and submitted by
- o. Remarks and/or special instructions and/or waivers
- p. Send report of test to
- q. Date sample received, results reported, and lab report number
- r. Test performed, results, sample result
- s. Qualification number (if available), and requirements
- t. Date, name and title of person conducting test, and signature

5.12 Testing. The quality surveillance segment (testing) presented in this section is the

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minimum essential to sound management of Government-owned properties. As a minimum, the test frequencies and minimum test parameters assures product quality throughout the logistic system and ultimately to the customer.

5.12.1 Contamination tests. Suspected contamination of petroleum products shall be confirmed by laboratory tests. Until such time as the results are conclusive, those petroleum products shall be segregated and not used in equipment. Organizations owning equipment in which suspected contaminated products were stored/installed shall be notified immediately. Tests which have proved most useful in determining whether a product is contaminated and the identification of the contaminating agents are listed under the individual products.

5.12.2 Test methods. All laboratory tests shall be conducted in accordance with the method prescribed in the specification covering the product, except any special or modified method outlined in this Standard which shall be used in lieu of the specification method when products are evaluated within the scope of this Standard.

5.12.3 Specification receipt limits. Specification receipt limits are absolute. Multiple tests may be performed and if these tests do not differ from each other by more than the amount specified for the reproducibility of the method, the results may be averaged to determine compliance with the specification limits.

5.12.4 Testing frequency. For current testing frequency requirements refer to Defense Logistics Information Service (DLIS) and/or Total Item Record (TIR).

5.12.5 Minimum testing. Table II outlines the minimum sampling and testing requirements considered necessary for determining the quality of petroleum and related products. It covers the conditions under which a sample is taken, the type of sample and the types of tests required to determine whether the quality is within acceptable limits.

5.12.6 Alternate test methods. The use of alternate test methods to measure physical properties is allowed, provided that: test results are presented in the format required in the specification; the test device has a demonstrated reliability and repeatability equal to or better than that called for by the ASTM and the device has been approved for use by the military services. The types of alternate tests are listed below:

a. Equivalent tests are test methods that provide analogous results and fully correlate with standard ASTM methods but have not yet been formally accepted by ASTM. These test methods have been found to provide test results that will be essentially identical to those results produced by ASTM testing methodologies.

b. Predictive testing involves the use of instrumental and other types of analytical techniques to predict lubricant test values using compositional data that typically is determined by standard or wet chemistry methods.

5.12.7 Calibrating test equipment. All laboratories shall calibrate testing and measuring equipment to the accuracy necessary to ensure the equipment is within allowable tolerance limits. See ANSI/NCSL Z540.3 and ISO/IEC 17025 as applicable.

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5.13 Disposition procedures. Prior to submission of samples for testing or prior to reclassification of condition codes, the storage activity/customer/laboratory shall consult the DoD QSL published by DLA Aviation to determine the status of the particular batch/lot number under a specific contract.

- a. If the extension data is listed in the QSL, then the stock shall be updated accordingly.
- b. If the QSL indicates condition code "H", then the stock shall be disposed of through DLA Disposition Services, formerly Defense Reauthorization Marketing Office (DRMO), in accordance with local procedures.
- c. If the item is not listed in the QSL, then the appropriate focal point shall be contacted.

5.13.1 Service and DLA responsibilities. The following are the responsible technical organizations within the Services and DLA for packaged petroleum products:

Army	U.S. Army Petroleum Center 8725 John J Kingman Rd. Ft. Belvoir, VA 22060 DSN: 427-0659 FAX DSN: 427-0669 Commercial: (703) 767-0659
Navy	NAVSUP Energy ATTN: Code PS 8725 John J. Kingman Rd., Suite 3719 Ft. Belvoir, VA 22060-6224 DSN: 427-7341 FAX DSN: 427-7389 Commercial: (703) 767-7341
Air Force	Air Force Petroleum Office ATTN: AFPET/PTPS 2430 C Street, Building 70, Area B Wright Patterson AFB, OH 45433-7632 DSN: 785-8050 FAX: DSN 785-8051 Commercial: (937) 255-8050
DLA FSC 9150 / FSG 68	DLA-Aviation ATTN: DLA-FAJA 8000 Jefferson Davis Highway Richmond, VA 23297-5000 DSN: 695-3995 FAX DSN: 695-6701 Commercial: (804) 279-3995

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FSC 9110 or 9160

DLA-Troop Support
700 Robbins Avenue
Philadelphia, PA 19111-5096
DSN: 442-5515
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5.14 Packaging and storage of packaged petroleum products. The care and preservation of packaged oils and lubricants in a ready-for-issue condition, from supplier to user, is an important responsibility of the military services. Strict adherence to storage temperatures for all products is required. The appropriate military activity shall prescribe the procedures and establish the requirements in each phase of the storage program. The organization owning these products has an inherent obligation to ensure that such storage conditions are enforced. These shall be predicated on the type of item, type of storage, anticipated length of storage, probable end use and other factors.

5.14.1 Documentation. Care of packaged products in storage is a program of such magnitude that detailed procedures cannot be included in this Standard. Reference shall be made to appropriate departmental publications. Pertinent highlights are cited in the following paragraphs.

5.14.2 Container inspection. Containers shall be inspected before being placed in storage and periodically thereafter. These inspections shall be made more frequently if required by local conditions. If containers are received in an unsuitable condition and repackaging is necessary, the product shall be fully inspected by a Government agent at the repackaging facility. Under no circumstances shall product be accepted without Government inspection if it has been repackaged by the railroad or trucking company.

5.14.3 Container suitability. Before filling, all containers shall be inspected to ensure they are clean, free of loose rust, paint flakes and contaminants and are suitable for receiving the product. Meticulous cleanliness of the container and filling equipment shall be ensured since many products require a high degree of cleanliness and have been micronically filtered. Super-clean fluids are MIL-PRF-7808, DOD-PRF-85734, and MIL-PRF-23699. Containers shall be appropriately marked prior to filling and shall be closed immediately after filling.

5.14.4 Drum storage. Except in an emergency, containers shall not be stored in direct contact with the ground. Drums shall be stored on their sides on dunnage with proper blocking and bracing. Bungs shall be in a horizontal position so leaks may be detected and/or eliminated. Drums shall never be stored vertically outdoors as water shall collect on drum heads, seep through bungs and contaminate the product.

5.14.5 Separate storage. For identification purposes, different products and grades shall be stored separately. Stocks of similar dates of filling shall be stored together whenever possible. Oldest stocks shall be used first.

5.14.6 Stock rotation. Where feasible, packaged products opened for spot checking or storage control testing shall be used as soon as possible. When this cannot be done, the

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containers shall be reclosed tightly, marked as having been previously opened and be included in the next issue if possible. To minimize deterioration of a product due to age, excessive corrosion of containers, and/or deterioration of packing and markings, (excluding other quality considerations), the oldest package petroleum products shall be issued first. Fill dates on the containers and the condition of the package are the governing factors.

5.14.7 Galvanized containers. Internally galvanized containers shall not to be used.

5.14.8 Small container storage. Containers smaller than the 55-gallon drum shall be stored under cover, preferably in warehouses or open sheds. In emergency situations, containers shall be stored outside, off the ground on pallets or dunnage and covered with tarpaulins for protection from the elements.

5.14.9 Contamination. Many things can happen in the filling, handling, storage and dispensing of packaged petroleum products. Some of the more detrimental things include contamination, deterioration of quality, inadvertent use of incorrect products, damage to equipment, loss of identity and loss of product. Improper storage conditions can lead to contamination, deterioration of identification markings and excessive corrosion of metal containers. Refilling of previously used containers without first cleaning and remarking can lead to contamination on issue. The use of an incorrect grade product in unmarked containers can result in incorrect applications with resultant loss of life and equipment. Improper loading, blocking, or bracing of packaged products in transportation equipment will usually result in container damage and often the loss of product.

a. Water is a common source of contamination which can render packaged products unsuitable for use. Rough handling or improper application of plugs and gaskets will permit breathing and result in condensation of water vapor inside the package. Reasonable protection against atmospheric conditions will reduce water contamination.

b. Packaged petroleum products shall be properly protected from initial filling until ultimate consumption. Leaving containers open or unprotected at the final point of application of the product often results in contamination. Extreme care shall be taken at dispensing points to protect product quality. Instructions concerning disposition of product remaining after partial use of container contents shall be followed.

5.14.10 Minimum container markings. It is essential that containers for petroleum products are so marked that:

- a. The products may be properly identified.
- b. The origin and age of the product may be determined at any time.
- c. Any hazard associated with the use or handling of the product is clearly indicated as flammable, toxic, or corrosive.

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5.14.11 Field-filled container markings. The following minimum markings are required for all containers of petroleum products filled under field conditions:

- a. National stock number
- b. Nomenclature
- c. Specification with revision and amendment number (if applicable)
- d. Qualification Number (if applicable)
- e. Contractor and contract number
- f. Product batch, lot number or emulsion number
- g. NATO code (if applicable)
- h. Military symbol (if applicable)
- i. Date of filling
- j. Weight or volume of contents
- k. Filling activity/ telephone number
- l. Safety and use markings (when applicable)

5.14.12 Marking of boxes and cartons. Minimum markings shall also be shown on boxes and cartons.

5.12.13 Marking of contractor supplied product. Packaged oils and lubricants supplied by contractors shall be marked in accordance with MIL-STD-290, or in accordance with provisions of the contract.

5.12.14 Marking of used drums. When used drums are refilled in the field, all old drum markings shall be completely obliterated and drums thoroughly cleaned before being filled. The filled drums are to be marked as required in 5.14.11. Total capacity is 57.2 USG; however, to allow for adequate vapor space the drums shall be filled as follows:

- a. 54 USG, maximum, for products which flash at 27° C (81° F) or less.
- b. 55 USG, maximum, for products which flash over 27° C (81° F).

5.15 Deterioration of products.

5.15.1 Lubricating oils and gear oils. Most of these oils are procured as packaged products; however some are also procured and shipped in bulk. Those composed entirely of mineral oils, including those with additives such as viscosity index improvers, pour point depressants, or detergents, are very stable. If the package remains unbroken and airtight, the oil

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will remain on-specification for a long period of time. Storage guides and factors contributing to deterioration and contamination of packaged oils are contained in 5.15.

- a. Most existing specifications for oils do not establish a quantitative limit for water content since none should theoretically be present. At the time of packaging, water content is at a negligible level. However, it is possible for a container to breathe air through the closures over a period of time, thus introducing atmospheric moisture into its contents. Very small amounts of water can usually be detected by cloudy or hazy appearance.
- b. Engine lubricants and gear oils are required to pass ASTM D892, Foaming Characteristics of Lubricating Oils, which limits the amount of aerated foam in terms of foam tendency and foam stability. This tendency towards foaming is undesirable since it reduces lubricant flow to bearings/gears and decreases the thickness of the fluid film under hydrodynamic lubrication environments. To eliminate this, trace amounts of antifoam additives are added which shall be uniformly dispersed to be effective for controlling foam. Under storage conditions these dispersed antifoam additives may coalesce or stratify, which decreases their effectiveness significantly by allowing high foaming values under ASTM D892. In actual use environments, the high mechanical shear induced by gear/bearing activity re-disperses the antifoaming agent so satisfactory foaming control is attained. To ensure against premature failing of samples because of the coalescence tendency, ASTM D892 includes a pre-agitation requirement prior to sample analysis that involves mixing in a Waring-type blender.

5.15.2 Hydraulic fluids. Some hydraulic fluid specifications such as MIL-PRF-5606, MIL-PRF-6083, MIL-PRF-17672, MIL-PRF-46170, MIL-PRF-83282 and MIL-PRF-87257 contain particle contamination limits which are so low the products are required to be packaged under clean room conditions. Very slight amounts of dirt, rust, and metal particles will cause them to fail the specification limit for contamination. Five gallon and fifty-five gallon containers are opened by removing bungs. Quart and gallon containers are usually packaged in hermetically sealed containers, which should be opened by means of a piercing type device. To minimize external contamination, it is recommended that these containers are opened at the top of the vertical side rather than on the top. The act of opening any container may allow more contaminants into the fluid than the specification allows. In opening the container for use or evaluation it is extremely important that the can be opened and handled in a clean environment. The area of the container to be opened shall be flushed with filtered solvent (petroleum ether, mineral spirits or isopropyl alcohol). The device used for opening the container shall be thoroughly rinsed with filtered solvent. After the container is opened, a small amount of the material is poured from the container and disposed of prior to pouring the sample for analysis. Once a container is opened, the unused portion shall be discarded. Military hydraulic fluids, particularly those using ester synthetic hydrocarbon base stocks, can absorb water. The amount of water absorbed shall be controlled in order to prevent corrosion and other hydraulic system problems.

5.15.3 Greases. Deterioration of grease is usually indicated by bleeding or a change in texture, but neither constitutes assurance the grease is beyond specification limits. Tests such as

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penetration, dropping point and oil separation are necessary to make the determination.

a. Penetration is a method of measuring the consistency of grease. Consistency provides a means for classification of greases in accordance with the National Lubricating Grease Institute (NLGI) classification system. Most grease specifications contain a storage stability requirement which specifies that after a certain period of time under prescribed environmental conditions, the grease shall comply with all specification requirements except an expanded penetration. If the penetration is within the storage stability limits, the grease is satisfactory for use.

b. Dropping point indicates the temperature at which grease passes from a semisolid to a liquid state under the conditions of the test. It is not necessarily indicative of service performance. A change in dropping point is an indication the consistency of the grease has changed.

c. Oil separating from grease, commonly known as bleeding, is characteristic of most grease. The amount of bleeding varies with the composition of the grease, the size of the container and storage conditions. A film of free oil does not preclude satisfactory use of grease. However, where an excessive amount of free oil (pourable) is present, the grease shall not be used unless laboratory analysis confirms its continued conformance to specification requirements.

d. Incompatibility between the seal elastomer and the grease may result in the failure of seals to retain lubricating grease and exclude contamination. The deterioration of elastomer seals results in failure of lubricity and causes a shortened bearing life.

f. Grease is formulated with various types of base oils, viscosity additives and thickeners. Some of these greases freeze at extreme cold weather conditions that may result in failure of bearings and equipment. Most military greases will operate down to minus 54° C (minus 65° F), which reflects one of the military's global operability requirements. This property is often determined using the bearing torque test or other rheological tests.

5.15.4 Insulating oils. Special precautions shall be taken to maintain insulating oils in first class condition. Insulating oil is required to have a high dielectric strength. It shall be moisture free and contain no foreign matter. If it is necessary to store insulating oils outdoors, the containers shall be protected from the weather. Containers shall not be opened or unsealed before the oil is actually required for use. If necessary to open for test, the utmost precaution shall be taken against the entrance of moisture or other foreign matter.

5.16 Non-Conforming product.

5.16.1 Identification of a non-conforming product. A product is deemed to be non-conforming when:

a. A product being accepted by an authorized Government Representative either at origin on an Free on Board (FOB) Origin contract basis or at destination on an FOB Destination contract basis determined by inspection and/or tests not to conform to the procurement contract

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specifications or,

b. For DLA Aviation owned products determined by inspection and/or tests not to conform to the Intra-Governmental Receipt Limits (IGRL) contained in Tables.

c. Reports of non-conforming capitalized products are categorized as Customer/Depot Complaints.

5.16.2 Disposition request procedures. It is DLA Aviation policy to issue only those supplies and services that fully conform, in all respects, to the procurement specification requirement.

a. Based on these details, DLA Aviation will provide a decision concerning the product's use, rehabilitation, or disposition.

b. Where a characteristic does have an intra-Governmental receipt limit and the product does not meet this limit, DLA Aviation chemist shall obtain a waiver from the applicable Service Technical Office prior to shipment to an end user.

c. In the case of out of duty hour emergency requests, DLA Aviation shall provide disposition instructions and if possible notify the applicable Service technical office prior to shipment. If it is not possible to contact the Service technical office prior to shipment, then the contact shall be made as soon as practical.

d. When a service-owned product does not meet intra-Governmental receipt limits set forth in this Standard, they will contact the using service's technical office (see 5.13.1) for a decision concerning its use or disposition.

e. Report of Customer/Depot Complaint and request for disposition instructions shall be sent through channels to DLA Aviation. The use of Standard Form 368 is recommended. The report shall contain, as a minimum, the following details:

- (1) Specification and Grade of non-conforming product.
- (2) Quantity of non-conforming product by storage tank/conveyance.
- (3) Location where non-conforming product is held.
- (4) Date of Receipt.
- (5) Name of manufacturer, contract number, batch number, qualification number, date of manufacture, as applicable.
- (6) Type of container or storage.
- (7) Accountable military department.
- (8) Need for replacement product.

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(9) Detailed laboratory test results and if known, degree of contamination and contaminating materials. Test results reported shall include all known characteristics and whether results are within specification. The appropriate Type A or B test results performed on product just prior to identification of contamination problem shall also be included.

5.16.2 Service and DLA responsibilities. The following are the responsible technical organizations of the Services and DLA for petroleum and related products.

- | | | |
|-----------------|------------------|--|
| a. Army | Mailing Address: | U.S. Army Petroleum Center
Room 0522 Mail Stop 6241
8725 John J. Kingman Rd.
Ft. Belvoir, VA 22060-6241 |
| | Mailing Address: | USAPC Ft Belvoir VA//AMXPC//
Telephone: Commercial: (703) 767-0659
DSN: 427-0659 |
| b. Navy | Mailing Address: | Director NAVSUP Energy ATTN: Code PS
8725 John J. Kingman Rd., Suite 3719
Ft. Belvoir, VA 22060-6224 |
| | Message Address: | NAVSUP Energy BELVOIR VA
Telephone: Commercial: 703-767-7334/7341
DSN: 427-7334/7341 |
| c. Air Force | Mailing Address: | Commanding Officer
Air Force Petroleum Office
8725 John J. Kingman Road, Room 1227
Ft. Belvoir, VA 22060-6241 |
| | Message Address: | Telephone: Commercial: 703-767-8705
DSN 427-8705
Email: afpa@dla.mil |
| d. DLA Energy | Mailing Address: | DLA Energy DQA, Room 2843
8725 John J. Kingman Rd
Ft. Belvoir, VA 22060-6221 |
| | Message Address: | DLA Energy
FT BELVOIR VA//DLA Energy QA,
Telephone: Commercial: 703-767-8736/8395
DSN: 427-8736/8795 |
| e. DLA Aviation | Mailing Address: | DLA Aviation
Joint Commodities Division (FAJ)
8000 Jefferson Davis Highway
Richmond, VA23297-5809 |
| | Message Address: | DLA Aviation
VA//DLA AVIATION-FAJ//
Telephone: Commercial: 804-279-3995
DSN: 695-3995 |

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5.16.3 Communication copies. DLA Aviation shall be furnished copies of all communication regarding disposition of Government-owned off-specification product in overseas areas.

5.16.3.1 Chain of custody requirement for all samples shipped to a laboratory. In order to ensure sample integrity a record of the chain of custody must be maintained by the sample owner until sample disposal. Chain of custody documentation must be used for all samples forwarded where there is a contractual issue in question. Each change of custody shall be documented at the time and place of transfer including signature of the custodian. Chain of custody documentation shall be forwarded to DLA Aviation for inclusion into the Customer Depot Complaint (CDC) file. DLA Aviation determines product disposition, sample disposal and notifies sample owner(s) accordingly. Documentation and samples representing legal/potential legal disputes shall be maintained until release by DLA Aviation G.

5.16.3.2 Laboratory reports. While laboratories are authorized to provide recommended disposition instructions for non-conforming products, only DLA Aviation can provide official disposition.

5.16.3.3 Reclamation. This procedure restores or changes the quality of a contaminated or off-specification product so it will meet the specification of the original product or a lower grade product. The process of reclamation, when properly applied, will result in downgrading, blending, purification, or dehydration.

5.16.3.4 Determining factors. The following factors shall be carefully considered before reclamation is recommended:

- a. Contaminating agents present and source of contaminants.
- b. Degree of contamination.
- c. Probable end-use of petroleum product in present condition with consideration given to laboratory analysis, purchase specification, established intra-Governmental receipt limits and safety factors.
- d. Feasibility of removing or nullifying undesirable effects of contaminants so the petroleum product may be used.
- e. Actual location and quantities of off-specification or contaminated petroleum product.
- f. Probable need for reclaimed petroleum product.
- g. Availability of time, materials, equipment and labor necessary to reclaim the off-specification or contaminated product.

5.16.4 Reclamation techniques.

5.16.4.1 Downgrading. Downgrading is the procedure by which an off-specification or

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slightly contaminated petroleum product is approved for use as a lower grade of the same or similar petroleum product.

5.16.4.2 Blending. Blending is that procedure by which predetermined quantities of two or more similar petroleum products are mixed to produce a petroleum product of intermediate grade or quality.

5.16.4.3 Additive injection/mixing. The inclusion of an additive, such as MIL-S-53021 (for automotive diesel fuel), along with other techniques such as blending to bring the characteristics of former off-specification product back into the range of on-specification or intra-Governmental receipt limits.

5.16.4.4 Purification. The removal of contaminating agents by filtration or dehydration.

5.16.4.5 Water removal. Water Removal is accomplished primarily by filtering or settling process. Water in most light petroleum products will settle out if allowed to stand undisturbed from 6 to 24 hrs. If the light product is in a storage tank, the excess water may be withdrawn through the water draw-off valve. If the product is in a small container, the water may be separated by filtering and decanting into another container or by siphoning off the water.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The purpose of this Standard is to establish common requirements for maintaining quality during the receiving, storing and issuing of government-owned bulk and packaged petroleum products and coal. This Standard is military unique because it covers internal government procedures for the handling and storage of government-owned fuels under conditions not found in the commercial world such as long term storage and special testing requirements.

6.2 International standardization agreement implementation. This standard implements STANAG 1110 Allowable Deterioration Limits for NATO Armed Forces Fuels, Lubricants and Associated Products, STANAG 3149 Minimum Quality Surveillance for Fuels, STANAG 4714 Minimum Quality Surveillance for Lubricants and Associated Products, STANAG 7036 Methods of Detection and Treatment of Fuels Contaminated by Microorganisms, and AIR STD FG 4021 Allowable Deterioration Limits for Stored Fuels, Lubricants, and Associated Products. When changes to, revision, or cancellation of this standard are proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the international standardization agreement, as identified in the ASSIST database at <https://assist.dla.mil>.

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TABLE I. Minimum frequency for testing long-term storage of packaged petroleum products.¹

PRODUCT DESCRIPTION	MINIMUM TESTING FREQUENCY (MONTHS)
Gasoline, Aviation ¹	6 ²
Gasoline, Automotive ¹	12
Turbine Fuel Aviation ¹	12
Diesel Fuel ¹	12
Kerosene ¹	12
Fuels, Burner ¹	12
Fog Oils ¹	12
Other Petroleum Products, such as oils and greases	See Note 3

NOTES:

- For Bulk Petroleum Product long-term storage testing frequencies, see MIL-STD-3004 Part 1.
- For current minimum testing frequency requirements refer to Defense Logistics Information Service (DLIS) and/or the Total Item Record (TIR). See website, <http://www.dla.mil/HQ/InformationOperations/LogisticsInformationServices.aspx>.
- For products listed in TABLES IV – X, see minimum retest frequency for that product.

TABLE II. Minimum sampling and testing requirements for packaged petroleum products.

SERIES	LOCATION OF STOCKS	TYPE STORAGE	WHEN SAMPLED	TYPE SAMPLE	TESTING REQUIRED	REMARKS
1	Packaged petroleum stocks wherever stored	Packaged	(a) Periodically as required by Table I. (b) When contamination or deterioration is suspected. (c) When the identity is uncertain.	Representative sample IAW API MPMS Chapter 8	Type B-2 ^{1,2}	Where an agreed inspection period has not been stipulated, the product is to be inspected at least annually.

NOTES:

- No receiving tests are necessary on packaged products, provided the containers are intact and markings adequately identify the product.
- B-2 tests requirements are listed in the applicable product table in MIL-STD-3004 Part 1.

TABLE III. Tests required for lubrication oils.¹

PROPERTIES	B-1 TEST	C TEST
Appearance (to include visual sediment & water)	X	X
Emulsion test	X ²	
Gravity	X	X
Viscosity	X	
Flash point	X	
Foam test	X	
Water ²	X	X ³
Solid contaminants	X ³	

NOTES:

- B-2 tests are listed in TABLES IV.
- Only if the specification has this requirement.
- Is only required if the oil fails appearance because of water contamination cloudiness.

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TABLE IV. Type B-2 tests for lubricating oils³ – Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-DTL-46014	MIL-PRF-2104	MIL-PRF-3150	MIL-PRF-6081	MIL-PRF-6085	MIL-PRF-6086
Appearance / workmanship			X	X	X	X
Color				X	X	
Viscosity @ 100 C	X	X				
Viscosity @ 54 C					X	
Viscosity @ 40 C	X ¹		X	X ¹		X ¹
Viscosity @ -40 C				X		
Viscosity @ -54 C				X	X	
Relative density						
Flash point	X	X		X	X	X
Pour point		X	X	X	X	X
Neutralization number (acid/base)				X	X	X
Copper strip corrosion			X	X		X
Corrosion & oxidation stability	X			X	X	
Evaporation loss			X			
Precipitation number					X	
Ash						
Emulsion						
Foam test		X				X
Water content						
Particulate content / trace sediment	X			X		
Trace metals						
Carbon residue						
Hydrolytic stability						
Minimum retest frequency (months)	36	36	24	36	24	36
Visual check frequency (months)		12	12	12	12	12
Military symbol(s)	None	OE/HDO-10, OE/HDO-30, OE/HDO-40, OE/HDO-15/40 OE/HDO-5/40	PL-M	None	OAI	OGL, OGR
NATO Code Numbers	None	O-237, O-238, N/A, O-1236, N/A	O-192	O-133	O-147	O-153, O-155

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TABLE IV. Type B-2 tests for lubricating oils³ – Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-PRF-7808	MIL-PRF-7870	MIL-PRF-9000	MIL-PRF-14107	MIL-PRF-17331 ²	MIL-PRF-21260
Appearance / workmanship	X	X	X	X		X
Color		X				
Viscosity @ 100 C	X		X		X	X
Viscosity @ 54 C						
Viscosity @ 40 C	X	X ¹		X	X	
Viscosity @ -40 C		X				
Viscosity @ -54 C	X ¹			X		
Relative density						
Flash point	X	X	X	X	X	X
Pour point		X	X	X	X	X
Neutralization number (acid/base)	X	X	X	X	X	
Copper strip corrosion					X	
Corrosion & oxidation stability	X	X		X ¹	X ¹	
Evaporation loss		X		X		
Precipitation number		X		X		
Ash			X			
Emulsion					X	
Foam test	X		X		X ²	X
Water content					X	
Particulate content / trace sediment	X				X	
Trace metals	X					
Carbon residue						
Hydrolytic stability						
Minimum retest frequency (months)	36	36	24	24	24	24
Visual check frequency (months)	12	12				12
Military symbol(s)	None	None	9250	LAW	2190-TEP	PE-10, PE-30, PE-40, PE-15/40
NATO Code Numbers	O-148, O-163	O-142	O-278	O-157	O-250	C-640, C- 642, N/A, N/A

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TABLE IV. Type B-2 tests for lubricating oils³ – Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-PRF-23699	MIL-PRF-26087	MIL-PRF-32033	MIL-PRF-46167	MIL-PRF-53074	MIL-DTL-83767
Appearance /		X				X
Color		X	X			
Viscosity @ 100 C	X	X ¹		X	X	
Viscosity @ 54 C						
Viscosity @ 40 C	X	X ¹	X			X
Viscosity @ -40 C	X		X	X		
Viscosity @ -54 C			X			
Relative density						
Flash point	X	X	X	X	X	X
Pour point	X	X	X	X	X	X
Neutralization number	X	X			X	X
Copper strip corrosion		X	X		X	X
Corrosion & oxidation	X					
Evaporation loss	X		X			
Precipitation number		X	X			
Ash					X	
Emulsion						
Foam test	X	X		X		X
Water content						
Particulate content / trace	X					
Trace metals	X					
Carbon residue		X				X
Hydrolytic stability						
Minimum retest frequency	36	36	24	24	36	24
Visual check frequency	12		12			
Military symbol(s)	None	None	PL-S	OEA-30	5190, 5230	None
NATO Code Numbers	O-152, O-154, O-156	None	0-190	0-183	None	

Note:
MIL-PRF-46167 has been superseded by MIL-PRF-2104 and is for appearance only since Tri-Services have not unanimously endorsed MIL-PRF-2104.

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TABLE IV. Type B-2 tests for lubricating oils³ – Continued.

CHARACTERISTICS	SPECIFICATION			
	SAE J 1899	SAE J 1966	SAE J 2360	VV-L-825 4
Appearance / workmanship	X	X		
Color				
Viscosity @ 100 C	X	X	X	X
Viscosity @ 54 C				
Viscosity @ 40 C				X
Viscosity @ -40 C				
Viscosity @ -54 C				
Relative density	X	X		
Flash point	X	X	X	X
Pour point	X	X		X
Neutralization number (acid/base)	X	X		X
Copper strip corrosion	X	X	X	X
Corrosion & oxidation stability				
Evaporation loss				
Precipitation number				
Ash	X	X		X
Emulsion				
Foam test	X		X	
Water content				
Particulate content / trace sediment	X	X		
Trace metals	X			
Carbon residue				X
Hydrolytic stability				
Minimum retest frequency (months)	36	36	24	36
Visual check frequency (months)	12	12	12	
Military symbol(s)	Type II Type III	1065, 1080, 1100, 1120	GO-75/90, GO- 80/90, GO-85/140	RCO-2, RCO-3, RCO-4
NATO Code Numbers	None	None	O-186, O-226, O-228	O-283, O-290

NOTES:

1. If capability exists.
2. Option A may be used for Government owned 2190 TEP if the conditions are met as required by ASTM D892.
3. For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension at <https://www.shelflife.dla.mil/>. Program POCs for the Military Services and Agency Administrators are listed on the home page.
4. Also Floc Point and Dielectric Strength.

Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item. For laboratories that cannot perform the full B-2 series tests, recommend the following statement be included in the remarks section: "All required tests for shelf life extension were not performed. This lab report does not give authorization to extend the shelf life extension of this item.". Contact DLA Aviation for shelf life authorization.

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TABLE V. Type B-2 tests for greases, semi-fluids, lubricants, and other grease-like materials.⁶

CHARACTERISTICS	SPECIFICATION				
	DoD-G-85733	DoD-G-24508	DoD-G-24650	MIL-G-21164	MIL-G-25013
Appearance /workmanship	X	X	X		X
Odor		X			X
Penetration (un-worked)				X	
Penetration (worked)	X	X	X	X	X
Worked stability		X		X	X
Dropping point / melting	X	X	X	X	X
Oil separation		X		X	X
Evaporation loss / bleed	X	X		X	X
Copper strip corrosion		X		X	X
Oxidation stability (50hrs)					
Rust preventive properties		X		X	X
Water resistance		X		X	X
Fuel resistance					
Free-acidity / free alkali					
Molybdenum disulfide content				X	
Boiling water immersion					
Water stability /emulsification					
Water content					
Dirt (particles)		X			X
Load carrying capacity	X	X ⁵		X ⁵	
Minimum retest frequency (months)	24	24		24	24
Visual check frequency (months)					
Military symbol(s)		None	None	GMD	None
NATO Code numbers		None	None	G-353	G-372

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TABLE V. Type B-2 tests for greases, semi-fluids, lubricants, and other grease-like materials ⁶ – Continued.

CHARACTERISTICS	SPECIFICATION				
	MIL-G-25537	MIL-G-81827	MIL-G-81937	MIL-L-15719	MIL-L-19701
Appearance / workmanship	X	X	X	X	X
Odor	X		X		
Penetration (un-worked)	X	X	X		
Penetration (worked)	X	X	X	X	
Worked stability	X	X	X	X	
Dropping point / melting	X	X	X	X	
Oil separation	X	X	X		
Evaporation loss / bleed	X	X	X	X	X
Copper strip corrosion	X	X	X	X	
Oxidation stability (100 hrs.)			X		
Rust preventive properties	X	X	X		X
Water resistance	X	X	X	X	
Fuel resistance					
Free-acidity / free alkali					
Molybdenum disulfide content		X			
Boiling water immersion		X			
Water stability / emulsification					
Water content					
Dirt (particles)	X		X	X	
Load carrying capacity		X ⁵			
Minimum retest frequency (months)	24	24	24	24	24
Visual check frequency (months)					
Military symbol(s)	None	None	None	HTG	None
NATO Code Numbers	G-366		None	None	None

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TABLE V. Type B-2 tests for greases, semi-fluids, lubricants, and other grease-like materials ⁶ – Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-L-46000	MIL-L-46150	MIL-PRF-10924	MIL-PRF-18458 ¹	MIL-DTL-23549	MIL-PRF-23827
Appearance / workmanship	X	X	X	X	X	X
Odor	X		X			X
Penetration (un-worked)						X
Penetration (worked)	X		X	X	X	X
Worked stability			X			X
Dropping point / melting			X		X	X
Oil separation			X	X	X	X
Evaporation loss / bleed	X	X	X		X	X
Copper strip corrosion	X	X	X		X	X
Oxidation stability (100 hrs.)	X ⁴					
Rust preventive properties	X	X				X
Water resistance						X
Fuel resistance						
Acid number	X					
Molybdenum disulfide content					X	
Boiling water immersion					X	
Water stability / emulsification						
Water content						
Dirt (particles)						X
Load carrying capacity	X ⁵	X ⁵	X ⁵	X ⁵	X ⁵	X ⁵
Minimum retest frequency (months)	24	24	24	24	24	24
Visual check frequency (months)			12			
Military symbol(s)	LSA	None	GAA	None	None	None
NATO Code Numbers	O-158	None	G-403	None	None	G-354

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TABLE V. Type B-2 tests for greases, semi-fluids, lubricants, and other grease-like materials ⁶ - Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-PRF-24139	MIL-PRF-27617	MIL-PRF-81322	MIL-PRF-83261	MIL-PRF-83363	MIL-PRF-85336
Appearance / workmanship	X	X	X	X	X	
Odor	X		X			
Penetration (un-worked)		X			X	
Penetration (worked)	X	X	X	X	X	
Worked stability	X		X	X	X	
Dropping point / melting	X		X			
Oil separation		X	X	X	X	
Evaporation loss / bleed	X	X	X	X	X	X
Copper strip corrosion	X	X	X			X
Oxidation stability (100 hrs.)	X	X				X
Rust preventive properties			X			X
Water resistance	X	X	X	X		
Fuel resistance		X				
Free-acidity / free alkali						
Molybdenum disulfide content						
Boiling water immersion						
Water stability / emulsification						X
Water content						
Dirt (particles)	X		X			
Load carrying capacity	X ⁵		X ⁵	X ⁵	X ⁵	X ⁵
Minimum retest frequency (months)	24	24	24	24	24	24
Visual check frequency (months)						
Military symbol(s)	None	None	None	None	None	None
NATO Code Numbers	None	G-397, G-398, G-399,G-1350	G-395	None	G-396	None

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TABLE V. Type B-2 tests for greases, semi-fluids, lubricants, and other grease-like materials ⁶ - Continued.

CHARACTERISTICS	SPECIFICATION	
	MIL-PRF-32014	A-A-59173
Appearance / workmanship	X	X
Odor	X	
Penetration (un-worked)		
Penetration (worked)	X	X
Worked stability	X	
Dropping point / melting	X	X
Oil separation	X	
Evaporation loss / bleed		X
Copper strip corrosion	X	
Oxidation stability (100 hrs.)		X
Rust preventive properties	X	
Water resistance	X	
Fuel resistance		
Free-acidity / free alkali		
Molybdenum disulfide content		
Boiling water immersion		
Water stability / emulsification		
Water content		
Dirt (particles)	X	X
Load carrying capacity		
Extreme Pressure, Four-Ball Method	X	
Wear Preventive, Four-Ball Method (75 C)	X	
Minimum retest frequency (months)	24	24
Visual check frequency (months)		
Military symbol(s)	None	None
NATO Code numbers	None	None

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TABLE V. Type B-2 tests for greases, semi-fluids, lubricants, and other grease-like materials ⁶ – Continued.

CHARACTERISTICS	SPECIFICATION			
	SAE AMS-G-4343	SAE AMS-G-6032	VV-G-671 ²	VV-P-236 ³
Appearance / workmanship	X	X	X	X
Odor	X			
Penetration (un-worked)		X		X
Penetration (worked)	X		X	
Worked stability				
Dropping point / melting	X	X	X	X
Oil separation	X			
Evaporation loss / bleed	X			X
Copper strip corrosion	X	X	X	X
Oxidation stability (100 hrs.)				
Rust preventive properties	X			
Water resistance		X		
Fuel resistance		X		
Free-acidity / free alkali			X	
Molybdenum disulfide content				
Boiling water immersion				
Water stability / emulsification				
Water content			X	
Dirt (particles)				X
Load carrying capacity			X ⁵	
Minimum retest frequency (months)	24	24	24	24
Visual check frequency (months)		6 ⁵	12	
Military symbol(s)	None	None	None	None
NATO Code Numbers	G-392	G-363	G-412	S-743

NOTES:

1. Also volatile matter.
2. Also ash content.
3. Also neutralization number, viscosity, flash point, and abrasive material.
4. Per time cited in specification.
5. If capability exists.
6. Examine each 6 months for hardening.
7. For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension at <https://www.shelflife.dla.mil/>. Program POCs for the Military Services and Agency Administrators are listed on the home page.

Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item.

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TABLE VI. Type B-2 tests for hydraulic, brake, shock absorber fluid. ⁵

CHARACTERISTICS	SPECIFICATION					
	A-A-59290	A-A-59354	MIL-DTL-17111	MIL-H-19457 ¹	MIL-H-22072	MIL-H-81019
Appearance / workmanship			X		X	X
Color		X	X		X	
Composition						
Viscosity @ 100 C			X	X		
Viscosity @ 54 C					X	
Viscosity @ 40 C	X ²	X	X	X	X ²	X
Viscosity @ 25 C						
Viscosity @ -40 C			X ²			
Viscosity @ -54 C						X
Low temperature stability						
Relative density	X			X	X	
Flash point		X				X
Pour point		X	X	X		
Neutralization Number (acid/base)		X	X	X		X
Copper strip corrosion						X
Corrosion & oxidation stability						X
pH	X				X	
Evaporation loss			X	X	X	
Water content			X	X	X	X
Foam test		X		X	X	X
Particulate content / trace sediment						X
Ash	X					
Precipitation number			X	X		
Rust prevention		X				
Emulsion				X		
Lubricity (steel-on-steel)			X ⁴	X ⁴		
Gel time						
Minimum retest frequency (months)	24	24	24	24	24	24
Visual check frequency (months)						
Military symbol(s)	None	None	None	None	None	None
NATO Code	None	None	H-575	H-580	H-579	None

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TABLE VI. Type B-2 tests for hydraulic, brake, shock absorber fluid⁵ – Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-PRF-5606	MIL-PRF-6083	MIL-PRF-46170	MIL-PRF-17672	MIL-PRF-46176	MIL-PRF-83282
Appearance / workmanship	X	X	X	X	X	
Color	X	X				X
Composition						
Viscosity @ 100 C	X		X		X	X
Viscosity @ 54 C						
Viscosity @ 40 C	X	X	X	X		X
Viscosity @ 25 C						
Viscosity @ -40 C	X	X	X			X
Viscosity @ -54 C	X	X			X ²	
Low temperature stability						
Relative density						
Flash point	X	X	X	X	X	X
Pour point	X	X	X	X		X
Neutralization Number (acid/base)	X	X	X	X		X
Copper strip corrosion	X	X		X		
Corrosion & oxidation stability						
pH						
Evaporation loss	X	X				
Water content	X	X	X	X		X
Foam test	X	X	X	X		X
Particulate content / trace sediment	X	X	X	X		X
Ash				X		
Precipitation number						
Rust prevention						
Emulsion				X		
Lubricity (steel-on-steel)	X ⁴	X ⁴				X ⁴
Gel time						
Minimum retest frequency (months)	24	24	24	24	24	24
Visual check frequency (months)	12					12
NATO Code Numbers	NATO H-515	NATO 635	H-544	None, H-573, None	H-547	NATO H-537
Military symbol(s)	OHA	OHT	FRH	2075-T-H, 2110-T-H, 2135-T-H	BFS	None

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TABLE VI. Type B-2 tests for hydraulic, brake, shock absorber fluid⁵ – Continued.

CHARACTERISTICS	SPECIFICATION			
	MIL-PRF-87257	SAE J 1703	SAE AS1241	VV-D-1078
Appearance / workmanship	X	X	X	X
Color	X			
Composition				
Viscosity @ 100 C	X	X	X	
Viscosity @ 54 C				
Viscosity @ 40 C	X		X	
Viscosity @ 25 C				X
Viscosity @ -40 C	X	X		
Viscosity @ -54 C	X		X	
Low temperature stability	X			
Density @ 25 °C, fire point			X	
Relative density				X
Flash point	X		X	X
Pour point	X		X	X
Neutralization Number (acid/base)	X		X	X
Copper strip corrosion				
Corrosion & oxidation stability				
pH		X		
Evaporation loss				
Water content	X		X	
Foam test	X		X	
Particulate content / trace sediment	X		X	
Ash				
Precipitation number				
Rust prevention				
Emulsion				
Lubricity (steel-on-steel)				
Gel time				
Minimum retest frequency (months)	24	24	24	24
Visual check frequency (months)		12		12
Military symbol(s)	None	None	None	None
NATO Code Numbers	H-538		H-522	S-1714, S-1716, S-1718, S-1720, S-1724, S-1726, S-1728, S-1732

NOTES:

1. Also, hydrolytic stability
2. Per temperature in specification.
3. Fire point test characteristic also required.
4. If capability exists.
5. For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension at <https://www.shelflife.dla.mil/>. Program POCs for the Military Services and Agency Administrators are listed on the home page.

Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item.

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TABLE VII. Type B-2 tests for lubricants, (including solid film).⁶

CHARACTERISTICS	SPECIFICATION					
	A-A-59004	MIL-DTL-25681	MIL-L-23398	MIL-L-24131	MIL-L-24478	MIL-DTL-87177 ¹
Appearance / workmanship	X	X				X
Color						
Odor					X	
Viscosity @ 100 C		X				
Viscosity @ 40 C		X				
Viscosity @ 0 C						
Viscosity @ -40 C						
Boiling point						
Flash point		X				X
Pour point						
Density / relative density						
Composition		X				
Oil content	X					
Particle size				X		
Solids content				X	X	
Ash				X		
Adhesion						
Thermal stability						
Endurance life						
Load carrying capacity						X ³
Minimum retest frequency (months)	12	24	Note ⁴	12	12	24
Visual check frequency (months)			6		12	
Military symbol(s)	None	None	None	None	None	None
NATO Code Numbers	None	S-1735	S-749	None	None	None

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TABLE VII. Type B-2 tests for lubricants, (including solid film)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION					
	MIL-PRF-3572	MIL-PRF-46010	MIL-PRF-46147	MIL-PRF-63460	MIL-PRF-81329	SAE AS 87132
Appearance / workmanship	X			X	X	
Color						
Odor						
Viscosity @ 100 C	X ²					
Viscosity @ 40 C				X		
Viscosity @ 0 C	X ²					
Viscosity @ -40 C				X		
Boiling point						
Flash point	X			X		
Pour point	X			X		
Density / relative density						
Composition						X
Oil content						
Particle size	X					
Solids content	X					
Ash	X					
Adhesion					X	
Thermal stability					X	
Endurance life					X	
Load carrying capacity				X ³		
Minimum retest frequency (months)	24	Note ⁴	Note ⁴	36	Note ⁴	36
Visual check frequency (months)					6	
Military symbol(s)	None	None	None	CLP	None	None
NATO Code Numbers	None	S-1738	None	S-758	S-1737	None

NOTES:

1. Also, dielectric strength.
2. Per temperature in specification.
3. If capability exists.
4. Discard 12 months from date of manufacture.
5. Discard 6 months from date of manufacture.
6. For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension <https://www.shelflife.dla.mil/>. Program POCs for the Military Services and Agency Administrators are listed on the home page.

Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item.

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TABLE VIII. Type B-2 tests for waxes. ¹

CHARACTERISTICS	SPECIFICATION				
	A-A-59255	C-T-91	MIL-W-12062	MIL-W-13945	MIL-W-20553
Appearance / workmanship	X	X		X	
Odor		X		X	
Color	X				
Melting point / solidification	X	X		X	X
Softening point			X		
Penetration			X	X	X
Viscosity @ 100 °C				X	X
Oil content	X			X	X
Flash point				X	X
Relative density			X		
Ash		X	X		
Water content		X			
Neutralization Number				X	X
Saponification number		X		X	
Volatile matter					
Minimum retest frequency	36	48	36	36	36
Visual check frequency					
Military symbol(s)	None	None	None	None	None
NATO Code Numbers	None	None	None	None	None

NOTE:

1. For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension at <https://www.shelflife.dla.mil/>. Program POCs for the Military Services and Agency Administrators are listed on the home page.

Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item.

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.).⁶

CHARACTERISTICS	SPECIFICATION				
	A-A-59197	A-A-50493	A-A-52624	A-A-58092	ASTM D3487
Appearance / workmanship	X	X			
Viscosity @ 100 C					
Viscosity @ 54 C					
Viscosity @ 40 C	X ²	X			X
Viscosity @ 20 C					
Viscosity @ -40 C					
Viscosity @ -54 C					
Relative density			X		X
Distillation					
Flash point	X	X			X
Fire point					
Pour point	X				X
Freezing point			X		
Penetration (un-worked)					
Penetration (worked)					
Melting point					
Protection					
Corrosion		X			
Neutralization Number (acid/base)	X				X
Acidity					
Lead corrosion					
pH			X		
Stability					
Evaporation / bleed					
Residue on evaporation					
Ash			X		
Precipitation number					
Foaming					
Emulsification properties					
Contamination / sediment					
Water content		X			X
Dielectric strength					X
Film appearance					
Drying Rate					
Particle size (fineness)					
Surface and interface tension		X			
Non-volatile matter					
Color			X		
Minimum retest frequency (months)	36	36	36		24
Visual check frequency (months)				12 ⁴	
Military symbol(s)	None	None	None	None	None
NATO Code Numbers	None	None	S-750	S-1736	None

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION				
	MIL-DTL-4339	MIL-C-6529	MIL-C-11796	MIL-DTL-5020	A-A-59132
Appearance / workmanship	X	X	X	X	
Viscosity @ 100 C					
Viscosity @ 54 C					
Viscosity @ 40 C				X ²	
Viscosity @ 20 C					
Viscosity @ -40 C					
Viscosity @ -54 C					
Relative density					X
Distillation				X	X
Flash point				X	
Fire point					
Pour point					
Freezing point					
Penetration (un-worked)			X		
Penetration (worked)					
Melting point			X		
Protection		X			
Corrosion	X		X	X	
Neutralization Number (acid/base)					
Acidity					X
Lead corrosion					
pH	X				
Stability		X	X		
Evaporation / bleed					
Residue on evaporation					
Ash					
Precipitation number		X			
Foaming					
Emulsification properties	X				
Contamination / sediment					
Water content					X
Dielectric strength					
Film appearance					
Drying Rate					
Particle size (fineness)					
Surface and interface tension					
Minimum retest frequency (months)	48	36	36	48	None
Visual check frequency (months)				12	
Military symbol(s)	None	None	None	FDC	None
NATO Code Numbers	C-630	C-608, C-609, C-610	C-633	S-712	None

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION				
	MIL-PRF-8188	MIL-PRF-12070	MIL-PRF-16173	MIL-PRF-46002	MIL-PRF-87252
Appearance / workmanship	X	X	X	X	X
Viscosity @ 100 C	X	X		X	X
Viscosity @ 54 C					
Viscosity @ 40 C				X	X
Viscosity @ 20 C					
Viscosity @ -40 C					X
Viscosity @ -54 C					X
Relative density					
Distillation					
Flash point	X	X		X	X
Fire point					X
Pour point				X	
Freezing point					
Penetration (un-worked)					
Penetration (worked)					
Melting point					
Protection	X ²				
Corrosion			X	X	X
Neutralization Number (acid/base)					X
Acidity					
Lead corrosion	X				
pH					
Stability			X		
Evaporation / bleed				X	
Residue on evaporation					
Ash			X		
Precipitation number				X	
Foaming	X				
Emulsification properties					
Contamination / sediment					X
Water content					X
Dielectric strength					X
Film appearance			X		
Drying Rate			X		
Particle size (fineness)					
Surface and interface tension					
Minimum retest frequency (months)	36	36	36	24	24
Visual check frequency (months)					
Military symbol(s)	None	SGF-2	None	None	None
NATO Code Numbers	C-638	None	C-620, C-632	None	S-1748

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION				
	MIL-T-17128	SAE-AMS-1424	SAE-AMS-1428	SAE-AMS-2518	SAE AMS-M-7866
Appearance / workmanship	X	X	X	X	X
Viscosity @ 100 C	X				
Viscosity @ 54 C					
Viscosity @ 40 C	X				
Viscosity @ 20 C			X		
Viscosity @ -40 C					
Viscosity @ -54 C					
Relative density	X	X	X		
Distillation					
Flash point					
Fire point					
Pour point	X				
Freezing point		X	X		
Penetration (un-worked)				X	
Penetration (worked)					
Refractive index		X	X		
Moisture (loss of)					X
Corrosion					X
Neutralization Number (acid/base)	X				
Acidity					
Lead corrosion					
pH		X	X		
Stability					
Evaporation / bleed				X	
Residue on evaporation					
Ash					
Precipitation number					
Foaming					
Emulsification properties					
Contamination / sediment					
Water content					
Dielectric strength					
Film appearance					
Drying Rate					
Particle size (fineness)					X
Surface and interface tension					
Minimum retest frequency (months)	36	Note ⁵	Note ⁵	36	36
Visual check frequency (months)				12	
Military symbol(s)	None	None	None	None	None
NATO Code Numbers	None	S-1717	S-1719 S-1723	S-720	S-740

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION				
	MIL-A-53009	A-A-59921	MIL-PRF-85570	MIL-PRF-85704	MIL-PRF-87937
Appearance / workmanship			X	X	X
Viscosity @ 100 C					
Viscosity @ 54 C					
Viscosity @ 40 C					
Viscosity @ 20 C					
Viscosity @ -40 C					
Viscosity @ -54 C					
Relative density	X				
Distillation					
Flash point		X	X	X	X
Fire point					
Pour point					
Freezing point					
Penetration (un-worked)					
Penetration (worked)					
Refractive index					
Moisture (loss of weight)					
Corrosion		X	X	X	X
Neutralization Number (acid/base)					
Acidity					
Lead corrosion					
pH	X	X	X	X	X
Stability					
Evaporation / bleed					
Residue on evaporation		X			X
Ash					
Precipitation number					
Foaming					
Emulsification properties		X		X	X
Contamination / sediment		X			
Water content					
Dielectric strength					
Film appearance					
Drying Rate					
Particle size (fineness)					
Surface and interface tension					
Minimum retest frequency (months)	24	36	24	24	36
Visual check frequency (months)					
Military symbol(s)	None	None	None	None	None
NATO Code Numbers					

MIL-PRF-85570 also Polyamide insulated wire effect, Type IV minimum retest frequency: 18 months.

MIL-PRF-85704 also viscosity @ 27 °C.

MIL-PRF-87937 also insoluble matter, polyamide insulated wire effect.

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION			
	MIL-S-17980	O-E-751	SAE AMS 1435	MIL-DTL-83800
Appearance / workmanship	X	X	X	X
Viscosity @ 100 C				
Viscosity @ 54 C				
Viscosity @ 40 C				
Viscosity @ 20 C				
Viscosity @ -40 C				
Viscosity @ -54 C				
Relative density		X	X	X
Distillation		X		
Flash point				X
Fire point				
Pour point				
Freezing point				
Penetration (un-worked)				
Penetration (worked)				
Refractive index				
Moisture (loss of weight)				
Corrosion			X	
Neutralization Number (acid/base)				
Acidity		X		X
Lead corrosion				
pH			X	
Stability				
Evaporation / bleed				
Residue on evaporation		X		
Ash				
Precipitation number				
Foaming				
Emulsification properties				
Contamination / sediment				
Water content				X
Dielectric strength				
Film appearance				
Drying Rate				
Particle size (fineness)				
Surface and interface tension				
Minimum retest frequency (months)	24	36	48	18
Visual check frequency (months)				
Military symbol(s)	None	None	None	None
NATO Code Numbers				
MIL-S-17980 also volatile loss sodium fluorescein content insoluble matter.				
O-E-751 also odor.				

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION			
	MIL-PRF-25567	MIL-PRF-38299	MIL-PRF-680	MIL-PRF-7024
Appearance / workmanship			X	
Viscosity @ 100 C				
Viscosity @ 54 C				
Viscosity @ 40 C		X		
Viscosity @ 20 C				
Viscosity @ -40 C				
Viscosity @ -54 C				
Relative density			X	X
Distillation		X	X	
Flash point		X	X	
Fire point				
Pour point				
Freezing point		X		
Penetration (un-worked)				
Penetration (worked)				
Refractive index				
Moisture (loss of weight)				
Corrosion		X	X	X
Neutralization Number (acid/base)				
Acidity		X		
Lead corrosion				
pH	X			
Stability				
Evaporation / bleed				
Residue on evaporation	X			
Ash				
Precipitation number				
Foaming	X			
Emulsification properties				
Contamination / sediment		X	X	
Water content				
Dielectric strength				
Film appearance				
Drying Rate				
Particle size (fineness)				
Surface and interface tension				
Minimum retest frequency (months)	36	24	24	36
Visual check frequency (months)				
Military symbol(s)	None	None	None	None
NATO Code Numbers			S-752 / S-753 / S-760	
MIL-PRF-25567 also non-flammability. MIL-PRF-38299 also total sulfur, mercaptan sulfur, gum content, conductivity. MIL-PRF-7024 also viscosity at 0 °C, existent gum.				

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TABLE IX. Type B-2 tests for misc. products (specialty, cutting, anti-seizing, etc.)⁶ – Continued.

CHARACTERISTICS	SPECIFICATION				
	SAE-AS8660	O-M-232	SS-G-659	TT-I-735	VV-C-846
Appearance / workmanship	X	X	X	X	X
Viscosity @ 100 C					
Viscosity @ 54 C					
Viscosity @ 40 C					
Viscosity @ 20 C					
Viscosity @ -40 C					
Viscosity @ -54 C					
Relative density		X		X	
Odor					X
Flash point					X
Fire point					
Pour point					X
Freezing point					
Penetration (un-worked)					
Penetration (worked)	X				
Melting point					
Insolubility	X				
Corrosion	X				
Neutralization Number (acid/base)					
Acidity		X		X	
Lead corrosion					
pH			X		
Stability					
Evaporation / bleed	X				
Residue on evaporation		X			
Ash					
Precipitation number					
Foaming					
Emulsification properties					X
Contamination / sediment					
Water content					X
Dielectric strength	X ³				
Film appearance					
Drying Rate					
Particle size (fineness)			X		
Surface and interface tension					
Minimum retest frequency (months)	36	24	48	48	36
Visual check frequency (months)	12	12	12	12	12
Military Symbol(s)	None	None	None	None	OS
NATO Code Numbers	S-736	S-747	S-732	S-737	O-214
<p>Note:</p> <ol style="list-style-type: none"> Also, color. Per temperature in specification. If capability exists. Check container for damage. Bulk products should be tested annually prior to the winter season. Packaged products, such as 55-gal drums, have an initial 24- month shelf life from the date of manufacture and should be updated every 12 months. For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension at https://www.shelflife.dla.mil/. Program POCs for the Military Services and Agency Administrators are listed on the homepage. <p>Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item.</p>					

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TABLE X. Packaged additive shelf life and testing frequency^{7,9}

CHARACTERISTICS ¹	SPECIFICATION	
	MIL-DTL-85470 ⁵ FSII	MIL-PRF-25017 ⁶ CI/LI
Workmanship	X	X
Ash Content		X
Pour Point		X
Density @ 15 °C		X ⁷
Viscosity @ 40 °C		X ⁷
Flash Point		X ⁷
Total Acid Number	X	X ⁷
pH @ 25 °C (25% solution in water)	X	
Distillation		
Relative Density 20/20°C	X	
Water	X	
Ethylene Glycol		
NSN	6850-01-089-5514	6850-00-292-9780
Shelf Life ^{2,3}	18 Months	24 Months
Test Frequency ^{4,8}	9 Months	15 Months
NATO Code Numbers	S-1745	S-1747

NOTES:

- Characteristics are from the product specifications. Refer to associated additive specification to determine appropriate ASTM test methods.
- Static Dissipater Additive (SDA) and thermal stability improver (+100) additives are contracted and controlled through DLA Aviation, Richmond, VA (for address see 5.13.1) and do not have a defined shelf-life criteria. Any shelf life and/or testing requirements concerns for these items should be forwarded through them. It is noted that the manufacturer states that the self-life for SDA is 5 years, and for +100 is 12 months.
- Shelf Life, for packaged items, applies to those items which are unopened and stored IAW Section 5 of this MIL Standard.
- Once opened, packaged additives will be tested every 9 or 15 months until depleted or test results do not meet specifications.
- Follow instructions and ASTM test methods and table properties contained within MIL-DTL-85470 to fulfill verification testing for a Fuel System Icing Inhibitor (FSII), see B.2.3.
- Perform conformance test identified in Table 1 of MIL-PRF-25017 when conducting shelf life testing of Corrosion Inhibitor/ Lubricity Improver (CI/LI).
- Use the additive-specific values listed in QPL-25017, under Performance Specification, MIL-PRF-25017, to compare against the test results for each of these characteristics.
- For a commodity not listed in TABLES IV-X, see guidance on packaged product shelf life extension at <https://www.shelflife.dla.mil/>. Program POCs for the Military Services and Agency Administrators are listed on the home page.

Only an approved laboratory under the DoD Shelf Life Program can authorize the customer to extend the shelf life of any item.

For a list of approved laboratories, see the table of QSL Test Labs for chemical commodities at <https://www.shelflife.dla.mil/site/sles/TestLabs.aspx>, Common Access Card (CAC) enabled.

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TABLE XI. Minimum standards of filtration and water separation for petroleum products.

PRODUCT	INTO TANK CARS AND TRUCKS ⁵	INTO DISPENSING UNITS ⁴	INTO CONTAINERS (PACKAGE)	INTO AIRCRAFT ⁴	INTO USING UNIT
Aviation Gasoline Bulk ¹	150 microns ² (max) No Visible Water	Filter-Separator 10 ppm by volume water, max.	Filter-Separator 10 ppm by volume water, max.	Filter or Filter-Separator ¹ 10 ppm by volume Water, max. 150 microns ² (max), No Visible Water	
Aviation Gasoline, Packaged ³		Filter-Separator ¹ 10 ppm by volume Water, max.		Filter or Filter-Separator ¹ 10 ppm by volume Water, max.	
Aviation Turbine Fuels, Bulk ¹	150 microns ² (max)	Filter-Separator ¹ 10 ppm by volume Water, max.	Filter-Separator ¹ 10 ppm by volume water, max.	Filter-Separator ¹ 10 ppm by volume Water, max.	
Aviation Turbine Fuels, Packaged ³		Filter-Separator ¹ 10 ppm by volume Water, max.		Filter-Separator ¹ 10 ppm by volume Water, max.	
Aircraft Piston Engine Lube Oil, - Bulk	240 microns ² (max) No Visible Water	240 microns ² (max) No Visible Water	240 microns ² (max) No Visible Water	240 microns ² (max) No Visible Water	
Aircraft Piston Engine Lube Oil, Packaged		240 microns ² (max) No Visible Water	240 microns ² (max) No Visible Water	240 microns ² (max) No Visible Water	
Aircraft jet Engine Lube Oils, - Packaged		25 microns, absolute (max) No Visible Water	25 microns, absolute (max.) No Visible Water	10 microns (max) (No Filtration necessary for Hermetically sealed containers)	
Aircraft Hydraulic Fluids - Packaged			(Filtered at time of manufacture), 5 microns, absolute (max)	5 microns, absolute (max) (No filtration necessary for hermetically sealed containers)	
Diesel Fuel/ MOGAS (applicable for Army only)			Filter-Separator ¹ 10 ppm by volume Water		Filter-Separator 10 ppm by volume Water

NOTES:

1. Filter-separator in accordance with Energy Institute (EI) 1581 or MIL-PRF-52308, electronic sensors that provide both a water and solid defense in accordance with EI 1598 and EI 1570, or other approved filter-separator equipment or combinations thereof.
2. 150 microns equal 100 mesh; 240 microns equal 60 mesh.
3. All visible water to be stripped or drained from fuel prior to issue.
4. All dispensing units or equipment that issue Aviation Gasoline or Aviation Turbine Fuel directly to aircraft must have a filter separator or electronic sensor installed at point of issue meeting requirements of Note 1.
5. 150 micron equal 100 mesh; 240 micron equal 60 mesh for Lubricating Oils for Tank Cars, Trucks and Intermodal Containers.

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APPENDIX A

MILITARY SERVICE PETROLEUM LABORATORIES AND TESTING
CAPABILITIES

A.1 SCOPE

A.1.1 Scope. This appendix is not a mandatory part of this Standard. The information contained herein is intended for guidance only. Unless otherwise directed, all samples should be forwarded to the laboratory designated in the appropriate service regulations. It is recommended to contact the laboratories listed below prior to submission of samples to ensure capabilities exist to perform/accomplish sample testing requirements.

A.2 LIST OF LABORATORIES.

TABLE A-I List of laboratories.

AIR FORCE LABORATORIES	TYPE PRODUCTS	TYPE TEST
Aerospace Fuels Laboratory (FP2070) AFPET/PTPLA 2430 C Street, Bldg. 70, Area B Wright Patterson AFB OH 45433-7632 COMM: (937) 255-2106 DSN: 785-2106	Jet Fuel Packaged Petroleum, Oils and Lubricants (POL) Chemicals (Bulk and Packaged)	A B-2
ARMY LABORATORIES	TYPE	TYPE
US ARMY TARDEC Petroleum Laboratory Bldg. 5085 U Avenue, Bldg. 85 New Cumberland, PA 17070-5083	Packaged POL Chemicals (Bulk and Packaged)	B-2

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APPENDIX B

SIGNIFICANCE OF TESTS

B.1 SCOPE

B.1.1 Scope. This appendix discusses the significance and purpose of some of the tests used in the quality assurance of fuels and lubricants. This appendix is not a mandatory part of this Standard. The information contained herein is intended for guidance only.

B.2 GENERAL

B.2.1 General. Each of the various tests of fuels and lubricants indicated in the product specification has certain significance in relation to the quality of the product tested. Certain ones can give a quick, easy and positive identification of the product and at the same time, aid in detecting the presence of contaminants. Although descriptions of the testing equipment and test methods are not to be included in this publication, it is considered worthwhile to include a brief statement on the significance and purpose of certain tests. These statements may assist by providing a better understanding and appreciation of the scope and importance of the QA Program. For a more detailed coverage of this subject, see ASTM Manual 1, Significance of Tests of Petroleum Products.

B.2.2 Foam stability. This paragraph addresses Government-owned lubricating oil. All lubricating oils will foam to some extent when agitated. The foam that is formed in additive oils is often very stable and instead of breaking quickly tends to build in the oil system with subsequent oil loss through the breather outlets and other openings in the engine crankcase. Consequently, additive type motor oils are frequently treated with antifoam agents to eliminate potential foaming difficulties. The foam test requires agitating the oil sufficiently so a large quantity of foam is formed, then noting the time required for this foam to collapse. Some lubricants containing antifoam additive may fail initial foam tests. If they meet the foam requirements after agitation as described in Option A of ASTM D892, Foaming Characteristics of Lubricating Oils, they are satisfactory for use.

B.2.3 Fuel System Icing Inhibitor (FSII). This is a quantitative test to determine the concentration of diethylene glycol monomethyl ether in aviation turbine fuel. The additive prevents ice formation in aircraft fuel systems. ASTM D5006 (using the B2 AIA Kit) is the preferred method. FSII lowers the freeze point of entrained or free water present in turbine fuels or in fuel systems. The amount of FSII added to turbine fuels in the wholesale system shall be adjusted to ensure delivery of the fuel with the minimum FSII content outlined in Table 1. FSII does not readily dissolve into the fuel so it must be dispersed as fine droplets. A proportional-flow injection system is recommended with shearing devices such as meters or mixers downstream of the injector. FSII will not fully disperse in "wet fuel" (fuel containing free water) even with proper additive injection equipment. In fuel containing free water, the FSII will preferentially solubilize in the water resulting in a lower than expected concentration of FSII in the fuel and water bottoms containing high FSII concentrations. It is recommended a filter-separator system be installed upstream of the FSII injection point if the free water content cannot be maintained below 30 parts per million (ppm) by volume during the injection process. The FSII content of turbine fuels shall be verified when a storage tank is designated as an issue tank or when delivery into the bulk tank. Fuel stored in

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floating roof issue tanks shall be checked for FSII content after each heavy rain. Underground storage tanks shall be checked during periods of heavy rain, melting snow and other periods of high water tables. It should not be allowed to remain in tank bottoms or filter-separator sumps. In FSII treated fuel, the water at tank bottoms and sumps should be carefully drained daily or more frequently if warranted. It is also important to prevent water and moist air from entering the FSII additive tanks because the water dissolves rapidly into the additive. FSII that contains an excessive amount of water will not readily disperse into the fuel and can settle in the aircraft fuel tank causing corrosion and deterioration of the tank lining materials. Therefore, a desiccator or other drying mechanism shall be used in the air vent to prevent entrance of moist air into the FSII storage tank. FSII, either by itself or mixed with water, can be corrosive to epoxy linings or aluminum vessels under certain conditions. Because of its corrosive nature FSII should be stored in stainless steel or Teflon coated tanks. Since laboratory testing has shown long-term stability of FSII is questionable even if stored in stainless steel containers, it is recommended FSII stocks be rotated as frequently as possible. Bulk FSII stocks should be visually checked one month after delivery and fully retested for quality conformance every 9 months as a minimum. Packaged FSII stocks should be fully retested for quality conformance every 18 months as a minimum.

Warning: FSII has been determined to be a health hazard. Therefore, special precautions shall be taken to avoid exposure when handling glycols (for example, while sampling and testing). Refer to the manufacturer's Safety Data Sheets (SDS), formerly Material Safety Data Sheets (MSDS), for safety precautions.

B.2.4 Lubricity. In lubricants, it is proportional to film strength. In fuels, it refers to a value that is measured either by the scuffing load (SL) BOCLE wear test by ASTM D6078, the high frequency reciprocating rig (HFRR) test by ASTM D6079, or BOCLE test by ASTM D5001. The tests were developed to determine the ability of the fuel to properly lubricate fuel-wetted components/surfaces.

B.2.5 Viscosity. Viscosity is the measure of a liquid's resistance to flow. The significance of viscosity depends on the intended use of the product. From the point of view of application and performance, proper viscosity is highly important since specified minimum and maximum rates of flow are required for all fuels and lubricating oils. In fuel, viscosity determination serves as an index of how it will flow to the burners, the extent to which it will be atomized and the temperature at which the fuel must be maintained in order for heavy residual fuel to be properly atomized.

B.2.6 Lubricating oils. Care should be exercised to avoid contaminating lubricating oils with water, as it will hasten the decomposition of many oils, wash out additives, emulsify, and lead to engine malfunctioning. In used lubricating oils, water sediment may indicate poor maintenance or malfunctioning of screens, or its formation may have been caused by condensation.

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APPENDIX C

ACRONYMS AND INITIALISMS

C.1 SCOPE

C.1.1 Scope. This appendix lists most of the common acronyms and initialisms used in this document. This appendix is not a mandatory part of this standard and the information contained herein is intended for guidance only.

ACS	American Chemical Society
AFPET	Air Force Petroleum Office
AGMA	American Gear Manufacturers Association
AMSC	Acquisition Management Systems Control
APC	Army Petroleum Center
API	American Petroleum Institute
ASSIST	Acquisition Streamlining and Standardization Information System
BBL	Barrel
BOCLE	Ball On Cylinder Lubricity Evaluator
CAC	Common Access Card
CID	Commercial Item Descriptions
CI/LI	Corrosion Inhibitor /Lubricity Improver
CoA	Certificate of Analysis
DLA	Defense Logistics Agency
DLIS	Defense Logistics Information Service
DoD	Department of Defense
EA	Executive Agency
EI	Energy Institute
FSC	Federal Supply Class
FSII	Fuel System Icing Inhibitor
HFRR	High Frequency Reciprocating Rig
IAW	In Accordance With
IGRL	Intra-Governmental Receipt Limits
ISO	International Organization for Standardization
JPO	Joint Petroleum Office
MPMS	Manual of Petroleum Measurement Standards
NATO	North Atlantic Treaty Organization
NAVSUP	Naval Supply Systems Command (Energy)
NGS	Non-Government Standards
NLGI	National Lubricating Grease Institute
NSN	National Stock Number
OSHA	Occupational Safety and Health Administration
PAS	Pre-Award Survey
POL	Petroleum, Oils and Lubricants
ppm	Parts Per Million
PQDR	Product Quality Deficiency Report

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QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
QCP	Quality Control Plan
QPD	Qualified Products Database
QPL	Qualified Products List
QS	Quality Surveillance
QSL	Quality Surveillance List
RC	Recertification Certificate
RCQ	Refinery Certificate of Quality
RR	Receiving Report
RT	Recertification Test
SCP	Service Control Point
SDS	Safety Data Sheet
SDA	Static Dissipater Additive
SLBOCLE	Scuffing Load Ball-On-Cylinder Lubricity Evaluator
STANAG	Standardization Agreement
TIR	Total Item Record
USG	U.S. Gallons
VP	Vapor Pressure
WAWF	Wide Area Work Flow

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CONCLUDING MATERIAL

Custodians:

Army – AT
Navy – SA
Air Force – 68
DLA – GS

Preparing activity:

DLA – GS3
(Project 91GP-2017-003)

Review activities:

Navy – AS, SH, OS
Air Force – 11
DLA – PS

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