POL Products Guide

For Ground Vehicle and Equipment Materiel Systems

July 2010

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POL PRODUCTS GUIDE

This Petroleum, Oil and Lubricants (POL) Products Guide is designed as a quick reference to assist materiel and combat developers, supply and maintenance personnel, and other field users in properly using petroleum and its related product commodities that are common to the military supply system. The guidance being provided covers essentially fuels, fuel additives, lubricants, and associated products (e.g., hydraulic fluids, antifreeze, etc.) that are required and used in Army (and DOD) ground vehicles, equipment, and materiel. It also includes referee fuels and reference oils.

Individual product guides sheets have been developed and formatted to provide the maximum amount of information needed for using these POL Products. Each guide sheet covers a generic product type and includes such information as the relevant military/federal specification, military symbol and NATO Code Number, available container size and National Stock Number (NSN), product applications, temperature range limitation, and general comments relative to product usage.

This POL Products Guide is not intended to replace any military/ federal specification or the vehicle/equipment LUBE Order (LO), but merely to provide a quick reference source. This document will be updated periodically to accommodate changes in specifications, NSNs, etc.

As an example, this Guide will generate the following types of information on a typical product such as OE/HDO-15/40.

- OE/HDO-15/40 is the military symbol for the SAE 15W-40 Grade under MIL-PRF-2104. (Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service).

- OE/HDO-15/40 is interchanged within NATO under Code Number O-1236. It is packaged in three (3) different size containers each having separate National Stock Numbers (NSN).

- OE/HDO-15/40 is one of four (4) different grades under MIL-PRF-2104. This oil is used in engines, hydraulic systems, transmissions, power steering units, and can be used in gear box units. However, one should consult the vehicle/equipment Lube Order (LO) if there is a question.

- OE/HDO-15/40, when used in either engines or transmissions, is acceptable for use in ambient temperatures ranging from approximately 0°F to 120°F.

The regulations governing responsibility for development and updating documents of this nature are listed as follows:

- Army Regulation 70-12, Fuels and Lubricants Standardization Policy for Equipment Design, Operation, and Logistic Support, 1 May 1997.

- Army Regulation 715-13, Engineering Support for Items Supported by Defense Logistics Agency, 13 March 1986.

- AMC Regulation 750-11, Use of Lubricants, Fluids, and Associated Products, 15 June 1986.

Questions relative to this document and its use should be directed to the following:

U.S. Army RDECOM-TARDEC
6501 E. 11 Mile Road
ATTN: Fuels and Lubricants Technology Team
RDTA-DP (MS-110)
Warren, MI 48397-5000

Facsimile:

Commercial (586) 282-4244
DSN 786-4244

Email: POLhelp@us.army.mil

Any recommended change or additions to improve the overall utility of this POL Products Guide are welcome and will be appreciated.

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COMBAT/TACTICAL ENGINE OILS

MIL-PRF-2104 - Lubricating Oil, Internal Combustion Engine, Tactical Service

MIL-PRF-46167 - Lubricating Oil, Internal Combustion Engine, Arctic

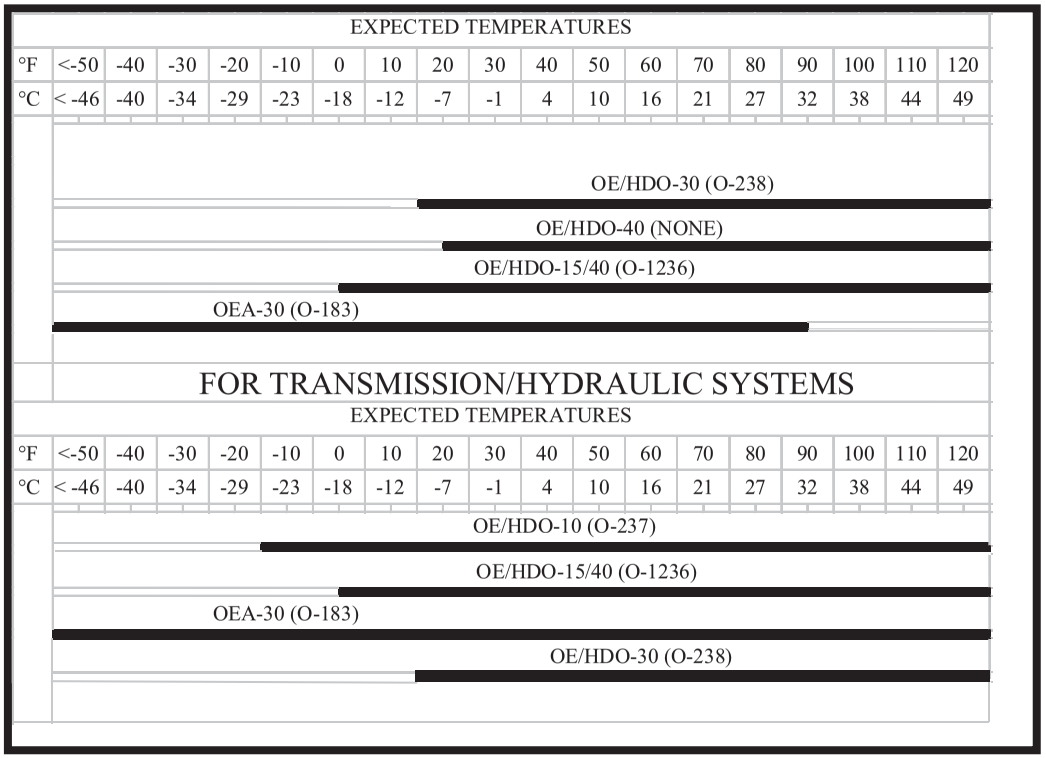
DESCRIPTION

These engine oils are designed for use in all combat and tactical diesel engine powered ground vehicles and equipment and includes performance requirements for power shift transmissions. Products are used also in many hydraulic, power steering, and gear box applications as specified by the Lube Orders (LO's). These oils are NOT to be used in HMMWV automatic transmissions, except under severe cold arctic conditions. The 10W grade (OE/HDO-10) under MIL-PRF-2104 is not recommended for use in high output 2-cycle diesel engines. Single grade oils qualified under MIL-PRF-2104 meet the API CG-4 and modified CF-2. Multigrade oils meet API CI-4 performance criteria. In addition, selected C-4 (Allison) and VC-70 (Caterpillar) transmission tests are included.

Military Specification	Military Symbol (SAE Grade)	NATO Code	Size Container	NSN 9150-	Application (All Products)
MIL-PRF-2104	OE/HDO-15/40 (SAE 15W-40)	O-1236	1-Qt 1-Qt (metal) 5-Gal 55-Gal	01-178-4725 01-421-1427♠ 01-152-4117 01-422-9346♠ 01-152-4118 01-421-1424♠ 01-152-4119 01-421-1432♠	★ Engine Systems ★ Hydraulic Systems ★ Transmission Systems ★ Power Steering Units ★ Non-hypoid Gear Box Systems
	OE/HDO-10 (SAE 10W)	O-237	1-Qt 1-Qt (metal) 5-Gal 55-Gal	01-177-3988 01-496-1957♠ 00-189-6727 00-186-6668 01-496-1946♠ 00-191-2772 01-496-1939♠	
	OE/HDO-30 (SAE 30)	O-238	1-Qt 1-Qt(metal) 5-Gal 55-Gal	01-178-4726 01-433-7974♠ 01-186-6681 01-433-7988♠ 00-188-9858 01-433-7986♠ 00-189-6729 01-433-7978	
	OE/HDO-40 (SAE 40)	NONE	55-Gal	00-188-9862 01-433-7970♠ 01-460-7956♠	
MIL-PRF-46167	OEA-30 (SAE 0W-30)	O-183	1-Qt 5-Gal 55-Gal	00-402-4478 00-402-2372 00-491-7197	

Ambient Temperature Range Usage (See Comments)

FOR ENGINE SYSTEMS



FOR TRANSMISSION/HYDRAULIC SYSTEMS

Comments: The temperature ranges recommended for usage of the various grade oils conform with requirements established by the Lube orders (LO's) for the majority of the combat and tactical ground systems. However, requirements for some equipment may vary from these recommendations and individual equipment LO's must be consulted if there is a question as to the proper grade of lubricant which should be used. These engine oils can tolerate engine oil sump temps of 250°F as standard operation with spikes up to 275°F for short durations. However, for transmission operations the oils can withstand 300°F temps in the trans oil sump. The NSNs identified with a - ♠ - are for lubricants manufactured with a minimum of 25% re-refined basestock. The metal cans are only for Navy use due to their stacking requirements aboard ships. OE/HDO-15/40 and OE/HDO-10W are fully compatible with MIL-PRF-46170 (FRH) and MIL-PRF-6083 (OHT) and may be used as hydraulic fluids in some hydraulic systems. See page 15 for more information on tactical and combat hydraulic fluids. Please contact POLHelp prior to changing the hydraulic fluid in a vehicle system.

TURBINE ENGINE OILS

MIL-PRF-23699 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-7808 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

DESCRIPTION

These oils are used as the engine lubricant for the Abrams series tank and other systems equipped with turbine engines. These oils are not for use in any ground engine systems powered by diesel or gasoline engines.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application (All Products)
MIL-PRF-23699	NONE	O-152	Class C/I		★ Turbine Engines Only
			7.5-Oz	00-180-6266	
			1-Qt	00-985-7099	
			55-Gal	00-681-5999	
		O-154	Class HTS		
			7.5-Oz	01-439-0764	
			1-QT	01-439-0756	
			55-Gal	01-439-2070	
		O-156	Class STD		
			7.5-Oz	01-476-1075	
			1-Qt	01-476-1074	
			55-Gal	01-476-1083	
MIL-PRF-7808	NONE	O-148	8-Oz	00-108-5359	
			1-Qt	00-782-2627	
			1-Gal	00-270-4057	
			55-Gal	00-782-2679	
		O-163	1-Qt	01-414-5926	
			1-Gal	01-414-5927	
			55-Gal	01-414-8141	

Ambient Temperature Range Usage

FOR TURBINE ENGINE

EXPECTED TEMPERATURES

°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49

MIL-PRF-7808 (O-163) Grade 4

MIL-PRF-23699 (O-156)

MIL-PRF-7808 (O-148) Grade 3

Comments: The temperature ranges recommended for usage of the turbine engine oils conform with requirements established by the Lube Orders (LO) for the M1/M1A1 series tank. Requirements for other ground equipment may vary from these recommendations. LO's must be consulted if there is a question as to the proper lubricant which should be used. Prolonged skin contact with either oil should be avoided since it may cause skin rash. Areas using these oils should be well ventilated. Do not intermix these oils with other gasoline or diesel engine oils since damage to internal components will occur.

THESE RECOMMENDATIONS DO NOT APPLY TO AIRCRAFT.

AUTOMOTIVE ENGINE/PRESERVATIVE OILS

MIL-PRF-21260 - Lubricating Oil, Internal Combustion Engine, Preservative and Break-In

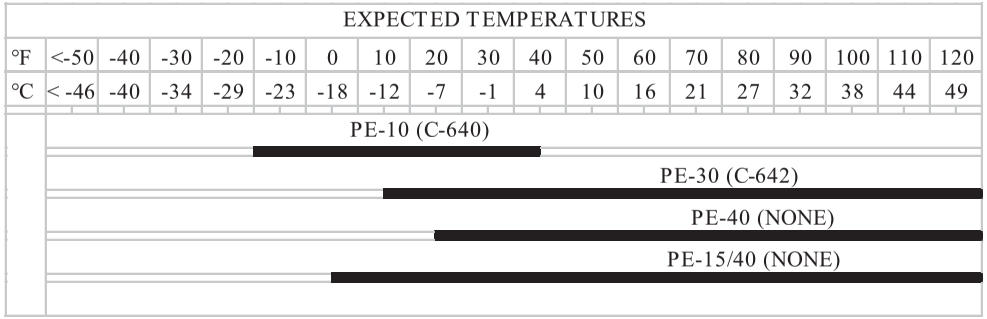
DESCRIPTION

These engine oils are designed for preservation, break-in, and use in all combat/tactical diesel powered ground vehicles and equipment systems. These oils are operational oils meeting MIL-PRF-2104G requirements in addition to corrosion and preservation requirements. These products can be used where MIL-PRF-2104G oils are specified until the first recommended oil change or 50 hrs of operation, whichever comes first. These oils meet the API CF, modified CF-2, and CG-4 performance criteria. PE-10 grade is not for use in high output 2-cycle diesel engines.

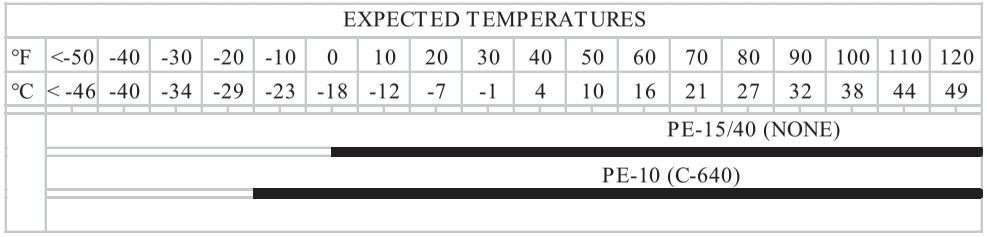
Military Specification	Military Symbol (SAE Grade)	NATO Code	Size Container	NSN 9150-	Application (All Products)
MIL-PRF-21260	PE-15/40 (SAE 15W-40)	NONE	55-Gal	01-293-2772	★ Preservation and Storage Engines, Hydraulic, and Transmission Systems ★ Break-In of New and Rebuilt Engine and Powertrain Systems
	PE-10 (SAE 10W)	C-640	5-Gal 55-Gal	00-111-3199 00-111-0208	
	PE-30 (SAE 30)	C-642	1-Pt 1-Qt 5-Gal 55-Gal	00-111-0201 00-153-0207 00-111-0209 00-111-0210	
	PE-40 (SAE 40)	NONE	5-Gal	01-293-2773	

Ambient Temperature Range Usage (See Comments)

FOR ENGINE SYSTEMS



FOR TRANSMISSION AND HYDRAULIC SYSTEMS



Comments: The temperature ranges recommended for usage of the various grade oils conform with requirements established by the Lube Orders (LO) for the majority of the combat and tactical ground systems. However, requirements for some equipment may vary from these recommendations and individual equipment LO's must be consulted if there is a question as to the proper grade of lubricant which should be used. These oils are also utilized for the preservation of vehicles/equipment fuel systems.

PRESERVATIVE OILS

MIL-PRF-32033 - Lubricating Oil, General Purpose, Preservative (Water-Displacing, Low Temperature)

MIL-PRF-3150 - Lubricating Oil, Preservative, Medium

MIL-PRF-46002 - Preservative Oil, Contact and Volatile Corrosion-Inhibited

DESCRIPTION

MIL-PRF-32033 is a water-displacing, preservative lubricating oil for general purpose lubrication and protection against corrosion of certain small arms and whenever a general purpose, low temperature lubricating oil is required. MIL-PRF-32033 can be applied by dipping, brushing or spraying from gas-pressurized cans.

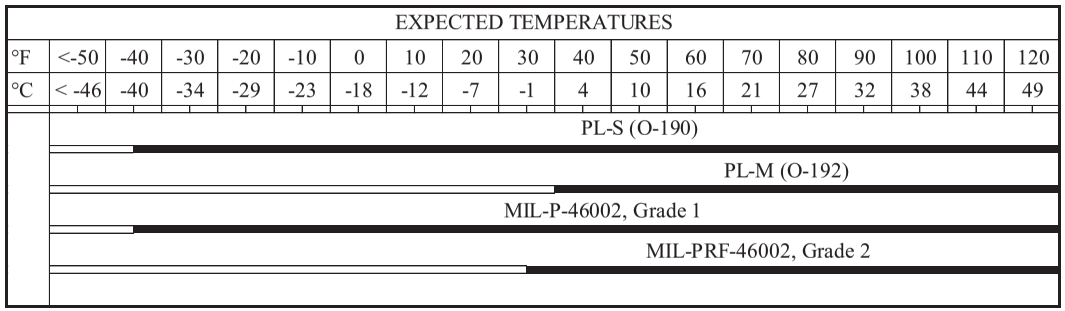
MIL-PRF-3150 is a general purpose preservative oil for ferrous and non-ferrous metals. It is not intended for protection of internal combustion engines. MIL-PRF-3150 can be applied by dipping or brushing; it is too viscous for spraying.

MIL-PRF-46002 is a volatile corrosion inhibited oil for use in the preservation of materiel in enclosed systems where the volatile components will provide protection above the fluid level. It can also be used as a contact preservative.

None of these preservative oils are to be used for the preservation of fuel tanks or engines.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application
MIL-PRF-32033	PL-S	O-190	1/2-Oz 1-Oz 4-Oz 16-Oz 16-Oz 1-Qt 1-Gal 5-Gal 55-Gal	00-836-8641 00-261-8146 00-273-2389 00-458-0075 01-374-2021 00-231-6689 00-231-9045 00-231-9062 00-281-2060	(Aerosol) (Sprayer) * Preservation and Lubrication of Materiel
MIL-PRF-3150	PL-M	O-192	4-Oz 1-Qt 5-Gal 55-Gal	00-271-8427 00-231-2361 00-231-2356 00-231-2357	
MIL-PRF-46002	NONE	NONE	1-Qt 5-Gal 55-Gal	00-889-3523 00-985-7293 00-407-0973	* Preservation of non-wetted Surfaces

Ambient Temperature Range Usage



Comments:
MIL-PRF-32033 is a light preservative oil which is also water-displacing. It has been found to wash away with water, so must be reapplied. **MIL-PRF-3150** is a medium weight preservative oil with much more stringent corrosion inhibiting requirements, so may be a superior preservative oil for many applications which can tolerate a more viscous oil.

GEAR LUBRICANTS

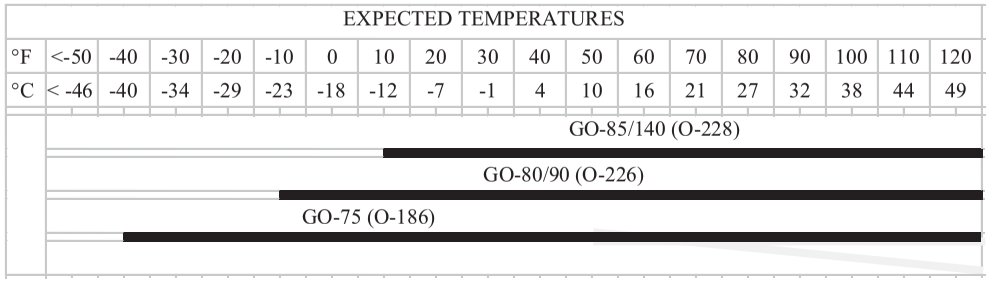
SAE J2360 - Lubricating Oil, Gear, Multipurpose (previously MIL-PRF-2105)

DESCRIPTION

These gear lubricants are for use in differentials and manual transmissions, heavy duty industrial type enclosed gear units, steering gears, and fluid lubricated universal joints of automotive ground equipment. These lubricants are not intended for use in automatic transmission or power steering systems. The oils under SAE J2360 meet the API GL-5 and MT-1 (class 7/8 manual transmission) performance criteria.

Military Specification	Military Symbol (SAE Grade)	NATO Code	Size Container	NSN 9150-	Application (All Products)
SAE J2360	G0-75 (SAE 75W-90)	O-186	1-Qt 1-Gal 5-Gal	01-035-5390 01-048-4593 01-035-5391	★ Axles ★ Differentials ★ Final Drives ★ Heavy Duty Industrial type Enclosed Gear Units ★ Manual Transmission ★ Steering Gears ★ Wire Rope ★ Fluid Lubricated Universal Joints
	GO-80/90 (SAE 80W-90)	O-226	1-Qt 5-Gal 55-Gal	01-035-5392 01-422-9329♠ 01-035-5393 01-422-9335♠ 01-035-5394 01-422-9340♠	
	GO-85/140 (SAE 85W-140)	O-228	1-Qt 5-Gal 55-Gal	01-048-4591 01-035-5395 01-035-5396	
	GO-80/90 (SAE 80W-90) LIMITED SLIP	O-226	5-Gal	00-001-9395 01-422-9342♠	

Ambient Temperature Range Usage (See Comments)



Comments: The temperature ranges recommended for usage of the various oils conform with requirements established by the Lube Orders (LO) for the majority of the combat and tactical ground systems. However, requirements for some equipment may vary from these recommendations and individual LO's must be consulted if there is a question as to the proper grade of lubricant which should be used. Limited-slip differentials allow unequal torque to be transmitted to each axle and require the use of special friction modified gear lubricants. For these applications those gear lubricants designated "GO-80/90 LIMITED SLIP" are required. The friction-modified oils can be used in standard (non limited-slip) differentials, without any adverse effect. The NSNs identified with a - ♠ - are for gear lubricants manufactured with a minimum of 25% re-refined basestock.

SOLID FILM LUBRICANTS

MIL-PRF-46010 - Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting, NATO Code Number S-1738

MIL-PRF-46147 - Lubricant, Solid Film, Air-Cured, Corrosion Inhibiting

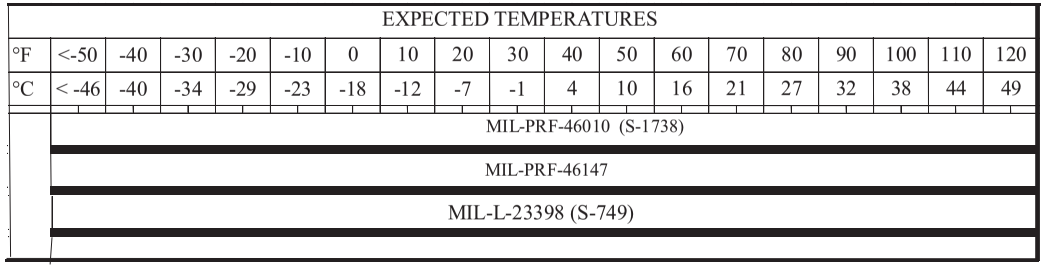
MIL-L-23398 - Lubricant, Solid Film, Air-Cured, Corrosion Inhibiting, NATO Code Number S-749

DESCRIPTION

MIL-PRF-46010 is dispersion of lubricating solids suspended in an adhesive binder that upon application and heat curing provides a solid lubricating surface.
MIL-PRF-46147 is a dispersion of lubricating solids suspended in an adhesive binder that can be applied to a surface and allowed to dry at room temperature to form the solid lubricating surface.
MIL-L-23398 is similar to MIL-PRF-46147 except it provides corrosion protection against exposure to sulfurous acid, but does not have the same wear properties.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application (All Products)
MIL-PRF-46010 Type III	NONE	S-1738	1-Gal 1-Gal	01-416-9506 (Natural) 01-416-9509 (Black)	★ Special Uses
MIL-PRF-46147 Type 1-Can	NONE		1-Qt 1Gal 1-Qt 1-Gal	01-360-1908 01-360-1909 01-360-1907 00-142-9361	Form 1-Color 2 Form 1-Color 2 Form 1-Color 1 Form 1-Color 1
Type 1-Aerosol	NONE		12 Oz. 16 Oz. 12 Oz. 16 Oz.	01-360-1904 01-360-1906 01-360-1903 01-360-1905	Form 2-Color 2 Form 2-Color 2 Form 2-Color 1 Form 2 Color 1
Type II	NONE			01-500-2751 01-500-2795 01-500-2801 01-500-3017 01-500-3099 01-500-3104 01-500-3108 01-500-3114	
MIL-L-23398	NONE	S-749	16 Oz. 1 Qt.	01-260-2534 00-954-7422	(Aerosol)

Ambient Temperature Range Usage



Comments: MIL-PRF-46010 provides both high load carrying capacity and long wear life and also both types of corrosion protection. MIL-PRF-46010 is low in volatile organic compound content and lead free. SAE AS 5272 is an older version of MIL-PRF-46010 and continues to have Types I, II, and III for Aerospace use. **MIL-PRF-46147** has two types. Type I, available in bulk and in aerosol cans, is solvent based. Type II, available in bulk form only, has a lower endurance life than Type I. The aerosol form provides in-field use capability. Both MIL-PRF-46010 and MIL-PRF-46147 are available in black and natural colors. **MIL-L-23398** is similar to MIL-PRF-46147 except for performance differences noted in the Description section above.

WEAPON LUBRICANTS

MIL-PRF-14107 - Lubricating Oil, Weapons, Low Temperature

MIL-L-46000 * - Lubricant, Semi-Fluid (Automatic Weapons)

MIL-L-46150 - Lubricant, Weapons, Semi-Fluid (High Load Carrying Capacity)

MIL-PRF-63460 - Lubricant, Cleaner and Preservative for Weapons and Weapons Systems (Metric)

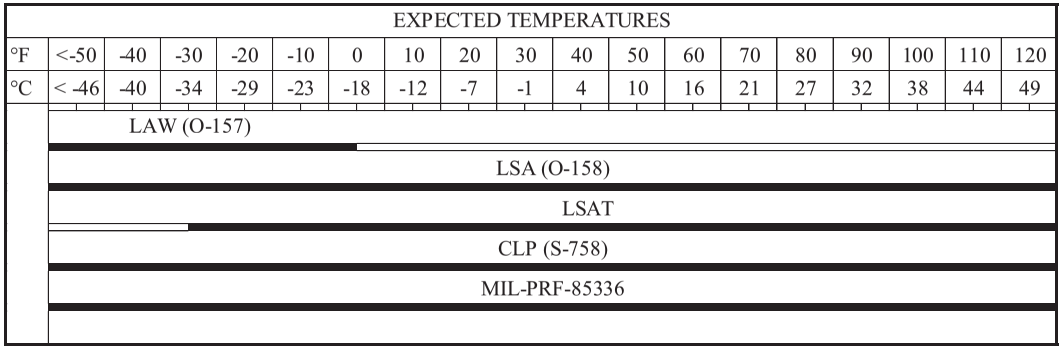
MIL-PRF-85336 - Lubricant, All Weather (Automatic Weapons)

DESCRIPTION

MIL-PRF-14107 is a low temperature preservative and lubricating oil for aircraft and small caliber ground weapons.
MIL-L-46000* is a semi-fluid lubricant for automatic weapons under conditions of extreme pressure for use in all temperatures.
MIL-L-46150 is a semi-fluid lubricant, containing "Teflon", for the 7.62 mm machine gun and for other applications requiring an extreme pressure (high load) lubricant with a low coefficient of friction.
MIL-PRF-63460 is a cleaner, lubricant and short term preservative for both small and large caliber weapons for use in a field environment where ease of application and convenience of a single product are important. It is usable in all climatic conditions.
MIL-PRF-85336 is a petroleum and/or synthetic corrosion inhibited semi-fluid intended for lubrication of aircraft weapons.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application (All Products)
MIL-PRF-14107	LAW	O-157	1-Qt 5-Gal	00-292-9689 00-292-9687	* Small caliber Weapons
MIL-L-46000	LSA	O-158	2-Oz 4-Oz 1-Qt 1-Gal	00-935-6597 00-889-3522 00-687-4241 00-753-4686	* Large caliber Weapons
MIL-L-46150	LSAT-T	NONE	8-Oz 1-Lb	00-949-0323 01-109-7793	* Small caliber Weapons
MIL-PRF-63460	CLP	S-758	1/2-Oz 4-Oz 1-Pt 1-Lt 1-Gal	01-102-1473 01-079-6124 01-054-6453 01-327-9631 01-053-6688	* Small and Large Automatic Weapons
MIL-PRF-85336	NONE	NONE	1-Qt	01-104-5227	* See Comments

Ambient Temperature Range Usage



Comments:
MIL-PRF-63460 may be used instead of MIL-PRF-372 (Rifle Bore Cleaner), MIL-PRF-32033 (Low Temperature Preservative Lubricating Oil), and MIL-PRF-3150 (Medium Preservative Lubricating Oil).
MIL-PRF-14107, MIL-L-46000 and MIL-L-46150 may be used for specific applications where tests have shown it to be satisfactory for large and small caliber weapons.
MIL-PRF-85336 is intended for use on 20 mm rotary guns on almost all parts. It reduces corrosion in marine environments, permits high firing rates at low temperatures, and permits operation under icing conditions.

* Specification is Inactive for New Design.

TACTICAL HYDRAULIC FLUIDS

MIL-PRF-46170 - Hydraulic Fluid, Rust Inhibited, Fire Resistant, Synthetic Hydrocarbon Base

MIL-PRF-6083 - Hydraulic Fluid, Petroleum Base for Preservation and Operation

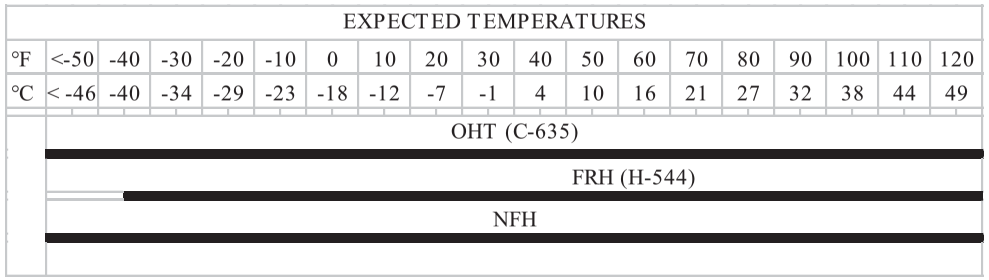
MIL-H-53119 - Hydraulic Fluid, Nonflammable, Chlorotrifluoroethylene Base

DESCRIPTION

MIL-PRF-46170 is a synthetic hydrocarbon base hydraulic fluid. Type I is undyed and is intended for tank recoil and hydraulic systems. **MIL-PRF-6083** is a petroleum based hydraulic fluid for use as a recoil and hydraulic fluid in howitzers and certain other equipment where MIL-PRF-46170 is not used.
MIL-H-53119 is a chlorotrifluoroethylene (CTFE) based hydraulic fluid which is nonflammable to all known flammability hazards. It is to be used only in hydraulic systems which are specifically designed for its use.
All fluids meet stringent particle cleanliness standards.
MIL-PRF-6083 and **MIL-PRF-46170** are rust inhibited and are used both as preservatives for hydraulic systems and components as well as being operational fluids.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application
MIL-PRF-46170 Type I (yellow)	FRH	H-544	1-Pt 1-Qt 1-Gal 5-Gal 55-Gal	01-332-7819 00-111-6256 00-111-6254 00-111-6255 01-158-0462	★ Hydraulic Systems ★ Gun Recoil Systems ★ Tank Suspension Systems
MIL-PRF-6083	OHT	C-635	Aerosol 1-Qt 1-Gal 5-Gal 55-Gal	00-159-4472 00-935-9807 00-935-9808 00-935-9809 00-935-9810	
MIL-H-53119*	NFH	NONE	none at this time	none at this time	★ ASM Vehicles

Ambient Temperature Range Usage



Comments: MIL-PRF-6083 and MIL-PRF-46170 may be used as emergency substitutes for each other. MIL-PRF-5606 (OHA, H-515) is the non-corrosion inhibited version of MIL-PRF-6083 and is not authorized for Army ground equipment. MIL-PRF-83282 (H-537) is the non-corrosion inhibited version of MIL-PRF-46170 and is not authorized for use in Army ground equipment. However, MIL-PRF-5606 and MIL-PRF-83282 may be used as emergency substitutes for MIL-PRF-6083 and MIL-PRF-46170. MIL-H-53119 is not compatible with either MIL-PRF-6083, MIL-PRF-46170, MIL-PRF-5606, MIL-PRF-83282, MIL-PRF-87257 and cannot be used as an emergency substitute for those fluids. **MIL-PRF-6083** has a flash point of at least 82°C, MIL-PRF-46170 has a flash point of at least 218°C, and **MIL-H-53119** has no flash point (is nonflammable).

OE/HDO-15/40 and OE/HDO-10W (see page 6) are compatible with MIL-PRF-46170 and MIL-PRF-6083 may be able to be used in hydraulic systems. Please contact POLHelp prior to changing the hydraulic fluid in a vehicle system.

* Inactive for New Design.

BIOBASED HYDRAULIC FLUID

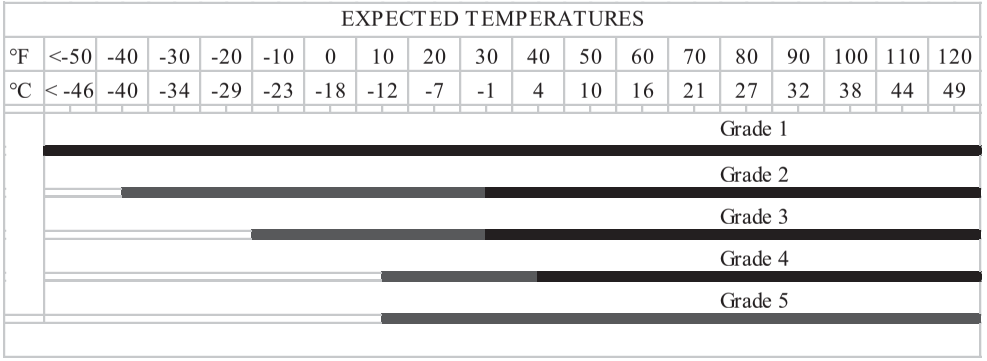
MIL-PRF-32073 - Hydraulic Fluid, Biobased

DESCRIPTION

MIL-PRF-32073 is a hydraulic fluid intended for use in hydraulic systems constructions equipment, bridging, tactical vehicles (when specified), shipboard systems, and metal working tools.

Military Specification	Military Symbol (Grade)	NATO Code	Size Container	NSN 9150-	Application
MIL-PRF-32073	Grade 1 (ISO VG 15)	NONE	1-Gal 5-Gal 55-Gal	01-498-0268 01-498-0315 01-498-0014	
	Grade 2 (ISO VG 22)	NONE	1-Gal 5-Gal 55-Gal	01-498-1483 01-498-1468 01-498-1481	
	Grade 3 (ISO VG 32)	NONE	1-Gal 5-Gal 55-Gal	01-503-1775 01-503-1759 Not Avail yet	
	Grade 4 (ISO VG 46)	NONE	1-Gal 5-Gal 55-Gal	01-498-1518 01-498-1492 01-498-1487	
	Grade 5 (ISO VG 68)	NONE	1-Gal 5-Gal 55-Gal	01-498-1522 01-498-1523 01-498-1524	

Ambient Temperature Range Usage



Comments: **MIL-PRF-32073** covers five viscosity grades. Selection of viscosity grades should be based on the low temperature operational requirement. These hydraulic fluids are intended for use in environmentally sensitive areas such as construction, forestry, river and mining. If used in any other equipment of hydraulic systems, a study should be made to determine its applicability for the systems.

MACHINE TOOL HYDRAULIC FLUID

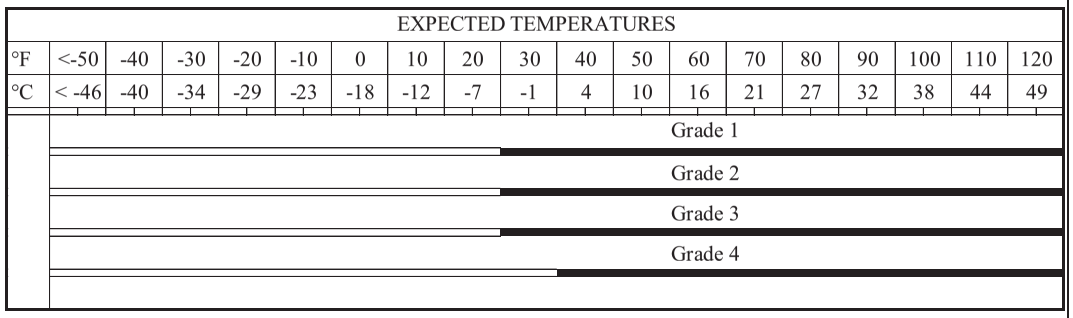
A-A-59354 Hydraulic Fluid, Petroleum Base, For Machine Tools

DESCRIPTION

A-A-59354 hydraulic fluid intended for use in hydraulic systems of metal-working tools which require anti-wear oils.

Military Specification	Military Symbol (Grade)	NATO Code	Size Container	NSN 9150-	Application
A-A-59354	Grade 1 (ISO VG 32)	NONE	5-Gal 55-Gal	00-966-8830 00-966-8831	
	Grade 2 (ISO VG 46)	NONE	5-Gal 55-Gal	00-966-8834 00-966-8833	
	Grade 3 (ISO VG 68)	NONE	5-Gal 55-Gal	00-966-8832 00-966-8835	
	Grade 4 (ISO VG 150)	NONE	5-Gal 55-Gal	00-966-8836 990966-7736	

Ambient Temperature Range Usage



Comments: A-A-59354 covers four viscosity grades. Selection of viscosity grades should be based on the recommendation of the machine tool manufacturer. These hydraulic fluids may also be used in application requiring corrosion-inhibiting and oxidation-resistant lubricating oils.

AUTOMATIC TRANSMISSION FLUID

GM 6297-M , Automatic Transmission Fluid

DESCRIPTION

GM 6297-M is intended for use in automatic transmissions in GM and AMC manufactured administrative and some tactical vehicles. The transmission of these vehicles requires fluids with special frictional characteristics.

Specification	Military Symbol	NATO Code	Size Container	NSN	Application (All Products)
GM 6297-M	NONE	NONE	1 Qt 5 Gal 1 Qt HDPE 55 Gal	9150-00-698-2382 9150-00-657-4959 9150-01-353-4799 9150-01-114-9968	Automatic Transmissions

Ambient Temperature Range Usage

FOR GM AND AMC AUTOMATIC TRANSMISSIONS

EXPECTED TEMPERATURES

°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49

(GM 6297-M)

Comments: This fluid shall only be used in tactical vehicles when explicitly required by the Military Lubrication Orders (LO). However, it is not intended for Arctic conditions where temperatures go below -40°F. Use lubricants under MIL-PRF-46167 for Arctic conditions.

BRAKE FLUID

MIL-PRF-46176 - Brake Fluid, Silicone, Automotive, All Weather, Operational and Preservative, Metric

DESCRIPTION

MIL-PRF-46176 is a silicone brake fluid classified as DOT 5 which is resistant to water and prevents corrosion. It also meets SAE J1705 (Low Water Tolerant Brake Fluids).

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application
MIL-PRF-46176	BFS	H-547	1-Gal 5-Gal 55-Gal	01-102-9455 01-123-3152 01-072-8379	* Brake Systems

Ambient Temperature Range Usage

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	BFS (H-547)																	

Comments:
MIL-PRF-46176 is a corrosion inhibiting brake fluid that has a higher vapor lock temperature than conventional SAE 1703 or DOT 3 brake fluids (i.e., glycol ether base brake fluid). It can be used in arctic environments and also functions as a preservative fluid in storage/prepositioning applications.

MIL-PRF-46176 is not compatible with conventional DOT 3 and DOT 4 brake fluids. DOT 5 is a silicone brake fluid similar to MIL-PRF-46176, but has slightly different viscosity properties.

TACTICAL GREASES

MIL-PRF-10924 - Grease, Automotive and Artillery
MIL-PRF-81322 - Grease, Aircraft, General Purpose, Wide Temperature Range

DESCRIPTION

MIL-PRF-10924 covers one grade of a multi-purpose biodegradable grease for lubrication and surface corrosion protection of all ground vehicles and equipment. **MIL-PRF-81322** covers a general purpose grease for use in aircraft accessories. These greases are not intended for use on machinery which comes in contact with food.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application
MIL-PRF-10924	GAA	G-403	2-1/4 oz 14-oz 1.75- lb 6.5-lb 35-lb 120-lb 370-Lb	01-197-7688 01-197-7693 01-197-7690 01-197-7689 01-197-7692 01-197-7691 01-501-7745	★ Automotive Wheel Bearing and Chassis System ★ Artillery ★ Ground Equipment ★ General Application
MIL-PRF-81322	WTR	G-395	8-oz 1-lb 5-lb 35-lb	00-181-7724 00-944-8953 00-145-0268 00-935-5851	★ Aircraft Wheel Bearings ★ Anti-friction Bearings ★ Gear Box ★ Plain Bearings

Ambient Temperature Range Usage

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	GAA (G-403)																	
	WTR (G-395)																	

Comments: MIL-PRF-10924 is lithium complex grease and bio-degradable grease. It is designed for use over a wide operating temperature and in a saltwater corrosion environment. Most of MIL-PRF-81322 greases are clay-thickened greases and they may not be fully compatible with MIL-PRF-10924 greases. Both greases can be used where bearing temperatures range from -54°C to 180°C.

GENERAL GREASES

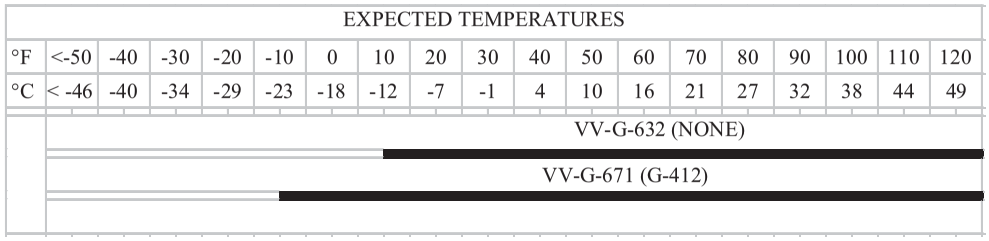
VV-G-632 - Grease, Industrial, General Purpose
VV-G-671 - Grease, Graphite

DESCRIPTION

VV-G-632 and **VV-G-671** each cover one grade of a lubricating grease intended primarily for the lubrication of machinery which is equipped with compression type grease cups. **VV-G-671** covers graphite grease and provides a higher load-carrying capacity than VV-G-632 grease.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 9150-	Application
VV-G-632	NONE	NONE	8-oz 35-lb	00-753-4649 00-273-2374	★ General Equipment and Machinery
VV-G-671	GG2	G-412	1.75-lb 6.5-lb	00-190-0918 00-190-0919	★ General Equipment and Machinery requiring a Graphite Grease

Ambient Temperature Range Usage



Comments: Neither of these greases are inhibited against oxidation or corrosion under adverse conditions. Caution is advised in using these greases in non-specified applications. Particularly, the use of graphite grease in non-specified applications should be done only after evaluating its compatibility with all involved materials. Consult Lube Order (LO) for specific guidance. VV-G-671 contains 4.5 to 5.5% graphite.

ANTIFREEZE AND TEST KIT

A-A-52624 Antifreeze, Multi Engine Type

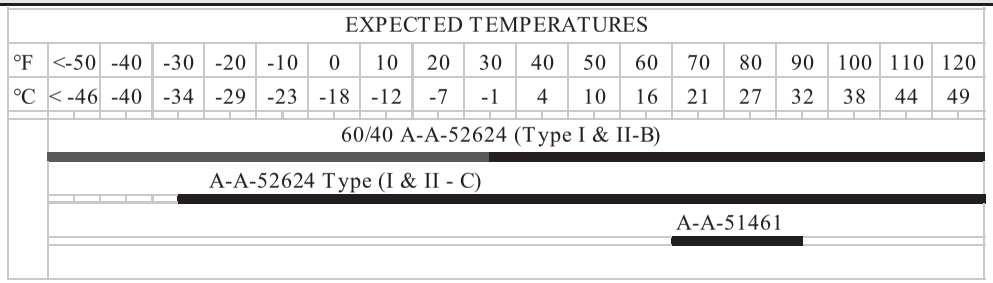
A-A-51461 Test Kit, Test Strips and Color Chart, Antifreeze, Freeze Point and Nitrite Concentration
Type I
Type II

DESCRIPTION

A-A-52624 covers a fully formulated commercial antifreeze for use in tactical/combat liquid-cooled internal Combustion engines other than aircraft. It covers two types and each type can have up to three concentrations as follows: Type I: Ethylene Glycol Based; Type II: Propylene Glycol Based.
Concentration A: 100% Glycol by volume; Concentration B: 60% Glycol by volume: Concentration C: 50% Glycol by volume. The concentrated versions (Type 1A or Type IIA) must be blended prior to using in radiator.
A-A-51461 Type II covers a test strip kit for determining both the freeze point and nitrite concentration of antifreeze.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 6850-	Application
A-A-52624 (Virgin) Type 1A	NONE	S-750	1-Gal 5-Gal CO 1-QT	01-464-9125 01-441-3221 00-664-1399	Multi Engines
(Virgin) Type IIA			55 Gal DR Box/6, 1Gal	01-383-3918 01-383-4244	Multi Engines
(Virgin) Type 1B			1 Gal 5 Gal CO 55 Gal DR	01-441-3234 01-441-3240 01-441-3248	Arctic condition
(Recycled) Type I	NONE	NONE	1-Gal 5-Gal CO 55 Gal DR	01-464-9125 01-464-9137 01-464-9152	Multi Engines
A-A-52624 Recycled Type IB	NONE		1-Gal 5-Gal CO 55-Gal DR	01-464-9266 01-464-9263 01-464-9096	Arctic condition
Recycled Type IIA	NONE		1Gal 5-Gal 55-Gal	01-383-4068 01-441-3257 01-383-3918	Multi Engines
Recycled Type IC	NONE		1-Gal 5-Gal CO 55-Gal DR	01-471-6530 01-471-6534 01-471-6521	Multi Engines
A-A-51461	NONE	NONE	Kit	Type II (See comment)	A-A-52624 coolants

Ambient Temperature Range Usage



* A mixture of 60% A-A-52642 Types I and II and 40% water will provide freeze protection down to approximately -56°F (-49°C).

Comments: Use commercial test strips that test for freeze point and nitrite concentration for both ethylene glycol and propylene glycol based coolants.

FUEL ANTI-ICING ADDITIVE

MIL-DTL-85470, Inhibitor, Icing, Fuel System, High Flash

DESCRIPTION

This product is used primarily used in turbine fuels to cope with small amounts of water contamination (entrained water), or to keep separated water from freezing. Military turbine fuels (JP-4, JP-5 and JP-8) are procured with the Fuels System Icing Inhibitor (FSII) already in the fuel. Additional FSII is not added to these fuels except under special circumstances (e.g., removal of the original FSII by water contact). FSII can also be added to commercial turbine fuels (ASTM D 1655) which do not already contain it in order for these fuels to be brought up to military standards if so authorized. FSII can also be used in diesel fuels (A-A-52557, ASTM D 975) to meet low temperature needs. FSII has no effect on the diesel fuel cloud point (wax formation tendency).

Military Specification	Military Symbol	NATO Code	Size Container	NSN	Application (All Products)
MIL-DTL-85470	FSII	S-1745	5 Gal 55 Gal	6850-01-057-6427 6850-01-089-5514	∨ Bulk and Intermediate Fuel Tanks ∨ Fuel Transport Vehicles and Fuel Cells

Ambient Temperature Range Usage

FOR FUEL STORAGE AND VEHICLE FUEL SYSTEMS

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	FSII (S-1745)																	

Addition instructions: FSII should only be added to turbine fuels by direction of the Petroleum Officer. To determine the level of FSII in turbine fuels, use ASTM D 5006.. Prescribed levels of FSII for turbine fuels are as follows: JP-4, 0.10 to 0.15 vol % ; JP-5, 0.15 to 0.20 vol % ; JP-8, 0.10 to 0.15 vol %. Addition of FSII to turbine fuels can be accomplished through the use of special injection equipment available at selected Air Force bases; otherwise use batch addition and mixing. Recommended level of FSII to diesel fuel (A-A-52557, ASTM D 975) is 0.15 vol %. Addition can be accomplished batch-wise by adding FSII on top of the fuel in a storage tank or tank truck; mixing can be accomplished by recirculating the fuel for at least 5 minutes for each 1000 gallons at a rate of at least 50 gallons per minute.

Diethylene glycol monomethyl ether (DIEGME) is hazardous to health. Before handling DIEGME, proper safety precautions should be followed. Avoid contact with skin and eyes by wearing protective gloves and goggles. Read the instructions on the container and the Materials Safety Data Sheet (MSDS) before handling the additive. Use the recommended protective equipment. In case of leaks or spills, follow the instructions in the MSDS for disposal.

FUEL BIOCIDE/STABILIZER ADDITIVE

MIL-S-53021 - Stabilizer Additive, Diesel Fuel

DESCRIPTION

MIL-S-53021 is for use in diesel fuel (A-A-52557, ASTM D 975) intended for intermediate (6-24 months) or long term (25-60 months) storage. This additive is designed to retard or prevent the formation of fuel deterioration products (i.e., gums, sludge, particulates, etc.) resulting from auto-oxidation, to reduce the potential for microbiological growth, and to provide for corrosion protection of fuel-wetted surfaces. This additive is for the treatment of fuel in (1) depot facilities where vehicles/equipment are in re-build or storage, (2) pre-positioned materiel at locations involving storage of equipment partially or fully fueled, and (3) fuel stocks intended for intermediate or long-term storage. Fuels treated with this additive shall not be used in aircraft.

Military Specification	Military Symbol	NATO Code	Size Container	NSN	Application
MIL-S-53021 Type I	NONE	NONE	5 Gal 55 Gal	6850-01-246-6544 6850-01-246-6545	* Bulk and Intermediate Fuel Storage Tanks * Fuel Transport Vehicles and Fuel Cells
Type II: Biocide Stabilizer Biocide Stabilizer	NONE	NONE	5 Gal (Use both NSNs) 55 Gal (Use both NSNs)	6840-01-173-6940 6850-01-167-4789 6840-01-041-0098 6850-01-167-4788	

Ambient Temperature Range Usage

FOR FUEL STORAGE AND VEHICLE FUEL SYSTEMS

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	MIL-S-53021																	

Comments: There are two types of stabilizer additives that have been qualified: the one package (Type I) and two package (Type II) systems. In the two-package type (i.e., Type II), the biocide is in one package or container, and the remaining additives are in the other. In most cases, both packages in Type II must be ordered and used together for maximum effectiveness. The one-package type (i.e., Type I) stabilizer additive has all of the additives, including the biocide, blended together in one container. The additives are supplied under several different brand names as listed in QPL-53021. The recommended treat rate varies with brand name and is specified in the QPL.

Mixing tips: When possible, bulk fuel supplies should be treated prior to dispensing the fuel, rather than treating fuel in individual vehicle fuel tanks. Additive(s) should not be added to an empty fuel tank and should be kept away from water. Most effective addition of the additive is to add to a partially filled tank as the additional fuel subsequently being introduced will provide agitation. Addition in a flowing stream is also effective. After fuel in a vehicle is treated, fuel filters may need to be changed due to the accumulation of dead microbiological debris.

Observe proper safety precautions when handling additives. Handle the product in open areas with good ventilation and avoid excessive inhalation of vapors. During hot weather, which increases the vapor hazard, or if handling the additives in enclosed areas, use hydrocarbon vapor-absorbing respiratory protection. Avoid contact with skin and eyes by wearing protective gloves and goggles. Read the instructions on the container and the Materials Safety Data Sheet (MSDS) before handling the additives. Use the recommended protective equipment. In case of leaks or spills, follow the instructions in the MSDS for disposal.

GROUND FUEL LUBRICITY ENHANCEMENT USING CORROSION INHIBITOR/LUBRICITY IMPROVER

MIL-PRF-25017 - Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble (Metric)

DESCRIPTION

The **MIL-PRF-25017** Corrosion Inhibitor/Lubricity Improver (CI/LI) is primarily an aircraft fuel additive mandated for use in all military aircraft turbine fuels (JP-4, JP-5, JP-8). It is supplied under several different brand names as listed in QPL-25017. The recommended dosage varies with brand name. It usually is not added at depot or by using units but is supplied in the fuel by refiners. The additive can be added to ground fuels to enhance lubricity. The QPL places brands in two categories: category 1 for ground and aircraft fuels and category 2 for aircraft fuels only. It has been determined that at the recommended dosage it is an effective fuel lubricity enhancer.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 6850-	Application	Ambient Temperature Range Usage
MIL-PRF-25017	NONE	S-1747	1 Gal 55 Gal	01-180-1074 00-292-9780	★ Bulk and Intermediate Fuel Storage Tanks ★ Fuel Transport Vehicles	FOR FUEL STORAGE AND VEHICLE FUEL SYSTEMS

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	MIL-PRF-25017																	

Additional instructions: It is recommended that addition of additives be accomplished at the wholesale level. Addition to ground fuels is best accomplished with fuel injectors that can control dosage. Second best option is to add in tank vehicles or in above ground tanks. Premix the additive with a small quantity of fuel (about 0.5 % of the quantity of fuel to be treated) and add to the tank *before* the bulk fuel. Mixing is accomplished by recirculation within the tank. Mixing time can be estimated by using the following formula: mixing time (min.) = 1/2(fuel quantity)/(recirculating pump capacity). If premix must be poured over the top of the fuel, mixing time should be doubled. If recirculation is not possible, mixing may be achieved by movement of the tank. Tank vehicle should be driven at moderate speed over rough terrain for a minimum of fifteen minutes or on a highway for 30 minutes.

In general, the MIL-PRF-25017 additive is considered mildly hazardous. The hazard varies with the formulation used, check with the Material Safety Data Sheet (MSDS) supplied with the additive. Avoid contact with skin and eyes by wearing protective gloves and goggles. In case of leaks or spills, follow the instructions in the MSDS for disposal. When recirculating fuel within a tank, be sure to ground the discharge nozzle to the tank body.

GASOLINE FUELS

ASTM D 4814 - Specification for Automotive Spark-Ignition Engine Fuel
A-A-52530 - Gasohol, Automotive, Unleaded

DESCRIPTION

These fuels are intended for ground combat, tactical and administrative vehicles and combat service support equipment as indicated in vehicle/equipment manuals. ASTM D 4814 (gasoline) for CONUS use, and NATO F-57 for OCONUS use, cover gasoline fuels suitable for use in spark-ignition (gasoline) engines and equipment designed to utilize gasoline. A-A-52530 is gasohol and contains 10% volume denatured ethanol in gasoline.

Specification	Military Symbol	NATO Code	Size Container	NSN 9130-	Application
ASTM D 4814					* Ground Gasoline Engines and Gasoline Fueled Equipment
Special grade	---	---	Bulk	00-148-7102	
Regular grade	---	---	Bulk	00-148-7103	
Midrange grade	---	---	Bulk	01-272-0983	
Premium grade	---	---	Bulk	00-148-7104	
A-A-52530		---	Bulk	01-090-1092	
Limited Grade		---	Bulk	01-090-1093	
Regular Grade		---	Bulk	01-355-2393	
Midrange Grade		---	Bulk	01-090-1094	
Premium Grade					

Temperature Range Usage

FOR FUEL STORAGE AND VEHICLE FUEL SYSTEMS

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	Gasoline, Gasohol																	

Comments: ASTM D 4814 (gasoline) allows the use of oxygenates to enhance antiknock quality and for the reduction of vehicle emissions. The use of gasoline fuels containing oxygenates designated as *reformulated* gasoline is mandated within parts of the U.S. by the Clean Air Act Amendments (CAAA) of 1990. STANAG 2845 covers NATO Code F-57 (GASOLINE, LOW LEAD, 91 RON) and NATO Code F-67 (GASOLINE, UNLEADED, 95 RON) as alternate fuels to ASTM D4814 for OCONUS only. F-57 can only be used with designated vehicles not equipped with catalytic converters.

DIESEL AND TURBINE FUELS

ASTM D 975 - Standard Specification for Diesel Fuel Oils
MIL-DTL-5624 - Turbine Fuel, Aviation, Grades JP-4, JP-5
MIL-DTL-83133* - Turbine Fuel, Aviation, Kerosene Type, NATO F-34 (JP-8) NATO F-35, and JP-8+100
ASTM D 1655 - Standard Specification for Aviation Turbine Fuels

DESCRIPTION

AR 70-12 provides the policies and responsibilities for use of liquid hydrocarbon fuels and identifies the primary, alternate, and emergency fuels for use in Army materiel. Diesel and turbine fuels are identified in AR 70-12 and are intended for use in ground combat, tactical and administrative vehicles and equipment as indicated in vehicle/equipment manuals. ASTM D 975 covers commercial diesel fuels designated Grade No.1-D (S15, S500 and S5000), Grade No. 2-D (S15, S500 and S5000) and Grade No. 4-D. It is recommended that the low sulfur (S15) fuels be used. Off-road, non-taxed, fuels will contain a red dye. DF-2,(F-54), is high-sulfur fuel for use outside the U.S., territories and possessions. MIL DTL-83133 (JP 8), MIL DTL 5624 (JP-5), and ASTM D 1655 (JET A-1) cover kerosene base turbine fuels suitable for use in all compression-ignition (diesel) and turbine engines, for OCONUS and CONUS use.

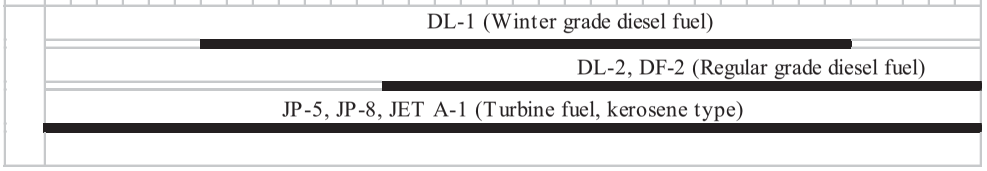
Specification	Military Symbol	NATO Code	Size Container	NSN	Application
ASTM D 975	LS-1 LS-2	--- ---	Bulk Bulk	9140- 01-398-1130 01-398-0697	★ Ground Diesel and Turbine Engines
MIL-DTL-5624	JP-5	F-44	Bulk	9130- 00-273-2379	★ Turbine and Diesel Engines
MIL-DTL-83133	JP-8	F-34	Bulk	01-031-5816	
ASTM D 1655	JET A-1^ ^ See comments	F-35	Bulk	00-753-5026	

Temperature Range Usage

FOR ENGINES AND OTHER FUEL CONSUMING EQUIPMENT

EXPECTED TEMPERATURES

°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49



Note: Temperature usage limits for diesel fuels are based on average or specification values of flash and cloud points. Cloud point is adjusted for different geographical/climatic areas.

Comments: **MIL-DTL-83133** (JP-8) will be used as the primary fuel in all theaters in accordance with the Single Fuel on the Battlefield policy following DOD Directive 4140.25 and AR 70-12. JET A-1, even though equivalent to JP-8, does not contain the additives required under JP-8. The additives required in JP-8 enhance the lubricity properties of the fuel preventing fuel pump wear in rotary-type fuel distribution injection pumps. However, this is not true for Jet A-1 and its use could result in fuel pump wear problems unless the equipment has been retrofitted with arctic equipment. **For this reason, JET A-1 is not recommended for use in ground diesel engine equipment unless the fuel is additized to meet the recommended concentration of the corrosion inhibitor/lubricity improver (CI/LI) additive in accordance with QPL-25017.**

***JP-8+100 is not approved for use in Army systems.**

B20 BIODIESEL FUEL

A-A-59693 - Diesel Fuel, Biodiesel Blend B20

DESCRIPTION

B20, a fuel blend composed of 20 volume percent biodiesel conforming to ASTM D 6751 and 80 volume percent diesel conforming to ASTM D 975, B20 has been designated as an alternative fuel by the Department of Energy and the Environmental Protection Agency. Biodiesel is defined in ASTM D 6751 as "a fuel composed of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100

Biodiesel Specifications according to ASTM D 7467 for B20 with maximum sulfur content of 15ppm:

Acid Number (mg KOH/g, max)	0.3	Aromaticity (%vol, max)	35
Viscosity (mm^2/s at 40°C)	1.9-4.1	Water and Sediment (%vol, max)	0.05
Flash Point (°C, min)	52	Copper Corrosion	No.3
Cloud Point (°C, max)	*E*	Biodiesel Content (%, V/V)	6.-20.
Distillation Temperature (°C, max)	343	Oxidation Stability (Hours, minutes)	6
Ramsbottom Carbon Residue	0.35	Lubricity at 60°C (µm, max)	520'
Cetane Number (min)	40	Ash Content (mass %, max)	0.01

Specification	Military Symbol	NATO Code	Size Container	NSN 9140-	Application
A-A-59693	---	---	Bulk	01-470-4520	★ Ground Diesel Engines

Temperature Range Usage

FOR ENGINES AND OTHER FUEL CONSUMING EQUIPMENT

EXPECTED TEMPERATURES

°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49

B20

Note: Temperature usage limits for diesel fuels are based on cloud points using the minimum tenth percentile values as guidelines. Cloud point is adjusted for different geographical/climatic areas to accommodate the seasonal changes. The temperature usage limits of B20 would be based upon the same minimum tenth percentile values that are given in A-A-59693 or ASTM D 975.

Comments: Although A-A-59693 (B20) can be used in lieu of ASTM D975 (diesel fuel) in conventional diesel engines without any hardware changes necessary, it is not approved for use in combat/tactical equipment. The maximum period for storing B20 is 6 months (and the initial acid number must not exceed 0.2 mg KOH/g sample). There is only one grade of B20. The Energy Conservation Reauthorization Act (ECRA) of 1998, an amendment to the Energy Policy Act (EPACT) of 1992, permits Federal Agencies to use biodiesel to meet a portion of their alternative fueled vehicle (AFV) acquisition requirements. Section 312 (Biodiesel Fuel Use Credits) of ECRA permits Federal Agencies to meet up to 50% of their AFV acquisition requirements by using biodiesel fuel. Under the new provisions, each 450 gallons of pure biodiesel (B100) used in a vehicle weighing over 8500 pounds counts as one full AFV credit. Since biodiesel is typically used as B20, using 2250 gallons of B20 equates to one AFV credit under EPACT.

MIL-PRF-680, DEGREASING SOLVENTS

MIL-PRF-680 - Degreasing Solvent

DESCRIPTION

MIL-PRF-680 is a petroleum distillate degreasing solvent used for degreasing of machine parts in equipment maintenance. It is also known as "mineral spirits" or as "petroleum spirits." There are four types.

Type I is an odorless Stoddard Solvent. It is intended to be used as a relatively safe dry cleaning solvent. When used indoors, adequate ventilation must be available to avoid excessive accumulation of vapors.

Type II is an odorless high flash point (140°F) solvent. It should be used where a higher flash point solvent is required. When used indoors, adequate ventilation must be available to avoid excessive accumulation of vapors.

Type III is an odorless 200°F flash point solvent. It is intended for used where a very high flash point is required and where conditions require that an odorless product is needed. It has a slower evaporation rate than Types I and II, and IV.

Type IV is a citrus based hydrocarbon solvent. The performance of this solvent is very similar to Type II solvent.

Type V is a low VOC solvent. The performance of this solvent is very similar to Type II solvent.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 6850-	Application
MIL-PRF-680 Type I	SD-1	S-752	1 Gallon 5 Gallon 55 Gallon	01-474-2302 01-474-2309 01-474-2313	★ Degreasing & for metal parts where flammability is not an issue.
MIL-PRF-680 Type II	SD-2	S-753	1 Gallon 5 Gallon 55 Gallon	01-474-2319 01-474-2317 01-474-2316	★ General degreasing for metal parts.
MIL-PRF-680 Type III	SD-3	S-760	1 Gallon 55 Gallon	01-474-2318 01-474-2320 01-474-2321	★ Degreasing for metal parts in confined areas or where high flash point is required.
MIL-PRF-680 Type IV	SD-4		Pint 1 Gal 5 Gal 55 Gal DR	01-472-2723 01-472-2722 01-472-2717 01-472-2719	★ General degreasing solvent for metal parts.
MIL-PRF-680 Type V	SD-5		1 Gal 5 Gal %% Gal	01-584-7237 01-584-7241 01-584-7227	★ Low VOC solvent and general degreasing for metal parts

Ambient Temperature Range Usage

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	SD-1 (S-752)																	
	SD-2 (S-753)																	
	SD-3 (S-760)																	
	SD-4																	
	SD-5																	

Comments: MIL-PRF-680 is an environmentally complaint solvent and low toxic solvent. Typically, Type V is EPA VOC exempt solvent. However Type I is a flammable solvent due to its low flash point. All should be disposed of as a regulated hazardous waste or can be recycled.

CLEANING COMPOUND

MIL-PRF-372 - Cleaning Compound, Solvent (For BORE of Small Arms and Automatic Aircraft Weapons)

DESCRIPTION

MIL-PRF-372 is a highly penetrating, mobile liquid intended for use in cleaning the bores of small arms and automatic aircraft weapons. The material provides a temporary rust-resistant coating for the cleaned surface.

Military Specification	Military Symbol	NATO Code	Size Container	NSN 6850-	Application
MIL-PRF-372	RBC	--	2-Oz. 8-Oz. 1-Quart 1-Gal	00-224-6656 00-224-6657 00-224-6658 00-224-6663	★ Cleaning compound and temporary preservative

Ambient Temperature Range Usage

EXPECTED TEMPERATURES																		
°F	<-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
°C	< -46	-40	-34	-29	-23	-18	-12	-7	-1	4	10	16	21	27	32	38	44	49
	RBC																	

Comments: **MIL-PRF-372** provides temporary preservation of metal and removes primer salts.

LUBRICATING OIL

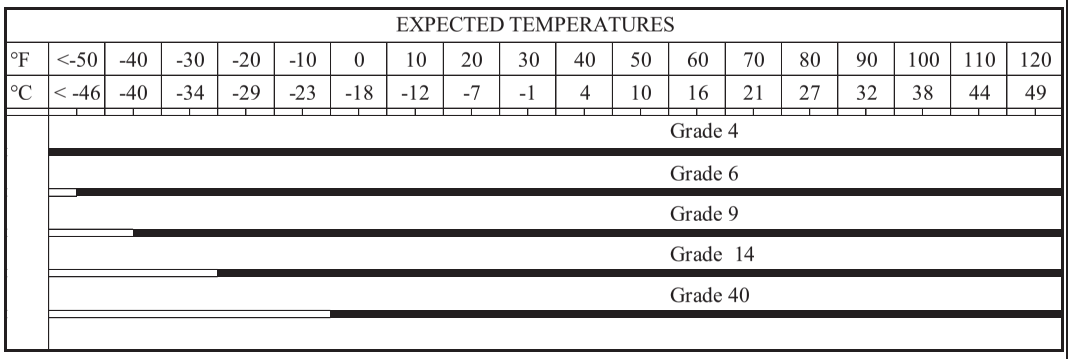
MIL-DTL-53131 – Lubricating Oil, Precision Rolling Element Bearing, Polyalphaolefin Based

DESCRIPTION

MIL-DTL-53131 lubricating oils are intended for use in the precision bearings of inertial guidance gyros, accelerometers and other suitable instrument bearing applications.

Military Specification	Military Symbol (Grade)	NATO Code	Size Container	NSN 9150-	Application
MIL-DTL-53131	Grade 4	NONE	1-Gal 5-Gal 55-Gal	01-498-0268 01-498-0315 01-498-0014	Precision Bearing Application
	Grade 6	NONE	1-Gal 5-Gal 55-Gal	01-498-1483 01-498-1468 01-498-1481	
	Grade 9	NONE	1-Gal 5-Gal 55-Gal	In process	
	Grade 14	NONE	1-Gal 5-Gal 55-Gal	01-498-1518 01-498-1492 01-498-1487	
	Grade 40	NONE	1-Gal 5-Gal 55-Gal	01-498-1522 01-498-1523 01-498-1524	

Ambient Temperature Range Usage



Comments: MIL-DTL-53131 covers five different grades of synthetic oils according to their viscosity properties. This specification allows the users the option of using specified oils with the optimum viscosity and operating temperatures for the applications.