

METRIC

MIL-L-2104E  
AMENDMENT 1  
26 May 1989

MILITARY SPECIFICATION

LUBRICATING OIL, INTERNAL COMBUSTION ENGINE, TACTICAL SERVICE

This amendment forms a part of MIL-L-2104D, dated 1 August 1988, and is approved for use by all Departments and Agencies of the Department of Defense.

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2.2, under AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), D 2896, delete the word "Total" from the title and add:

- "D 4624 - Measuring Apparent Viscosity by Capillary Viscometer at High Temperature and High-Shear Rates.
- "D 4741 - Measuring Viscosity at High Temperature and High Shear Rate by Tapered-Plug Viscometer.
- "D 4927 - Elemental Analysis of Lubricant and Additive Components - Barium, Calcium, Phosphorus, Sulfur, and Zinc by Wavelength Spectroscopy."

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2.2, add the following at the end of the section:

DEUTSCHES INSTITUT FUR NORMUNG (DIN)

DIN 51581 - Determination of evaporation loss of lubricating oils.

(Application for copies should be addressed to Deutsches Institut fur Normung e.V., Burggratenstr 4-10, D-1000 Berlin 30, Germany T 26011.)

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Table II, after "High temperature/high shear viscosity" insert an "X" in the columns under 10W, 30 and 40 grades.

Under "Viscosity index, (min)", grade 40, delete the "X" and substitute "80".

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4.5.2, add the following tests:

"Evaporation loss  
High temperature/high shear".

AMSC N/A

FSC 9150

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Table III, delete in its entirety and substitute the following:

TABLE III. Test methods.

Test	Test method			
	FED-STD-791	ASTM	SAE	DIN
Viscosity, kinematic <sup>1/</sup> Viscosity, apparent <sup>1/</sup> High temperature/high shear		D 445	J300	
Viscosity index		D 4683, D 4624, D 4741		
Pour point		D 2270		
Stable pour point		D 97		
Borderline pumping	203	D 4684		
Flash point		D 92		
Evaporative loss <sup>2/</sup>		D 2887		51581
Gravity, API		D 287		
Carbon residue		D 524		
Color		D 1500		
Total acid number		D 664		
Base number		D 2896		
Phosphorus		D 1091, D 4047 <sup>3/</sup>		
Chlorine <sup>4/</sup>		D 808, D 1317 <sup>3/</sup>		
Sulfur <sup>4/</sup>		D 129, D 1552, D 2622, D 4294		
Nitrogen		D 3228		
Saponification number		D 94		
Sulfated residue		D 874		
Boiling range distribution		D 2887 <sup>5/</sup> , D 4927		
Metallic components	5601	D 4628 <sup>5/</sup> , D 4927		
Foaming		D 892		
Stability & compatibility	3470 <sup>6/</sup>			
Moisture-corrosion characteristics		Sequence IID <sup>7/</sup>		
Oxidation & wear characteristics		Sequence III <sup>7/</sup>		
Low temperature deposits & wear		Sequence VE <sup>7/</sup>		
Bearing corrosion & shear stability		Labeco L-38 <sup>8/</sup>		
Ring-sticking, wear, & accumulations of deposits				
Four-stroke cycle diesel engine <sup>8/</sup>		Caterpillar 1G2		
Two-stroke cycle diesel engine	355			
Friction retention characteristics & wear:				
Slip time & wear		Allison C-3 <sup>9/</sup>		
Stopping time & wear		D 4736		
Seal compatibility		Allison C-3 <sup>10/</sup>		

1/ Obtain the apparent viscosity using the method of test set forth by appendix A of SAE J300.

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- 2/ The DIN 51581 is the preferred method.
- 3/ ASTM D 808 is the preferred method.
- 4/ ASTM D 1552 is the preferred method. ASTM D 4294 is only for use with base stock.
- 5/ Other spectrochemical analysis methods as approved by the qualifying activity (see 6.4) may be used as alternates.
- 6/ See 4.6.1 for clarifying instructions.
- 7/ In accordance with ASTM STP 315H.
- 8/ In accordance with STP 509A.
- 9/ Use procedure described in item 9, Allison Transmission Division (ATD) C-3 specification.
- 10/ Use procedure described in item 6, Allison Transmission Division (ATD) C-3 specification.

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Add the following at the top of the page:

"4.5 Shear stability. Determine the shear stability of grade 15W-40 oil by the following method:"

Custodians:

Army - ME  
Navy - SH  
Air Force - 68

Preparing activity:

Army - ME

Project 9150-1045

Review activities:

Army - AR, SM  
Navy - AS, MC, SA, YD  
Air Force - 11  
DLA - GS

User activities:

Army - AT, MI  
Navy - OS