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		D 445		
Viscosity, apparent[1/]			J300	
High temperature/high shear		D 4683, D 4624, D 4741		
Viscosity index		D 2270		
Pour point		D 97		
Stable pour point	203			
Borderline pumping		D 4684		
Flash point		D 92		
Evaporative loss[2/]		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		
Chlorine		D 808, D 1317[3/]		
Sulfur[4/]		D 129, D 1552, D 2622, D 4294		
Nitrogen		D 3228		
Saponification number		D 94		
Sulfated residue		D 874		
Boiling range distribution		D 2887		
Metallic components	5601	D 4628[5/], D 4927		
Foaming		D 892		
Stability & compatibility	3470[6/]			
Moisture-corrosion characteristics		Sequence IID[7/]		
Oxidation & wear characteristics		Sequence IIIE[7/]		
Low temperature deposits & wear		Sequence VE[7/]		
Bearing corrosion & shear stability		Labeco L-38[8/]		
Ring-sticking, wear, & accumulations of deposits				
Four-stroke cycle diesel engine[8/]		Caterpillar 1G2		
Two-stroke cycle diesel engine	355			
Friction retention characteristics & wear:				
Slip time & wear		Allison C-3[9/]		
Stopping time & wear		D 4736		
Seal compatibility		Allison C-3[10/]		

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

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