



LUBRICANT, GENERATION III, FUEL EFFICIENT HYPOID GEAR LUBE

WSS-M2C942-A

1. SCOPE

The material defined by this specification is a factory fill high efficiency driveline hypoid gear lubricant composed of base fluids, viscosity index improver and additives.

2. APPLICATION

This specification is released for use as a hypoid gear lubricant for driveline components such as rear and front axles and with both conventional and limited slip differentials (requires friction modifier additive). It is specifically designed for high efficiency lubrication and excellent thermal oxidation stability.

3. REQUIREMENTS

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements for Production Materials (WSS-M99P1111-A)

3.2 INFRARED SPECTROSCOPY

(FTIR Trace)

Match Master

3.3 COLOR

(Visual reference)

Clear, Bright and Green
(blue dye)

3.4 VISCOSITY

3.4.1 New fluid kinematic viscosity at 100 °C
(ISO 3104/ASTM D445)

11-13.0 mm²/s

3.4.2 After 20 hrs KRL, kinematic minimum viscosity at 100 °C
(CEC L-45-T-93)

11 mm²/s,

3.4.3 Brookfield viscosity at -40 °C,
(ASTM D2983)

< 80,000 mPa.s

3.4.4 Viscosity Index
(ASTM D2270)

165 min

3.4.5 Specific Gravity
(ASTM D4052 / D1298)

0.85 - 0.90

3.5 ELEMENTAL

3.5.1 Sulfur
(ASTM D4951 / D4927 / D1552)

1.63 to 2.21 wt%

3.5.2 Phosphorus
(ASTM D4951/D4927)

0.12 to 0.15 wt%

Date	Action	Revisions	Rev. 2
2014 10 07	Revised	See Summary of Revisions	C. Ved, NA
2012 05 03	Revised	See Summary of Revisions	C. Ved, FNA
2008 06 05	Activated		C. Ved, FNA, N. Chambers, FNA



3.5.3 Boron 0.01 to 0.02 wt%
(ASTM D4951)

3.5.4 Nitrogen 0.07 to 0.19 wt%
(ASTM D4629 / D3228 / D5291)

3.6 ANTI-FOAMING PROPERTIES
(ASTM D892)

Foam Tendency/Foam Stability at end of 5 min blowing period / 10 min settling period.

Sequence 1	50 - 0 ml
Sequence 2	50 - 0 ml
Sequence 3	50 - 0 ml

3.7 MOISTURE 0.1% max
(ASTM D6304 / D4928 / D7546)

3.8 POUR POINT -40 °C max
(ISO 3016/ASTM D97)

3.9 NON-CHANNELING TEMPERATURE -45 °C max
(FTM # 791C Method 3456.2)

3.10 COPPER STRIP 2A max
(ISO 2160/ASTM D130, 3 h at 121 °C,
No water added)

3.11 FLASH POINT (COC) 190 °C min
(ASTM D92)

3.12 AUTO-IGNITION POINT 300 °C min
(ASTM E659, cool flame)

3.13 EFFECT ON FORD MOTOR COMPANY DRIVELINE REFERENCE SEAL COMPOUNDS
(Immersion Testing per ASTM D471 for 1000 hrs at 125 °C and 150 °C
Materials: Federal Mogul: V41, V56, V72, and V77)

Report- Volume (%), Durometer (pts), Tensile and Elongation change at 50, 72, 200, 500 and 1000 hrs.

3.14 ODOR
(Jury evaluation) Equal to or better than
WSL-M2C192-A

The fluid manufactured to this specification shall be found acceptable for odor as evaluated by the Ford Transmission & Driveline Engineering team.

3.15 WEAR

3.15.1 Bearing Durability Dynamometer
(Test F150 8.8", 3.73:1 axle, ASTM D6121 for wear, rippling, ridging, scoring – performance
to be equal to or better than WSL-M2C192-A)

Evaluation of gear, bearings and lube.
Report amount of wear (iron content in ppm) vs. test hours.



3.15.2 44 hr Hypoid Gear Wear Test,
(Full scale Axle Dynamometer test)

No discernable gear pattern wear as judged by Axle Core Hypoid gear PD Engineering group. (See Driveline Lubrication Department for procedure and specifics)

3.15.3 Axle Efficiency Testing, per Ford 21 stage axle efficiency test
(8.8" & 9.75 axles)

Performance better than WSL-M2C192-A. Approval done by Ford based on weighted average for low vs high torques for various applications.

3.15.4 Fleet Test (rear drive vehicle) – 150,000 miles, sample size of 3 minimum
Evaluation of gear, bearings and lube (performance equal to or better than
WSL-M2C192-A)

Iron content	< 1000 ppm
Total Acid Number	< 3.5 TAN
Viscosity at 100 °C	< 17 mm ² /s

3.16 QUALIFICATION TESTS

In addition to initial acceptance tests, these are to be conducted by all new suppliers prior to source approval.

3.16.1 Limited Slip Differential Split Mu Test (2 Wheel Rear Drive)
(Ford CTEP 05.02-R-302)

Requirement: 40 cycles (2400 split mu's) with no chatter, moan, shudder using current friction materials (Raybestos 7901-4 and FCC 3710)

3.16.2 Full Size Low Velocity Friction Apparatus (FSLVFA) Test
(90 °C & 120 °C, 7070N, 17 hrs)

No chatter / No negative Slope (equal or better than WSL-M2C192-A)

Friction materials: Raybestos 7901-4, FCC 3710 and Carbon Fiber (Thermoset)

3.16.3 Thermal Oxidation Stability (L-60-1, 50 hours)
(ASTM D5704)

Viscosity Rise	25% max.
Pentane Insolubles	1.0% max.
Toluene Insolubles	1.0% max.
Carbon Varnish	8.5% Rating min
Sludge	9.4 Rating min