



Material Name

Specification Number

FLUID, POWER STEERING

WSA-M2C195-A

1. SCOPE

The materials defined by this specification are power steering fluids composed of base fluids and additives.

2. APPLICATION

This specification was released originally for fluid used in the power steering system.

3. REQUIREMENTS

3.1 QUALITY SYSTEM REQUIREMENTS

Material suppliers and part producers must conform to Quality System Requirements, QS-9000. Material specification requirements are to be used for initial qualification of materials. A Control Plan for ongoing production verification is required. This plan must be reviewed and approved by the relevant Ford Materials activity and/or Ford Supplier Technical Assistance (STA) prior to production parts submission. Appropriate statistical tools must be used to analyze process/product data and assure consistent processing of the materials.

Part producers using this material in their products, must use Ford approved materials and must conform to a process control plan which has been approved by STA and/or the relevant Materials Activity.

3.2 INFRARED SPECTROPHOTOMETRY AND/OR THERMAL ANALYSIS

Ford Motor Company, at its option, may conduct infrared and/or thermal analysis of material/parts supplied to this specification. The IR spectra and thermograms established for initial approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. All samples shall produce IR spectra and thermograms that correspond to the reference standard when tested under the same conditions.

3.3 COLOR

(ISO 2049/ASTM D 1500 or DIN 51-578)

Dyed red

Color Rating

6.0 to 8.0

Use the weight percent of Morton Chemical Company's Automate Red B (or equivalent) necessary to produce a distinct red hue when one drop of fluid is placed on white blotter paper.

Date	Action	Changes	
1997 11 11	Revised	Revised para 2 and 3.9; Updated	K. Gribble
1996 03 15	Revised	Updated and Revised para 3.4.2	A. Novakovic
1994 04 29	NC00E10244447028	Released	G.R. Hogle K.A. Gribble



3.4 VISCOSITY

3.4.1	At 100 °C, New Fluid, min (ISO 3104/ASTM D 445)	6.8 mm ² /s
3.4.2	At 100 °C, after 40 cycles through FISST (ASTM D 5275), min (ISO 3104, ASTM D 445)	5.3 mm ² /s
3.4.3	At - 40 °C, New Fluid, max (ASTM D 2983)	20,000 mPa.s

3.5 FLASH POINT, min
(ISO 2592/ASTM D 92) 177 °C

3.6 COPPER STRIP, max 1b
(ISO 2160, ASTM D 130, 3 h at 100 °C, with 1 %
distilled water added)

3.7 ANTI FOAMING PROPERTIES (ASTM D 892) Foam Tendency at
end of 5 minute blowing period Foam Stability at
end of 1 minute settling period

Sequence 1, max	100 mL	0 mL
Sequence 2, max	100 mL	0 mL
Sequence 3, max	100 mL	0 mL
Sequence 4, max	100 mL	0 mL

(Sequence 4 to consist of 150 +/- 3 °C, 200 mL/minute air)

3.8 NON-CORROSION AND NON-RUSTING PROPERTIES (ASTM D 665, Procedure A, 24 h) No visible rust

3.9 EFFECT ON FORD MOTOR COMPANY REFERENCE SEAL COMPOUNDS

3.9.1 ATRR-100 (RDR-008) Buna N*, after aging 168 h at 150 +/- 3 °C per ASTM D 471, para 6.1, with aluminum block, must be within the limits below:

. Volume Change from Original	+ 1 to + 6 %
. Hardness, Durometer A - Change from Original	+/- 5

3.9.2 ATRR-600 CSM, after aging 168 h at 150 +/- 3 °C per ASTM D 471, para 6.1, with aluminum block, must be within the limits below:

. Volume Change from Original	+ 30 +/- 10 %
. Hardness, Durometer A- Change from Original	- 20 +/- 10



3.9.3 ATRR-700 HNBR, after aging 168 h at 150 +/- 3 °C per ASTM D 471, para 6.1, with aluminum block, must be within the limits below:

- . Volume Change from Original + 30 +/- 10 %
- . Hardness, Durometer A - Change from Original +/- 5

3.10 ODOR

Fluids shall produce no objectionable odor under any test performed herein, particularly the oxidation test (para 3.15), and the copper strip test (para 3.6), at 30 and 60 minute intervals during the 3 h test; thermal stability test excepted.

3.11 VANE PUMP WEAR TEST, weight loss, max 10 mg
(ASTM D 2882 at 80 +/- 3 °C, 6.9 MPa)

3.12 TOXICITY

Shall be non-toxic and shall not cause skin rash or irritation (dermatitis) to exposed handlers in normal production and servicing operations.

3.13 FOUR BALL WEAR TEST, max diameter of scar 0.450 mm
(ASTM D 4172, 2 h at 93 +/- 3 °C)

3.14 MOISTURE, max 0.05 %
(ISO 3733/ASTM D 95)

3.15 OXIDATION TEST
(FLTM BJ 110-04, 250 h)

Pentane Insolubles, max 1.0 %

Differential Infrared Carbonyl Absorbance, max 40.0/cm

Total Acid Number Change, max 4.0

Viscosity Change at 40 °C, max 40 %

3.16 EFFECT ON FORD MOTOR COMPANY POWER STEERING HOSE

Production level power steering hose shall meet the specified impulse test requirements when WSA-M2C195-A is used.

Note: See para 3.7.7 for high pressure hose per ESA-M2D17-B, para 3.9.10 for low pressure hose per ESA-M2D122-B1/B3, para 3.7.4 for high pressure hose per ESL-M2D281-A, and para 3.6.6 for high pressure hose per WSA-M96D36-A1.



3.17 COMPATIBILITY

No observed separation in mixtures of ESP-M2C166-H transmission fluid with WSA-M2C195-A power steering fluid when equal volumes of each are heated together to 150 +/- 3 °C for 1 h and then cooled to - 30 +/- 1 °C.

3.18 SUPPLIER'S RESPONSIBILITY

All materials supplied to this specification must be equivalent in all characteristics to the material upon which approval was originally granted.

Prior to making any change in the properties, composition, construction, color, processing or labeling of the material originally approved under this specification, whether or not such changes affect the material's ability to meet the specification requirements, the Supplier shall notify Purchasing, Toxicology and the affected Materials Engineering activity of the proposed changes and obtain the written approval of the Materials Engineering activity. Test data, test samples and a new code identification are to be submitted with the request.

Substance restrictions imposed by law, regulations or Ford, apply to the materials addressed by this document. The restrictions are defined in Engineering Materials Specification WSS-M99P9999-A1.

4. APPROVAL OF MATERIALS

Materials defined by this specification must have prior approval by the responsible Materials Engineering activity. Suppliers desiring approval of their materials shall first obtain an expression of interest from the affected Purchasing, Design and Materials Engineering activity. Upon request, the Supplier shall submit to the affected Materials Engineering activity a completed copy of their laboratory test reports, signed by a qualified and authorized representative of the test facility, demonstrating full compliance with all the requirements of this specification (test results, not nominal values), the material designation and code number, and test specimens for Ford evaluation. Ford's engineering approval of a material will be based on its performance to this specification and on an assessment of suitability for intended processes and/or applications. Upon approval, the material will be added to the Engineering Material Approved Source List.