

The following procedures cover DEXRON® III

Color

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the color of the procedure fluid.

Field service simulated

This procedure simulates uniform identification by sight.

Procedure fixture

Performance of this procedure requires a sample container and a colorimeter consisting of light source, glass color standards, sample container housing with cover, and viewing piece.

Procedure parameters

Using a standard light source, the liquid procedure fluid is placed in the procedure container and compared with colored glass disks ranging in value from 0.5 to 8.0.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The color of the procedure fluid must fall between 6.0 and 8.0.

Elemental Analysis

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the amount of additive metals present in the fluid in the following manners:

- (A) Ba, B, Ca, Mg, P, Si, Na, Zn, Cu, Al, Fe, Pb, ASTM D 4951
- (B) Cl, ASTM D 808
- (C) N, ASTM D 3228
- (D) S, ASTM D 129 or D 4951

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture and procedure parameters

Procedure fixture and parameters are as required by ASTM procedure.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

There is no pass/fail criteria requirement – for information only.

Infrared Spectrum

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the infrared spectrum by ASTM Designation E 168.

Field service simulated

This procedure simulates the satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture and procedure parameters

Procedure fixture and parameters are as required by ASTM E 168.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

There is no pass/fail criteria requirement – for information only.

Miscibility

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine whether the procedure fluid is miscible with automatic transmission fluids.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires sample jars, ASTM cloud and pour point thermometers, refrigeration apparatus, metal sample jar holder, and hot oil bath.

Procedure parameters

Using three sample jars filled with a 50% mixture of the procedure fluid and reference fluids, one sample jar is filled with procedure fluid only. A series of cooling and heating is performed with observations at certain temperatures to determine pour point, separation, and color changes.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

No separation or color change at the end of procedure.

Viscosity

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine viscosity of procedure fluid at 40°C and 100°C by ASTM designation D 445.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires glass capillary-type viscometers, glass tube holders, viscometer thermostat and bath, temperature measuring and timing devices.

Procedure parameters

Charge glass capillary viscometer with procedure fluid. Place in bath and allow temperature to stabilize (100°C).

Measure the time for the procedure fluid to drain from the first timing mark to the second. Calculate kinematic viscosity using time and tube factor.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

There is no pass/fail criteria requirement – for information only.

Flash Point

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine flash point by ASTM designation D 92.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires a procedure cup, heating plate, procedure flame applicator, heater, shield, and thermometer.

Procedure parameters

Fill cup with proper amount of fluid. Heat fluid and, when approaching anticipated flash point, pass procedure flame over cup. Flash point is that temperature when the procedure fluid first flashes.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The pass/fail criterion is 170°C minimum.

Fire Point

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine fire point by ASTM designation D 92.

Field service simulated

This procedure simulates satisfactory performance in normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires a procedure cup, heating plate, procedure flame applicator, heater, shield and thermometer.

Procedure parameters

Fill cup with proper amount of procedure fluid. Heat fluid and, when approaching anticipated fire point, pass procedure flame over cup. Fire point is that temperature when the procedure fluid will sustain a flame for 5 seconds.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The pass/fail criterion is 185°C minimum.

Low-Temperature Fluidity

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine actual viscosity at -10, -20, -30, and -40°C of the new fluid and the used fluid from Oxidation and Cycling procedures.

Field service simulated

This procedure simulates satisfactory performance in normally functioning transmissions under service conditions.

Procedure fixture

Performance of this procedure requires a Brookfield viscometer (Model LVT), Brookfield viscometer stand, No. 4 spindle, procedure tube for fluids, cell rack and turntable, refrigerated cold box, and temperature readouts.

Procedure parameters

Place procedure fluid in oven at 50°C for half an hour, then remove and let stand at room temperature for half an hour. Put fluids in cold box and stabilize for 16 hours. Remove and immediately place in Brookfield viscometer. Attach spindle and run viscosity procedure at selected temperatures.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- Report -10°C viscosity, no requirement
- 1,500 cP maximum at -20°C
- 5,000 cP maximum at -30°C
- 20,000 cP maximum at -40°C
- 2,000 cP maximum at -20°C for final drain from oxidation procedure
- 2,000 cP maximum at -20°C for final drain from cycling procedure

Copper Strip Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine copper strip corrosion by ASTM designation D 130.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires a 125 ml bottle, heating oven or bath, and metal specimen conforming to ASTM D 130.

Procedure parameters

Place copper strip in bottle and cover with procedure fluid. Heat at 150°C for 3 hours.

Procedure parts evaluated

The copper strip is evaluated.

Pass/fail criteria

The pass/fail criterion is 1b maximum.

Noncorrosion and Nonrusting

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine corrosion and rusting by ASTM designation D 665.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

This procedure requires an oil bath, 400 ml beaker, beaker cover, stirrer, and grinding and polishing equipment.

Procedure parameters

Polish specimens as per procedure. Fill beaker with 300 ml of procedure fluid and 20 ml of distilled water. Insert procedure specimen and spin at 1000 rpm for 24 hours. Remove and rate.

Procedure parts evaluated

The procedure specimens (pins) are evaluated.

Pass/fail criteria

The pass/fail criterion requires no rust on procedure pins.

Rust Protection

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine rusting by ASTM designation D 1748.

Field service simulated

The procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires a humidity cabinet, air circulating supply, specimen holders, and temperature controls and readouts.

Procedure parameters

Prepare procedure panels and heat procedure oil to 23.3°C. Dip procedure panel in procedure fluid for 10 seconds. Place panel in humidity cabinet for 50 hours. Cabinet temperature is 40°C. Remove at 50 hours and rate.

Procedure parts evaluated

The procedure specimens (panels) are evaluated.

Pass/fail criteria

The pass/fail criterion requires no rust or corrosion on procedure panels.

Vane Pump Wear Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the fluid anti-wear characteristics by ASTM designation D 2882 (modified).

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires an electric motor-driven Vickers 104-C pump mounted on a stand capable of controlling speed, temperatures, and pressures.

Procedure parameters

The fluid is tested for 100 hours at 1000 psi and 175°F.

Procedure parts evaluated

The weight loss to ring and vanes, any unusual wear, scuffing, deposits, and deterioration to seals are evaluated.

Pass/fail criteria

Total weight loss should be 15 mg maximum.

Foam Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine anti-foaming characteristics in General Motors foam procedureer.

Field service simulated

Performance of this procedure requires satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires a pump, circulating system, heater, and agitating device.

Procedure parameters

Fill apparatus with procedure fluid. Turn on agitator and heater, regulating pressure at 275 kPa. Make foam observations at 95°C and 135°C.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- No foam at 95°C or at 135°C
- Maximum foam height 5 mm
- Maximum break time 15 seconds

Fluid Effect on Seals – Comp. A (Total Immersion Procedure)

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the procedure fluid's effect on seal elastomers.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires ASTM D 471 equipment, oil bath, procedure tubes, reflux condensers, balance, three beakers, wetting agent, ASTM D 676 equipment, durometer, reference fluids, and seal material (polyacrylate) Compound A.

Procedure parameters

Determine volume and durometer reading of seal material. Immerse seal material in 100 ml of procedure fluid. Heat to 150°C for 70 hours. Determine volume and durometer change.

Procedure parts evaluated

The seal material is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- +5 to +12% Nominal Volume Change
- +1 to -8 Pts. Nominal Hardness Change

Fluid Effect on Seals – Comp. B (Total Immersion Procedure)

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the procedure fluid's effect on seal elastomers.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires ASTM D 471 equipment, oil bath, procedure tubes, reflux condensers, balance, three beakers, wetting agent, ASTM D 676 equipment, durometer, reference fluids, and seal material (nitrile) Compound B.

Procedure parameters

Determine volume and durometer reading of seal material. Immerse seal material in 100 ml of procedure fluid. Heat to 150°C for 70 hours. Determine volume and durometer change.

Procedure parts evaluated

The seal material is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- +1.0 to +6.0% Nominal Volume Change
- +6 to -3 Pts. Nominal Hardness Change

Fluid Effect on Seals – Comp. C (Total Immersion Procedure)

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the procedure fluid's effect on seal elastomers.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires ASTM D 471 equipment, oil bath, procedure tubes, reflux condensers, balance, three beakers, wetting agent, ASTM D 676 equipment, durometer, reference fluids, and seal material (polyacrylate) Compound C.

Procedure parameters

Determine volume and durometer reading of seal material. Immerse seal material in 100 ml of procedure fluid. Heat to 150°C for 70 hours. Determine volume and durometer change.

Procedure parts evaluated

The seal material is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- +2 to +7% Nominal Volume Change
- +4 to -4 Pts. Nominal Hardness Change

Fluid Effect on Seals – Comp. H (Total Immersion Procedure)

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the procedure fluid's effect on seal elastomers.

Field service simulated

Performance of this procedure requires satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires ASTM D 471 equipment, oil bath, procedure tubes, reflux condensers, balance, three beakers, wetting agent, ASTM D 676 equipment, durometer, reference fluids, and seal material (fluorinated) Compound H.

Procedure parameters

Determine volume and durometer reading of seal material. Immerse seal material in 100 ml of procedure fluid. Heat to 150°C for 70 hours. Determine volume and durometer change.

Procedure parts evaluated

The seal material is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- +0.5 to +5% Nominal Volume Change
- +6 to –5 Pts. Nominal Hardness Change

Fluid Effect on Seals – Comp. J (Total Immersion Procedure)

Specifications

The procedure covers DEXRON® III.

Objective

The objective is to determine the procedure fluid's effect on seal elastomers.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires ASTM D 471 equipment, oil bath, procedure tubes, reflux condensers, balance, three beakers, wetting agent, ASTM D 676 equipment, durometer, reference fluids, and seal material (silicone) Compound J.

Procedure parameters

Determine volume and durometer reading of seal material. Immerse seal material in 100 ml of procedure fluid. Heat to 150°C for 70 hours. Determine volume and durometer change.

Procedure parts evaluated

The seal material is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- +23 to +45% Nominal Volume Change
- 13 to –30 Pts. Nominal Hardness Change

Fluid Effect on Seals – Comp. R (Total Immersion Procedure)

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the procedure fluid's effect on seal elastomers.

Field service simulated

The procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires ASTM D 471 equipment, oil bath, procedure tubes, reflux condensers, balance, three beakers, wetting agent, ASTM D 676 equipment, durometer, reference fluids, and seal material (ethylene/acrylic) Compound R.

Procedure parameters

Determine volume and durometer reading of seal material. Immerse seal material in 100 ml of procedure fluid. Heat to 150°C for 70 hours. Determine volume and durometer change.

Procedure parts evaluated

The seal material is evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- +13 to +27% Nominal Volume Change
- 7 to -17 Pts. Nominal Hardness Change

Plate Clutch Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the friction characteristics and friction durability of procedure fluid.

Field service simulated

This procedure simulates satisfactory performance in normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires the SAE No. 2 friction procedure machine.

Procedure parameters

23,000 cycles (150 hours) of 20 seconds duration are required. Clutches are engaged once each cycle absorbs 15,700 joules of total energy. Fluid temperature is maintained at 140°C and air is injected at 50 cc per minute.

Procedure parts evaluated

The 3T40 steel and composition clutch plates are evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- Between 10 and 100 hours of operation, the level of kinetic torque, measured midway between the start and end of clutch engagement, must fall between 150 and 180 Nm.
- Between 10 and 100 hours of operation, the static torque must not exceed the kinetic torque by more than 30 Nm.
- Between 10 and 100 hours of operation, the engagement time must fall between 0.50 and 0.60 seconds.
- Maximum torque must be greater than 150 Nm.
- No requirements for report-end torque.
- Unusual steel clutch plate wear or composition plate flaking shall be unacceptable.

Band Clutch Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the friction characteristics and friction durability of procedure fluid.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires the SAE No. 2 friction procedure machine.

Procedure parameters

24,000 cycles (100 hours) of 15 seconds duration are required. Band is engaged once each cycle absorbs 15,000 joules of total energy. Fluid temperature is maintained at 135°C, and air is injected at 50 ml per minute through a sparger. For Dexron VI, the procedure must be run 150 hours (36,000 cycles).

Procedure parts evaluated

The 3T40 band and drum are evaluated.

Pass/fail criteria

The pass/fail criteria are as follows:

- Between 10 and 100 hours of operation, the level of kinetic torque, measured midway between the start and end of clutch engagement, must fall between 180 and 225 Nm.
- End torque must be more than 170 Nm.
- Between 10 and 100 hours of operation, the static torque must not exceed the kinetic torque by more than 80 Nm.
- Between 10 and 100 hours of operation, the engagement time must fall between 0.35 and 0.55 seconds.
- Report maximum torque, no requirement.
- Unusual drum wear or band flaking is unacceptable.

Oxidation Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the oxidation resistance, thermal stability, and corrosion protection characteristics of a procedure fluid.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

The procedure fixture consists of an electric motor-driven Hydra-matic 4L60E automatic transmission. The motor drives a converter with the stator installed in the reverse position.

Procedure parameters

The transmission is driven at 1755 rpm under no load, at 163°C converter-out temperature for 300 hours, with air introduced at 90 cc per minute and a fluid flow rate of 0.086 ± 0.003 L/s.

Procedure parts evaluated

All of the internal transmission parts are rated for sludge, varnish, deterioration, wear, or abnormal conditions.

Used lubricant analysis

The used lubricant analysis consists of viscosity, TAN, copper content, carbonyl group absorbance increase, and effluent gas O₂ content.

Pass/fail criteria

- Parts must be essentially free of sludge and varnish.
- The difference between the 300-hour and 0-hour sample TAN values must not be greater than 3.25.
- The Brookfield viscosity of the final sample at -20°C must not exceed 2000 cP.
- The increase in carbonyl group absorbance in final sample must not exceed 0.45 over that of 0-hour sample.
- The kinematic viscosity at 100°C must not be lower than 5.5 cSt during the procedure.
- Fluid level must be measurable at all times.
- Transmission part condition must be equal to or better than that obtained with reference fluids.
- Tubular cooler brazed alloy condition must be acceptable.

Cycling Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine friction retention, oxidation stability, and corrosion protection characteristics of a procedure fluid.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service.

Procedure fixture

Performance of this procedure requires a Hydra-matic 4L60 automatic transmission that is driven by a GM 5.7L L-98 engine. The engine and transmission are mounted on a procedure stand capable of cyclic operation with control of speed, load, temperatures and pressures.

Procedure parameters

Twenty thousand (20,000) accelerations through the 1–2, 2–3, and 3–4 shifts are performed at 40% throttle. Transmission sump temperature is maintained at 135°C. Engine speed, output shaft speed, output shaft torque, and acceleration times are all controlled during the cycle.

Procedure parts evaluated

All of the internal transmission parts are rated for sludge, varnish, deterioration, wear, or abnormal conditions.

Used lubricant analysis

Used lubricant analysis consists of viscosity, TAN, carbonyl group absorbance increase, and effluent gas O₂ content.

Pass/fail criteria

The pass/fail criteria are as follows:

- 1–2 shift time must be 0.30 to 0.75 seconds for 20,000 cycles.
- 2–3 shift time must be 0.30 to 0.75 seconds for 20,000 cycles.
- Viscosity at 100°C must be greater than 5.0 cSt.
- TAN increase must be less than 2.0.
- IR absorbance increase must be less than 0.30.
- Brookfield viscosity of used fluid must be less than 2,000 cP at –20°C.
- Transmission part condition must be equal to or better than that obtained with reference fluids.

Vehicle Performance Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective is to determine the effect of fluid on shift characteristics based on shift performance produced by a reference fluid in the same vehicle.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires the procedure be conducted in a 2005 Chevrolet Tahoe equipped with a 5.3-L engine and a Hydra-matic 4L60E automatic transmission.

Procedure parameters

The fluid is compared to the reference fluid at three throttle settings (50%, 75%, and 100% throttle) and four sump temperatures (65°C, 90°C, 105°C, and 120°C).

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The procedure fluid must have essentially the same shift characteristics as the reference fluid and the shift time must be less than $\pm 10\%$ of the reference fluid.

ECCC Vehicle Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective of this procedure is to determine if a procedure fluid produces shudder or hunting in a vehicle with an electronically controlled capacity clutch.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires the procedure be conducted in a 1997 Buick Riviera equipped with a 3.8-L supercharged engine and a GM powertrain 4T65-E automatic transmission.

Procedure parameters

The fluid is compared to the reference fluid on a chassis dynamometer at two different transmission sump temperatures, road load and high load, and at 20 and 80 rpm slip speed.

Procedure parts evaluated

The procedure fluid is evaluated.

Pass/fail criteria

The procedure fluid must essentially have the same characteristics as the reference fluid for shudder and hunting.

Sprag Clutch Overrunning Wear Procedure

Specifications

This procedure covers DEXRON® III.

Objective

The objective of this procedure is to determine the fluid anti-wear characteristics in an overrunning sprag clutch.

Field service simulated

This procedure simulates satisfactory performance in a normally functioning transmission under service conditions.

Procedure fixture

Performance of this procedure requires the procedure be conducted in an electric motor-driven sprag clutch procedure stand with the inner and outer races of the sprag turning in different directions.

Procedure parameters

The sprag clutch is driven at an overrunning speed of 17,800 rpm for one hour at 121°C.

Procedure parts evaluated

The various sprag clutch components are weighed and visually inspected for wear.

Pass/fail criteria

The average inner race weight loss of five different one-hour procedures on the procedure fluid cannot be greater than 60 mg.