

FALEX PIN CORROSION TESTAPPLICATION

This procedure is used to determine the probability of rusting of gear housing assemblies where a lubricant containing potentially corrosive chemicals is used and where moisture is present. The method also indicates the effectiveness of inhibitors which may have been added to the lubricant to prevent rust formation.

APPARATUS REQUIREDFalex E. P. Tester

A Falex or other similar machine where loading may be controlled to produce an oil bath temperature of  $210 \pm 10$  F is required.

Falex Pin and Bushings

The pin and bushings referred to in this procedure are the same as the standard steel test shaft and bushings used in Ford Laboratory Test Method BJ 1-1.

Forceps

A clean pair of forceps is required for handling the pin and bushings as at no time during the test should they be touched with the hands, which may leave a moisture film on the part and cause rusting.

Oven

A drying oven at  $180 \pm 2$  F is required. Draining the lubricant from the pins at this temperature simulates axle drainage conditions from that part of a differential ring gear above the oil after a test.

Bell Jar

A Bell jar (6 - 7 in. I.D. and 9 - 10 in. high) placed over a 12 in. by 12 in. glass plate is necessary to expose the sample pins at a relative humidity of 60 - 90%. The ground edge of the Bell jar should be coated with stopcock grease to effect a tight seal when placed on the glass plate.

Thermometer

If the oil bath of the Falex machine is not equipped with a thermocouple-thermometer, a glass thermometer (0-300 F) must be placed in the test cup near the bushings and pin so that the bulb end is completely immersed in the oil.

Gooch Crucible

A porcelain Gooch crucible is required for draining excess oil from the pin.

REAGENTS REQUIRED

Naphtha  
Petroleum Ether  
Butyl Cellosolve  
Phosphoric Acid (20% solution by volume)

PROCEDURE

1. Clean standard pin and bushings by brushing in naphtha to remove all traces of rust-proofing grease and oil and air dry.
2. Examine and select pins and bushings which have no flaws or surface roughness.
3. Clean pin and bushings (use forceps) in petroleum ether and dry with a clean, soft towel.
4. Pour oil into E.P. test cup and heat to approximately 200 F.
5. Assemble the pin and bushings in the machine with forceps.
6. Load the machine sufficiently to maintain an oil bath temperature of 210  $\pm$  10 F and run the test for 25 min.

Note: 1. Heat generated by friction between pin and bushings causes a release of the chemical additives such as occur in the frictional contact of gears in service.

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- Note: 2. If seizure of the pin or excessive scoring occurs, the test shall be run at a lower load. If necessary, a source of external heat should be applied to maintain the oil bath temperature.
7. With a clean forceps, remove the pin from the machine, place on end at a slight angle in the Gooch crucible, place the crucible on a watch glass and heat in an oven at  $180 \pm 2$  F for 30 min.
  8. Place the crucible containing the pin on a 12 in. by 12 in. glass plate in an area free of corrosive fumes.
  9. Place a 150 ml beaker of tap water on center of plate, cover with a Bell jar for 24 hr. at room temperature. Make sure that an air tight seal is formed between Bell jar and plate, and that no water is splashed onto pin.
  10. Remove pin with forceps, wash in petroleum ether to remove traces of lubricant.
  11. Wash in butyl cellosolve to remove oxidized oil deposits. Severe deposits of oxidized oil may be removed by long soaking in butyl cellosolve followed by a gently rubbing with a soft cloth moistened in buty cellosolve.
  12. Inspect visually for iron oxide rust deposits. Brownish deposits may be due to varnish or oxidized residue. A spot test may be made by using a drop or two of 20% phosphoric acid on a part of the brown deposit. Iron rust will be dissolved by this treatment
  13. If specimens are required for future reference, coat with clear lacquer or mount in Lucite or other clear plastic.