



L-37

ASTM D6121

L-37

- L-37 evaluates the load carrying, wear and extreme pressure performance of a gear oil in a hypoid axle under high speed/low torque in the conditioning/break-in phase and low speed/high torque in the test phase.
- L-37 simulates the severe driving conditions of a loaded truck going up a steep incline for 24 hours at 8 mph.



L-37 TEST RIG

- Dana 60 axle with Dana gears (5.86:1)
- Gear conditioning phase (highway speeds)
 - Oil @ 297°C
 - 440-wheel rpm
 - 395 lbf-ft wheel torque
- Test phase
 - 80- wheel rpm/8 mph
 - 1,742 lbf-ft wheel torque (1)
 - Std. = 24 hrs @ 275°F
 - Canadian = 24 hrs @ 200°F
 - Hi Temp = 16 hrs @ 325°F (not J2360)

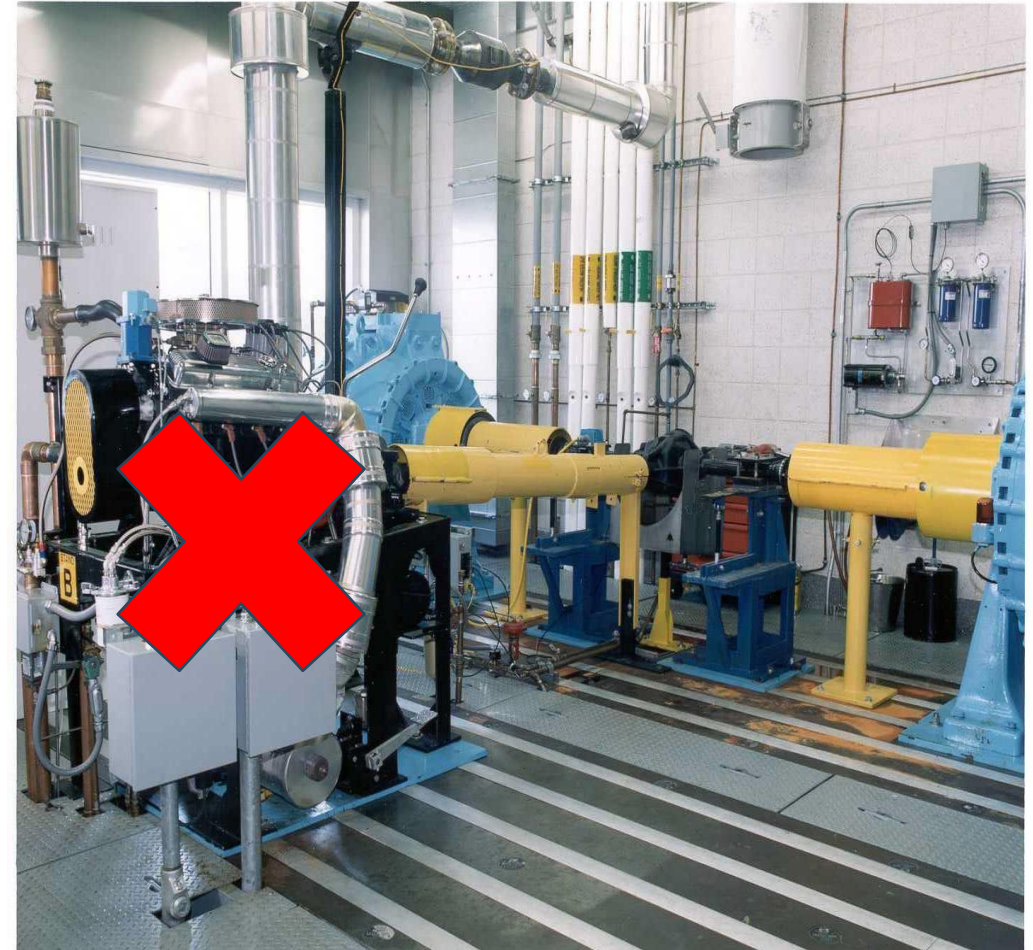
(1) some gear batches use 1213 lbf-ft wheel torque



L-37-1 TEST (ASTM D8165)

- Same as L-37 but uses electric dyno vs. fired gas engine and Gleason gears instead of Dana
- Gear conditioning phase (highway speeds)
 - Oil @ 297°C
 - 440-wheel rpm
 - 395 lbf-ft wheel torque
- Test phase
 - 80-wheel rpm/8 mph
 - 1,742 lb_f-ft wheel torque (1)
 - Std. = 24 hrs @ 275°F
 - Canadian = 24 hrs @ 200°F
 - Hi Temp = 16 hrs @ 325°F (not J2360)

(1) some gear batches use 1213 lbf-ft wheel torque



New L37-1 test method uses an electrical dyno vs. fired engine.

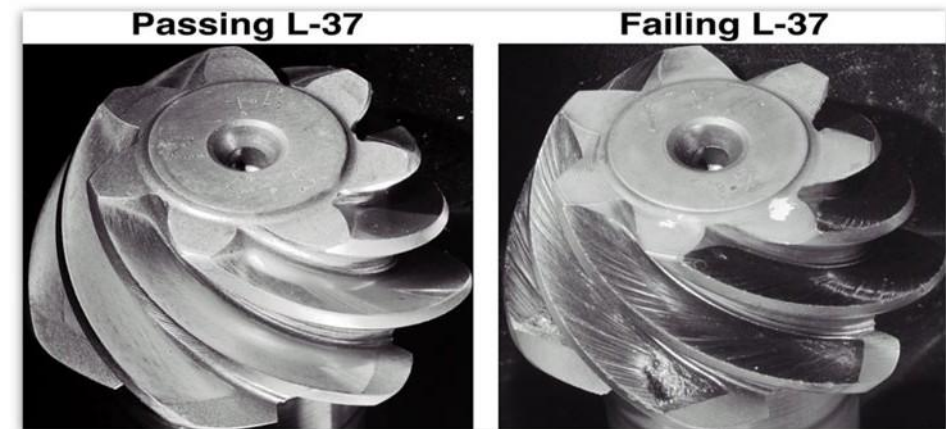
LEVELS OF DISTRESS



- If the gear oil has insufficient antiwear chemistry, typically in the form of phosphorus components, then distress on the gears can occur.
- Certified raters will rate and document the distress on the ring and pinion according to industry standards for critical distress:
 - 10: None, absence of distress
 - 9: Trace, barely discernible, may need magnification
 - 7: Light, discernible without magnification
 - 5: Medium, easily discernible
 - 3: Heavy, intense or severe
- Non-critical distress is also noted:
 - Scratching
 - Discoloration
 - Deposits
 - Corrosion
 - Burnish

L-37 RATINGS

- SAE J2360 rating minimums for ring and pinion:
 - Wear 5 min.
 - Rippling 8 min.
 - Ridging 8 min.
 - Pitting/Spalling 9.3 min.
 - Scoring 10 min.



WEAR

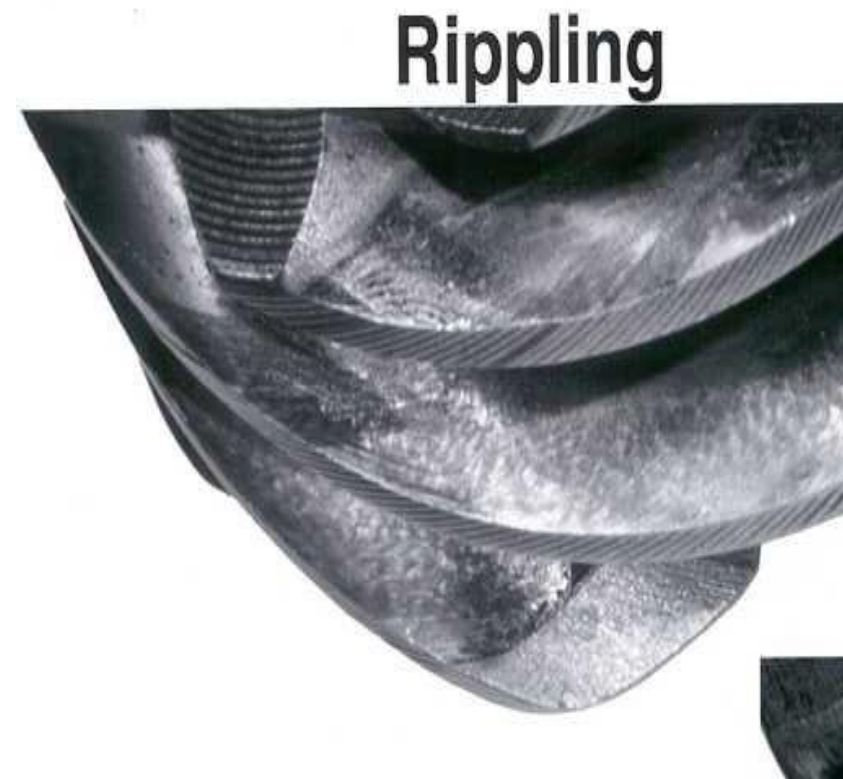
- The removal of metal without the evidence of surface fatigue or scoring, resulting in partial or complete elimination of tool marks and the development of a discernable step.



Wear Step Area

RIPPLING

An alteration of the tooth surface to give a regular pattern resembling ripples of water or fish scales.



RIDGING

- An alteration of the tooth surface, to give a series of parallel raised and polished ridges running in the direction of the sliding motion, either partially or completely across the tooth surfaces.



PITTING

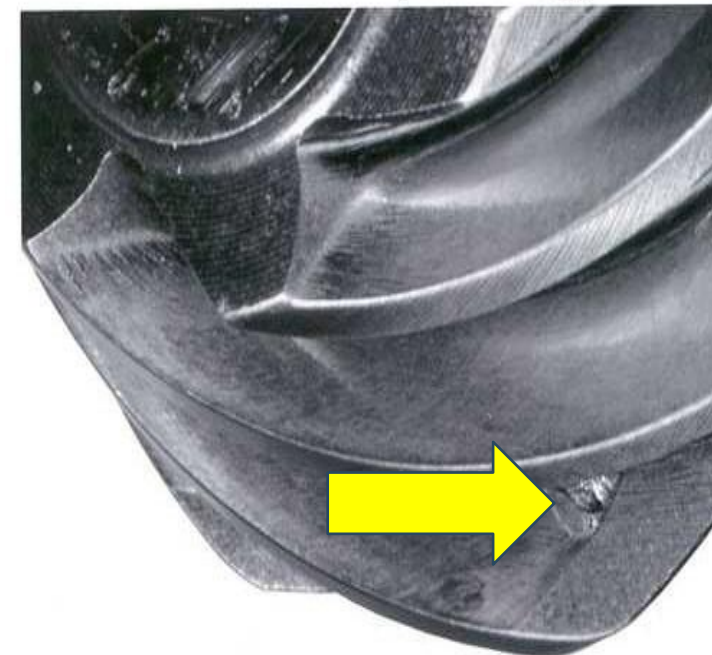
Small irregular cavities in the tooth surface, less than one square mm., resulting from the breaking out of surface metal.



SPALLING

The breaking-out of flakes or irregular area of the tooth surface, one square mm. or larger; a condition more extensive than pitting.

Spalling



OTHER DISTRESSES

- Scratching
 - An alteration of the tooth surface in the form of sharp linear depressions of random length in the direction of surface sliding
- Corrosion
 - A general alteration of the finished surfaces of bearings or gears by discoloration, accompanied by roughening not attributable to mechanical action
- Burnish
 - An alteration of the original manufactured surface from a dull to brightly polished condition

L-37 RIG CALIBRATION

- Test labs must complete a “blind” reference test every 4 months or 650 test hours, whichever occurs first.
 - Reference oil obtained from Test Monitoring Center (TMC)
 - Test reports are submitted to TMC to ensure they are consistent with industry standards before rig is deemed calibrated.
- L-37 can be conducted at Southwest Research Institute or Intertek AR
 - The Lubrizol Corporation and Afton Chemical Corporation have capability.