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# 40 C.F.R. § 1037.565

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## Transmission efficiency test.

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This section describes a procedure for mapping transmission efficiency through a determination of transmission power loss.

- (a) You may establish transmission power loss maps based on testing any number of transmission configurations within a transmission family as specified in § 1037.232. You may share data across any configurations within the family, as long as you test the transmission configuration with the lowest efficiency from the transmission family. Alternatively, you may ask us to approve analytically derived power loss maps for untested configurations within the same transmission family (see § 1037.235(h)).
- (b) Prepare a transmission for testing as follows:
- (1) Select a transmission with less than 500 hours of operation before testing.
  - (2) Mount the transmission to the dynamometer such that the geared shaft in the transmission is aligned with the input shaft from the dynamometer.
  - (3) Add transmission oil according to the transmission manufacturer's instructions. If the transmission manufacturer specifies multiple transmission oils, select the one with the highest viscosity at operating temperature. You may use a lower-viscosity transmission oil if we approve it as critical emission-related maintenance under § 1037.125. Fill the transmission oil to a level that represents in-use operation. You may use an external transmission oil conditioning system, as long as it does not affect measured values.
  - (4) Include any internal and external pumps for hydraulic fluid and lubricating oil in the test. Determine the work required to drive an external pump according to 40 CFR 1065.210.
  - (5) Install equipment for measuring the bulk temperature of the transmission oil in the oil sump or a similar location.
  - (6) If the transmission is equipped with a torque converter, lock it for all testing performed in this section.
  - (7) Break in the transmission using good engineering judgment. Maintain transmission oil temperature at (87 to 93) °C for automatic transmissions and transmissions having more than two friction clutches, and at (77 to 83) °C for all other transmissions. You may ask us to approve a different range of transmission oil temperatures if you have data showing that it better represents in-use operation.
- (c) Measure input and output shaft speed and torque as described in 40 CFR 1065.210(b). You must use a speed measurement system that meets an accuracy of  $\pm 0.05\%$  of point. Accuracy requirements for torque transducers depend on the highest loaded transmission input and output torque as described in paragraph (d)(2) of this section. Use torque transducers for torque input measurements that meet an accuracy requirement of  $\pm 0.2\%$  of the highest loaded transmission input for loaded test points and  $\pm 0.1\%$  of the
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highest loaded transmission input torque for unloaded test points. For torque output measurements, torque transducers must meet an accuracy requirement of  $\pm 0.2\%$  of the highest loaded transmission output torque for each gear ratio. Calibrate and verify measurement instruments according to 40 CFR part 1065, subpart D. Command speed and torque at a minimum of 10 Hz, and record all data, including bulk oil temperature, at a minimum of 1 Hz mean values.

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