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(F)(*1*) For a paired comparison, calculate the t-value:

$t_{paired} = (A_{avg} - R_{avg})/(S_D^2/n)^{1/2}$

(*2*) The absolute value of t must be less than the critical t value, t_{crit} at a 90% confidence interval for ''n−1'' degrees of freedom. The following table lists 90% confidence interval t_{crit} values for n−1 degrees of freedom:

90% Confidence interval critical t values vs. n−1 degrees of freedom for a two-sided, paired t−test

n −1	t_{crit}
6	1.94
7	1.89
8	1.86
9	1.83
10	1.81
11	1.80
12	1.78
13	1.77
14	1.76
15	1.75
16	1.75
17	1.74
18	1.73
19	1.73
20	1.72

[66 FR 5168, Jan. 18, 2001]

§ 86.1306–96 Equipment required and specifications; overview.

(a) *Exhaust emission tests*. All engines subject to this subpart are tested for exhaust emissions. Petroleum-, natural gas-, liquefied petroleum gas-, and methanol-fueled Otto-cycle and diesel engines are tested identically with two exceptions. First, the systems used to measure hydrocarbon, nitrogen oxide, methanol, formaldehyde and particulate depend on the type of engine being tested; petroleum-fueled diesel engines require a heated, continuous hydrocarbon detector and a heated, continuous nitrogen oxide detector (see § 86.1310); methanol-fueled engines require a heated hydrocarbon detector, a methanol detector and a formaldehyde detector; either a heated or non-heated continuous hydrocarbon detector may be used with natural gas-fueled and liquefied petroleum gas-fueled diesel engines; gasoline-fueled, natural gas-fueled, liquefied petroleum gas-fueled and methanol-fueled Otto-cycle engines are not tested for particulate emissions (see § 86.1309). Second, if a gasoline-fueled and methanol-fueled engine is to be used in a vehicle equipped with an evaporative canister, the test engine must have a loaded evaporative canister attached for the exhaust emission test. Necessary equipment and specifications appear in §§ 86.1308, 86.1309, 86.1310 and 86.1311.

(b) *Fuel, analytical gas, and engine cycle specifications*. Fuel specifications for exhaust emission testing are specified in § 86.1313. Analytical gases are specified in § 86.1314. The EPA heavy-duty transient engine cycles for use in exhaust testing are described in § 86.1333 and specified in appendix I to this part.

[58 FR 16064, Mar. 24, 1993, as amended at 59 FR 48525, Sept. 21, 1994]

§ 86.1308–84 Dynamometer and engine equipment specifications.

(a) *Engine dynamometer*. The engine dynamometer system must be capable of controlling engine torque and rpm simultaneously over transient cycles. The transient torque and rpm schedules described in § 86.1333–84 and specified in appendix I ((f)(i), (2), and (3)) must be followed within the accuracy requirements specified in § 86.1341–84. In addition to these general requirements, the engine or dynamometer readout signals for speed and torque shall meet the following accuracy specifications:

(1) Engine speed readout shall be accurate to within ±2 percent of the absolute standard value, as defined in paragraph (d) of this section.

(2) Engine flywheel torque readout shall be accurate to either within ±3 percent of the NBS ''true'' value torque (as defined in paragraph (e) of this section), or the following accuracies:

(i) ±2.5 ft-lbs. of the NBS ''true'' value if the full scale value is 550 ft-lbs. or less.

(ii) ±5 ft-lbs. of the NBS ''true'' value if the full scale value is 1050 ft-lbs. or less.

(iii) ±10 ft.-lbs., of the NBS ''true'' value if the full scale value is greater than 1050 ft.-lbs.

(3) *Option*. Internal dynamometer signals (i.e., armature current, etc.) may be used for torque measurement provided that it can be shown that the engine flywheel torque during the test cycle conforms to the accuracy specifications in paragraph (a) of this section. Such a measurement system must