§ 86.1341–98 40 CFR Ch. I (7–1–13 Edition)

FIGURE N90–11

Regression Line Tolerances

<table>
<thead>
<tr>
<th>Speed</th>
<th>Torque</th>
<th>BHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 rpm</td>
<td>13 pt. of power map maximum engine torque</td>
<td>8 pt. of power map maximum BHP</td>
</tr>
<tr>
<td>0.970 to 1.030</td>
<td>0.83–1.03 (hot), 0.77–1.03 (cold)</td>
<td>0.89–1.03 (hot), 0.87–1.03 (cold)</td>
</tr>
<tr>
<td>50 rpm</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Petroleum-fueled and methanol-fueled diesel engines

<table>
<thead>
<tr>
<th>Slope of the regression line, m</th>
<th>Coefficient of determination, r²</th>
<th>Y intercept of the regression line, b.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9700</td>
<td>0.8800 (hot), 0.85000 (cold)</td>
<td>0.9100</td>
</tr>
<tr>
<td>0.92–1.03 (hot), 0.88–1.03 (cold)</td>
<td>0.93–1.03 (hot), 0.89–1.03 (cold)</td>
<td></td>
</tr>
<tr>
<td>0.9400 (hot), 0.9000 (cold)</td>
<td>2.0% (hot), 2.5% (cold)</td>
<td></td>
</tr>
</tbody>
</table>

Gasoline-fueled and methanol-fueled Otto-cycle engines

<table>
<thead>
<tr>
<th>Slope of the regression line, m</th>
<th>Coefficient of determination, r²</th>
<th>Y intercept of the regression line, b.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9700</td>
<td>0.9300 (hot), 0.9000 (cold)</td>
<td>0.9100</td>
</tr>
<tr>
<td>0.92–1.03 (hot), 0.88–1.03 (cold)</td>
<td>0.93–1.03 (hot), 0.89–1.03 (cold)</td>
<td></td>
</tr>
<tr>
<td>0.9400 (hot), 0.9000 (cold)</td>
<td>2.0% (hot), 2.5% (cold)</td>
<td></td>
</tr>
</tbody>
</table>

1 Minimum.

PERMITTED POINT DELETIONS FROM REGRESSION ANALYSIS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points to be deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wide Open Throttle and Torque Feedback &lt; Torque Reference</td>
<td>Torque, and/or BHP.</td>
</tr>
<tr>
<td>2. Closed Throttle, Not an Idle Point, Torque Feedback &gt; Torque Reference</td>
<td>Torque, and/or BHP.</td>
</tr>
<tr>
<td>3. Closed Throttle, Idle Point, and Torque Feedback = CITT (10 ft-lb)</td>
<td>Speed, and/or BHP.</td>
</tr>
</tbody>
</table>

For the purposes of this discussion:
An Idle Point is defined as a point having a Normalized Reference Torque of 0 and a Normalized Reference Speed of 0 and an engine tested as having a manual transmission has a CITT of 0. Point deletion may be applied either to the whole or to any part of the cycle. EXPSTB=’00’

(4)(i) For petroleum-fueled and methanol-fueled diesel engines, the integrated brake horsepower-hour for each cycle (cold and hot start) shall be between −15 percent and +5 percent of the integrated brake horsepower-hour for the reference cycle, or the test is void.

(ii) For gasoline-fueled and methanol-fueled Otto-cycle engines, the integrated brake horsepower-hour of the feedback cycle shall be within 5 percent of the integrated brake horsepower-hour of the reference cycle for the cold cycle, or the test is void. The tolerance for the hot cycle shall be 4 percent.

(5) If a dynamometer test run is determined to be statistically or experimentally void, corrective action shall be taken. The engine shall then be allowed to cool (naturally or forced) and the dynamometer test rerun per §86.1337 or be restarted at §86.1336–84(e).

(d) For petroleum-fueled and methanol-fueled diesel engines, all reference torque values specified in paragraph (f)(2) of appendix I to this part as “closed throttle” shall be deleted from the calculation of cycle torque and power validation statistics.


§ 86.1341–98 Test cycle validation criteria.

Section 86.1341–98 includes text that specifies requirements that differ from §86.1341–90. Where a paragraph in §86.1341–90 is identical and applicable to §86.1341–98, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see §86.1341–90”.

(a) Through (b)(2) [Reserved]. For guidance see §86.1341–90.

(b)(3) All feedback torques due to accessory loads, either actual or simulated as defined in §86.1327–90 (d)(4), shall be excluded from both cycle validation and the integrated work used for emissions calculations.

(4) For reference idle portions of the cycle where CITT is not applied, use
measured torque values for cycle validation and the reference torque values for calculating the brake horsepower-hour value used in the emission calculations. For reference idle portions of the cycle where CITT is applied, use measured torque values for cycle validation and calculating the brake horsepower-hour value used in the emission calculations.

(c) Through (d) [Reserved]. For guidance see §86.1341-90.

§86.1342-90 Calculations; exhaust emissions.

(a) The final reported transient emission test results should be computed by using the following formula:

\[
A_{WM} = \frac{(1/7)\bar{g}_C + (6/7)\bar{g}_H}{(1/7)(BHP-hr_C) + (6/7)(BHP-hr_H)}
\]

Where:

1. \(A_{WM}\) = Weighted mass emission level (HC, CO, CO\(_2\), or NO\(_X\)) in grams per brake horsepower-hour and, if appropriate, the weighted mass total hydrocarbon equivalent, in grams per brake horsepower-hour.

2. \(\bar{g}_C\) = Mass emission level in grams or grams carbon mass equivalent, measured during the cold start test.

3. \(\bar{g}_H\) = Mass emission level in grams or grams carbon mass equivalent, measured during the hot start test.

4. \(BHP-hr_C\) = Total brake horsepower-hour (brake horsepower integrated over time) for the cold start test.

5. \(BHP-hr_H\) = Total brake horsepower-hour (brake horsepower integrated over time) for the hot start test.

(b) The mass of each pollutant for the cold start test and the hot start test for bag measurements and diesel continuously heated sampling system measurements is determined from the following equations:

\[
(1) \text{Hydrocarbon mass:} \\
\text{HC}_{mass} = V_{mix} \times \text{Density}_{HC} \times \left(\text{HC}_{conc}/10^6\right)
\]

\[
(2) \text{Oxides of nitrogen mass:} \\
\text{NOX}_{mass} = V_{mix} \times \text{Density}_{NO2} \times K_H \times \left(\text{NOX}_{conc}/10^6\right)
\]

\[
(3) \text{Carbon monoxide mass:} \\
\text{CO}_{mass} = V_{mix} \times \text{Density}_{CO} \times \left(\text{CO}_{conc}/10^6\right)
\]

\[
(4) \text{Carbon dioxide mass:} \\
\text{CO2}_{mass} = V_{mix} \times \text{Density}_{CO2} \times \left(\text{CO2}_{conc}/10^2\right)
\]

\[
(5) \text{Methanol mass:} \\
\text{CH3OH}_{mass} = V_{mix} \times \text{Density}_{CH3OH} \times \left(\text{CH3OH}_{conc}/10^6\right)
\]

\[
(6) \text{Formaldehyde mass:} \\
\text{HCHO}_{mass} = V_{mix} \times \text{Density}_{HCHO} \times \left(\text{HCHO}_{conc}/10^6\right)
\]

\[
(7) \text{Total hydrocarbon equivalent mass:} \\
\text{THCE} = \text{HC}_{mass} + \frac{13.8756}{32.042} \left(\text{CH3OH}_{mass}\right) + \frac{13.8756}{30.0262} \left(\text{HCHO}_{mass}\right)
\]

(c) The mass of each pollutant for the cold start test and the hot start test for flow compensated sample systems is determined from the following equations: