§ 34.23 Exhaust Emission Standards for Engines Manufactured on and after July 18, 2012.

The standards of this section apply to aircraft engines manufactured on and after July 18, 2012, unless otherwise exempted or excepted. Where a gaseous emission standard is specified by a formula, calculate and round the standard to three significant figures or to the nearest 0.1 g/kN (for standards at or above 100 g/kN). Where a smoke standard is specified by a formula, calculate and round the standard to the nearest 0.1 SN. Engines comply with an applicable standard if the testing results show that the engine type certificate family’s characteristic level does not exceed the numerical level of that standard, as described in §34.60.

SN = \(83.6(rO)^{-0.274}\) (rO is in kN) not to exceed a maximum of SN = 50.

(2) For Classes T3, T8, TSS, and TF of rated output equal to or greater than 26.7 kN (6,000 lb) manufactured on or after January 1, 1984:

\[SN = \frac{83.6(rO)^{-0.274}}{rO}\] (rO is in kN).

(3) For Class TP of rated output equal to or greater than 1,000 kW manufactured on or after January 1, 1984:

\[SN = 187(rO)^{-0.168}\] (rO is in kW).

(f) The standards set forth in paragraphs (a), (b), (c), (d), and (e) of this section refer to a composite gaseous emission sample representing the operation cycles and exhaust smoke emission emitted during operation of the engine as specified in the applicable sections of subpart G of this part, and measured and calculated in accordance with the procedures set forth in subpart G.

(g) Where a gaseous emission standard is specified by a formula, calculate and round the standard to three significant figures or to the nearest 0.1 g/kN (for standards at or above 100 g/kN). Where a smoke standard is specified by a formula, calculate and round the standard to the nearest 0.1 SN. Engines comply with an applicable standard if the testing results show that the engine type certificate family’s characteristic level does not exceed the numerical level of that standard, as described in §34.60.
§ 34.23

0.1 SN. Engines comply with an applicable standard if the testing results show that the engine type certificate family’s characteristic level does not exceed the numerical level of that standard, as described in §34.60.

(a) Gaseous exhaust emissions from each new aircraft gas turbine engine shall not exceed:

(1) For Classes TF, T3 and T8 of rated output less than 26.7 kN (6,000 lb) manufactured on and after July 18, 2012:

\[
SN = 83.6(rO)^{-0.274} \text{ or } 50.0, \text{ whichever is smaller}
\]

(2) Except as provided in §§34.9(b) and 34.21(c), for Classes TF, T3 and T8 engines manufactured on and after July 18, 2012, and for which the first individual production model was manufactured on or before December 31, 2013 (Tier 6):

<table>
<thead>
<tr>
<th>Class</th>
<th>Rated pressure ratio—rPR</th>
<th>Rated output rO (kN)</th>
<th>NOx ((g/kN))</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF, T3, T8</td>
<td>(rPR \leq 30)</td>
<td>(26.7 &lt; rO \leq 89.0)</td>
<td>38.5486 + 1.6823 (rPR) (- 0.2453 (rO) - (0.00308 (rPR) (rO)).)</td>
</tr>
<tr>
<td></td>
<td>(rO &gt; 89.0)</td>
<td></td>
<td>16.72 + 1.4080 (rPR).</td>
</tr>
<tr>
<td></td>
<td>(30 &lt; rPR &lt; 82.6)</td>
<td>(26.7 &lt; rO \leq 89.0)</td>
<td>46.1600 + 1.4286 (rPR) (- 0.5303 (rO) + (0.00642 (rPR) (rO)).)</td>
</tr>
<tr>
<td></td>
<td>(rO &gt; 89.0)</td>
<td></td>
<td>(- 1.04 + 2.0 (rPR).)</td>
</tr>
<tr>
<td>rPR (\geq 82.6)</td>
<td>(rO \geq 26.7)</td>
<td></td>
<td>(32 + 1.6 (rPR).)</td>
</tr>
</tbody>
</table>

(3) Engines exempted from paragraph (a)(2) of this section produced on or before December 31, 2016 must be labeled “EXEMPT NEW” in accordance with §45.13 of this chapter. No exemptions to the requirements of paragraph (a)(2) of this section will be granted after December 31, 2016.

(4) For Class TSS Engines manufactured on and after July 18, 2012:

(b) Gaseous exhaust emissions from each new aircraft gas turbine engine shall not exceed:

(1) For Classes TF, T3 and T8 engines of a type or model of which the first individual production model was manufactured after December 31, 2013 (Tier 8):

<table>
<thead>
<tr>
<th>Class</th>
<th>Rated pressure ratio—rPR</th>
<th>Rated output rO (kN)</th>
<th>NOx ((g/kN))</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF, T3, T8</td>
<td>(rPR \leq 30)</td>
<td>(26.7 &lt; rO \leq 89.0)</td>
<td>40.052 + 1.5681 (rPR) (- 0.3615 (rO) - (0.0018 (rPR) (rO)).)</td>
</tr>
<tr>
<td></td>
<td>(rO &gt; 89.0)</td>
<td></td>
<td>7.88 + 1.4080 (rPR).</td>
</tr>
<tr>
<td></td>
<td>(30 &lt; rPR &lt; 104.7)</td>
<td>(26.7 &lt; rO \leq 89.0)</td>
<td>41.9435 + 1.505 (rPR) (- 0.5823 (rO) + (0.005562 (rPR) (rO)).)</td>
</tr>
<tr>
<td></td>
<td>(rO &gt; 89.0)</td>
<td></td>
<td>(- 9.88 + 2.0 (rPR).)</td>
</tr>
<tr>
<td>rPR (\geq 104.7)</td>
<td>(rO \geq 26.7)</td>
<td></td>
<td>(32 + 1.6 (rPR).)</td>
</tr>
</tbody>
</table>
§ 34.30 Exhaust Emissions (In-Use Aircraft Gas Turbine Engines)

The provisions of this subpart are applicable to all in-use aircraft gas turbine engines certificated for operation within the United States of the classes specified, beginning on the dates specified in §34.31.

§ 34.31 Standards for exhaust emissions.

(a) Exhaust emissions of smoke from each in-use aircraft gas turbine engine of Class T8, beginning February 1, 1974, shall not exceed a smoke number (SN) of 30.

(b) Exhaust emissions of smoke from each in-use aircraft gas turbine engine of Class TF and of rated output of 129 kN (29,000 lb) thrust or greater, beginning January 1, 1976, shall not exceed

SN = 83.6 (rO) ^ 0.274 (rO is in kN).

(c) The standards set forth in paragraphs (a) and (b) of this section refer to exhaust smoke emission emitted during operation of the engine as specified in the applicable sections of subpart G of this part, and measured and calculated in accordance with the procedures set forth in subpart G.


Subpart E—Certification Provisions

§ 34.48 Derivative engines for emissions certification purposes.

(a) General. A derivative engine for emissions certification purposes is an engine configuration that is determined to be similar in design to a previously certificated (original) engine for purposes of compliance with exhaust emissions standards (gaseous and smoke). A type certificate holder may request from the FAA a determination that an engine configuration is considered a derivative engine for emissions certification purposes. To be considered a derivative engine for emission purposes under this part, the configuration must have been derived from the original engine that was certificated to the requirements of part 33 of this chapter and one of the following:

1. The FAA has determined that a safety issue exists that requires an engine modification.

2. Emissions from the derivative engines are determined to be similar. In general, this means the emissions must meet the criteria specified in paragraph (b) of this section. The FAA may amend the criteria of paragraph (b) in unusual circumstances, for individual cases, consistent with good engineering judgment.

3. All of the regulated emissions from the derivative engine are lower than the original engine.

(b) Emissions similarity. (1) The type certificate holder must demonstrate that the proposed derivative engine model’s emissions meet the applicable standards and differ from the original model’s emission rates only within the following ranges:

(i) ±3.0 g/kN for NOX.

(ii) ±1.0 g/kN for HC.

(iii) ±5.0 g/kN for CO.

(iv) ±2.0 SN for smoke.

(2) If the characteristic level of the original certificated engine model (or any other sub-models within the emission type certificate family tested for certification) before modification is at or above 95% of the applicable standard for any pollutant, an applicant must measure the proposed derivative engine model’s emissions for all pollutants to demonstrate that the derivative engine’s resulting characteristic levels will not exceed the applicable emission standards. If the characteristic levels of the originally certificated engine model (and all other sub-models within the emission type certificate family tested for certification) are below 95%