(e) Other gaseous emissions measurement systems may be used if shown to yield equivalent results and if approved in advance by the Administrator or the Secretary.

[47 FR 58470, Dec. 30, 1982, as amended at 49 FR 31875, Aug. 9, 1984; 62 FR 25366, May 8, 1997]

EFFECTIVE DATE NOTE: At 77 FR 36386, June 18, 2012, § 87.60 was revised, effective July 18, 2012. For the convenience of the user, the revised text is set forth as follows:

§ 87.60 Testing engines.

(a) Use the equipment and procedures specified in Appendix 3, Appendix 5, and Appendix 6 of ICAO Annex 16 (incorporated by reference in § 87.8), as applicable, to demonstrate whether engines meet the gaseous emission standards specified in subpart C of this part. Measure the emissions of all regulated gaseous pollutants. Similarly, use the equipment and procedures specified in Appendix 2 and Appendix 6 of ICAO Annex 16 to determine whether engines meet the smoke standard specified in subpart C of this part. The compliance demonstration consists of establishing a mean value from testing some number of engines, then calculating a ''characteristic level'' by applying a set of statistical factors that take into account the number of engines tested. Round each characteristic level to the same number of decimal places as the corresponding emission standard. For turboprop engines, use the procedures specified for turbofan engines, consistent with good engineering judgment.

(b) Use a test fuel meeting the specifications described in Appendix 4 of ICAO Annex 16 (incorporated by reference in § 87.8). The test fuel must not have additives whose purpose is to suppress smoke, such as organometallic compounds.

(c) Prepare test engines by including accessories that are available with production engines if they can reasonably be expected to influence emissions. The test engine may not extract shaft power or bleed service air to provide power to auxiliary gearbox-mounted components required to drive aircraft systems.

(d) Test engines must reach a steady operating temperature before the start of emission measurements.

(e) In consultation with the EPA, the FAA may approve alternate procedures for measuring emissions as specified in this paragraph (e). This might include testing and sampling methods, analytical techniques, and equipment specifications that differ from those specified in this part. Manufacturers and operators may request this approval by sending a written request with supporting justification to the FAA and to the Designated EPA Program Officer. Such a request may be approved only if one of the following conditions is met:

(1) The engine cannot be tested using the specified procedures.

(2) The alternate procedure is shown to be equivalent to or better (e.g., more accurate or precise) than the specified procedure.

(f) The following landing and take-off (LTO) cycles apply for emission testing and calculating weighted LTO values:

TABLE 1 TO § 87.60—LTO TEST CYCLES

Mode	Turboprop		Subsonic turbofan		Supersonic turbofan	
	Percent of rated output	Time in mode (minutes)	Percent of rated output	Time in mode (minutes)	Percent of rated output	Time in mode (minutes)
Take-off	100	0.5	100	0.7	100	1.2
Climb	90	2.5	85	2.2	65	2.0
Descent					15	1.2
Approach	30	4.5	30	4.0	34	2.3
Taxi/ground idle	7	26.0	7	26.0	5.8	26.0

(g) 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 § 87.60.

§ 87.61 Turbine fuel specifications.

For exhaust emission testing, fuel meeting the specifications listed in this section shall be used. Additives used for the purpose of smoke suppression (such as organometallic compounds) shall not be present.

Property and Allowable Range of Values

Density kg/m³ at 15 °C: 780–820.
Distillation temperature, °C: 10% boiling point, 155–201; final boiling point, 235–285.
Net heat of combustion, MJ/kg: 42.86–43.50.
Aromatics, volume %: 15–23.
Naphthalenes, volume %: 1.0–3.5.
Smoke point, mm: 20–28.
Hydrogen, mass %: 13.4–14.1.
Sulfur, mass %: less than 0.3%.

Kinematic viscosity at −20 °C, mm^2/s: 2.5–6.5.

[62 FR 25366, May 8, 1997]

EFFECTIVE DATE NOTE: At 77 FR 36386, June 18, 2012, § 87.61 was removed, effective July 18, 2012.

§ 87.62 Test procedure (propulsion engines).

(a)(1) The engine shall be tested in each of the following engine operating modes which simulate aircraft operation to determine its mass emission rates. The actual power setting, when corrected to standard day conditions, should correspond to the following percentages of rated output. Analytical correction for variations from reference day conditions and minor variations in actual power setting should be specified and/or approved by the Secretary:

Mode	Class		
	TP	TF, T3, T8	TSS
Taxi/idle	(1)	(1)	(1)
Takeoff	100	100	100
Climbout	90	85	65
Descent	NA	NA	15
Approach	30	30	34

[1] See paragraph (a)(2) of this section.

(2) The taxi/idle operating modes shall be carried out at a power setting of 7% rated thrust unless the Secretary determines that the unique characteristics of an engine model undergoing certification testing at 7% would result in substantially different HC and CO emissions than if the engine model were tested at the manufacturers recommended idle power setting. In such cases the Secretary shall specify an alternative test condition.

(3) The times in mode (TIM) shall be as specified below:

Mode	Class		
	TP	TF, T3 or T8	TSS
Taxi/idle (minutes)	26.0	26.0	26.0
Takeoff	0.5	0.7	1.2
Climbout	2.5	2.2	2.0
Descent	N/A	N/A	1.2
Approach	4.5	4.0	2.3

(b) Emissions testing shall be conducted on warmed-up engines which have achieved a steady operating temperature.

[47 FR 58470, Dec. 30, 1982, as amended at 62 FR 25366, May 8, 1997]

EFFECTIVE DATE NOTE: At 77 FR 36386, June 18, 2012, § 87.62 was removed, effective July 18, 2012.

§ 87.63 [Reserved]

EFFECTIVE DATE NOTE: At 77 FR 36386, June 18, 2012, reserved § 87.63 was removed, effective July 18, 2012.

§ 87.64 Sampling and analytical procedures for measuring gaseous exhaust emissions.

(a) The system and procedures for sampling and measurement of gaseous emissions shall be as specified by Appendices 3 and 5 to ICAO Annex 16 (incorporated by reference in § 87.8).

(b) Starting January 1, 2011, report CO_2 values along with your emission levels of regulated NO_X to the Administrator for engines of a type or model of which the date of manufacture of the first individual production model was on or after January 1, 2011. By January 1, 2011, report CO_2 values along with your emission levels of regulated NO_X to the Administrator for engines currently in production and of a type or model for which the date of manufacture of the individual engine was before January 1, 2011. Round CO_2 to the nearest 1 g/kilonewton rO.

(c) Report CO_2 by calculation from fuel mass flow rate measurements in Appendices 3 and 5 to ICAO Annex 16, volume II or alternatively, according to the measurement criteria of CO_2 in Appendices 3 and 5 to ICAO Annex 16, volume II.

[74 FR 56374, Oct. 30, 2009]

EFFECTIVE DATE NOTE: At 77 FR 36386, June 18, 2012, § 87.64 was amended by removing and reserving paragraph (a), effective July 18, 2012.

§§ 87.65–87.70 [Reserved]

EFFECTIVE DATE NOTE: At 77 FR 36386, June 18, 2012, reserved §§ 87.65–87.70 were removed, effective July 18, 2012.

§ 87.71 Compliance with gaseous emission standards.

Compliance with each gaseous emission standard by an aircraft engine