



**MENTERI PERHUBUNGAN  
REPUBLIK INDONESIA**

**PERATURAN MENTERI PERHUBUNGAN REPUBLIK INDONESIA**

**NOMOR : PM 49 TAHUN 2015**

**TENTANG**

**PERUBAHAN ATAS PERATURAN MENTERI PERHUBUNGAN NOMOR  
KM 28 TAHUN 2009 TENTANG PERATURAN KESELAMATAN PENERBANGAN  
SIPIL BAGIAN 34 AMANDEMEN 1 (*CIVIL AVIATION SAFETY REGULATIONS  
PART 34 AMENDMENT 1*) TENTANG PERSYARATAN BAHAN BAKAR  
TERBUANG DAN EMISI GAS BUANG UNTUK PESAWAT UDARA YANG  
DIGERAKKAN DENGAN MESIN TURBIN (*FUEL VENTING AND EXHAUSE  
EMISSION REQUIREMENT FOR TURBIN ENGINE POWERED AIRPLANES*)**

**DENGAN RAHMAT TUHAN YANG MAHA ESA**

**MENTERI PERHUBUNGAN REPUBLIK INDONESIA,**

- Menimbang :
- a. bahwa Pasal 37 Undang-Undang Nomor 1 Tahun 2009 tentang Penerbangan mengatur persyaratan untuk memperoleh sertifikat kelaikudaraan harus memenuhi standar kebisingan dan standar emisi gas buang;
  - b. bahwa persyaratan bahan bakar terbuang dan emisi gas buang untuk pesawat udara yang digerakkan dengan mesin turbin telah diatur dalam Peraturan Menteri Perhubungan Nomor KM 28 Tahun 2009, namun perlu dilakukan perubahan guna meningkatkan standar kelaikan pesawat udara dan perlindungan terhadap lingkungan hidup;
  - c. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a dan huruf b, perlu menetapkan Peraturan Menteri Perhubungan tentang Perubahan Atas Peraturan Menteri Perhubungan Nomor KM 28 Tahun 2009 tentang Peraturan Keselamatan Penerbangan Sipil Bagian 34 Amandemen 1 (*Civil Aviation Safety Regulations Part 34 Amendment 1*) tentang Persyaratan Bahan Bakar Terbuang dan Emisi Gas Buang untuk pesawat udara yang digerakkan dengan mesin Turbin (*Fuel Venting And Exhaust Emission Requirement for Turbine Engine Powered Airplanes*);

- Mengingat :
1. Undang-Undang Republik Indonesia Nomor 1 Tahun 2009 tentang Penerbangan (Lembaran Negara Republik Indonesia Tahun 2009 Nomor 1, Tambahan Lembaran Negara Republik Indonesia Nomor 4956);
  2. Peraturan Pemerintah Nomor 3 Tahun 2001 tentang Keamanan dan Keselamatan Penerbangan (Lembaran Negara Republik Indonesia Tahun 2001 Nomor 9, Tambahan Lembaran Negara Nomor 4075);
  3. Peraturan Presiden Nomor 24 Tahun 2010 tentang Kedudukan, Tugas dan Fungsi Kementerian Negara serta Susunan Organisasi, Tugas dan Fungsi Eselon I Kementerian Negara, sebagaimana telah diubah terakhir dengan Peraturan Presiden Nomor 135 Tahun 2014;
  4. Peraturan Presiden Nomor 7 Tahun 2015 tentang Organisasi Kementerian Negara (Lembaran Negara Republik Indonesia Tahun 2015 Nomor 8);
  5. Peraturan Menteri Perhubungan Nomor KM 28 Tahun 2009 tentang Peraturan Keselamatan Penerbangan Sipil Bagian 34 Amandemen 1 (*Civil Aviation Safety Regulations Part 34 Amendment 1*) tentang Persyaratan Bahan Bakar Terbuang dan Emisi Gas Buang untuk Pesawat Udara yang Digerakkan dengan Mesin Turbin (*Fuel Venting and Exhaust Emission Requirements for Turbine Engine Powered Airplanes*);
  6. Peraturan Menteri Perhubungan Nomor KM 60 Tahun 2010 tentang Organisasi dan Tata Kerja Kementerian Perhubungan sebagaimana telah diubah dengan Peraturan Menteri Perhubungan Nomor PM 68 Tahun 2013;
  7. Peraturan Menteri Perhubungan Nomor 41 Tahun 2011 tentang Organisasi dan Tata Kerja Kantor Otoritas Bandar Udara;
  8. Peraturan Menteri Nomor 63 Tahun 2011 tentang Kriteria, Tugas, dan Wewenang Inspektur Penerbangan sebagaimana telah diubah terakhir dengan Peraturan Menteri Perhubungan Nomor PM 98 Tahun 2011;

MEMUTUSKAN:

- Menetapkan :
- PERATURAN MENTERI PERHUBUNGAN TENTANG PERUBAHAN ATAS PERATURAN MENTERI PERHUBUNGAN NOMOR KM 28 TAHUN 2009 TENTANG PERATURAN KESELAMATAN PENERBANGAN SIPIL BAGIAN 34 AMANDEMEN 1 (*CIVIL AVIATION SAFETY REGULATIONS PART 34 AMENDMENT 1*) TENTANG PERSYARATAN BAHAN BAKAR TERBUANG DAN EMISI GAS BUANG UNTUK PESAWAT UDARA YANG DIGERAKKAN DENGAN MESIN TURBIN (*FUEL VENTING AND EXHAUSE EMISSION REQUIREMENT FOR TURBIN ENGINE POWERED AIRPLANES*).

## Pasal I

Beberapa ketentuan dalam Lampiran Peraturan Menteri Perhubungan Nomor KM 28 Tahun 2009 tentang Peraturan Keselamatan Penerbangan Sipil Bagian 34 Amandemen 1 (*Civil Aviation Safety Regulations Part 34 Amendment 1*) tentang Persyaratan Bahan Bakar Terbuang dan Emisi Gas Buang untuk pesawat udara yang digerakkan dengan mesin Turbin (*Fuel Venting And Exhaust Emission Requirement for Turbine Engine Powered Airplanes*), diubah sebagai berikut:

1. Ketentuan butir 34.0 diubah sehingga berbunyi sebagai berikut:

This Civil Aviation Safety Regulation (CASR) Part 34 sets the implementing rules of Fuel Venting and Exhaust Emission Requirements For Turbine Engine Powered Airplanes as required by Aviation Act Number 1, 2009 Chapter VIII "Airworthiness and Aircraft Operational" Article 37.

2. Ketentuan butir 34.1 ditambahkan definisi sebagai berikut:

*Characteristic level* has the meaning given in Appendix 6 of ICAO Annex 16 as of July 2008. The characteristic level is a calculated emission level for each pollutant based on a statistical assessment of measured emissions from multiple tests.

*Derivative engine for emissions certification purposes* means an engine that has the same or similar emissions characteristics as an engine covered by a type certificate issued under CASR part 33. These characteristics are specified in Section 34.48.

*Introduction date* means the date of manufacture of the first individual production engine of a given engine model or engine type certificate family to be certificated. Neither test engines nor engines not placed into service affect this date.

*Tier*, as used in this part, is a designation related to the NO<sub>x</sub> emission standard for the engine as specified in CASR Part 34 Sec. 34.21 or Sec. 34.23 of this part (e.g., Tier 0).

CO<sub>2</sub> Carbon dioxide.

kN Kilonewton(s)

kW Kilowatt(s)

lb Pound(s)

3. Menambahkan ketentuan butir 34.9 yang berbunyi sebagai berikut:

*Spare engines.* Certain engines that meet the following description are excepted:

- (1) This exception allows production of an engine for installation on an in-service aircraft. A spare engine may not be installed on a new aircraft.
- (2) Each spare engine must be identical to a sub-model previously certificated to meet all applicable requirements.
- (3) A spare engine may be used only when the emissions of the spare do not exceed the certification requirements of the original engine, for all regulated pollutants.
- (4) No separate approval is required to produce spare engines.
- (5) The record for each engine excepted under this paragraph (c) must indicate that the engine was produced as an excepted spare engine.
- (6) Engines produced under this exception must be labeled "EXCEPTED SPARE" in accordance with Sec. 45.13 of this CASR.

On and after July 18, 2012, and before August 31, 2013, a manufacturer may produce up to six Tier 4 compliant engines that meet the NO<sub>x</sub> standards of paragraph (d)(1)(vi) of this section rather than Sec. 34.23(a)(2). No separate approval is required to produce these engines. Engines produced under this exception are to be labeled "COMPLY" in accordance with CASR Part 45 Sec 45.13

4. Ketentuan huruf a pada butir 34.10 diubah sehingga butir 34.10 berbunyi sebagai berikut:

- (a) The provisions of this subpart are applicable to all new aircraft gas turbine engines of classes T3, T8, TSS, and TF equal to or greater than 36 kilonewtons (8090 pounds) rated output, manufactured on or after January 1, 1974, and to all in-use aircraft gas turbine engines of classes T3, T8, TSS, and TF equal to or greater than 36 kilonewtons (8090 pounds) rated output manufactured after February 1, 1974.
- (b) The provisions of this subpart are also applicable to all new aircraft gas turbine engines of class TF less than 36 kilonewtons (8090 pounds) rated output and class TP manufactured on or after January 1, 1975, and to all in-use aircraft gas turbine engines of class TF less than 36 kilonewtons (8090 pounds) rated output and class TP manufactured after January 1, 1975.
- (c) To all in operated aircraft gas turbine engine of classes stated in paragraph (a) and (b) of this section shall comply with the provisions of this subpart not later than December 31, 1995.

5. Ketentuan butir 34.21 diubah sehingga butir 34.21 berbunyi sebagai berikut:

- (a) Exhaust emissions of smoke from each new aircraft gas turbine engine of class T8 manufactured on or after February 1, 1974, shall not exceed a smoke number (SN) of 30.
- (b) Exhaust emissions of smoke from each new aircraft gas turbine engine of class TF and of rated output of 129 kilonewtons (29,000 pounds) thrust of greater, manufactured on or after January 1, 1976, shall not exceed.

$SN = 83.6 (rO) - 0.274 (rO \text{ is in kilonewtons})$ .

- (c) Exhaust emissions of smoke from each new aircraft gas turbine engine of class T3 manufactured on or after January 1, 1978, shall not exceed a smoke number (SN) of 25.
- (d) Gaseous exhaust emissions from each new aircraft gas turbine engine shall not exceed:

(1) For Classes TF, T3, T8 engines greater than 26.7 kN (6,000 lb) rated output:

- (i) Engines manufactured on or after January 1, 1984:

Hydrocarbons: 19.6 g/kN rO.

- (ii) Engines manufactured on or after July 7, 1997:

Carbon Monoxide: 118 g/kN rO.

- (iii) Engines of a type or model of which the date of manufacture of the first individual production model was on or before December 31, 1995, and for which the date of manufacture of the individual engine was on or before December 31, 1999 (Tier 2):

Oxides of Nitrogen:  $(40 + 2(rPR))$  g/kN rO.

- (iv) Engines of a type or model of which the date of manufacture of the first individual production model was after December 31, 1995, or for which the date of manufacture of the individual engine was after December 31, 1999 (Tier 2):

Oxides of Nitrogen:  $(32 + 1.6(rPR))$  g/kN rO.

(v) The emission standards prescribed in paragraphs (d)(1)(iii) and (iv) of this section apply as prescribed beginning July 7, 1997.

(vi) The emission standards of this paragraph apply as prescribed after December 18, 2005. For engines of a type or model of which the first individual production model was manufactured after December 31, 2003 (Tier 4):

(A) That have a rated pressure ratio of 30 or less and a maximum rated output greater than 89 kN:

Oxides of Nitrogen:  $(19 + 1.6(\text{rPR})) \text{ g/kN rO}$ .

(B) That have a rated pressure ratio of 30 or less and a maximum rated output greater than 26.7 kN but not greater than 89 kN:

Oxides of Nitrogen:  $(37.572 + 1.6(\text{rPR}) - 0.2087(\text{rO})) \text{ g/kN rO}$ .

(C) That have a rated pressure ratio greater than 30 but less than 62.5, and a maximum rated output greater than 89 kN:

Oxides of Nitrogen:  $(7 + 2(\text{rPR})) \text{ g/kN rO}$ .

(D) That have a rated pressure ratio greater than 30 but less than 62.5, and a maximum rated output greater than 26.7 kN but not greater than 89 kN:

Oxides of Nitrogen:  $(42.71 + 1.4286(\text{rPR}) - 0.4013(\text{rO}) + 0.00642(\text{rPR} \times \text{rO})) \text{ g/kN rO}$ .

(E) That have a rated pressure ratio of 62.5 or more:

Oxides of Nitrogen:  $(32 + 1.6(\text{rPR})) \text{ g/kN rO}$ .

(2) For Class TSS Engines manufactured on or after January 1, 1984:

Hydrocarbons:  $140 (0.92)^{\text{rPR}} \text{ g}$ .

(e) Smoke exhaust emissions from each gas turbine engine of the classes specified below shall not exceed:

- (1) Class TF of rated output less than 26.7 kilonewtons (6000 pounds) manufactured on or after August 9, 1985

$SN=83.6(rO)-0.274(rO)$  (rO is in kilonewtons) not to exceed a maximum of  $SN=50$ .

- (2) Classes T3, T8, TSS and TF of rated output equal to or greater than 26.7 kilonewtons (6000 pounds) manufactured on or after January 1, 1984.

$SN=83.6(rO)-0.274(rO)$  (rO is in kilonewtons) not to exceed a maximum of  $SN=50$ .

- (3) For class TP of rated output equal to or greater than 1,000 kilowatts manufactured on or after January 1, 1984.

$SN=187(ro)-0.168(ro)$  (ro is in kilowatts)

- (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 operating cycles set forth in the applicable sections of subpart G of this part; and exhaust smoke emissions emitted during operations of the engine as specified in the applicable sections of subpart H of this part, measured and calculated in accordance with the procedures set forth in those subparts.

- (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 Sec. 34.60

6. Menambah ketentuan butir 34.23 yang berbunyi sebagai berikut:

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 Sec. 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):

*Tier 6 Oxides of Nitrogen Emission Standards for Subsonic Engines*

| Class      | Rated pressure ratio—rPR | Rated output rO (kN) | NO <sub>x</sub> (g/kN)                                       |
|------------|--------------------------|----------------------|--|
| TF, T3, T8 | rPR ≤ 30                 | 26.7 < rO ≤ 89.0     | 38.5486 + 1.6823 (rPR) - 0.2453 (rO) - (0.00308 (rPR) (rO)). |
|            |                          | rO > 89.0            | 16.72 + 1.4080 (rPR).  |
|            | 30 < rPR < 82.6          | 26.7 < rO ≤ 89.0     | 46.1600 + 1.4286 (rPR) - 0.5303 (rO) + (0.00642 (rPR) (rO)). |
|            |                          | rO > 89.0            | -1.04 + 2.0 (rPR).   |
|            | rPR ≥ 82.6               | rO ≥ 26.7            | 32 + 1.6 (rPR).  |

(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:

[RESERVE] NOTE : FOR SUPERSONIC N/A

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

(5) 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):

*TIER 8 OXIDES OF NITROGEN EMISSION STANDARDS FOR SUBSONIC ENGINES*

| Class      | Rated pressure ratio—rPR | Rated output rO (kN) | NO <sub>x</sub> (g/kN)                                       |
|------------|--------------------------|----------------------|--|
| TF, T3, T8 | rPR ≤ 30                 | 26.7 < rO ≤ 89.0     | 40.052 + 1.5681 (rPR) - 0.3615 (rO) - (0.0018 (rPR) (rO)).   |
|            |                          | rO > 89.0            | 7.88 + 1.4080 (rPR).   |
|            | 30 < rPR < 104.7         | 26.7 < rO ≤ 89.0     | 41.9435 + 1.505 (rPR) - 0.5823 (rO) + (0.005562 (rPR) (rO)). |
|            |                          | rO > 89.0            | -9.88 + 2.0 (rPR).   |
|            | rPR ≥ 104.7              | rO ≥ 26.7            | 32 + 1.6 (rPR).  |

- (b) Engines (including engines that are determined to be derivative engines for the purposes of emission certification) type certificated with characteristic levels at or below the NO<sub>x</sub> standards of § 34.21(d)(1)(vi) of this part (as applicable based on rated output and rated pressure ratio) and introduced before July 18, 2012, may be produced through December 31, 2012, without meeting the NO<sub>x</sub> standard of paragraph (a)(2) of this section.

7. Menambah ketentuan butir 34.48 yang berbunyi sebagai berikut:

- (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 DGCA 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 DGCA 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 DGCA 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 NO<sub>x</sub>
- (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% of the applicable standard for each pollutant, the applicant may use engineering analysis consistent with good engineering judgment to demonstrate that the derivative engine will not exceed the applicable emission standards. The engineering analysis must address all modifications from the original engine, including those approved for previous derivative engines.
- (c) Continued *production allowance*. Derivative engines for emissions certification purposes may continue to be produced after the applicability date for new emissions standards when the engines conform to the specifications of this section.
- (d) *Non-derivative engines*. If the DGCA determines that an engine model does not meet the requirements for a derivative engine for emissions certification purposes, the type certificate holder is required to demonstrate that the engine complies with the emissions standards applicable to a new engine type
8. Ketentuan butir 34.60 diubah sehingga butir 34.60 berbunyi sebagai berikut:
- (a) Use the equipment and procedures specified in Appendix 3, Appendix 5, and Appendix 6 of ICAO Annex 16, as applicable, to demonstrate whether engines meet the applicable gaseous emission standards specified in subpart C of this part. Measure the emissions of all regulated gaseous pollutants. Use the equipment and procedures specified in Appendix 2 and Appendix 6 of ICAO Annex 16 to determine whether engines meet the applicable smoke standard specified in subpart C of this part. The compliance demonstration consists of establishing a mean value from testing the specified 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 that meets the specifications described in Appendix 4 of ICAO Annex 16. 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) DGCA may approve alternative procedures for measuring emissions, including testing and sampling methods, analytical techniques, and equipment specifications that differ from those specified in this part. Manufacturers and operators may request approval of alternative procedures by written request with supporting justification to the DGCA. To be approved, one of the following conditions must be met:
  - (1) The engine cannot be tested using the specified procedures; or
  - (2) The alternative procedure is shown to be equivalent to, or more accurate or precise than, the specified procedure.
- (f) The following landing and takeoff (LTO) cycles apply for emissions testing and for calculating weighted LTO values:

*LTO TEST CYCLES AND TIME IN MODE*

- (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 the applicable appendix of Annex 16.
- (h) The system and procedure for sampling and measurement of gaseous emissions shall be as specified by in Appendices 2, 3, 4, 5 and 6 to the International Civil Aviation Organization (ICAO) Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Third Edition, July 2008.

Pasal II

Peraturan Menteri ini mulai berlaku pada tanggal diundangkan.

Agar setiap orang mengetahuinya, memerintahkan pengundangan Peraturan Menteri Perhubungan ini dengan penempatannya dalam Berita Negara Republik Indonesia.

Ditetapkan di Jakarta  
pada tanggal 20 Februari 2015

MENTERI PERHUBUNGAN  
REPUBLIK INDONESIA,

ttd

IGNASIUS JONAN

Diundangkan di Jakarta  
pada tanggal 23 Februari 2015

MENTERI HUKUM DAN HAK ASASI MANUSIA  
REPUBLIK INDONESIA,

ttd

YASONNA H. LAOLY

BERITA NEGARA REPUBLIK INDONESIA TAHUN 2015 NOMOR 304

Salinan sesuai dengan aslinya

KEPALA BIRO HUKUM DAN KSLN,



SRI LESTARI RAHAYU

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