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Part IV

**Department of
Transportation**

Federal Aviation Administration

14 CFR Part 34

**Emission Standards for Turbine Engine
Powered Airplanes; Final Rule**

DEPARTMENT OF TRANSPORTATION**Federal Aviation Administration****14 CFR Part 34**

[Docket No. FAA-1999-5018; Amendment No. 34-3]

RIN 2120-AG68

Emission Standards for Turbine Engine Powered Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.
ACTION: Final rule.

SUMMARY: This document revises the emission standards for turbine engine powered airplanes to incorporate the current standards of the International Civil Aviation Organization (ICAO) for gaseous emissions of oxides of nitrogen (NO_x) and carbon monoxide (CO), and to adopt revised test procedures for gaseous emissions. This rule will bring the United States emissions standards into alignment with the standards of ICAO. Because, this rule is consistent with international standards, an emission certification test that meets U.S. requirements will meet ICAO requirements.

EFFECTIVE DATE: February 3, 1999.

The incorporation by reference of the publication listed in the rule is approved by the director of the Federal Register February 3, 1999.

FOR FURTHER INFORMATION CONTACT: Mr. Edward McQueen, Research and Engineering Branch (AEE-110), Office of Environment and Energy, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591, telephone (202) 267-3560.

SUPPLEMENTARY INFORMATION:**Availability of Final Rules**

An electronic copy of this document may be downloaded, using a modem and suitable communications software, from the FAA regulations section of the Fedworld electronic bulletin board service (telephone: 703-321-3339), the Government Printing Office's electronic bulletin board service (telephone: 202-512-1661), or the FAA's Aviation Rulemaking Advisory Committee Bulletin Board service (telephone 800-322-2722 or 202-267-5948).

Internet users may reach the FAA's web page at <http://www.faa.gov/avr/arm/nprm/nprm.htm> or the Government Printing Office's webpage at <http://www.access.gpo.gov/nara/aces/aces140.html> for access to recently published rulemaking documents.

Any person may obtain a copy of this final rule by submitting a request to the

Federal Aviation Administration Office of Rulemaking, ARM-1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267-9680. Communications must identify the amendment number or docket number of this final rule.

Persons interested in being placed on the mailing list for future Notices of Proposed Rulemaking and Final Rules should request from the above office a copy of Advisory Circular No. 11-2A, Notice of Proposed Rulemaking Distribution System, that describes the application procedure.

Small Entity Inquiries

The Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires the FAA to report inquiries from small entities concerning information on, and advice about, compliance with statutes and regulations within the FAA's jurisdiction, including interpretation and application of the law to specific sets of facts supplied by a small entity.

If you are a small entity and have a question concerning this rule, contact your local FAA official. If you do not know how to contact your local FAA official, you may contact Charlene Brown, Program Analyst Staff, Office of Rulemaking, ARM-27, Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, 1-888-551-1594. Internet users can find additional information on SBREFA in the "Quick Jump" section of the FAA's web page at <http://www.faa.gov> and may send electronic inquiries to the following Internet address: 9-AWA-SBREF@faa.gov

Background

Section 232 of the Clean Air Act Amendments of 1970 (the Act), 42 U.S.C. 7401 *et. seq.*, requires the Federal Aviation Administrations (FAA) to issue regulations that ensure compliance with all aircraft emission standards promulgated by the Environmental Protection Agency (EPA) under Section 231 of the Act. The EPA has promulgated standards for engine fuel venting emissions, engine smoke emissions, and exhaust gaseous emissions of unburned hydrocarbons (HC), oxides of nitrogen NO_x, and carbon monoxide (CO). These emission standards are prescribed in 40 CFR part 87.

Since the promulgation of the initial U.S. standards in 1973 by the EPA, the FAA has worked with the International Civil Aviation Organization (ICAO) on the development of international aircraft engine exhaust emissions standards for NO_x, CO, HC, and smoke (SN).

Currently, the FAA regulations governing aircraft engine exhaust emissions do not include NO_x and CO. This rule amends 14 CFR Part 34 to add the standards for NO_x and CO that were adopted by the EPA in July 1997.

Analysis of the Rule as Adopted*Section 34.1*

Section 34.1 is amended by expanding the definition of Class TF so that it would apply to new engine development programs such as propfan, unducted fan, and advanced ducted propfan (ADP) engines.

Section 34.2

Section 34.2 is amended by adding the abbreviations for Carbon Monoxide (CO) and Oxides of Nitrogen (NO_x), the two emissions standards being added to the regulations.

Section 34.21(d), (d)(1), and (e)(3)

In section 34.21, paragraphs (d), (d)(1) and (e)(3) are being amended to add CO and NO_x standards for exhaust emissions as requirements for newly manufactured aircraft gas turbine engines of rated thrust greater than 26.7 Kilonewtons (kN). This change will make U.S. and international emissions standards and test procedures compatible.

Section 34.60(c)

Section 34.60(c) is amended to require a NO_x measurement as part of the test procedures for engine exhaust gaseous emissions. This change is necessary to provide the data from which compliance with the new NO_x standard may be demonstrated.

Section 34.61

Section 34.61 is amended by adjusting the allowable ranges of values in the properties of the fuel specifications to be used in aircraft turbine engine emission testing. This change will allow a wider band of test fuel acceptability without degradation in emission data quality and make U.S. and international emissions standards and test procedures compatible.

Section 34.62(a)(2)

Section 34.62(a)(2) is amended by adding CO emissions to the taxi/idle operating modes of the test procedure. This change is necessitated by the addition of the CO standard, and will make U.S. international emissions test procedures for engine exhaust gaseous emissions compatible.

Section 34.64

Section 34.64 is amended by incorporating by reference the most

recent version of ICAO Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, July 1993. Appendices 3 and 5 of this document specify the system and procedures for sampling and measurement of gaseous emissions. This change is necessitated by the addition of the CO and NO_x standards, and will make U.S. and international emissions test procedures for engine exhaust gaseous emissions compatible.

Section 34.71

Section 34.71 is amended by incorporating by reference the most recent version of ICAO Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, dated July 1993. Appendices 3 and 5 of this document specify the system and procedures for sampling and measurement of gaseous emissions. This change is necessitated by the addition of the CO and NO_x standards, and will make U.S. and international emissions test procedures for engine exhaust gaseous emissions compatible.

Section 34.82

Section 34.82 is amended by incorporating by reference the most recent version of ICAO Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, dated July 1993. Appendices 3 and 5 of this document specify the system and procedures for sampling and measurement of smoke emissions. This change will make U.S. and international emissions test procedures for engine smoke emissions compatible.

Section 34.89

Section 34.89 is amended by incorporating by reference the most recent version of ICAO Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, dated July 1993. Appendices 3 and 5 of this document specify the system and procedures for sampling and measurement of smoke emissions. This change will make U.S. and international emissions test procedures for engine smoke emissions compatible.

Paperwork Reduction Act

There are no requirements for information collection associated with this final rule; accordingly, no analysis under the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) is required.

International Compatibility

The FAA has reviewed corresponding International Civil Aviation Organization standards and recommended practices and Joint

Aviation Airworthiness Authorities requirements and has identified no differences in these amendments and the foreign regulations. These changes are intended to make the U.S. and international standards more compatible.

Regulatory Evaluation Summary

Proposed and final rule changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effect of regulatory changes on international trade. Finally, Public Law 104-4 requires federal agencies to assess the impact of any federal mandates on state, local, tribal governments, and the private sector.

In conducting these analyses, the Federal Aviation Administration (FAA) has determined that the final rule will generate benefits that justify its costs and is not "a significant regulatory action" as defined under section 3(f) of Executive Order 12866 and Department of Transportation Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). The final rule will not have a significant impact on a substantial number of small entities and will not constitute a barrier to international trade. In addition, this final rule does not contain any Federal intergovernmental mandates, but does contain a private sector mandate. However, because expenditures by the private sector will not exceed \$100 million annually, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

Overview

In July, 1997, the Environmental Protection Agency (EPA) amended existing United States regulations governing the exhaust emissions from new commercial gas turbine aircraft engines. Under authority of section 231 of the Clean Air Act (the Act), the EPA promulgated new emission standards for oxides of nitrogen (NO_x) and carbon monoxide (CO) for newly manufactured and newly certified commercial gas turbine aircraft engines. The EPA action codified the NO_x and CO emission standards of the United Nations International Civil Aviation Organization (ICAO). As a result, U.S.

emission standards are in alignment with internationally adopted standards.

This final rule amends Part 34 of Title 14 of the Code of Federal Regulations (14 CFR Part 34) to ensure that it contains the same aircraft emission standards as those promulgated by the EPA in 40 CFR Part 87. A full regulatory evaluation of the potential monetary costs that would be imposed and benefits generated (including separate analyses for regulatory flexibility, international trade impact, and unfunded mandates) is usually prepared for FAA rulemaking actions. However, this regulation brings FAA rules into conformity with EPA rules, which have already been issued. Therefore, a full regulatory evaluation is unwarranted because the FAA is not imposing a new rule on the aviation industry, and any costs associated with these changes have been accounted for by the EPA rule (62 FR 25356, May 8, 1997). Thus, for the aforementioned reason, an abbreviated regulatory evaluation has been prepared for this final rule, which will serve as both the summary and full regulatory evaluation.

Costs

On July 7, 1997, EPA issued a final rule amending regulations governing the exhaust emissions from aircraft and aircraft engines, emission standards, and test procedures. The EPA estimated that their action will impose no additional burden on manufacturers. This final rule puts forth the FAA's responsibility to enforce the EPA's revised emission standards.

Aircraft manufacturers and affected aircraft parts manufacturers are currently meeting the NO_x and CO emission standards that EPA adopted. Therefore, the FAA has determined that because the emission test procedures are widely applied and accepted, little or no costs will be incurred by the aviation industry as a result of the FAA's action.

Benefits

This final rule will ensure that the public receives the air quality benefits established by the Clean Air Act. These certification testing rules are consistent with ICAO's standards, and emission certification test procedures. This harmonization of U.S. emission requirements with ICAO emission requirements is expected to reduce certificate testing requirements for newly manufactured aircraft engines and could help the sale of U.S. aviation products abroad.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 establishes "as a principle of regulatory

issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation." To achieve that principal, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis (RFA) as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 Act provides that the head of the agency may so certify and a RFA is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear. The rule incorporates current ICAO standards already met by the impacted aircraft manufacturers and aircraft parts manufacturers of commercial gas turbine engines, this rule does not add additional cost to the aviation industry. In addition, in July 1997, the EPA issued a final rule amending regulations governing the exhaust emissions from aircraft and aircraft engines, emission standards, and test procedures. This final rule does not add any additional costs on the aviation industry. This rule only puts forth the FAA's responsibility to enforce the EPA's emission standards. Accordingly, the FAA certifies that this rule will not have a significant economic impact on a substantial number of small entities.

International Trade Impact Assessment

This final rule will not impose a competitive disadvantage to either U.S. air carriers doing business abroad or foreign air carriers doing business in the United States. However, it could positively affect the sale of United States aviation products or services in foreign countries due to the harmonization and consistency for certification testing between United States and international emission standards and control program requirements.

Federalism Implications

The regulations herein will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution accordance with Executive Order 12612, it is determined that this rule will not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of \$100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This rule does not contain any Federal intergovernmental mandates, but does contain a private sector mandate. Since expenditures by the private sector will not exceed \$100 million annually, as the result of little or no costs imposed by this final rule, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

Environmental Analysis

Pursuant to Department of Transportation, "Policies and Procedures for Considering Environmental Impacts" (FAA Order 1050.1D, Appendix 7, paragraph 4,

Change 3, December 5, 1986), the FAA is categorically excluded from providing an environmental analysis with regard to Part 34. It is mandated by law to issue regulations to ensure compliance with the EPA aircraft emissions standards and the EPA has performed all required environmental analyses prior to the issuance of those standards.

Determination of Effective Date

This regulation is being promulgated as a final rule without notice and opportunity for prior public comment. Since the regulations adopted in this rule were adopted by the EPA in 1997 in 40 CFR part 87 and are already required for aircraft engine certification under those regulations, the FAA has determined that notice and prior public comment are necessary. The FAA does not anticipate that a request for public comment at this time would result in a receipt of useful information. Opportunity for public comment was provided by the EPA, and comments received were addressed by that agency.

For the same reason, the FAA has determined that good cause exists for making this amendment effective in less than 30 days. Compliance with these regulations has been required since their promulgation by the EPA in 1997.

List of Subjects in 14 CFR Part 34

Air pollution control, Aircraft, Incorporation by reference.

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends part 34 of Title 14, Code of Federal Regulations (14 CFR part 34) as follows:

PART 34—FUEL VENTING AND EXHAUST EMISSION REQUIREMENTS FOR TURBINE ENGINE POWERED AIRPLANES

1. The authority citation for part 34 continues to read as follows:

Authority: 42 U.S.C. 4321 et seq., 7572; 49 U.S.C. 106(g), 40113, 44701-44702, 44704, 44714.

2. Section 34.1 is amended by revising the definition of "Class TF", to read as follows:

§ 34.1 Definitions.

* * * * *

Class TF means all turbofan or turbojet aircraft engines or aircraft engines designed for applications that otherwise would have been fulfilled by turbojet and turbofan engines except engines of class T3, T8, and TSS.

* * * * *

3. Section 34.2 is amended by adding the following abbreviations in alphabetical order to read as follows:

§ 34.2 Abbreviations.

- * * * * *
- CO Carbon Monoxide
- * * * * *
- NO_x Oxides of Nitrogen
- * * * * *

Subpart C—Exhaust Emissions (New Aircraft Gas Turbine Engines)

4. Section 34.21 is amended by revising paragraphs (d) and (e)(3) to read as follows:

§ 34.21 Standards for exhaust emissions.

- * * * * *
- (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 kilonewtons (6000 pounds) rated output:
 - (i) Engines manufactured on or after January 1, 1984:
 - Hydrocarbons: 19.6 grams/kilonewton r0.
 - (ii) Engines manufactured on or after July 7, 1997.
 - Carbon Monoxide: 118 grams/kilonewton r0.
 - (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:
 - Oxides of Nitrogen: (40+2(rPR)) grams/kilonewtons r0.
 - (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:
 - Oxides of Nitrogen: (32+1.6 (rPR)) grams/kilonewtons r0.
 - (v) The emission standards prescribed in paragraphs (d)(1)(iii) and (iv) of this section apply as prescribed beginning July 7, 1997.
 - (2) For Class TSS Engines manufactured on or after January 1, 1984:
 - Hydrocarbons=140 (0.92)^{rPR} grams/kilonewtons r0.
 - (e) * * *
 - (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 is in kilowatts)
 - * * * * *

Subpart G—Test Procedures for Engine Exhaust Gaseous Emissions (Aircraft and Aircraft Gas Turbine Engines)

5. Section 34.60 is amended by revising paragraph (c) to read as follows:

§ 34.60 Introduction.

(c) The exhaust emission test is designed to measure concentrations of hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen, and to determine mass emissions through calculations during a simulated aircraft landing-takeoff cycle (LTO). The LTO cycle is based on time in mode data during high activity periods at major airports. The test for propulsion engines consists of at least the following four modes of engine operation: taxi/idle, takeoff, climbout, and approach. The mass emission for the modes are combined to yield the reported values.

6. Section 34.61 is revised to read as follows:

§ 34.61 Turbine fuel specifications.

For exhaust emission testing, fuel that meets 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.

SPECIFICATION FOR FUEL TO BE USED IN AIRCRAFT TURBINE ENGINE EMISSION TESTING

| Property | Allowable range of values |
|---|---------------------------|
| Density 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 /sec. | 2.5–6.5. |

7. Section 34.62 is amended by revising paragraph (a)(2) to read as follows:

§ 34.62 Test procedure (propulsion engines).

- (a)(1) * * *
- (2) The taxi/idle operating modes shall be carried out at a power setting of 7% rated thrust unless the Administrator 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 Administrator shall specify an alternative test condition.

8. Section 34.64 is revised to read as follows:

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

The system and procedures for sampling and measurement of gaseous emissions shall be as specified in Appendices 3 and 5 to the International Civil Aviation Organization (ICAO) Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, July 1993. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. This document can be obtained from the International Civil Aviation Organization (ICAO), Document Sales Unit, P.O. Box 400, Succursale: Place de L'Aviation Internationale, 1000 Sherbrooke Street West, Suite 400, Montreal, Quebec, Canada H3A 2R2. Copies may be reviewed at the FAA Office of the Chief Counsel, Rules Docket, Room 916, Federal Aviation Administration Headquarters Building, 800 Independence Avenue, SW., Washington, DC, or at the FAA New England Regional Office, 12 New England Executive Park, Burlington, Massachusetts, or at the Office of Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

9. Section 34.71 is revised to read as follows:

§ 34.71 Compliance with gaseous emission standards.

Compliance with each gaseous emission standard by an aircraft engine shall be determined by comparing the pollutant level in grams/kilonewton/thrust/cycle or grams/kilowatt/cycle as calculated in § 34.64 with the applicable emission standard under this part. An acceptable alternative to testing every engine is described in Appendix 6 to ICAO Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, July 1993, effective March 20, 1997. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. This document can be obtained from, and copies may be reviewed at, the

respective addresses listed in § 34.64. Other methods of demonstrating compliance may be approved by the FAA Administrator with the concurrence of the Administrator of the EPA.

10. Section 34.82 is revised to read as follows:

§ 34.82 Sampling and analytical procedures for measuring smoke exhaust emissions.

The system and procedures for sampling and measurement of smoke emissions shall be as specified in Appendix 2 to ICAO Annex 16, Volume II, Environmental Protection, Aircraft Engine Emissions, Second Edition, July 1993. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5

U.S.C. 552(a) and 1 CFR part 51. This document can be obtained from, and copies may be reviewed at, the respective addresses listed in § 34.64.

11. Section 34.89 is revised to read as follows:

§ 34.89 Compliance with smoke emission standards.

Compliance with each smoke emission standard shall be determined by comparing the plot of SN as a function of power setting with the applicable emission standard under this part. The SN at every power setting must be such that there is a high degree of confidence that the standard will not be exceeded by any engine of the model being tested. An acceptable alternative to testing every engine is described in

Appendix 6 to ICAO Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, July 1993. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. This document can be obtained from the address listed in § 34.64. Other methods of demonstrating compliance may be approved by the Administrator with the concurrence of the Administrator of the EPA.

Issued in Washington, DC, on January 20, 1999.

Jane F. Garvey,

Administrator.

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