

**FAA Validation of EASA State of Design Turbine Aircraft Engines
 FAA Significant Standards Difference Summary List
 Per FAA-EASA Technical Validation Procedures (TIP) Revision 6**

**14 CFR Part 34 Amendment 5A compared to CS-E Amendment 2
 Dated March 21, 2018**

SSD	Subject	14 CFR Section	Remarks
1	Standard for Fuel Venting Emissions	34.11	1. Section 34.11 does not allow any fuel to be released from the engine into the atmosphere following engine shut down. The FAA requirement addresses liquid and vaporized fuel, after engine shut down. 2. Section 34.11(c) specifies three acceptable means of compliance for engine/aircraft certification.
2	Standard for Exhaust Emissions	§34.21(a), (b), (c), and (e), §34.23(a)(1) and §34.31(a) and (b) 34.21(e)(3)	1. FAA's smoke number (SN) regulations are covered under §34.21(a), (b), (c), and (e), §34.23(a)(1) and §34.31(a) and (b). These regulations apply to all the engine classes. The SN regulations identify the maximum smoke number for the given engine class and thrust ratings. These regulatory limits have not been adjusted since their promulgations and require compliance to the peak smoke number at any thrust setting not only at the four LTO operating mode thrust settings. 2. The § 34.21(e)(3) requirements for turboprop engines with rated output (takeoff) power greater than or equal to 1,000 kW includes a specific smoke number regulation.

Notes:

- 1) In accordance with Title 14 Code of Federal Regulations (14 CFR) 21.29 and the Technical Implementation Procedures for Airworthiness and Environmental Certification between the Federal Aviation Administration of the United States of America and the European Aviation Safety Agency of the European Union, Revision 6, dated September 22, 2017, (TIP Rev 6), the FAA here prescribes additional requirements relative to CS-34 to provide fuel venting, and exhaust emission levels no greater than those provided by 14 CFR part 34.
- 2) Reference detail SSD write ups for additional information including guidance material.

Approved by:

RALPH JOSEPH IOVINELLI Digitally signed by RALPH JOSEPH IOVINELLI
 Date: 2018.03.22 10:22:47 -04'00'

Manager, Emissions Division (AEE-300)
 Office of Environment and Energy

ROBERT J GANLEY Digitally signed by ROBERT J GANLEY
 Date: 2018.03.22 10:40:53 -04'00'

Manager, Engine and Propeller Standards Branch, (AIR-6A0)
 Policy and Innovation Division
 Aircraft Certification Service

Significant Standards Differences (SSD) Detail Description
14 CFR part 34 Amendment 5A versus CS-34 Amendment 2
Engine Fuel Venting Emissions § 34.11 vs CS-34
March 21, 2018

A. Summary:

In accordance with Title 14 Code of Federal regulations (14 CFR) 21.29 and the Technical Implementation Procedures for Airworthiness and Environmental Certification between the Federal Aviation Administration of the United States of America and the European Aviation Safety Agency of the European Union, Revision 6, dated September 22, 2017, (TIP Rev 6), the FAA here prescribes additional requirements relative to CS-34 to provide fuel venting emission levels no greater than those provided by 14 CFR part 34.11 as described below.

B. Regulatory Comparison:

1. Section 34.11 does not allow any fuel to be released from the engine into the atmosphere following engine shut down. The FAA requirement addresses liquid and vaporized fuel, after engine shut down.
 - a. CS-34 and ICAO Annex 16 Volume II do not consider fuel venting vapors to the atmosphere as part of the fuel venting assessment.
 - b. The requirement in CS-34 primarily focuses on liquid fuel release outside the engine case.
2. Section 34.11(c) specifies three acceptable means of compliance for engine/aircraft certification.
 - a. CS-34, Amendment 2 does not specify acceptable design features or methods of compliance.

C. Guidance Material:

1. FAA Advisory Circular (AC) 34-1B. Compliance with § 34.11 is determined by inspection of the method designed to eliminate these emissions.
2. Turbohaft engines are not required to comply with § 34.11.
3. The fuel venting requirements under § 34.11 have been in effect since the inception of 14 CFR part 34.
4. For example, a noncompliant design could include high pressure fuel released into the engine and subsequently to the atmosphere if fuel nozzle shutoff valves are not utilized.
5. Another noncompliant design could include fuel impinging on hot surfaces in the engine that results in release of fuel vapors to the atmosphere.

E. Applicable Amendment Pair:

These differences are applicable to the original publication and all amendments of 14 CFR part 34. 14 CFR part 34 latest amendment is applicable at time of certification.

Approved by: **RALPH JOSEPH IOVINELLI**

Digitally signed by RALPH JOSEPH IOVINELLI
Date: 2018.03.22 10:21:49 -04'00'

Manager, Emissions Division (AEE-300)
Office of Environment and Energy

**ROBERT J
GANLEY** Digitally signed by
ROBERT J GANLEY
Date: 2018.03.22
10:39:51 -04'00'

Manager, Engine and Propeller Standards Branch, (AIR-6A0)
Policy and Innovation Division
Aircraft Certification Service

File: SSD 14 CFR 34.11 Fuel Venting Amdt 5A vs CS-34 Amd 2.docx

Significant Standards Differences (SSD) Detail Description
14 CFR part 34 Amendment 5A versus CS-34 Amendment 2
Engine Exhaust Emissions § 34.21 vs CS-34
March 21, 2018

A. Summary:

In accordance with Title 14 Code of Federal regulations (14 CFR) 21.29 and the Technical Implementation Procedures for Airworthiness and Environmental Certification between the Federal Aviation Administration of the United States of America and the European Aviation Safety Agency of the European Union, Revision 6, dated September 22, 2017, (TIP Rev 6), the FAA here prescribes additional requirements relative to CS-34 to provide exhaust emission levels no greater than those provided by 14 CFR part 34.21 as described below.

B. Regulatory Comparison:

1. FAA's SN regulations are covered under §34.21(a), (b), (c), and (e), §34.23(a)(1) and §34.31(a) and (b). These regulations apply to all the engine classes. FAA's SN regulations identify the maximum smoke number for the given engine class and thrust ratings. These SN regulatory limits have not been adjusted since their promulgations and require compliance to the peak smoke number at any thrust setting not only at the four LTO operating mode thrust settings.
 - a. CS-34, Amendment 2 allows the maximum smoke number to be assessed only at the four LTO operating mode thrust settings (100%, 87%, 30%, and 7%).
2. The § 34.21(e)(3) requirements for turboprop engines with rated output (takeoff) power greater than or equal to 1,000 kW includes a specific smoke number regulation.
 - a. CS-34 does not have an equivalent regulatory requirement for this class of engine.

C. Guidance Material:

1. FAA Advisory Circular (AC) 34-1B, Fuel Venting and Exhaust Emission Requirements for Turbine Engine Powered Airplanes, June 27, 2003.
2. Testing requirements for compliance with 34.21 are prescribed in 14 CFR Subpart G (i.e. § 34.60).

D. Applicable Amendment Pair:

These differences are applicable to the original publication and all amendments of 14 CFR part 34. 14 CFR part 34 latest amendment is applicable at time of certification.

Approved by: **RALPH JOSEPH IOVINELLI** Digitally signed by RALPH JOSEPH IOVINELLI
Date: 2018.03.22 10:22:17 -04'00'

Manager, Emissions Division (AEE-300)
Office of Environment and Energy

ROBERT J GANLEY Digitally signed by ROBERT J GANLEY
Date: 2018.03.22 10:40:32 -04'00'

Manager, Engine and Propeller Standards Branch, (AIR-6A0)
Policy and Innovation Division
Aircraft Certification Service

File: SSD 14 CFR 34.21 and 33.23 Smoke Emissions Amdt 5A vs CS-34 Amd 2.docx