

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

**14 CFR Part 33 Amendment 34 compared to CS-E Amendment 4  
 Dated March 21, 2018**

<b>SSD</b>	<b>Subject</b>	<b>14 CFR Section</b>	<b>Remarks</b>
1	Instructions for Continued Airworthiness (ICA)	33.4, A33.1(b), A33.3, A33.3(b), A33.4(a)(2), A33.3(c)	1) 33.4 requires ICA instructions to be complete at type certification unless a program exists to ensure their completion prior to delivery of the first aircraft with the engine installed, or upon issuance of a standard certificate of airworthiness for the aircraft with the engine installed, whichever occurs later. 2) A33.1(b) requires that each engine ICA must include ICAs for all engine parts. 3) A33.3 requires ICAs to be in the English language. 4) A33.3(b) requires an Engine Overhaul Manual or Section in the ICAs. 5) A33.4(a)(2) requires an ICA Airworthiness Limitations FAA approval statement to support FAA regulatory authority. 6) A33.3(c) Requires engine condition monitoring for ETOPS eligibility.
2	Engine ratings and operating limitations. Reciprocating engine limits	33.7(b)(6) & (8)	1) 33.7(b)(6) requires limits for accessory drive torque and overhang moment. 2) 33.7(b)(8) requires limits for turbosupercharger turbine wheel rpm.
3	Durability (Propeller Blade Pitch Control Systems)	33.19(b)	1) 33.19(b) requires each component of the propeller blade pitch control system which is a part of the engine type design to meet the requirements of Sec. 35.21, 35.23, 35.42 and 35.43.
4	Turbine, compressor, fan, and turbosupercharger rotor overspeed.	33.27	1) Turbosuperchargers must comply with 33.27, i.e. compliance with CS-E 840 turbine engine requirements plus identified Turbine Engine SSD difference.
5	Turbocharger Rotors	33.34	1) Requires that all turbocharger fragments must be contained.
6	Lubrication System	33.39(a) & (c)	1) 33.39 (a) Requires demonstration for all flight attitudes and atmospheric conditions. Demonstration for wet sumps with only one-half of the maximum lubricant supply. 2) 33.39(c) Requires crankcase venting to preclude leakage of oil from excessive pressure.
7	Vibration Test	33.43	1) 33.43(a) requires testing using the same propeller load used during the endurance test. 2) 33.43 (c) requires that all engine output shafts be loaded.
8	Endurance Test	33.49 (d)	1) 33.49 (d) requires testing for helicopter engines.

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-E to provide a level of safety equivalent to that provided by 14 CFR part 33.
- 2) Reference detail SSD write ups for additional information including guidance material.

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

Significant Standards Differences (SSD) Detail Description  
14 CFR part 33 Amend 34 versus CS-E Amendment 4  
Instructions for Continued Airworthiness § 33.4 vs CS-E  
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-E 25 to provide a level of safety equivalent to that provided by the Instructions for Continued Airworthiness (ICA) requirement contained in 14 CFR part 33.4 and its appendices as described below.

**B. Regulatory Comparison:**

1. **33.4** requires ICA instructions to be complete at type certification unless a program exists to ensure their completion prior to delivery of the first aircraft with the engine installed, or upon issuance of a standard certificate of airworthiness for the aircraft with the engine installed, whichever occurs later.
  - a. EASA requires the same for ICAs in Part 21.A.61 with the allowance that the “availability of some manual or portion of the instructions for continued airworthiness, dealing with overhaul or other forms of heavy maintenance, may be delayed until after the product has entered into service, but shall be available before any of the products reaches the relevant age or flight-hours/cycles”.
2. **A33.1(b)** requires that each engine ICA must include ICAs for all engine parts. If ICAs are not supplied by the engine manufacturer for an engine part, the engine ICA must include the information essential to the continued airworthiness of the engine.
3. **A33.3** requires ICAs to be in the English language.
4. **A33.3(b)** requires an Engine Overhaul Manual or Section in the ICAs.
  - a. All approved engines must be capable of being overhauled; i.e. no throw away engines.
5. **A33.4(a)(2)** requires an ICA Airworthiness Limitations FAA approval statement to support FAA regulatory authority. “The Airworthiness Limitations section is FAA approved and specifies maintenance required under Sec. Sec. 43.16 and 91.403 of Title 14 of the Code of Federal Regulations unless an alternative program has been FAA approved.”
6. **A33.3(c)** Requires engine condition monitoring for ETOPS eligibility.
  - a. Compliance with AMC 20-6 revision II, Chapter II, Section 7 Paragraph (15) Engine Condition Monitoring meets this requirement.

**C. Guidance Material:**

**AC 33.4-1** dated 08/27/1999 and titled “Instructions for Continued Airworthiness”.

**AC 33.4-2** dated 03/08/2001 and titled “Instructions for Continued Airworthiness: In-Service Inspection of Safety Critical Turbine Engine Parts at Piece-Part Opportunity”.

**AC 33.4-3** dated 09/16/2005 and titled “Instructions for Continued Airworthiness, Aircraft Engine High Intensity Radiated Fields (HIRF) and Lightning Protection Features”.

**PS-ANE-2004-33.4-4** dated 03/04/2005 and titled Design Approval Procedures for Parts Manufacturer Approval of Critical Engine and Propeller Parts.

**E. Applicable Amendment Pair Matrix:**

		14 CFR Part 33 Amendment															
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
JAR-E Change	9	X															
	10	X	X														
	11	X	X														
	12	X	X														
CS-E Amendment	0	X	X	X	X	X	X										
	1						X	X	X	X	X	X	X				
	2												X				
	3												X	X	X	X	X
	4																

The actual amendment pair will be based on the bilateral agreement. Per TIP Rev 6 the validating authority certification basis is established based on the application date to the certifying authority. This SSD may be applicable to later amendment pairs which will be reflected in the SSD list summary. For amendment pairs prior to 14 CFR Part amendment 19 contact the Engine and Propeller Standards Branch.

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

File: SSD 14 CFR 33.4 ICA Amd 19 and later vs CS-E.docx

Significant Standards Differences (SSD) Detail Description  
 14 CFR part 33 versus CS-E  
 Durability § 33.19 vs CS-E  
 March 15, 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-E to provide a level of safety equivalent to that provided by the durability (propeller controls) requirements contained in 14 CFR part 33.19 as described below.

**B. Regulatory Comparison:**

1. 33.19(b) requires each component of the propeller blade pitch control system which is a part of the engine type design to meet the requirements of Sec. 35.21, 35.23, 35.42 and 35.43.

**C. Guidance Material:**

- Advisory Circular (AC) 35.23-1 - Guidance Material for 14 CFR § 35.23, Propeller Control System, Date Issued October 21, 2011
- AC 35-1 - Certification of Propellers, Date Issued December 29, 2008

**D. Applicable Amendment Pair Matrix:**

		14 CFR Part 33 Amendment															
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
JAR-E Change	9																
	10																
	11																
	12																
CS-E Amendment	0																
	1									X	X	X					
	2												X				
	3												X	X	X	X	X
	4																X

The actual amendment pair will be based on the bilateral agreement. Per TIP Rev 6 the validating authority certification basis is established based on the application date to the certifying authority. This SSD may be applicable to later amendment pairs which will be reflected in the SSD list summary. For amendment pairs prior to 14 CFR Part amendment 28 contact the Engine and Propeller Standards Branch.

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

File: SSD 14 CFR 33.19 Durability (Propeller Controls) Amd 28 and later vs CS-E.docx

Significant Standards Differences (SSD) Detail Description  
14 CFR part 33 versus CS-E  
Turbine, compressor, fan, and turbosupercharger rotor overspeed § 33.27 vs CS-E  
March 20, 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-E 840 and 850 to provide a level of safety equivalent to that provided by the turbine, compressor, fan, and turbosupercharger rotor overspeed requirements contained in 14 CFR part 33.27 as described below.

**B. Regulatory Comparison:**

1. 33.27(f) is applicable to fan forward shaft only as discussed in the preamble. The exclusion criterion in 33.27(f) was established for the fan forward shaft where industry experience has shown that it will never fail.
  - a. EASA interprets CS-E 850 to apply to any shaft.
2. 33.27(f)(6) does not allow exclusion of the entire shaft from failure consideration in determining the highest rotor overspeed.
  - a. CS-E 850 does not have a corresponding requirement that prohibits excluding the entire shaft.
3. 33.27(d) requires rotor growth assessment be performed at 105% of the highest rotor speed that results from the failures specified in 33.27(b)(3)(i) and (ii).
  - a. CS-E 840(d) requires evaluation of growth at 100% of the maximum rotor overspeed for the same conditions specified in 840(b)(3).

**C. Guidance Material:**

Advisory Circular 33.27-1A, Titled, Engine and Turbosupercharger Rotor Overspeed Requirements of 14 CFR § 33.27.

CS-E 840(c) allows exclusion of certain elements of a shaft if it can be shown to be Extremely Remote under the provisions of CS-E 850. EASA clarified that the intent of CS-E 850(a)(3) is that in order for an element to be considered extremely remote, it must meet all of the criteria in CS-E 850(b)(2), and not to allow use of probability for single failures. This interpretation is consistent with 33.75(c) which says that the primary failure of certain single elements cannot be sensibly estimated in numerical terms. Therefore, we conclude that there is no significant standard difference with respect to 33.27(c).

**E. Applicable Amendment Pair Matrix:**

		14 CFR Part 33 Amendment															
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
JAR-E Change	9																
	10																
	11																
	12																
CS-E Amendment	0																
	1																
	2																
	3													X	X	X	X
	4																X

The actual amendment pair will be based on the bilateral agreement. Per TIP Rev 6 the validating authority certification basis is established based on the application date to the certifying authority. This SSD may be applicable to later amendment pairs which will be reflected in the SSD list summary. For amendment pairs prior to 14 CFR Part amendment 31 contact the Engine and Propeller Standards Branch.

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File: SSD 14 CFR 33.27 Overspeed Amd 31 and later vs CS-E.docx