

	AVS Quality Management System	QPM # AIR-001-007-F1	Revision 0
		Title: Document Review Log	Date: June 19, 2009

1. Document No.: 33-Burner Rig , Oxidation, Hot Corrosion, Thermal Fatigue, and Erosion Characteristics Testing to Support 14 CFR, Part 33, § 33.15 Compliance	2. Project Manager: Marc Bouthillier 781-238-7120 Daniel Tibuni 781-238-4158 ANE-111	3. Reviewing Office: Reviewer's Name & phone #: Steve Ramdeen, AIR-130, 5-4883	4. Date of Review: August 20, 2013	5. Date of Disposition:
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Instructions for Completing the Document Review Log

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- **Concur but Outside of Scope (Will be considered in next change/revision); or**
- **Answer to Question or Statement.**

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Item No:	Page and Paragraph No:	Comment:	Reason:	Recommendation:	Disposition:
1.	Throughout the document (AIR130SR)	The difference between gas 'PATH' and 'STREAM'. Care should be taken to use the correct word for the appropriate meaning. The engine gasses follow a specific 'Path' through the engine and the components are in contact with a gas 'Stream' or stands in a gas 'stream'..	Add clarity	Ensure that 'Path' and 'Stream' is used correctly throughout the document.	Disagree. Both words are used in accordance with standard industry usage. No changes.
2.	Pg-2, para 4. A. and Pg-3 para 5. A. (2) (AIR130SR)	Please remember that Oxidation is a metal's molecular reaction to oxygen. It is a natural process and will occur without contaminants, heat and/or pressure. Also, Oxidization is only one form of Corrosion and corrosion weakens the base material.	Add clarity	In-lieu of using 'chemical reaction' use, "molecular reaction to oxygen in the gas path with the surface coating or base metal of the part." (1) Corrosion. Corrosion is the deterioration of the surface coating or base metal of a part by molecular reaction with the various constituents of the engine core gas path.	Disagree. Chemical reaction is the correct term. Oxidation is one form of corrosion. AC is clear in this regard. Other forms of corrosion are not significant to engine gas path parts. No changes.
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Item No:	Page and Paragraph No:	Comment:	Reason:	Recommendation:	Disposition:
1.	Title	Make the title explicitly state that the AC is for turbine engines	Increased clarity of intent.	Change title to: Oxidation, Hot Corrosion, Thermal Fatigue, and Erosion Characterization via Burner Rig Testing to Support 14 CFR, Part 33, § 33.15 Compliance for Turbine Engine Materials	Agree to clarify. Added the term "turbine engine" into title.

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2.	Page 1, Paragraph 1	The intent of the AC is not explicit in the first sentence.	It doesn't mention that the AC is concerned with materials and turbine combustion process and product effects.	Change the first sentence to read something like: "This advisory circular (AC) describes an acceptable method, not the only method, which can generate data for a Title 14 of Code of Federal Regulations (14 CFR), part 33, § 33.15, Materials compliance finding pertinent to turbine engine parts subjected to combustion processes and products."	Partially agree. Added term "turbine engine" into paragraphs 1 & 2.
3.	Page 1, Paragraph 1	The second sentence is confusing.	Because it doesn't begin with a definition of the "acceptable method," mentioned in the first sentence.	Change the second sentence to read something like: "The method, comparison testing, can generate the aforementioned data for a geometry, material and/or service change (ie, temperature) by showing performance equivalence with an airworthy reference."	Agree to clarify. The 2 nd sentence is revised for clarity and completeness and grammar.
4.	Page 1, Paragraph	AC could be used to find compliance for some parts of a turbocharger used in piston engine applications.	The turbine portion of a turbocharger is driven by the combustion exhaust stream of a piston engine in a way that is similar to how high and low pressure turbines are driven by a turbine engine's combustor.	Mention applicability of AC to some parts of a turbocharger used for internal combustion engine applications.	Agree. Noted in Applicability section.

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5.	Page 3, Paragraph 1 or Paragraph 3	Liquid metal and solid metal induced embrittlement is a concern between mating materials at high temperature. The presence of a gas stream with sulphur and salts can decrease the temperature at which the phenomena occur.	An example: The silver plating of fasteners mating with low expansion iron-nickel alloys in the presence of sulphur/ salt containing core gas can lead to silver metal embrittlement of the iron-nickel alloy (via grain boundary attack).	New definition: (1) Corrosion. Corrosion is the deterioration of the surface coating or base metal of a part by chemical reaction with the various constituents of an engine's combustion products and/or materials of mating parts.	Disagree on need to revise text. The AC is not attempting to address galvanic reactions of dissimilar metals. However a statement was added to indicate such reactions could result in corrosion.
6.	Page 2, Paragraph 5.	First sentence implies that 'material reverse engineering' can be used to show identity.	"Comparative material tests...are necessary...where the base material or coating specifications are not identical...as determined by...material reverse engineering.."	Change or add a sentence that clearly states that you cannot get to identity through material reverse engineering.	Disagree. The noted section does not imply that reverse engineering can result in identity. No changes.
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1. Document No.: 33-Burner Rig, Oxidation, Hot Corrosion, Thermal Fatigue, and Erosion Characteristics Testing to Support 14 CFR, Part 33, § 33.15 Compliance	2. Project Manager: Marc Bouthillier 781-238-7120 Daniel Tibuni 781-238-4158 ANE-111	3. Reviewing Office: Reviewer's Name & phone #: Chris Gavriel and James Gray	4. Date of Review: Aug 20, 2013	5. Date of Disposition Aug 28, 2013
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Item No:	Page and Paragraph No:	Comment:	Reason:	Recommendation:	Disposition:
1.	4(b) and 5; Same comment	Are rotating parts intentionally omitted?	Rotating parts are also subject to the degradation modes for which this AC is proposed	Rotating components should be included. Even though they may be unlikely candidates for PMAs for large engines, they may be for APUs	Agree. Added to list of items in 4(b) and 5.

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2.	5	Are the four processes listed the only ways to determine whether or not it is identical?	There may be more processes, so this statement should not be definitive as it is	Recommend adding etc. at the end. Also strike process differences at the end of the sentence and replace with "processes", since it confuses the message as it is.	Agree. Text revised as recommended.
3.	5(b)(1)	Do you need to list the baseline "corrosion" here for consistency with 5(a)(1) above, or is it covered by oxidation? Similar comment applies in the following sections of this document where corrosion was omitted			Disagree. Engine industry standard terms are oxidation and hot corrosion for the subject of this AC. The higher level definition of corrosion can cover many causes, including oxidation and hot corrosion, but this AC is limited to oxidation and hot corrosion of gas path parts. No changes.
4.	5(C)	Can you elaborate more on what a "representative test specimen" is/could be?	Clarification		Agree in part. Deleted the word "representative" to eliminate confusion.
5.	5(d)(3)	How about thermal fatigue resistance of the base material?		Should be broken out similar to how it is for Oxidation and Hot Corrosion in 5(D)(2)	Agree in part. Added "base material" to list of items for true completeness. However this testing, historically, has been used for coatings and not so much for base materials.
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Item No:	Page and Paragraph No:	Comment:	Reason:	Recommendation:	Disposition:
1.	PP 5 (a)(3)	Middle of PP has a misspelled word.		Change "reform" to "perform"	Disagree. Word is spelled correctly.
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DOCUMENT REVIEW LOG

1. Document No.: AC 33-XX (Burner Rig): Oxidation, Hot Corrosion, Thermal Fatigue, and Erosion Characteristics testing to Support 14 CFR, Part 33, § 33.15 Compliance		2. Project Lead: Marc Bouthillier (MB), ANE-11 Daniel Tibuni (DT), ANE-111		3. Reviewing Office: AIR-500	4. Date of Review: 7/3/13	5. [reserved]
6. #	7. Page and Paragraph No.:	8. Comment:	9. Reason For Comment:	10. Suggested Change:	11. [reserved]	
1.	Global Change	Missing date and AC number from header.		Place the date in the top left-hand corner and AC number in the top right-hand corner of the header.	DT – Added date and tentative AC number in header.	
2.	Global Change	Missing page numbers from footer.		Page numbers in the footer of each page beginning with page 2.	DT – Added page numbers.	
3.	Global Change	Missing space.		There should be two spaces between sentences.	DT – Nonconcur. References: GPO Style Manual, pg. 16, para. 2.49. “A single justified word space will be used between sentences. This applies to all types of composition.”	
4.	Header Area, Page 1	Incorrect spacing.		Check the spacing in the logo title of “U.S. Department of Transportation, Federal Aviation Administration” and adjust it accordingly.	DT – Concur. Adjusted logo spacing as shown in AC Order 1320.46C template.	

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5.	Subject Area, Page 1	Incorrect formatting for citing reference and using section symbol (§).	Non-compliance to the Federal Register Document Drafting Handbook.	Remove the section symbol (§) found after the reference to “Part 33” in the AC title.	DT – Removed section symbol.	
6.	Paragraph 1, 1 st sentence, Page 1	Incorrect formatting for citing reference and using section symbol (§).	Non-compliance to the Federal Register Document Drafting Handbook.	Do not use the section (§) symbol or the word “section” when the reference follows “XX CFR”. Only use the section symbol (§) when referring to different paragraphs/subparagraphs within the same section. For example: Correct way to cite: 14 CFR part 33, 33.15 Incorrect: 14 CFR, part 33, § 33.15	DT – Corrected citation.	
7.	Paragraph 2a, 1 st sentence, Page 1	Change and add wording.		Rewrite to read: The guidance in this document is for applicants requesting FAA approval for PMA, TC design change...	DT – Changed writing as suggested.	
8.	Paragraph 2b, 4 th sentence, Page 1	Improper usage of comma.		Remove the comma found after the word “Terms”.	DT – Removed comma.	

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9.	Paragraph 3a, Page 2	Incorrect format.	When using a subparagraph, there should be at least two in a section. You cannot label only one.	Move the text in paragraph 3a up a line to beginning directly after the title "References".	DT – Moved text as suggested.	
10.	Paragraph 5, 1 st sentence, Page 2	Incorrect spacing.		Remove the extra space from in front of the term "formal".	DT – Removed extra space.	
11.	Paragraph 5a(3), 4 th sentence, Page 3	Change wording.		Rewrite to read: Hot corrosion typically occurs when salts form in the gas stream, react with protective oxide films on the part surface that cause that protective layer to...	MB – Partially concur. Do not fully agree with suggested change, but did make a small change to clarify intent of paragraph.	
12.	Paragraph 5b(3), 4 th sentence, Page 4	Improper usage of comma.		Remove the comma from before term "describes" and after the term "detail".	DT – Removed commas as suggested.	
13.	Paragraphs 5c, 2 nd sentence, Page 5	The term "thermal fatigue" has already been defined.		Use the acronym "TF".	DT – Concur. Removed acronym use of the word.	

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14.	Paragraphs 5c(3), 1 st & last sentence and 5d(3), Page 6	The term “thermal fatigue” has already been defined.			Use the acronym “TF”.			DT – Concur. Removed acronym use of the word.	
15.	Paragraph 5d(5)(f), Page 7	Missing forward mark that connects to conjunctions.			Rewrite to read: Associated cracking and/or spalling.			DT – Corrected as suggested.	
16.	Paragraph 6, Page 7	Clarity.			Is this paragraph necessary?			MB – Nonconcur. Paragraph is necessary to provide summary.	
17.	Under Paragraph 6, Page 7	Unnecessary language.			Remove the title/term “END” from the bottom of the page.			DT – Word removed as suggested.	

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18.	Page 7	Missing signature block.		Place the signature block five spaces after the last paragraph of the document.	DT – Partially Concur. Signature block will be added once finalized. For the meantime, the words “SIGNATURE BLOCK” will be added.	