

DISPOSITION OF FAA COMMENTS

Policy Statement PS-ANM-25.1441-01, Mitigating Fire Hazards in Gaseous Oxygen Systems

Prepared by Robert Hettman, ANM-112

No.	Comment	Requested Change	Disposition
Commenter: ACE			
1.	After reading the requirements for potential ignition sources, I don't understand what a potential ignition source is. An example of a potential ignition source in the context of § 25.863 is a surface temperature > 450°F near jet fuel, because 450°F can ignite fuel vapors. What are potential ignition sources in the oxygen leakage context?	Clarify section 1 regarding potential internal ignition sources.	Section 1 has been clarified.
2.	For the material evaluation, I appreciate the examples of materials that are not suitable for an oxygen environment - titanium and cadmium coatings. I understand that the policy can't be exhaustive, but more details on what to look for would be helpful.	Clarify section 2 regarding the identification of materials and components.	Section 2 has been clarified.
3.		Page 1, under Current Regulatory and Advisory Material: Add “Section 25.869(c) states “Oxygen equipment and lines must- (1) Not be located in any designated fire zone, (2) Be protected from heat that may be generated in, or escape from, any designated fire zone, and (3) Be installed so that escaping oxygen cannot cause ignition of grease, fluid, or vapor accumulations that are present in normal operation or as a result of failure or malfunction of any system.”	Comment accepted and document revised.

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4.		Page 3, item 1: Suggest including the wording from § 25.869(c)(1) and (c)(2), as these requirements are also compatible with the concern of potential ignition sources.	Same as above – Comment accepted and document revised.
5.	Page 4, Item 1.3: There may be circumstances such as conservatism or ventilation obviously in excess of requirements where validation is not necessary.	After "...should be validated by an alternative method, such as testing," add "unless justification for not doing so is provided."	The section was clarified. If ventilation rates are known, then they do not need validated.
6.	Reason: The term "flash point" is generally used as a descriptive characteristic of liquid fuels.	Page 4, Item 1.4: In the third sentence, replace "have a lower ignition flash point" with "are more easily ignitable."	Comment accepted, but changed to "can ignite more easily" in lieu of proposed wording.
7.	Page 4, Item 1.5: What is the concern with potential leaks from adjacent equipment? Would this be something like a bleed air leak that would be a heat source, or is it related to spillage of a flammable fluid that could ignite if the oxygen system also leaks? Also, what about other external heat sources like lights or other powered equipment?	Suggest expanding this paragraph to better explain the concerns.	
8.		Page 4, Item 2.2: Add the statement: "Aluminum should be used with caution in these types of components, as it is particularly susceptible to ignition in an oxygen environment."	Comment generally accepted. Although aluminum is common, there are multiple materials that should be avoided or used with caution. The following was added to section 2.2. "For example, aluminum should be used with caution in these types of components, as it is particularly susceptible to

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			ignition in an oxygen environment.”
9.		Page 4, Item 2.3: Add the statement: “Oil and grease are particularly hazardous in the presence of oxygen.	Added the following statement to 2.3. “Also, the use of oil, grease or other hydrocarbon material is particularly hazardous in the presence of oxygen and should be avoided. “
10.	Page 5, Item 5.2: Should the hazard analysis specify the separation distance between the oxygen system and EWIS? Most of the guidance discusses “adequate physical separation” however the separation distances are not defined. It seems like the hazard analysis might be the appropriate place.	Suggest adding a sentence that states: The hazard analysis should define the separation distances and the design requirements to maintain the separation distances (i.e., the necessary routing, clamping, and protection).	We disagree. A hazard analysis is not the appropriate document to define an installation requirement because it would not be used during component or product manufacturing. The hazard analysis should be used to justify that the design is safe while taking into consideration detailed design and installation requirements defined in appropriate engineering documentation, such as drawings and material specifications. The document remains as written.
11.	The proposed [Advisory Circular] policy statement addresses wire routing and electrical sources of ignition very well. However, oxygen systems in aircraft can have metallic tubing (e.g., aluminum tube) with threaded end fitting joints. Such aluminum tubes can be found in the oxygen distribution system tube routing. There have been cases in which unapproved lubricants/sealants have been applied to the tube fittings and threads prior to mating. The unapproved lubricants/sealants can have organic	I recommend that the proposed [AC] policy statement for Task Tracker 2780 include information addressing the materials not allowed in oxygen systems.	Section 2.4 was added to discuss the use of lubricants/sealants.

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	compounds which are combustibile. When oxygen, lubricants/sealants, and static electrical discharges are present simultaneously, an oxygen fire can result.		
12.		Page 1 Summary: Need to add § 25.1453. This rule is about two specific fire hazards for oxygen systems.	Comment accepted and document revised.
13.		Page 1, Add as second paragraph under Current Regulatory and Advisory Material: “Section 25.1453 states Oxygen pressure tanks, and lines between the tanks and the shutoff means, must be-(a) Protected from unsafe temperatures; and (b) Located where the probability and hazards of rupture in a crash landing are minimized.”	Comment accepted and document revised.
14.	Page 2, under Current Regulatory and Advisory Material, last paragraph reads: “Although guidance materials do exist for general requirements for oxygen systems, the FAA currently has no existing policy on methods to address potential fire hazards within gaseous oxygen systems.” Disagree with need for hazard analysis for fire hazards. Beyond not pressurizing flexible lines when not in use, those		We disagree. There have been recent airplane fires in which the oxygen system design either caused or was a contributing factor in the event. Some applicants already utilize guidance provided in SAE documents and complete a thorough oxygen hazard analysis. However, others may not. This policy is intended to document the FAA position regarding such analysis and describe a standardized approach that can be used for certification. The document remains as written.

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	general requirements with standard industry practices seem to work to prevent oxygen fed fires. Don't see justification to impose these costs.		
15.		Page 4, Add a new paragraph 1.6 to read: "In accordance with § 25.1453, the hazard analysis should show that oxygen equipment, shutoff means and lines are protected from unsafe temperatures and are located where the probability of rupture in a crash landing are minimized."	Comment accepted and document revised.
16.		Page 5, Add a new 4.4 that reads: "Flexible hoses must be unpressurized until oxygen is being used."	Disagree. Flexible hoses can be safe while always pressurized provided they are designed for such purposes and used as intended. In some cases, flexible lines are required to account for movement between adjacent equipment and it may be impractical to design some systems using only rigid supply tubing. Document remains as written.

No.	Comment	Requested Change	Disposition
Commenter: AIR-110			
1.	Page 1; Last paragraph. The first sentence in the last paragraph a term "electrical wiring interconnection	Suggest revising to read: "Section 25.1707(a) states, "Each electrical wiring	This section was clarified to avoid confusion. The original paragraph was a quote from the regulation, with text added for clarity contained in square

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	system" is incorrectly enclosed in square brackets "[]", followed by its acronym "EWIS."	interconnection system (EWIS) must be "	brackets.

No.	Comment	Requested Change	Disposition
Commenter: ANM-100			
1.		P 1, second to last paragraph, inconsistent font size, should be consistent.	Comment accepted. The text describing AC 25-22 was revised to a consistent font.
2.		P 4, first line, the word "that" is repeated. Delete one instance of "that".	Comment accepted and document revised.
3.	P 6, second paragraph, reads "...aircraft certification office has to coordinate it with the policy-issuing office using..."	For clarification or easier reading, better wording might be: "... aircraft certification office must coordinate with the policy-issuing office using..." -or- "... aircraft certification office is required to coordinate with the policy-issuing office using..." -or- "... aircraft certification office is expected to coordinate with the policy-issuing office using..."	The intent was to ensure coordination with the policy office to maintain a standardized certification approach throughout the various certification offices. We also recognize that an issue paper may not always be required depending on specific project circumstances, so the sentence was clarified to read"... the project aircraft certification office must coordinate it with the policy-issuing office and initiate an issue paper if determined necessary."
4.	Under policy, paragraph 1.2 seems to conflict with paragraph 1.1 in consideration of the phrase, "installed so	In recognition that paragraphs 1.1 and 1.2 are intended to address different hazards, suggest a small clarification be	Sections 1.1 and 1.2 were clarified.

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	escaping oxygen cannot cause ignition ” in paragraph 1.1 and the phrase, “where potential ignition may occur if the oxygen system leaks” in paragraph 1.2.	added to paragraph 1.2 to indicate, that the hazard analysis should identify locations where potential ignition may occur if the oxygen system leaks (in addition to or despite) consideration for paragraph 1.1 above....	
5.		Under Policy, paragraph 1.1, it may be helpful to reference §25.869(c)(3) rather than all of § 25.869(c).	Comment accepted and document revised.
6.		Under policy, paragraph 1.4, the last sentence is confusing. To help clarify, I suggest deleting the words “ from additional heat sources such as contamination ” from the sentence.	Comment accepted and document revised.
7.		Under policy, paragraph 2, to clarify, I suggest revise the wording from “The hazard analysis should include component designations ” to “The hazard analysis should include component descriptions. ”	Comment accepted and document revised.

No.	Comment	Requested Change	Disposition
Commenter: AIR-40			
1.		On Page 1, Para 5, the brackets surrounding the words “electrical	This section was clarified.

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		wiring interconnection system” should be deleted and a parenthesis should be added surrounding the first acronym “EWIS”.	
2.		On Page 2, para 6, the word “the” should be added before the first quote mark preceding the number “1992”. SAE (Society of Automotive Engineering) should be spelled out. In the 4 th sentence, the number 14 should not be spelled out.	Comment partially accepted. SAE was previously spelled out and is contained within quotes in the noted paragraph. The number 14 is no longer spelled out.
3.		On Page 3, para 1, 2 nd sentence, the word “materials” should be singular.	Comment accepted and document revised.
4.		On Page 3, para 2, 1 st sentence, it is recommended to add the word “can” after the word “which.	Comment accepted and document revised.
5.		Page 4, para 1, 1 st sentence, the word “that” is written twice.	Comment accepted and document revised.