U.S. Department of Transportation
Federal Aviation Administration

Policy Statement

Subject: Flightcrew Procedures for Addressing Fire Hazards in the Flight Deck

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Policy No: PS-ANM-25-19

Initiated By: ANM-112

Summary

This policy statement describes methods of compliance with Title 14, Code of Federal Regulations (14 CFR) 25.851(a)(2), 25.1301(a)(1), 25.1439(a), and 25.1585(a)(3), in consideration of potential fire hazards in the flight deck. Specifically, this policy provides information that should be considered when providing equipment and procedures for the flightcrew to use in the event of an in-flight fire in the flight deck.

Definition of Key Terms

In the text below, the terms "must," "should," and "recommend" have specific meanings, which we explain in appendix A.

Current Regulatory and Advisory Material

The following regulations pertain to the flightcrew equipment and procedures required in the event of an in-flight fire in the flight deck:

- Section 25.831, *Ventilation.*
- Section 25.851, *Fire extinguishers.*
- Section 25.1301, *Function and installation*.
- Section 25.1439, *Protective breathing equipment*.
- Section 25.1529, *Instructions for Continued Airworthiness.*
- Section 25.1541, *Markings and Placards – General*.
- Section 25.1561, *Safety equipment*.
- Section 25.1585, *Operating procedures.*

Section 25.831(d) states that, if accumulation of hazardous quantities of smoke in the cockpit area is reasonably probable, smoke evacuation must be readily accomplished, starting with full pressurization and without depressurizing beyond safe limits.

Section 25.851(a)(2) requires at least one hand fire extinguisher conveniently located in the pilot compartment.

Section 25.1301(a)(1) states that each item of installed equipment must be of a kind and design appropriate to its intended function.

Section 25.1439(a) states in pertinent part that fixed (stationary or built in) protective breathing equipment (PBE) must be installed for the use of the flightcrew, and at least one portable PBE shall be located at or near the flight deck for use by a flightcrew member. Section 25.1439 also defines minimum performance standards for PBE.

Section 25.1529 states in pertinent part that the applicant must prepare Instructions for Continued Airworthiness in accordance with appendix H to part 25.

Section 25.1541 contains general requirements for markings and placards, such as those used to identify the location of emergency equipment.

Section 25.1561(b) states that each location, such as a locker or compartment, that carries any fire extinguishing, signaling, or other lifesaving equipment must be marked accordingly.

Section 25.1585(a)(3) states that emergency procedures must be furnished for foreseeable but unusual situations in which immediate and precise action by the crew may be expected to substantially reduce the risk of catastrophe.

Although existing advisory material contains little information to address a fire in the flight deck, the following advisory circulars (ACs) do contain general guidance to address in-flight fires:

- Advisory Circular (AC) 20-42D, *Hand Fire Extinguishers for Use in Aircraft*, dated January 14, 2011.
- AC 25-9A, *Smoke Detection, Penetration, and Evacuation Tests and Related Flight Manual Emergency Procedures*, dated January 6, 1994.
- AC 25-17A, *Transport Airplane Cabin Interiors Crashworthiness Handbook*, dated September 26, 2002.
- AC 25-22, *Certification of Transport Airplane Mechanical Systems*, dated March 14, 2000.
- AC 120-80A, *In-Flight Fires*, dated December 22, 2014.

AC 20-42D contains guidance for the firefighting effectiveness, selection, and safe use of hand fire extinguishers in airplanes and rotorcraft. This AC also shows how to gain FAA approval of hand fire extinguishers for aircraft.

AC 25-9A provides guidelines for conducting certification tests related to smoke detection, penetration, and evacuation and evaluating related airplane flight manual procedures. Although existing regulations do not require the consideration of continuous smoke generation in the flight deck and evacuation from the flight deck, the FAA recommends that the airframe design address this situation. Accordingly, paragraphs 12a(l) and 12e(3) of AC 25-9A describe test procedures

that can be used to address continuous smoke generation in the flight deck and smoke evacuation.

AC 25-17A contains general guidance related to types of fire extinguishers and the standards for their approval. In addition, it provides guidance for identifying and marking the stowage location of emergency equipment, including fire extinguishers.

AC 25-22 contains general methods of compliance with § 25.1439. This AC describes the differences between fixed and portable PBE as well as their intended functions.

AC 120-80 provides general guidance for a number of issues linked to in-flight fires.

Relevant Past Practice

In 2014, the FAA published AC 120-80A to address a number of issues linked to in-flight fires. The methods described in AC 120-80A to extinguish fires can be applied generally to the flight deck; however, they were written primarily for cabin crew since the majority of in-flight fires have originated in the passenger cabin.

Transport category airplanes operating under 14 CFR part 121 typically have equipment installed in the flight deck intended for fighting a fire. The equipment includes a fire extinguisher, portable PBE, and crash axe. In addition, a stationary PBE is installed for use by each flightcrew member to protect against smoke and other harmful gases while operating the airplane. Flightcrew procedures in the event of smoke/fire/fumes in the flight deck have been standardized over the years and include the first step to don the oxygen mask, and goggles if necessary, to provide breathing and eye protection while flying the airplane. Some operators use full face masks with built-in eye protection. After the flightcrew has established communication with the cabin crew and made an initial assessment of the situation, flightcrew procedures typically include a step to extinguish the fire if the source is obvious and can be extinguished quickly. Because of numerous potential scenarios, judgment by the flightcrew is necessary to determine if the source is obvious and could be extinguished quickly.

Background

During one reported flight deck fire[1], the pilot in command attempted to retrieve the fire extinguisher while wearing his oxygen mask. However, the fire extinguisher was out of reach, so the pilot had to remove his mask to retrieve it and extinguish the fire. After this event, the FAA's Office of Chief Counsel (AGC) reviewed the applicable regulations and determined that as long as there is a fire extinguisher located in the flight deck that is clearly marked and flightcrew members have unobstructed access to it, then the fire extinguisher installation would meet the applicable part 121 operating regulations and guidance provided in AC 20-42D. This AGC determination was documented in a memorandum dated March 30, 2011, and it clarified a previous related interpretation documented in a memorandum dated November 12, 2008.

[1] The incident occurred on May 16, 2010. For details, see NTSB Factual Report ID: ENG10IA029.

The FAA evaluates fire extinguisher installations for compliance with part 25 regulations using the same general criteria as indicated by AGC. The "Current Regulatory and Advisory Material" section of this policy lists several ACs related to in-flight fires. In general, there have been various methods used to reduce the risk of in-flight fires within the flight deck depending on factors such as type of airplane, number of crew on flight deck duty, whether additional persons are available to assist, and type of operations.

Policy

This policy provides guidance for installation of equipment and for developing procedures for the flightcrews of transport category airplanes in the event of a fire in the flight deck to meet the airworthiness standards in §§ 25.851, 25.1301, 25.1439, 25.1529, and the related operational requirements in §§ 121.309 and 121.337. This policy complements existing guidance in ACs 25-22, 25-17A, 20-42D, and 120-80A.

1 **INSTALLATION OF REQUIRED EQUIPMENT.**

Equipment that could be used to fight a fire in the flight deck must be installed in accordance with the applicable regulations and should be maintained to ensure it will continue to function properly throughout the service life of the airplane.

1.1 In accordance with § 121.309(b)(2), emergency equipment must be readily accessible to the crew.

1.2 In accordance with §§ 25.851(a)(2) and 121.309(c)(4), at least one fire extinguisher must be conveniently located on the flight deck for use by the flightcrew.

1.3 In accordance with §§ 25.1439 and 121.337, a portable PBE must be located at or near the flight deck for use by a flightcrew member.

1.4 In accordance with § 25.1301, each item of installed equipment must be of a kind and design appropriate to its intended function; be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors; be installed according to limitations specified for that equipment; and function properly when installed.

1.5 As described in AC 25-17A, equipment such as fire extinguishers located in clear view need not have an arrow or other indicator pointing to location. However, the location should be clearly marked to indicate what equipment goes in that location if that equipment is removed. If emergency equipment is not in clear view, multiple placards may be necessary to identify the equipment in accordance with §§ 25.1541 and 25.1561.

1.6 For emergency equipment to be considered conveniently located and readily accessible, the flightcrew should have clear and unobstructed access to it, but not necessarily while seated or while wearing equipment intended for use while seated. For example, accessibility of each piece of equipment should be assessed by itself. In addition, the installation should either preclude stowage of additional items that might impede access, or be clearly labeled to prevent stowage of such items.

2 FLIGHTCREW PROCEDURES.

2.1 In accordance with § 25.1585(a)(3), emergency operating procedures must be furnished for foreseeable but unusual situations in which immediate and precise action by the crew may be expected to substantially reduce the risk of catastrophe. These emergency procedures should include the possibility of a fire contained within the flight deck that could be fought by the flightcrew or by other crew members.

2.2 In accordance with § 25.831(d), if accumulation of hazardous quantities of smoke in the flight deck is reasonably probable, smoke evacuation must be readily accomplished, starting with full pressurization and without depressurizing beyond limits.

2.3 To provide immediate protection from potential smoke or other noxious gases that might enter the flight deck, flightcrew operational procedures for a smoke/fire or fumes event should include an initial step for the flightcrew to don their oxygen masks and goggles if necessary as described in AC 120-80A.

2.4 Flightcrew operational procedures for a smoke/fire or fumes event should describe that the oxygen mask should be used in the 100% oxygen setting, or emergency setting at the discretion of the flightcrew, as long as smoke, fire, or fumes are evident in the flight deck. For reference, a 100% oxygen setting does not provide a mixture of oxygen and ambient air, and thus protects the wearer from inhaling contaminants from the surrounding air. In addition to breathing 100% oxygen, an emergency setting provides positive pressure within the mask to prevent potential inward leakage of exterior contaminants into the mask.

2.5 Procedures may include a step for the flightcrew to extinguish the fire if the source is obvious and can be extinguished quickly. A source is not considered obvious if hidden behind a sidewall panel.

2.6 If the source of fire is confirmed to be in the flight deck but is not obvious, or cannot be extinguished quickly enough such that either stationary or portable PBE is necessary, procedures should emphasize that the flightcrew request immediate assistance from other available personnel, such as cabin crew or supernumeraries so that the flightcrew can continue to operate the airplane and prepare for emergency landing as necessary.

2.7 If emergency procedures prepared in accordance with § 25.1585(a)(3) are written with the expectation that the flightcrew will exit their seats to combat a fire, such as during operations conducted with minimum flightcrew only, then it should be shown that there would be sufficient time and flight deck air flow to do so safely after removing the stationary oxygen mask. For example, the capability to demonstrate evacuation of continuous smoke in the flight deck in accordance with AC 25-9A could be one method to demonstrate sufficient time and airflow to access emergency equipment without the use of PBE. Alternatively, if the emergency procedures provide for the flightcrew to combat a fire, emergency equipment should be within the flightcrew’s reach while wearing their stationary oxygen mask.

3 **FLIGHTCREW TRAINING.**

As discussed in AC 120-80A, flightcrew members should practice the procedures and/or techniques associated with—

- Planning for an immediate descent and landing at the nearest suitable airport;
- Aggressively locating the source of a fire;
- Notifying the cabin crew under non-normal circumstances;
- Operating the airplane with the use of PBE and smoke goggles; and
- Alternative means of dispersing smoke and fumes when the source of a fire is unknown

3.1 AC 120-80A provides knowledge and skill-based objectives that operators should incorporate into their flightcrew training procedures related to in-flight fires.

3.1.1 As a minimum, training should emphasize the intended function of all emergency equipment intended to be used by the flightcrew as well as provide hands-on experience with the equipment's use. For example, stationary oxygen masks are typically only intended for use while the flightcrew is seated and flying the airplane, to provide protection from hypoxia and smoke or other noxious fumes.

Effect of Policy

The general policy stated in this document does not constitute a new regulation. Agency employees and their designees and delegations should not depart from this policy statement without appropriate justification and concurrence from the FAA management that issued this policy statement. The authority to deviate from this policy statement is delegated to the manager of the Transport Standards Staff.

Whenever a proposed method of compliance is outside this established policy, the project aircraft certification office should coordinate it with the policy issuing office using an issue paper. Similarly, if the project aircraft certification office becomes aware of reasons that an applicant's proposal that meets this policy should not be approved, the office should coordinate its response with the policy issuing office. Applicants should expect that certificating officials would consider this information when making findings of compliance relevant to new certificate actions. In addition, as with all guidance material, this policy statement identifies one means, but not the only means, of compliance.

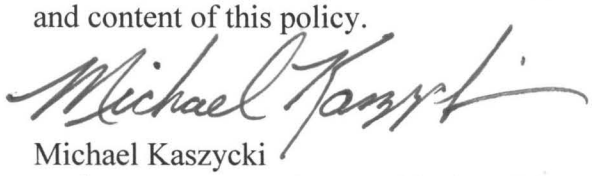
Implementation

This policy discusses compliance methods that should be applied to type certificate, amended type certificate, supplemental type certificate, and amended supplemental type certification programs. The compliance methods apply to those programs with an application date that is on or after the effective date of the final policy. If the date of application precedes the effective date of the final policy, and the methods of compliance have already been coordinated with and

approved by the FAA or its designee, the applicant may choose to either follow the previously acceptable methods of compliance or follow the guidance contained in this policy.

Conclusion

The FAA has concluded that it is necessary to provide guidance for flightcrew procedures in the event of a fire in the flight deck. This policy statement provides new guidance regarding the installation of emergency equipment and considerations for crew procedures and training. If other data were to be presented that demonstrated otherwise, the FAA might reconsider the intent and content of this policy.



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Terms

Table A-1 defines the use of key terms in this policy statement. The table describes the intended functional impact.

Table A-1. Definition of Key Terms

	Regulatory Requirements	Acceptable Methods of Compliance (MOC)	Recommendations
Language	Must	Should	Recommend
Meaning	Refers to a regulatory requirement that is mandatory for design approval.	Refers to instructions for a particular MOC.	Refers to a recommended practice that is optional.
Functional Impact	No design approval if not met.	Alternative MOC has to be approved by issue paper.	None, because it is optional.