U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria

Date: 09/29/2025 **AC No:** 20-135A
Initiated By: AIR-625

1 PURPOSE.

1.1 This advisory circular (AC) provides guidance for powerplant fire testing and recognizes the Society of Automotive Engineers (SAE) Aerospace Standard (AS) 6826, *Powerplant Fire Test Standards,* as an acceptable Means of Compliance (MoC) for demonstrating compliance to the applicable regulations specified in Appendix A.

1.2 The SAE AS6826 document is an industry consensus standard that provides applicants with standardized and harmonized fire test methodologies and pass/fail criteria that have been found to be acceptable by certification authorities to meet applicable engine and propulsion fire protection regulations.

1.3 The use of AS6826 should benefit current and future certification programs with more standardized and harmonized fire test methodologies and pass/fail criteria. Additional benefits include the need for fewer certification project issue papers, thereby reducing certification work scope and burden to both industry as well as aviation certification authorities. Overall, the standardized and harmonized fire test calibration equipment and set up, calibration procedures, and standard flame requirements will improve certification project efficiency by eliminating today's variations between industry applicants and certification authorities.

1.4 This AC also provides additional clarification to the kerosene burner requirement for modifications to previously certified components. For previously certified components, if there are modifications where the fire protection design features could be affected, fire testing using the kerosene burner may be required to ensure the component can still meet its fireproof or fire-resistant capability and the intended function. Early applicant coordination of proposed design change modifications and compliance approaches for the project-specific certification plan with the Federal Aviation Administration (FAA) certification office will facilitate concurrence and approval.

2 APPLICABILITY.

2.1 The guidance provided in this AC is for manufacturers, modifiers, foreign regulatory authorities, FAA engineers, and the Administrator's designees.

2.2 This is a guidance document. Its content is not legally binding in its own right and will not be relied upon by the Department as a separate basis for affirmative enforcement action or other administrative penalty. Conformity with the guidance document is voluntary only. Nonconformity will not affect rights and obligations under existing statutes and regulations.

2.3 The FAA will consider other means of demonstrating compliance that an applicant may elect to present. Terms such as "should," "may," and "must" are used only in the sense of ensuring the applicability of this particular method of compliance when the acceptable method of compliance in this document is used. If the FAA becomes aware of circumstances in which following this AC would not result in compliance with the applicable regulations, the FAA may require additional substantiation or design changes as a basis for finding compliance.

2.4 This material does not change or create any additional regulatory requirements or authorize changes in, or permit deviations from, existing regulatory requirements.

3 CANCELLATION.

This AC cancels AC 20-135 Change 1, *Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria*, dated October 11, 2018.

4 RELATED MATERIAL.

See Appendix A for related sections from title 14, Code of Federal Regulations (14 CFR) and Appendix B for a list of relevant guidance material.

5 DEFINITION OF KEY TERMS.

The definitions and terms applicable to this AC can be found in section 2.2 of AS6826. A key update is the harmonized definition of a standard flame, which will help eliminate variations between industry applicants and between certification authorities. The standard flame is now defined as a flame having a temperature of 2000 degrees Fahrenheit (F) minimum average and a heat transfer rate of 4500 BTU/hour minimum average when calibrated in accordance with the AS6826 procedures.

6 BACKGROUND.

6.1 SAE AS6826 is a new consensus standard published in April 2025. Previous guidance information for regulations where AS6826 can be used to show compliance has been

incorporated into AS6826. For engine case burn-through regulations, guidance information is provided in paragraph 7.4 of this AC.

6.2 In 2018, the FAA chartered SAE A-22 Fire Protection and Flammability Testing Committee to develop industry standards based on best practices for demonstrating compliance to the applicable regulations specified in this AC. This AC and the AS6826 consensus standard will also help address some of the "significant differences in standards or guidance" as mentioned in the FAA Reauthorization Act of 2024, section 313, *Fire Protection Standards.* For example, guidance differences in fire test equipment, test articles, and test criteria have been addressed as discussed in paragraph 7.

7 FIRE TEST METHODS, STANDARDS, AND CRITERIA

7.1 Fire Protection Principles and Objectives.

The AS6826 consensus standard has revised and updated previous information regarding fire protection principles and objectives based on previous successful certification programs and best practices. The major updates are in AS6826 sections 3.2 to 3.4, which provide additional guidance for fire protection principles, fire test objectives, and examples for test article setup and burner location relative to the test article's key features. The additional guidance and component examples should help improve certification project efficiency by reducing today's variations in test article setup and burner location by industry applicants and certification authorities.

7.2 Fire Test Equipment Standards and Test Criteria.

7.2.1 The AS6826 consensus standard has revised and updated information regarding fire test equipment based on previous successful certification programs and best practices. The major updates are in AS6826 sections 4, 5, and 6, which provide information on acceptable test burners, standardized test set-up equipment and instrumentation, and standardized pre- and post-test flame temperature and heat transfer rate calibration setups, procedures, and acceptance criteria.

7.2.2 For pre-test flame calibration, a standard flame calibration requires a minimum 2000°F average temperature and a minimum 4500 BTU/hour average heat transfer rate. As there can be variation between the five temperature calibration thermocouples, the tolerance for each individual thermocouple can be +/- 150°F. To minimize industry temperature variations experienced during pre-test flame temperature calibrations, a standardized thermocouple specification based on industry comparison testing is now specified in the AS6826 consensus standard versus several different thermocouple wire diameters and gauges found in previous guidance.

7.2.3 For post-test flame calibration, a heat transfer rate calibration is now specified instead of temperature, as heat transfer provides a more representative check of the flame intensity than the pre-test flame calibration where heat transfer is the final check before the flame is applied on the test article. A standardized heat transfer rate calibration test

rig set-up has also been developed by industry to minimize heat transfer calibration variations.

7.3 **Fire Protection Installation and Design Features.**

7.3.1 The AS6826 consensus standard has revised and updated fire protection installation and design features based on previous successful certification programs and best practices. The major updates are in AS6826 section 7, which provide additional guidance for testing of flight and ground conditions, as well as the operating environment conditions such as vibration, loads, airflow, fluid pressure and temperature. Aerospace Standard 6826 section 8 provides more prescriptive pass-fail criteria for different powerplant components such as firewalls, flammable fluid carrying components, and nacelle components for engines and APUs.

7.3.2 Based on recent certification programs and industry fire test data review, post-test residual flames of duration less than 2 minutes are considered acceptable at the component level. However, at the powerplant system integration level, the cumulative acceptability of any residual flames with a duration greater than 5 seconds must be coordinated with the FAA and may require further documentation, including systems level hazard assessments.

7.3.3 The fire test methods of AS6826 can be utilized for thermal and structural integrity demonstrations of engine mounts to the applicable airworthiness standards. However, for rotorcraft, the applicant must coordinate and receive acceptance for the structural loading requirement from the FAA as specified in AS6826.

7.3.4 For simple 14 CFR part 23 airplanes that operate at low speeds and altitudes, a simplified approach may be used to identify and establish the applicable boundary conditions. While all the boundary conditions discussed in AS6826 section 7.3 should be considered, their effects on these types of products during a fire may be insignificant or already well understood. Documented coordination and agreement with the FAA are acceptable in place of the detailed assessment requested in AS6826 section 7.4.

7.4 **Engine Case Burn-Through Criteria.**

Engine case burn-through is a fire condition within the engine that burns through the engine case, allowing a high-pressure and high-temperature gas stream to escape from the engine. The following paragraphs remain unchanged from previous versions regarding test methods and criteria appropriate for demonstrating the requirement for minimizing the hazard from engine case burn-through situations. SAE's A-22 committee is working to develop a relevant consensus standard that the FAA expects will be referenced as an acceptable MoC in a future AC 20-135 revision.

7.4.1 If the installation design provides a burn-through barrier for deflecting an engine combustion chamber burn-through and a fire detector installation to provide quick detection of the event, an evaluation is necessary to show that the proposed protection is adequate. Although combustion chamber design has continually improved, service experience has shown that turbine engine case burn-throughs have and continue to

occur. Burn-throughs have also been caused by other types of failures such as fuel nozzle malfunctions, turbine vane burnout, and combustion chamber cracking.

7.4.2 Normally the area of concern is the projection between the forward and aft combustion flange of the engine case, including a 15° cone from the engine flange. This is the section of the engine where the hot, high pressure gas stream from a burn-through may emerge in the direction of the pylon. A specific engine configuration may be shown to have more or less engine length where burn-through should be considered. The temperatures (approximately 3000 – 3500°F) and gas pressures (approximately 350 – 550 psi) are considerably higher than the criteria and melting point of the materials used in firewall construction; therefore, conventional firewalls will generally fail in a very localized area and can expose the pylon, fuselage, or wing to a hazardous situation which could go undetected for a considerable length of time. Experience and tests have shown that for a radial distance of approximately 10 burn-through hole diameters from the engine case surface or burn-through hole, the temperatures and pressures do not significantly decay. However, effects of discrete installation considerations (such as fan or full fan-ducted airflow) should be individually addressed with respect to the applied characteristics of the burn-through gas stream.

7.4.3 The test setup and torch configuration required to verify burn-through protection is a torch with a nominal 1-inch diameter orifice or nozzle, having a torch pressure approximately the same as the maximum burner pressure of the installed engine. The test article (burn-through barrier) should be located at the same distance and supported similarly to the proposed installation. The engine burn-through criterion requires that under these operating conditions the barrier will maintain its integrity for a minimum of 3 minutes when exposed to a minimum flame temperature of 3000°F.

7.4.4 The proposed certification test plan, including the above operating environment, should be submitted to the FAA office responsible for the project for coordination and acceptance prior to conducting the fire testing.

8 AC FEEDBACK FORM.

If you have suggestions for improving this AC, you may use the form at the end of this AC.

DANIEL J. ELGAS

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Appendix A. Related CFR Sections

A.1 RELATED CFR SECTIONS.

A.1.1 The following 14 CFR sections or regulations are related to this AC. You can download the full text of these regulations from the Federal Register website at eCFR.

14 CFR PART	SECTION
1	1.1
23	23.859, 23.863, 23.865, 23.903, 23.1013, 23.1091, 23.1121, 23.1123, 23.1141, 23.1182, 23.1183, 23.1189, 23.1191, 23.1192, and 23.1193.
23 (Amendment 23-64)	23.2325, 23.2330, and 23.2440.
25	25.859, 25.863, 25.865, 25.867, 25.903, 25.1013, 25.1091, 25.1103, 25.1121, 25.1123, 25.1165, 25.1181, 25.1182, 25.1183, 25.1189, 25.1191, 25.1192, 25.1193, 25.1201, 25.1203, and 25.1207.
27	27.859, 27.863, 27.903, 27.861*, 27.1123, 27.1183, 27.1185, 27.1189, 27.1191, 27.1193, 27.1194, and 27.1195.
29	29.859, 29.861, 29.863, 29.903, 29.1025, 29.1103, 29.1121, 29.1123, 29.1165, 29.1183, 29.1189, 29.1191, 29.1193, 29.1194, 29.1201, and 29.1203.
33	33.17, 33.71.
Auxiliary Power Units (APU)	TSO-C77b.
	*Category A only

Appendix B. Related Material

B.1 FAA REPORTS.

- Federal Aviation Administration: Powerplant Engineering Report No. 3A, *Standard Fire Test Apparatus and Procedure*, Revised March 1978.
- Federal Aviation Administration: Report No. FAA-RD-76-213, *Re-evaluation of Burner Characteristics for Fire Resistance Tests*, January 1977.
- Federal Aviation Administration: Report No. DS-67-4, *A Study of the Fire Resistance of Aluminum Alloy Tubing and Fittings*, April 1967.
- Certification Authorities for Large Transport Aircraft (CATA), CS/14 CFR 25.867, *Certification Authorities for Large Transport Aircraft (CATA) - CATA Worklist Item (CWI) EASA-002 -2D Nacelle Fire Resistance*

B.1. FAA ADVISORY CIRCULARS.

The following ACs are related to the guidance in this AC. The latest version of each AC referenced in this document is available on the FAA website at FAA Advisory Circulars and on the Dynamic Regulatory System.

- AC 25.901-1, *Safety Assessment of Powerplant Installations*.
- AC 25.1193*, Cowling and Nacelle Skin, Under Development*.
- AC 25.863-1, *Flammable Fluid Fire Protection, Under Development*.
- AC 27-1B CHG9, *Certification of Normal Category Rotorcraft.*
- AC 29-2C CHG9, *Certification of Transport Category Rotorcraft.*

B.2. FAA TECHNICAL STANDARD ORDERS.

The following Technical Standard Orders (TSO) are related to the guidance in this AC. The latest version of each TSO referenced in this document is available on the FAA website at Technical Standard Orders (TSO) | Federal Aviation Administration and on the Dynamic Regulatory System.

- TSO-C42, *Propeller Feathering Hose Assemblies*.
- TSO-C77b, *Gas Turbine Auxiliary Power Units*.
- TSO-C140, *Aerospace Fuel, Engine Oil, and Hydraulic Fluid Hose Assemblies*.

B.3. SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) INTERNATIONAL.

The following SAE Aerospace Recommended Practice (ARP) documents are related to the guidance in this AC. If the SAE document is revised after publication of this AC,

you should verify that the FAA accepts the subsequent revision or update as an acceptable form of guidance. The documents are available online at SAE.

- AS1055B, *Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components*.
- AIR1377A, *Fire Test Equipment for Flexible Hose and Tube Assemblies*.
- AS6826, *Powerplant Fire Test Standards*.

09/29/2025

OMB Control Number: 2120-0746
Expiration Date:12/31/2027

Advisory Circular Feedback Form

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by (1) emailing this form to 9-AVS-AIR-Directives-Management-Officer@faa.gov or (2) faxing it to the attention of: N/A.

Subject: AC 20-135A _____ Date: 09/29/2025 _____

Please mark all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page be changed as follows:

☐ In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

☐ Other comments:

☐ I would like to discuss the above. Please contact me using the information below.

Submitted by:_____ Date: _____