FEDERAL AVIATION AGENCY
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FLIGHT STANDARDS SERVICE RELEASE NO. 453

SUBJECT: Fire Prevention Test Procedures for Airframe Materials

SUPERSEDES: Safety Regulation Release No. 259

This release transmits, as Attachment A, acceptable test procedures for demonstrating compliance with the fire protection requirements as they relate to airframe materials.

Pending incorporation of appropriate test procedures in our Civil Aeronautics Manuals, this release serves as an interim measure to provide the public with the related material previously issued by the Civil Aeronautics Administration as Safety Regulation Release No. 259, dated August 26, 1947.

George C. Prill

George C. Prill
Director
Flight Standards Service

Distribution:

FAA 1, 3, 3A, 13, 16, 16B

FAA 40, Tabs 1, 2, 3, and 5
FAA 40-1
FAA 14
FAA 11, Tab 1
FAA 90, Tabs 1 and 2

ATTACHMENT - A

Fireproof Materials

The following test is considered acceptable for demonstrating compliance with Civil Air Regulations, Sections 6.384 and 7.384, with respect to those portions which refer to fireproof materials.

All structure, controls, rotor mechanism, and other parts essential to a controlled landing should be capable of resisting flame penetration and remain capable of carrying the loads and satisfactorily performing the function for which they are designed when subjected to a test flame of 2000 ± 50°F flame for 15 minutes.

1. Sheet materials should be tested by subjecting the test flame to a test specimen of approximately 10 inches square. The test flame should be applied at the center of the specimen and be of sufficient size to maintain the required temperature over an area approximately five inches square.
2. Lines, fittings, controls, and other essential components should be enveloped in the test flame on the side that would be exposed in case of a fire when mounted in a manner simulating their actual installation. In the case of fluid fittings, lines or conduits should be connected to both sides of the fittings to simulate actual conditions of heat conduction that would be present during an actual fire in the aircraft. The test should be conducted with the operating fluid in the lines unless the design and function of the system is such as to preclude the presence of the fluid in the lines during an actual fire in the aircraft.

Fire-Resistant Materials

The following test is considered acceptable for demonstrating compliance with Civil Air Regulations, Sections 4b.381, 4b.383, 6.382, 7.381, and 7. 382.

If the material is rigid, an 8-inch specimen should be tested. If the material is flexible, the material should be placed in a frame exposing an area of 8 inches x 8 inches. If a backing will be used in the airplane, the test specimen should be provided with the same backing.

The test specimen should be supported at an angle of 45° to a horizontal surface. The surface that will be exposed, when installed in the aircraft, should face down for the test. The specimen should be exposed to either a Bunsen or a Tirrill

burner, adjusted for no air intake, giving a yellow-tipped 1½-inch flame when resting on a horizontal surface. Suitable precautions should be taken to avoid drafts. The period of flame application should be 30 seconds with one-third of the flame in contact with the material at the center of the specimen.

To be acceptable, no penetration of the material should result during application of the test flame or subsequent to its removal and if the material ignites the flame should extinguish itself within 15 seconds with no smoldering or glowing visible 10 seconds thereafter.

Flame Resistant Material (1)

The following test is considered acceptable for demonstrating compliance with Civil Air Regulations, Sections 3.388(a), 4b.381, 4b.382, 6.381, 6.382, and 7.381.

Test specimens. Three specimens, approximately four inches wide and 14 inches long, should be tested. Each specimen should be clamped in a metal frame so that the two long edges and one end are held securely. The frame should be such that the exposed area of the specimen is at least two inches wide and 13 inches long, with the free end at least ½ inch from the end of frame for ignition purposes. In the case of fabrics, the direction of the weave corresponding to the most critical burn rate should be parallel to the 14 inch dimension. A minimum of 10 inches of the specimen should be used for timing purposes, and approximately 1½ inches should burn before the burning front reaches the timing zone. The specimen should be long enough so that the timing is stopped at least one inch before the burning front reaches the end of the exposed specimen.

Test procedure. The specimens should be supported horizontally and tested in draft-free conditions. The surface that will be exposed when installed in the aircraft, should face down for the test. The specimens should be ignited by a Bunsen or Tirrill burner. To be acceptable, the average burn rate of the three specimens must not exceed four inches per minute. Alternatively, if the specimens do not support combustion after the ignition flame is applied for 15 seconds, or if the flame extinguishes itself and subsequent burning without a flame does not extend into the undamaged areas, the material is also acceptable. (Federal Specification CCC T191-b, Method 5906 may also be used for testing materials of this type but the material should not exceed the above four inches per minute burn rate).

Flash-Resistant Materials

The following test is considered acceptable for demonstrating compliance with Civil Air Regulations, Sections 3.388(a), 4b.381, 6.381, and 7.381.

Test specimens. Three specimens, approximately four inches wide x 14 inches long, should be tested. Each specimen should be clamped in a metal frame so that the two long edges and one end are held securely. The frame should be such that the exposed area of the specimen is at least two inches wide and 13 inches long, with the free end at least ½ inch from the end of the frame for ignition purposes. In the case of fabrics, the direction of the weave corresponding to the most critical burn rate should be parallel to the 14 inch dimension. A minimum of 10 inches of the specimen should be used for timing purposes, and approximately 1½ inches should burn before the burning front reaches the timing zone. The timing should be stopped at least one inch before the burning front reaches the end of the exposed specimen.

Test procedure. Each of the three specimens should be supported horizontally and tested in draft-free conditions. The surface that will be exposed, when installed in the aircraft, should face down for the test. The specimen may be ignited by a match or similar means. If the specimen do not support combustion after the ignition flame is applied for 15 seconds, or if the average burn rate of the three specimens does not exceed 20 inches per minute, the material is acceptable. (Federal Specification CCC T191-b, Method 5906 may also be used for testing materials of this type but the material should not exceed the above 20 inches per minute burn rate).