

Petitioner further contended that any change or narrowing of the seat back would destroy symmetry and significantly reduce appeal while having no increased safety benefit. The Petitioner also contended that to eliminate one passenger seat, thus causing the minimum aisle width requirements to no longer apply, would result in loss of sales and revenue, and result in an economic burden and owner dissatisfaction. The Petitioner offered two compensating factors which he contended are present to establish a level of safety commensurate with that of the original Model 300 certification.

First, the Petitioner noted that the Model 300, with the high density or commuter type, seats is approved with an occupancy of 13; whereas, with the "soft touch" interior the Model 300 has a maximum capacity of ten passengers. The Petitioner contended that the smaller number of passengers is beneficial to emergency egress when all other factors are equal. Emergency egress tests, documented in Beech Report 101E2504 and witnessed by FAA personnel, resulted in evacuation times of 42 seconds for an interior with a 16-inch aisle width and 55 seconds for an interior with a 10-inch aisle width. Because, in both cases, passengers were congregated at the exit waiting to egress, the Petitioner contended that the longer time shown for the tests with the narrower aisle width was not a function of the narrow aisle width but illustrated the variation in evacuation times that can be expected when different groups of people are involved.

Second, the Petitioner contended that the exit marking system on the Model 300 utilizes signs which exceed the illumination requirements of SFAR 41C 5(e)(i). Those signs are lighted internally by a power source that is independent of the airplane power supply, and are inertially activated by moderate ground impact. The Petitioner noted that excess illumination from the exit signs is beneficial to emergency egress in cases involving total darkness, and the signs are required equipment in the limitations section of the Model 300 Pilot Operating Handbook (POH).

The FAA requested additional data from Beech which would assure that the exit marking system would be available after a survivable crash landing and would provide adequate illumination for rapid egress past those areas in the cabin where the seats protrude into the required aisle space. The FAA suggested that Beech consider developing criteria for the exit marking system which would assure adequate operating, reliability, strength, and illumination features to assure this system would aid in egress past the locations of reduced aisle width during emergency conditions. The FAA noted that, in a similar action, a Notice of Proposed Special Conditions was issued (52 FR 1011, dated March 30, 1987) for Fairchild Corporation Model SA227-AC airplanes which incorporate an emergency lighting system as an aid for emergency evacuation. The FAA suggested that Beech consider developing similar criteria.

In response, the Petitioner contended that, by installing an emergency exit lighting system which exceeds the requirements of SFAR 41C 5(e)(i), the aisle width requirements of SFAR 41C 5(e)(k) are compensated for by factors that serve to maintain the level of safety provided by the original Model 300 certification. The Petitioner noted that the Model 300 exit lighting system complies with FAR Part 25 before amendment 15, and provides adequate operating, reliability, strength, and

illumination features to assure safety in an emergency condition. The Petitioner contended that the Model 300 exit lighting system meets the same objectives as those provided in the proposed special conditions for the Fairchild Model SA227-AC emergency lighting system; and, to require a different system from that now present in the Model 300 would be costly to their customers and not contribute to additional safety.

On July 6, 1987, the FAA denied the Beech petition of exemption to SFAR 41C 5(e)(k), dated February 25, 1987. In denying that petition, the FAA responded to both major contentions of the Petitioner. First, with regard to the Petitioner's contention that the change in aisle width had been demonstrated by test not to influence the emergency egress, the FAA noted that SFAR 41C contains both requirements for main passenger aisle widths and for evacuation demonstration times. The FAA considered those requirements unique, and did not consider an evacuation demonstration, which must meet the requirements of SFAR 41C 5(e)(h) to be a compensating factor for approving an exemption to the aisle width requirements of SFAR 41C 5(e)(k). Therefore, the FAA disagreed with the Petitioner's contention that those emergency egress test results adequately demonstrated that the aisle width restrictions have no adverse affect on safety.

Second, the FAA concluded that the Petitioner had not provided sufficient evidence for allowing the exit lighting system on the Model 300 to be used as a compensating factor for exemption from the aisle width requirements of SFAR 41C 5(e)(k). The FAA noted that, although both the available lighting and the aisle width affect the ability of occupants to egress from an airplane in an emergency, the ability of available lighting to compensate for aisle width restrictions is a complex issue that was not demonstrated by the Petitioner. Therefore, the FAA concluded that the fact that the exit marking system exceeds the illumination requirements of SFAR 41C 5(e)(i) is not justification for using this lighting as a compensating factor for exemption to the aisle width requirements.

In the letter dated December 17, 1987, Beech renewed their petition for exemption from the requirements of SFAR 41C 5(e)(k) for their Model 300 airplanes with serial numbers FA-1 through FA-111 based upon an emergency lighting system that fully complies with the emergency lighting requirements stated in Special Conditions 23-ACE-31 [52 FR 37509; dated October 8, 1987] issued against the Fairchild SA227-AC airplanes. In the new petition, the Petitioner notes that, for Beech Model 300 airplanes with serial numbers of FA-112 and after, compliance with SFAR 41C 5(e)(k) is not an issue because the maximum seating capacity for these airplanes is limited to nine or less for takeoff and landing as a result of FAR 23.785(g) side facing seat restraint rules, and the two-place couch supplied with this configuration is placarded for only one occupant for takeoff and landing. The Petitioner notes that, of the Model 300 airplanes with serial numbers FA-1 through FA-111, which are eligible for the tenth passenger seat, only 45 airplanes are actually in the tenth passenger seat configuration. To provide supportive information for the emergency lighting system, the Petitioner restates Special Conditions 23-ACE-31 and the proposed methods of complying with those special conditions as follows:

1. If an emergency lighting system is installed and used as an aid in showing compliance with any applicable regulatory requirement, including emergency evacuation demonstrations, the following special conditions apply:

- (a) The source of illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency lighting system is independent of the power supply to the main lighting system.

Proposed Compliance: The emergency exit sign light will be powered from the aircraft electrical bus for normal operations. A separate rechargeable power supply will provide emergency exit lighting for the emergency conditions.

- (b) There must be a caution light which illuminates in the cockpit when power is on in the airplane and the emergency lighting control device is not armed.

Proposed Compliance: One caution annunciator will be located in the caution/advisory panel which will give indication when power is on the aircraft and the emergency lighting switch is not armed.

- (c) The emergency lights must be operable manually from the flightcrew station and be provided with automatic activation. The cockpit control device must have an "on", "off", and "armed" position so that when armed in the cockpit, the lights will operate by automatic activation. The emergency light must be armed or turned on during taxiing, takeoff, and landing. For automatic activation of the system, the sensor must:

Proposed Compliance: The AUTO position is the position that arms the system. The switch is operable by the flightcrew. The Pilot's Operating Handbook would be changed to add appropriate procedures.

- (1) Activate when engine-driven electrical generator power is lost,

Proposed Compliance: The control switch will be wired in series with the auxiliary contacts of both generator line contactors to provide emergency lighting if both generators should fail.

- or
- (2) Activate when subjected to a force of 5., +2., -0g and greater for a duration of 11., +5., -0 milliseconds and greater in the direction of the longitudinal axis of the airplane: must not be activated under conditions less severe; and, after activation must remain activated when subsequently subjected to shock forces in any direction of up to 50g and having durations up to 11., +5., -0 milliseconds.

Proposed Compliance: An inertia switch at each emergency light power supply shall activate the exit sign when subject to a force of 5 to 7 g's for a duration of 11 to 16 milliseconds and greater in the direction of the longitudinal axis of the airplane and shall not be activated under less severe conditions and will remain activated when subsequently subjected to shock forces in all directions of up to 50g and having a duration up to 11 to 16 milliseconds or greater.

- or
(3) Activate when subjected to alternate crash forces approved by FAA;

Proposed Compliance: Not applicable as 1.c(2) is complied with.

- and
(4) Regardless of sensor type, must be capable of being reset by the flightcrew if activated by any occurrence other than a survivable crash.

Proposed Compliance: A control switch in the cockpit will allow the flightcrew to reset the emergency sensor if activated by any occurrence.

- (d) The energy supply to each emergency lighting unit must provide the required level of illumination for at least 10 minutes at the critical ambient condition after emergency landing.

Proposed Compliance: Each emergency light power supply shall be capable of providing the required level of illumination for a minimum of 10 minutes at the critical ambient condition after emergency landing.

- (e) If rechargeable batteries are used as the energy supply for the emergency lighting system, the charging circuit must be designed to preclude inadvertent battery discharge into charging circuit faults. If the emergency lighting system does not include a charging circuit, then the battery condition monitors are required.

Proposed Compliance: The charging circuit for the power supply battery pack is designed to preclude inadvertent battery discharge into the charging circuit.

- (f) Components of the emergency lighting system, including batteries, wiring relays, lamps, and switches must be capable of normal operation after having been subjected to the inertia forces listed in Paragraph 23.561(b).

Proposed Compliance: All components of the emergency lighting system shall be capable of normal operation after having been subjected to the inertia forces listed in Paragraph 23.561(b).

- (g) The emergency lighting system must be designed so that a single probable failure, or probable system damage following a

survivable crash, will not render the entire emergency lighting system inoperative. Single transverse vertical separation of the fuselage is considered a probable event during a survivable crash. The minimum emergency illumination, after a single probable failure, must be specified by the applicant and during an emergency evacuation demonstration, the maximum emergency illumination must be equal to less than the specified level.

Proposed Compliance: The emergency lighting system shall be designed such that a single probable failure, or probable system damage following survivable crash, will not render the entire emergency lighting system inoperative.

The Petitioner contends that, in regard to illumination of the exit lights, the new lighting system will meet or exceed the present system and the present lights were used during three emergency evacuation tests of the Model 300 airplane, and were more than adequate. By letter dated January 8, 1988, the FAA notified the Petitioner that, in order to consider the emergency lighting system as a compensation factor, the minimum lighting provided by the system must be known. The FAA suggested that an acceptable way of stating the lighting values could be found in § 25.812 of the Federal Aviation Regulations. By letter dated April 8, 1988, the Petitioner responded to that FAA request for specific illumination data on the emergency lighting system. The Petitioner noted that Beech had conducted tests to measure illumination levels of the emergency exit lights in a Model 300 with lights operated by batteries. The airplane cabin was arranged with the seating configuration that was found in non-compliance with SFAR 41C 5(e)(k).

According to the Petitioner, illumination levels of the emergency exit lights in a Model 300 were measured using the requirements of FAR 25.812 as guidelines. With power to both emergency exit lights, illumination levels were measured at 40 inch increments using a photometer. After 30 minutes of lighting operation, the illumination readings at the five locations averaged 0.34 foot-candle, with a high reading of 0.53 foot-candle and a low reading of 0.10 foot-candle. During those tests, illumination levels at the five positions were measured with only the aft emergency exit light powered. The results averaged 0.185 foot-candle with a high reading of 0.52 foot-candle and a low reading of 0.002 foot-candle. Since § 25.812(c) requires an average illumination of not less than 0.05 foot-candle and not less than 0.01 foot-candle at each 40-inch interval, the Petitioner contends that the measurements made in the Model 300 with both emergency exit lights illuminated are an order of magnitude greater than those required in § 25.812(c); and, even when only one emergency exit light is operating, the average in both cases exceeds the 0.05 foot-candle requirements of § 25.812(c).

The Petitioner states that granting the requested exemption would be in the public interest for two reasons. The first is related to Beech customer relations and the second is related to economics.

With regard to Beech's customer relations, the Petitioner states that Beech has sold 45 airplanes with the ten (10) passenger seats, and the customers accepted those airplanes. Sixty-six (66) other airplanes were

sold with the tenth passenger seat as a possible option. The Petitioner contends that Beech has an obligation to find an acceptable alternative to retain the ten passenger seats in airplanes so represented when sold. The Petitioner further believes that emergency lighting kits are an acceptable means of retaining the ten passenger seat configuration.

With regard to economics, the Petitioner states that the tenth passenger seat was valued to customers at \$8,950.00 per airplane, which is a total of \$403,000.00 for the 45 airplanes sold with the ten passenger seat configuration. The Petitioner assumes that, for the 45 airplanes, the revenue/value of one passenger seat is lost over the life of those airplanes, and the potential for revenue loss to the remaining 66 airplanes exists if the customers desire to install the ten passenger seat configuration but cannot. The Petitioner states that, while a value in terms of dollars would be difficult to place, one could assume 365 flights per year per airplane at a conservative \$100.00 per seat. For the 45 airplanes with the ten seat configuration, the Petitioner estimates that this amounts to \$1,600,000.00 per year, or approximately \$32,000,000.00 over the 20 year life of those airplanes.

Comments on published petition:

A summary of this petition was published in the FEDERAL REGISTER for public comment on February 10, 1988 (53 FR 3972) and no comments were received.

The Federal Aviation Administration's (FAA) analysis is as follows:

To obtain the exemption, the Petitioner must show, as required by § 11.25(b)(5) of the Federal Aviation Regulations, that: (1) granting the request is in the public interest, and (2) the grant of the exemption would not adversely affect safety, or that a level of safety will be provided which is equal to that provided by the rule from which the exemption is sought.

The FAA has carefully reviewed all of the information contained in the Petitioner's request for exemption. The aisle width requirements of SFAR 41C 5(e)(k) were in the original SFAR 41, except in this original issuance of SFAR 41, the main passenger aisle width requirement of 15 inches for heights of 25 inches or more from the floor covered airplanes with a total seating capacity of 10 to 23. For airplanes with a total seating capacity over 23, the main passenger aisle width requirement was 20 inches at any location 25 inches or more above the floor. SFAR 41, as originally proposed (43 FR 46734-46739, dated October 10, 1978), contains those aisle width requirements. The preamble to SFAR 41, as adopted (44 FR 53723-53728, dated September 17, 1979), indicates that no adverse comments were received on the minimum aisle width requirements.

With amendment C (47 FR 35150-35153, dated August 12, 1982), the applicability of SFAR 41C was amended, in part, to eliminate the 12,500 pound maximum zero fuel weight (MZFW) restriction and limit the number of passenger seats to 19 for those small propeller-driven multiengine airplanes that operate at a certificated gross takeoff weight in excess of 12,500 pounds. For that amendment, SFAR 41C 5(e)(k) was revised to

reflect the limit on the number of passenger seats; however, the 15-inch minimum aisle width restriction for locations 25 inches or more from the floor remained unchanged.

The Petitioner contends that, although the seats restrict the aisle to 10 inches at two locations, the seat cushions can be compressed to expand this width to 14 inches; however, this is still one inch narrower than the minimum required aisle width stated in SFAR 41C 5(e)(k). Also, the FAA stated policy is that the minimum aisle width distance should be determined without compressing the seat fabric or cushions and with the seats or other aisle constraints in the most adverse position.

The Petitioner requests an exemption from SFAR 41C 5(e)(k) only for those Beech Model 300 airplanes with serial numbers from FA-1 to FA-111. The Model 300 airplanes with serial numbers of FA-112 or greater have a maximum seating capacity of nine or less for takeoff or landing. Therefore, the FAA analysis of the petition considered an exemption of the aisle width requirements of SFAR 41C 5(e)(k) that would be applicable only to those specific Model 300 airplanes as requested in the petition.

The Petitioner has not provided sufficient information or technical data to support the contention that the exemption would be in the public interest. The Petitioner contends that Beech has an obligation to find an acceptable alternative to retain the ten passenger seat configuration that existed in the Model 300 airplanes when sold. The FAA recognizes the potential for lost revenue that could result from a reduction in passenger capacity in the Model 300 airplanes; however, safety considerations must be the primary issues considered in the FAA analysis of the petition. The requirements in SFAR 41C establish minimum airworthiness standards for certain propeller-driven multiengine airplanes. The aisle width requirements, along with several other requirements in SFAR 41C, are intended to ensure that the occupants can safely egress those airplanes in emergency situations.

Beech has installed an emergency exit lighting system in the Model 300 that the Petitioner contends will comply with certain operating and illumination standards and will provide interior lighting during evacuation of the airplane in emergency situations. The FAA does not agree that this lighting system, even though it exceeds the requirements of SFAR 41C 5(e)(i), is a compensating feature to offset noncompliance with the aisle width requirements of SFAR 41C 5(e)(k). The aisle width requirements relate as much to daytime evacuation as to nighttime evacuation. The 10-inch aisle width in these Model 300 airplanes is a significant deviation from the required 15-inch aisle width requirement. The fact that the emergency exit lighting system exceeds the requirements of SFAR 41C 5(e)(i) is not justification for using this lighting as a compensating factor for exemption to the aisle width requirements of SFAR 41C 5(e)(k).

The FAA does not agree with the Petitioner's contention that significant economic hardships or poor customer relations suffered by Beech in bringing the affected airplanes into compliance with the airworthiness standards of SFAR 41C is a relevant consideration. Economic impact and market desires are important issues that are given serious considerations in rulemaking, so that the standards in the FAR do not create economic burdens that are unnecessary for safety; however, once a standard is

established, the FAA cannot exempt that standard as a result of economic hardships from compliance, unless equivalent safety is established. This is particularly the case when the hardships are the result of a lack of attention toward compliance with the regulation during certification.

In consideration of the foregoing, I find that a grant of exemption, as requested, is not in the public interest nor maintains the level of safety required by the rule from which exemption is sought. Therefore, pursuant to the authority of Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), the petition of Beech Aircraft Corporation, dated December 17, 1987, for an exemption from SFAR 41C 5(e)(k) of the Federal Aviation Regulations is hereby denied.

Issued in Kansas City, Missouri on January 5, 1989.



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