



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: LEAST RISK BOMB
LOCATION

Date: 10/24/08
Initiated By: ANM-100

AC No: 25.795-6

1. PURPOSE. This advisory circular (AC) describes an acceptable means for showing compliance with the requirements of Title 14, Code of Federal Regulations (CFR), part 25, § 25.795(c), “Least risk bomb location.” This section requires that a location on the airplane be designed where an explosive or incendiary device may be placed to protect flight critical structures and systems from damage in case of detonation. The means of compliance described in this document provide guidance to supplement the engineering and operational judgment that must form the basis of any compliance findings relative to the design of a Least Risk Bomb Location on an airplane.

2. APPLICABILITY.

a. The guidance provided in this document is directed to manufacturers and modifiers of large passenger transport airplanes and repair facilities for such airplanes. Information on procedures also applies to certain air carriers operating under part 121.

b. The material in this AC is neither mandatory nor regulatory in nature and does not constitute a regulation. It describes acceptable means, but not the only means, for demonstrating compliance with the applicable regulations. The Federal Aviation Administration (FAA) will consider other methods of demonstrating compliance that an applicant may elect to present. Furthermore, if we become aware of circumstances that convince us that following this AC would not result in compliance with the applicable regulations, we will not be bound by the terms of this AC, and we may require additional substantiation or design changes as a basis for finding compliance.

c. The material in this AC does not change, create any additional, authorize changes in, or permit deviations from regulatory requirements.

3. RELATED REGULATIONS.

a. 14 CFR part 25. Sections 25.795 and 25.1585.

b. 14 CFR part 121. Section 121.295.

4. FORMS AND REPORTS. Persons with a need to know may contact the Transportation Security Administration for the necessary forms and reports, including “DHS Recommended Least Risk Bomb Location Procedures for Airlines,” Sensitive Security Information (Limited Distribution). This document is available on request to those with a certified “need to know” from:

Transportation Security Administration
Explosives Operations Division
TSA-18
601 South 12th Street
Arlington, VA 22202-4202
Phone: 703-487-3100
Fax: 703-487-3305

Requests should be in writing on official letterhead stating a need for the information. For a prompt reply, requests should include an e-mail address. These procedures are exempt from public disclosure under 5 USC 552. Operators should use these procedures in developing their training programs.

5. DEFINITIONS. For the purposes of this AC, the following applies:

- a. Least Risk Bomb Location (LRBL):** The location on the airplane an explosive or incendiary device should be placed to minimize the effects to the airplane in case of detonation.
- b. Suspect Item:** An item that may be an explosive or incendiary device.

6. BACKGROUND.

a. Historical Practice. Procedures for designation of a Least Risk Bomb Location (LRBL) began with voluntary participation by airplane manufacturers in approximately 1972. The use of these procedures has been shown to significantly decrease the effects of an explosion in the passenger cabins of large commercial airplanes. In addition, the International Civil Aviation Organization (ICAO) Security Manual (a restricted document) provides information on the location of the LRBL and guidance to operators on procedures to use when a suspect item is found onboard an airplane.

b. Design Considerations. Because the voluntary approach identified the LRBL after the basic design of the aircraft was complete, it did not provide the safety improvements that are possible when the LRBL is included in the initial design process. Therefore, additional features may need to be explored to improve safety. Design considerations may include specially-sized areas or pressure relief panels in the cabin structure where a suspect device should be placed by crewmembers. On airplanes with more than one passenger deck, more than one LRBL may be desirable.

c. Harmonization. A draft of this AC was harmonized with the European Joint Aviation Authorities (JAA). That draft provided a method of compliance that both the FAA and JAA

found acceptable. Subsequently, the European Aviation Safety Agency (EASA) was formed as the principal aviation regulatory agency in Europe. The FAA will work with EASA to ensure that this proposed AC is harmonized with ACs referred to in EASA's Certification Specifications.

7. DISCUSSION.

a. The purpose of this guidance material is to provide guidance for LRBL design as well as establish critical parameters that need to be addressed to demonstrate compliance with § 25.795(c). These include the amplifying effects of the pressure differential between the cabin and the outside air—which can be significant. Maximum damage is sustained when an explosion occurs in a fully pressurized airplane.

b. When a suspect item is found in the cabin of an airplane in flight, measures to minimize its effect include the following:

- reducing cabin pressure—with full depressurization preferred—to reduce the damage caused by an explosion;
- minimizing the loss of integrity of the structure or systems;
- using explosive containment devices; and
- conducting operational procedures established in consideration of the airplane performance.

c. While it is important that the crew be aware of the LRBL, the LRBL should not be marked or otherwise obvious to other persons. Close coordination among the airframe manufacturer, operator, and regulatory authorities is needed in order to maximize the effectiveness of the LRBL and associated procedures.

8. DEMONSTRATION OF COMPLIANCE.

a. The specific location of the LRBL on an airplane, and procedural details to follow for moving suspect items to the LRBL, are exempt from public disclosure under 5 USC 552 and should not be distributed to people who do not have the need to know. When determining the LRBL, the following operational and design issues should be addressed:

(1) If the applicant chooses a site adjacent to the fuselage skin, the applicant should assume that a portion of the structure will be lost. The applicant should determine the structural capability of the airplane in the presence of the resulting opening. For example, if the LRBL is a door, it should be assumed that the entire door is lost. If the area is not a door, the following factors should be considered:

(a) When using this approach, the LRBL fuselage-skin blowout area must be discontinuous from the surrounding structure, so that cracks developed in the blowout section cannot propagate into the surrounding structure.

(b) The dimensions of the LRBL blowout region should be no smaller than a 30-inch diameter circle. However, the dimensions may be reduced to no less than a 20-inch diameter circle, if the basic airplane geometry and other considerations prevent a larger diameter.

(c) Adequate space must be available to place the attenuating materials required by the operational procedures.

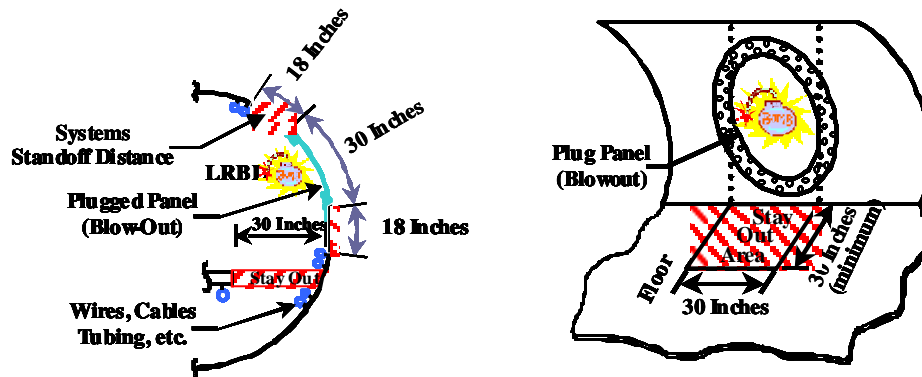
(d) The LRBL should allow the suspect item to be placed as close to the fuselage skin as possible. That is, interior features, such as galleys, closets, and seats, should not obstruct access to the LRBL or the space available for the LRBL.

(2) The location of the LRBL should include considerations of the secondary effects, including the following:

- structural losses,
- ingestion of debris into the engine,
- large mass strikes on the tailplane,
- smoke or fire, or
- hazards to passengers.

(3) The applicant should evaluate system integrity in the area likely to be affected around the LRBL. Wherever practicable, flight critical systems (including fuel systems) should be kept 18 inches away from the established LRBL contours, as shown in Figure 1. In addition, flight critical systems should be kept out of the area under the floor at the LRBL for a distance of 30 inches inboard over the width of the LRBL cutout, also shown in Figure 1. This applies to systems that are attached to the floor beams or mounted above the bottom of the floor beams. This guidance is separate from the requirement of § 25.795(c)(2).

Figure 1. LRBL Design Dimensions



(4) Where the criteria provided in paragraph 8a(3) would conflict with the requirements of § 25.795(c)(2), maximizing system separation takes precedence. However, in this case, the applicant should consider adding protection from fragments and large structural deformation to systems that must be run in proximity to the LRBL

(5) Systems shielding and/or inherent protection should be able to withstand fragment impacts from 0.5-inch diameter 2024-T3 aluminum spheres traveling 430 feet per second. The ballistic resistance of 0.09-inch thick 2024-T3 aluminum offers an equivalent level of protection. System designs must incorporate features that minimize the risk of their failure due to large displacements of the structure to which they are attached. This may include flexibility in both the systems and/or their mountings. In the absence of test evidence or alleviating rationale, provisions should allow for a minimum 6-inch displacement in any direction from a single point force applied anywhere within the protected region. The applicant may also incorporate frangible attachments or other features that would preclude system failure.

b. Traditionally, the LRBL was chosen where there was intrinsic structural reinforcement. However, the applicant may take other measures to meet the intent of the rule. An example would be a containment system. Such an approach would require the concurrence of the applicable Aircraft Certification Office and the Transport Airplane Directorate to establish the appropriate criteria.

c. In most circumstances, it is preferable to reduce the cabin pressure differential to zero. Reduction of cabin pressure is an extremely effective way to minimize structural damage in the event of a detonation.

d. The goal of LRBL procedures is to mitigate the effects of an in-flight explosion and to enhance aircraft survivability through use of prior planning, training, and available resources. In-flight emergency safety procedures recommended by the Department of Homeland Security serve as a guide for airlines and crews to refine specific emergency procedures in their Flight Operations Manuals and in initial and recurrent training programs.

e. Section 121.295 requires that information on the LRBL be available to the crew during flight. The information must be concise and easy to understand.

f. Effectiveness of the LRBL does not need to be verified by test.

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