

certification requirements of 14 CFR part 36. In addition, the FAA must issue a finding of regulatory adequacy pursuant to section 611 of Public Law 93-574, the "Noise Control Act of 1972."

Special conditions, as defined in 14 CFR 11.19, are issued in accordance with 14 CFR 11.38 and become part of the type certification basis in accordance with 14 CFR 21.17(a)(2), Amendment 21-69, effective September 16, 1991.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, the special conditions would also apply to the other model under the provisions of 14 CFR 21.101.

#### Discussion of Novel or Unusual Design Features

While the main deck of the A380-800 airplane has five pairs of type A exits, these are not sufficient for the total number of persons on board the airplane. Therefore, the upper deck exits must also be used as ditching exits. As a result, the upper deck exits are being equipped with slide/rafts. With two decks, there is the possibility of interference between the slides/rafts of the upper deck and the slide/rafts or rafts of the main deck.

Since 14 CFR part 25 does not address the use of upper deck exits as ditching exits, special conditions are necessary to ensure that occupants can be safely evacuated from these exits following a ditching event.

#### Discussion of Comments

Notice of Proposed Special Conditions No. 25-05-12-SC, pertaining to flotation and ditching, were published in the **Federal Register** on August 9, 2005 (70 FR 46115). Comments were received from the Airline Pilots Association (ALPA) and an individual commenter.

*Requested change 1:* ALPA suggests that in general the special conditions "should evaluate the arrangement and utility of the slide/rafts at each exit using a realistic range of aircraft configurations and sea state."

Regarding proposed Special Condition b., ALPA recommends that "The demonstration of the boarding of the upper deck slide/rafts should be done using crewmembers from air carriers operating the aircraft. In addition, these crewmembers should have had no training beyond that which will be provided to regular line crewmembers."

*FAA response:* Demonstrations of the slide/rafts will consider a realistic range of airplane configurations and sea states. These demonstrations and the associated crew training will be consistent with current practice. The A380-800 is not novel with respect to those matters. Therefore, we have made no change to the special conditions, as proposed.

*Requested change 2:* In terms of proposed Special Condition c., an individual commenter expressed concern about interference between the M3 slide/raft and other slide/rafts. ALPA commented that preventing such interference should not rely on crew procedures.

*FAA response:* Since the M3 exit will not be used as a ditching exit, proposed Special Condition c. is not included in these Final Special Conditions. Should this exit later be reinstated as a ditching exit, appropriate requirements will be developed for its use.

#### Applicability

As discussed above, these special conditions are applicable to the Airbus A380-800 airplane. Should Airbus apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, these special conditions would apply to that model as well under the provisions of § 21.101.

#### Conclusion

This action affects only certain novel or unusual design features of the Airbus A380-800 airplane. It is not a rule of general applicability.

#### List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

■ The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

#### The Special Conditions

■ Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for the Airbus A380-800 airplane.

In addition to the requirements of §§ 25.801, 25.807(i), 25.810, 25.1411, and 25.1415, the following special conditions apply:

a. For door sill heights that would be greater than six (6) feet above the waterline during a ditching event, an assist means must be provided from the airplane to the water.

b. Boarding of the upper deck slide/rafts must be demonstrated for the rated

and overload capacity of the slide/rafts from the representative door sill heights associated with planned and unplanned ditching. The boarding procedure must ensure that the occupants boarding the slide/rafts remain on the slide/raft whether the occupants enter the slide/raft or raft by walking, jumping or sliding. In addition, the boarding procedure must not result in injury either to occupants entering the slide/raft or to occupants already in the slide/raft.

c. It must be demonstrated that the upper deck slide/rafts located at doors U1 and U2 (just forward and just aft of the wing) can be safely separated from the airplane. Safety considerations include damage to the slide/rafts, injury to occupants of the slide/raft, ejection of the occupants from the slide/raft into the water as a result of the contact with the wing, and the slide/raft becoming beached on the wing. Probable damage to the wing leading and trailing edge flight control structure during a water landing must be considered when assessing the damage caused to the slide/rafts or life rafts.

d. It must be demonstrated that when the upper deck slide/rafts are separated from the airplane, they do not injure occupants of the slide/raft, eject occupants of the slide/raft into the water, or damage the slide/raft in a way that affects its seaworthiness.

Issued in Renton, Washington, on August 28, 2006

**Ali Bahrami,**

*Manager, Transport Airplane Directorate, Aircraft Certification Service.*

[FR Doc. E6-15012 Filed 9-8-06; 8:45 am]

**BILLING CODE 4910-13-P**

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No. NM320; Special Conditions No. 25-330-SC]

#### Special Conditions: Airbus Model A380-800 Airplane, Escape Systems Inflation Systems

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the Airbus A380-800 airplane. This airplane will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. Many of these novel or

unusual design features are associated with the complex systems and the configuration of the airplane, including its full-length double deck. For these design features, the applicable airworthiness regulations do not contain adequate or appropriate safety standards regarding escape system reliability. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards. Additional special conditions will be issued for other novel or unusual design features of the Airbus Model A380-800 airplane.

**DATES:** *Effective Date:* The effective date of these special conditions is August 28, 2006.

**FOR FURTHER INFORMATION CONTACT:** Holly Thorson, FAA, International Branch, ANM-116, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington 98055-4056; telephone (425) 227-1357; facsimile (425) 227-1149.

#### **SUPPLEMENTARY INFORMATION:**

##### **Background**

Airbus applied for FAA certification/validation of the provisionally-designated Model A3XX-100 in its letter AI/L 810.0223/98, dated August 12, 1998, to the FAA. Application for certification by the Joint Aviation Authorities (JAA) of Europe had been made on January 16, 1998, reference AI/L 810.0019/98. In its letter to the FAA, Airbus requested an extension to the 5-year period for type certification in accordance with 14 CFR 21.17(c).

The request was for an extension to a 7-year period, using the date of the initial application letter to the JAA as the reference date. The reason given by Airbus for the request for extension is related to the technical challenges, complexity, and the number of new and novel features on the airplane. On November 12, 1998, the Manager, Aircraft Engineering Division, AIR-100, granted Airbus' request for the 7-year period, based on the date of application to the JAA.

In its letter AI/LE-A 828.0040/99 Issue 3, dated July 20, 2001, Airbus stated that its target date for type

certification of the Model A380-800 had been moved from May 2005, to January 2006, to match the delivery date of the first production airplane. In a subsequent letter (AI/L 810.0223/98 issue 3, dated January 27, 2006), Airbus stated that its target date for type certification is October 2, 2006. In accordance with 14 CFR 21.17(d)(2), Airbus chose a new application date of December 20, 1999, and requested that the 7-year certification period which had already been approved be continued. The FAA has reviewed the part 25 certification basis for the Model A380-800 airplane, and no changes are required based on the new application date.

The Model A380-800 airplane will be an all-new, four-engine jet transport airplane with a full double-deck, two-aisle cabin. The maximum takeoff weight will be 1.235 million pounds with a typical three-class layout of 555 passengers.

##### **Type Certification Basis**

Under the provisions of 14 CFR 21.17, Airbus must show that the Model A380-800 airplane meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-98. If the Administrator finds that the applicable airworthiness regulations do not contain adequate or appropriate safety standards for the Airbus A380-800 airplane because of novel or unusual design features, special conditions are prescribed under the provisions of 14 CFR 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Airbus Model A380-800 airplane must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36. In addition, the FAA must issue a finding of regulatory adequacy pursuant to section 611 of Public Law 93-574, the "Noise Control Act of 1972."

Special conditions, as defined in 14 CFR 11.19, are issued in accordance with 14 CFR 11.38 and become part of the type certification basis in accordance with 14 CFR 21.17(a)(2).

Special conditions are initially applicable to the model for which they

are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, the special conditions would also apply to the other model under the provisions of 14 CFR 21.101.

##### **Discussion of Novel or Unusual Design Features**

The inflation system for the escape systems associated with the exits includes a pressurized cylinder with a mixture of carbon dioxide and argon in both gaseous and liquid states. The inflation system also includes a smaller cylinder containing a solid propellant that burns to generate gaseous propellant. The opening of the valve and the ignition of the propellant are accomplished by the firing of squibs. The firing of these squibs is sequenced to improve their performance in the extreme temperatures to which they are subjected. Firing of the squibs is controlled by a system mounted on the emergency exit.

The proposed design for the escape systems on the A380 is much more complex than the design of systems currently in use. Typically, inflation systems for escape systems consist of a pressurized cylinder containing a mixture of gases and a regulator valve that reduces the outlet pressure supplied from the inflation cylinder. The regulator valve is opened either by mechanical means or by the firing of a squib.

The regulations governing the certification of the A380 do not adequately address the certification requirements of this type of inflation system for an escape system. Furthermore, the Technical Standard Order (TSO) that addresses escape systems (*i.e.*, TSO-C69c) does not adequately address this type of inflation system. The current requirements for escape system reliability are predicated on a simple inflation system, where reliability is driven by the performance of the inflatable itself. The existing requirements do not account for an inflation system that could adversely affect the overall reliability of the escape system.

Since the A380 has 16 emergency exits, the requirements of § 25.810 require a total of 80 successful deployments (5 successive deployments for each exit). However, since the requirements apply to each system independently, failures in a system common to all the escape systems would not be adequately addressed. Therefore, the inflation system needs a specific requirement that will show adequate system reliability. With a goal of achieving 95% reliability of the inflation system with a 95% confidence, we are establishing such a requirement. As we noted above, the propellant used is designed to burn. The regulations do not address this type of propellant, and some measure of fire safety protection is needed. United Nations document No. ST/SG/AC.10/I1/Rev.3 "Transport of Dangerous Goods, Manual of Tests and Criteria," section 13.7.1, contains a small scale test that addresses this concern. Propellants that pass this test will not be a fire hazard.

Therefore, a special condition is needed to ensure that the inflation system for the A380 escape system is reliable and that the propellant itself does not constitute a fire hazard.

#### Discussion of Comments

Notice of Proposed Special Conditions No. 25-05-15-SC, pertaining to escape systems inflation systems, was published in the **Federal Register** on August 9, 2005, (70 FR 46100). Comments were received from the Airline Pilots Association (ALPA) and an individual commenter.

*Requested change 1:* ALPA recommends that the tests of the inflation system "be conducted on the aircraft (or a mockup). Bench testing does not adequately ensure that the entire system will have the declared reliability. The system and its components should be subjected to accelerated aging representative of long-term storage (temperature and pressure cycling), long term exposure (high and low frequency vibration) as part of each test." ALPA adds that "the inflation systems should be demonstrated to function in winds from the most severe angle at speeds up to at least the maximum wind speed (gust included) for which flight operations can occur."

*FAA response:* Many of these recommendations go beyond current regulatory requirements for inflation systems. For example, wind performance is already specified in 14 CFR part 25. The purpose of the special conditions is to establish criteria that will validate that the reliability of the inflation system as a component will not drive the overall reliability of the

escape system. Thus tests on the escape slides installed on the airplane will be performed as is consistent with current practice, and additional tests will be performed on the inflation system itself. Accordingly, we have not changed the special conditions, as proposed.

*Requested change 2:* An individual commenter expresses concern about various aspects of the inflation system, including its output of high temperature gas; residue from combustion of the solid propellant; high pressure produced in the inflation system; activation of the inflation system, including inadvertent activation by a lightning strike; and the need for a redundant manual (backup) power source for the inflation system.

*FAA response:* These comments relate to the general safety and suitability of the inflation system for the escape system and its related components. These are fundamental considerations for any airplane system. Although the inflation system may warrant highly specific considerations, it is the need to show the reliability of the system relative to conventional design that makes it novel. Showing that the system elements are compatible with one another is a basic certification requirement for any system.

To address the novel features of the inflation system requires imposition of special conditions in addition to the applicable requirements of § 25.1301. The slide must be both soaked and inflated at a range of temperatures to determine its operating range. The minimum pressures are determined to establish evacuation rate and stiffness. Therefore, the initial internal pressure of the slide will not be an issue in the qualification. The electrical systems are protected against lightning by other requirements. The manual backup is, indeed, an alternative electrical supply, which is addressed in the system safety analysis. Accordingly, we have not changed the special conditions, as proposed.

#### Applicability

As discussed above, these special conditions are applicable to the Airbus A380-800 airplane. Should Airbus apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, these special conditions would apply to that model as well under the provisions of § 21.101.

#### Conclusion

This action affects only certain novel or unusual design features of the Airbus A380-800 airplane. It is not a rule of general applicability.

#### List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

■ The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

#### The Special Conditions

■ Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for the Airbus A380-800 airplane.

a. In addition to the requirements of § 25.810, the following special condition applies:

To ensure that the inflation system is a reliable design, it must be tested using 84 inflation/firing system bench tests with no more than one failure. For these special conditions, the inflation/firing system is defined as everything upstream of the outlet connection to the inflation valve, which includes but is not limited to the door-mounted systems that provide the firing signals to the squibs, the squibs themselves, the solid propellant, and the valve.

b. In addition to the requirements of § 25.853(a) and Appendix F Part I (a)(ii), in standard atmosphere conditions, the following special condition applies:

To ensure that the propellant itself does not contribute significantly to a fire, the propellant must be subjected to and must pass a standard "Small-Scale Burning Test," as specified in United Nations document No. ST/SG/AC.10/11/Rev. 3 "Transport of Dangerous Goods, Manual of Tests and Criteria," section 13.7.1.

Issued in Renton, Washington, on August 28, 2006.

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[FR Doc. E6-15010 Filed 9-8-06; 8:45 am]

**BILLING CODE 4910-13-P**