U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject:	Action: Review and Concurrence, Equivalent Level of Safety Finding for Hydraulic System Proof Pressure Test FAA Project Number AT6937SE-T	Date:	May 19, 2004
		Reg Ref:	§25.1435, Amendment Level 25-45
From:	Manager, TSS Propulsion/Mechnical Systems, ANM-112	Reply to Attn of :	Ken Frey, Systems & Equipment, ANM-130S
To:	Manager, Seattle Aircraft Certification Office, ANM-100S	ELOS Memo #:	AT6937SE-T -S-1

Background
Boeing has applied for an amended type certificate to add a model 767-200C airplane. The 767-200C is a passenger/cargo/combi derivative of the 767-200. Part of this modification includes re-routing of the hydraulic tubing. This design change requires a hydraulic system proof pressure test to show compliance to § 25.1435(b)(1), Amendment 25-45. The purpose of the hydraulic system proof pressure test required by § 25.1435(b)(1) is to show adequate separation between hydraulic system elements and structure or other systems; and to show that there will be no permanent detrimental deformation that would prevent the system from performing its intended function.

Section 25.1435(c)(3), Amendment 25-104, allows the hydraulic system proof pressure test to be conducted at the system relief pressure or 1.25 times the design operating pressure if a system pressure relief device is not part of the system design. The rule also requires the complete hydraulic system(s) to be functionally tested on the airplane in normal operation over the range of motion of all associated user systems.

Boeing proposes using a hydraulic system test pressure as related to 14 CFR 25.1435(b)(1), of not less than 3400 psig for this program.

Applicable regulation(s)
Section 14 CFR 25.1435(b)(1), Amendment 25-45 states:

(b)(1) A complete hydraulic system must be static tested to show that it can withstand a pressure of 1.5 times the design operating pressure without a deformation of any part of the system that would prevent it from performing its intended function. Clearance between structural members and hydraulic system elements must be adequate and there must be no permanent detrimental deformation. For the purpose of this test, the pressure relief valve may be made inoperable to permit application of the required pressure.

Section 14 CFR 25.1435(c)(3), Amendment 25-104 states:

(c)(3) The complete hydraulic system(s) must be functionally tested on the airplane in normal operation over the range of motion of all associated user systems. The test must be conducted at the system relief pressure or 1.25 times the DOP if a system pressure relief device is not part of the system design. Clearances between hydraulic system elements and other systems or structural elements must remain adequate and there must be no detrimental effects. **]**

Regulation(s) requiring an ELOS
Section 14 CFR 25.1435(b)(1)

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)
This equivalent safety finding is being considered based on the requirements for hydraulic systems proof pressure testing in 14 CFR Part 25.1435, Amendment 25-104. Changes to the hydraulic system in this 767-200C program are not in locations where there is relative motion of the user systems, other systems, or airplane components; therefore, actuation system operation over the entire range of motion should not have any effect on the proof pressure test for this program. The proposed proof pressure test at 3400 psig provides an equivalent level of safety to the proof pressure requirement in § 25.1435(b)(1) at 4500 psig for the design changes to the hydraulic system in this airplane.

Testing at this lower pressure has the added benefit of allowing a more complete test, because a test pressure of 4500 psig would require portions of the hydraulic system to be disconnected or blocked off from the test pressure to prevent structural overload from the actuators.

Note: The consideration of hydraulic system proof pressure testing at the system relief pressure and range of motion of the user system, other systems, or airplane components in the area of the hydraulic system has been formally and explicitly addressed in 14 CFR Part 25, Amendment 25-104. Range of motion of the user system, other systems, or airplane components in the area of hydraulic system has to be considered when evaluating an equivalent safety finding to hydraulic system proof pressure tests requirements of § 25.1435(b)(1).

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation
As stated above, changes to the hydraulic system in this program are not in locations where there is relative motion of the user systems, other systems, or airplane components; therefore, actuation system operation over the entire range of motion should not have any effect on the proof pressure test for this airplane program. Boeing has proposed a proof pressure test at 3400 psig. This provides an equivalent level of safety to the proof pressure requirement in § 25.1435(b)(1) at 4500 psig for the design changes to the hydraulic system in this airplane.

FAA approval and documentation of the ELOS
The FAA has approved the aforementioned Equivalent Level of Safety Finding in issue paper S-1. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this

ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) or in the limitations and conditions section of the STC Certificate. [E.g. Equivalent Safety Findings have been made for the following regulation(s): §25.1435(b)(1) Hydraulic System Proof Pressure Test (documented in TAD ELOS Memo AT6937SE-T-S-1)]

Original Signed by

Neil D. Schalemkamp — May 19, 2004

Manager, Propulsion/Mechanical Systems Branch, ANM-112 — Date

ELOS Originated by Seattle ACO:	Name Ken Frey	Routing Symbol ANM-130S