Exemption No. 5765C

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of **Dornier Luftfahrt GmbH** for an exemption from § 25.562(c)(5) of the Federal Aviation Regulations	**Regulatory Docket No. 27432**

GRANT OF EXEMPTION

By letter LREZ-1487/95 dated September 29, 1995, document LREZ-1488/95 dated September 29, 1995, and document EK34-WO88/95 dated September 19, 1995, Messrs. Goße and Krause, Dornier Luftfahrt GmbH, Postfach 1103, D-82230 Wessing, Federal Republic of Germany, petitioned for a time extension to Exemption No. 5765B, which expires on December 31, 1995, from the Head Injury Criterion (HIC) of § 25.562(c)(5) of the Federal Aviation Regulations (FAR), for front row passenger seats located behind bulkheads in Dornier Model 328 airplanes.

Sections of the FAR affected:

> Section 25.562(c)(5), as amended by Amendment 25-64, requires that each occupant must be protected from serious head injury under the dynamic test conditions prescribed in paragraph (b) of this section. Where head contact with seats or other structure can occur, protection must be provided so that the head impact does not exceed a HIC of 1,000 units. The level of HIC is defined by the equation:

$$HIC = \left[(t_2 - t_1) \left[\frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a(t)\, dt \right]^{2.5} \right]_{max}$$

ANM-96-007-E

Related Section of the FAR:

Section 25.785(a), as amended by Amendment 25-64, requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of inertia forces specified in §§ 25.561 and 25.562.

The petitioner's supportive information is as follows:

"Dornier Luftfahrt is submitting this petition for an extension of the partial Exemption No. 5765B granted until Dec. 31, 1995, from the requirement for a maximum Head Injury Criterion (HIC) of 1000 units of § 25.562(c)(5) for passenger seats located behind the cockpit/cabin bulkhead (RH) and behind the bulkhead (LH). It is petitioned that the extension be granted up to and including June 1996.

"Document EK34-WO88/95 presents design a solution, i.e., front row seats with integral three-point safety harnesses, test results, and establishes the Dornier 328 retrofit schedule necessary to implement modified seats in the fleet in a cost effective and orderly manner.

"The schedule shows that seats are available in May of 1996, with approximately eight weeks needed for retrofit and completion. The late availability date of the seats is caused by long lead times of material for upholstery and shrouds.

"An alternative would be to equip the seats with readily available material for upholstery and shrouds but this would still not allow us to complete the retrofit prior to the deadline. This alternative also has the disadvantage that the seats would again have to retrofitted when the customer preferred materials are eventually available and also would penalize the seat vendor in that production schedules and processes would have to be switched around.

"The only remaining option left open to Dornier and its U.S. customers, other than grounding essentially the complete fleet after the deadline, would be to remove the three front row seats (approximately ten percent of the available seating capacity), incurring a grave financial burden on the various operators of the Dornier 328 and seriously affecting their competitive situation.

"In both alternative cases, Dornier would have to certify cabin layouts either with alternative materials or with removed front row seats. In either case, at [sic] six operator individual cabin layouts are affected, putting a high workload and cost penalty on the airframe manufacturer.

"We feel that it is again necessary to point out that the majority of seating capacity offered in the U.S. starting even after January of 1996 will not have incorporated the

improved safety level that the Dornier 328 can, as of July of this year. Dornier Luftfahrt GmbH has succeeded, with a considerable financial and manpower effort, to show compliance with the requirements of § 25.562 (c)(5). It now seems only fair to allow Dornier and its seat vendor another six months to sensibly and smoothly perform the remaining steps in order to close this very long (since 1989) and elaborate program.

"Granting the extension of the partial exemption by six months is in the public interest because:

"1. Until implementation of the new design, the safety standard of the three seats concerned is equivalent to relevant seat locations as offered in most other commercial transports.

"2. It will allow retrofit of the terminating action in the U.S. fleet based on a schedule which will not incur an economic burden otherwise caused by removal of front row seats (approximately ten percent of the available seating capacity) on the operators and in turn increase air fares.

"3. Dornier has developed a technical solution that provides the required occupant protection. The best effort process of developing the final means to fulfill the new safety standards for front row seating started 1989. In light of this, adding another six months to the termination of this activity would not be detrimental to the interests of the public."

"1) Description of Technical Solution for Front Row Seat HIC Problem

In order to comply with the requirement JAR/FAR § 25.562 (c)(5), Dornier decided to install front row seats with shoulder harnesses, after investigating many alternative solutions such as improved bulkhead upholstery and airbags installed in bulkheads.

"In case of an emergency landing condition similar to the test condition described in Advisory Circular (AC) 25.562-1, the front row seats with shoulder harnesses shall avoid that [sic] a front row seat's ninety-ninth percentile occupant will have contact to structure in front of these seats.

"It was decided not to attach the shoulder strap to the aircraft structure, in order to minimize cost and to allow a certain cabin layout flexibility (attachment points do not have to be relocated for different customer cabin layouts). So the three-point restraint system of the front row seat is attached to the seat only.

"This required a completely new seat design with a stronger seat backrest and, as a secondary effect, an improved backrest upholstery, in order to solve the second row to front row HIC problem.

"The necessary distance to structure in front of the front row seat, defined by dynamic tests and the new seat design, led to new installation positions for the passenger seats. These affect the installation positions of the front row seats in the standard 30-passenger cabin layout, the 31-passenger Horizon Air cabin layout, and the 33-passenger cabin layout. These three typical cabin layouts cover all different front row seat installation positions for aircraft delivered up to now."

"2) Certification Status

"Compliance with seat certification requirements of FAR/JAR 25, as well as TSO C-127, is being shown by tests/analysis as applied for under JAA Change Notice CN-0028 1.

"The latest front row seat design and the front row seat installation, defined by the above mentioned cabin layouts, fulfilled the requirements of AC 25.562-1 during dynamic HIC testing in calendar week 34, witnessed by JAA/LBA. Structural dynamic seat testing for TSO C-127 approval has been successfully performed in calendar week 37 of this year."

A summary of the petition was published in the Federal Register on November 15, 1995 (60 FR 57476). No comments were received.

The FAA's analysis/summary is as follows:

On October 19, 1993, the FAA issued Exemption No. 5765 from the HIC requirements for front-row seating, until the requested date of June 30, 1994. The exemption was granted in response to industry's general reluctance to utilize more readily available solutions to the HIC requirement (e.g., various torso and shoulder restraints, increased clearance), and their preference instead to pursue research into what they considered to be a more commercially desirable but not yet available means of compliance (i.e., "crash pads"). In response to continued unsuccessful testing in this area, Exemption No. 5765A was issued on June 13, 1994, to extend the compliance deadline until December 31, 1994. Exemption No. 5765B was issued on December 30, 1994, to allow yet another year of non-compliance, until December 31, 1995, while research continued for commercially desirable solutions. The current petition implies that this research activity is at last terminated, and outlines an intent for implementing a more readily achievable design means of compliance, but one that had been generally characterized by industry as commercially undesirable.

In consideration of the foregoing, I find that a grant of exemption is in the public interest, and will not significantly affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in §§ 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 Dornier Luftfahrt for exemption from the HIC requirements of § 25.562(c)(5) of the FAR, for front row passenger seats located behind bulkheads on Dornier Model 328 airplanes, is granted through June 30, 1996, only. Other

provisions of Exemption No. 5765B, together with its conditions and limitations, remain the same and are applicable to this exemption. This amendment is part of, and shall remain attached to, Exemption No. 5765B.

Issued in Renton, Washington, on December 14, 1995.

/s/

Darrell M. Pederson
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service