

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
KANSAS CITY, MISSOURI 64106

In the matter of the petition of

SUPER 18 CORPORATION

for exemption from § 23.562
of Title 14 of the Code of Federal Regulations

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* Regulatory Docket No.
* [FAA-2004-17235-1]
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AMENDMENT TO GRANT OF EXEMPTION

By letter dated March 2, 2004, Mr. Mark Erickson, President, Super 18 Corporation, P.O. Box 521795, Big Lake, AK 99652 petitioned for an exemption from § 23.562 of Title 14 of the Code of Federal Regulations. The exemption, as granted, permits type certification of the Super 18-160 with seats that have not shown compliance to § 23.562, Emergency landing dynamic conditions, effective at Amendment level 23-50. Super 18 Corporation demonstrated mitigating factors in the airframe, fuel system, and passenger seating system to show that the exemption did not adversely affect safety.

After granting the exemption, the applicant determined, through flight testing, that the aircraft stall speed is actually 45 knots and not the 39 knots estimated in the initial exemption. The FAA examined details associated with the exemption at the proposed stall speed and has determined that this exemption can be granted with the higher stall speed without a substantial impact on safety. This exemption is identical to the initial exemption with the same requirements, with the exception that the acceptable stall speed is 45 knots.

The petitioner requires relief from the following regulation(s):

Section 23.562 requires each seat/restraint system for use in a normal, utility, or acrobatic category airplane to successfully complete dynamic tests. Otherwise, demonstrate each seat/restraint system by rational analysis supported by dynamic tests, under the test conditions named in § 23.562, paragraphs (b)(1) and (2). These tests are conducted with an

occupant simulated by a 170-pound anthropomorphic test dummy (ATD), as defined by 49 CFR part 572, Subpart B. In addition, compliance with the occupant injury criteria of § 23.562(c) must also be shown during the tests conducted under § 23.562, paragraphs (b)(1) and (2).

The petitioner supports its request with the following information:

Super 18 Corporation supplied the information required by 14 CFR part 11, § 11.81, "What information must I include in my petition for an exemption?" The following is an excerpt from that submittal. Information such as company address and a summary suitable for publication in the Federal Register is not repeated.

"14 CFR § 11.81(c) The extent of relief you seek, and the reason you seek the relief

"Super 18 Corporation, P.O. Box 521795, Big Lake, AK, petitions for exemption from regulation 14 CFR Part 23.562, 'Emergency landing dynamic conditions' for the Model Super 18-160. This exemption would allow the Super 18-160 to secure a part 23 normal category Type Certificate. Super 18 Corporation will demonstrate mitigating factors in the airframe, fuel system, and passenger seating system to show that the exemption will not adversely affect safety.

"The Model Super 18-160 is a part 23 normal category aircraft. It has a flaps down stall speed at 45 knots as determined in flight testing and a maximum capacity of two (2) occupants. It will have improved crashworthiness features and a static seat test will be demonstrated to 18g forward (twice the load required under 14 CFR part 23, Section 23.561).

"14 CFR § 11.81(d) The reason why granting your request would be in the public interest; that is, how it would benefit the public as a whole

"A positive finding to the petition for exemption will result in several immediate benefits to the public. This exemption will allow for manufacturing and final assembly of the Super 18 Corporation Model Super 18-160. The local, state, and national economies will experience tangible income benefits due to the resulting number of employment positions required for the production of this aircraft. Further, it is reasonable to assume that job security for airframe and powerplant mechanics will benefit as a result of the routine maintenance and continued airworthiness requirements of this aircraft.

"This exemption will permit the Super 18-160 to secure a part 23 normal category Type Certificate. The level of certitude required for this type certificate category exceeds that of a Civil Air Regulation (CAR) 3, normal category aircraft.

"14 CFR § 11.81(e) The reasons why granting the exemption would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which you seek the exemption

"The following mitigating factors will ensure that the Super 18-160 does not experience an adverse safety effect due to a grant of exemption to § 23.562:

"1. Each seat on the Super 18-160 will be equipped with a 4-point harness that has a TSO, is attached to the fuselage instead of the seat, and the seat legs will be strengthened so that fuselage distortion will not cause a seat to move relative to the seat belt attachment. Super 18 Corporation will perform a static test on the seat/harness system to an ultimate load of 3060 pounds (170 pounds multiplied by 18 G). Restraints for items of mass (e.g., batteries, fire extinguishers, etc.) must be designed to a longitudinal load factor of 18 G. This load factor was introduced at the time 23.562 became a regulation, viewed as a suitable static alternative to dynamically testing items of mass. A successful static test to this load will demonstrate that the strength of the occupant seating system is equivalent in strength to an item of mass restraint.

"A seating system designed to a static load of 170 pounds multiplied by 18 G exceeds the current static design requirement for a normal category part 23 aircraft seating system (9 G). This static test will demonstrate the structural adequacy of the seat, the seat attachment hardware, the harness, and the airframe attachment points of the harness.

"2. While a 4-point harness minimizes the head flail envelope when compared to a simple shoulder harness, the head strike envelope will be conservatively determined from actual test data. The reference for this test data is "Aircraft Crash Survival Design Guide, Volume 1 – Design Criteria and Checklists," report number USAAVSCOM TR 89-D-22A. The flail envelope shown in Figure 43 is for a 95th-percentile Army aviator subjected to a deceleration of 30 G. Ultimately, the seat deflections during the 18 G static test and the head flail envelope predicted by this report will be combined. Overlaying the cockpit of the Super 18-160 to this combined flail envelope will show that head contact does not occur with any item in the cockpit.

"3. The Super 18-160 will have enhanced crashworthiness in the fuel system relative to the Piper Super Cub due to the elimination of the header tanks adjacent to the primary electrical buss.

"4. Diamond plane aluminum floorboards, .063 thick, will be used to enhance the survivable volume in the cockpit.

"5. Two pieces of webbing will be woven through the seat pan springs to provide additional support to eliminate the possibility of submarining.

"6. The Federal Aviation Administration should consider the occupant safety features for this aircraft, identified above, when evaluating the request for exemption to § 23.562. In summary, they are:

- A low stall speed of 45 knots or less resulting in a lower impact kinetic energy than a 61 knot aircraft;
- A seating system that is designed to the item of mass longitudinal load factor for a 170-pound occupant, which exceeds current part 23 requirements;
- The use of a robust 4-point harness;
- A strike free head flail envelope;
- Enhanced crashworthiness of the fuel system;
- Improved survivable volume;
- Protection against submarining;
- A maximum occupant count of two."

Comments on published petition summary:

A summary of the petition for the original exemption was published in the FEDERAL REGISTER for public comment on July 2, 2004 (69 FR 40466). The comment period closed July 22, 2004. The FAA received twelve comments. This exemption is being issued without a public comment period because the increased stall speed does not substantially impact the nature of the previous comments received nor would it affect how they would be dispositioned. The 12 comments to the previous exemption are not included here.

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

To obtain this exemption, the Petitioner must show, as required by § 11.81, paragraphs (d) and (e), respectively, that (1) granting the request is in the public interest and (2) the exemption will not adversely affect safety, or that a level of safety will be provided that is equal to that provided by the rules from which the exemption is sought. The FAA has previously granted similar exemptions on other aircraft types with stall speeds of 45 knots or less. The other exemptions also provided similar types of safety-enhancing, mitigating features.

In the early 1990's, the FAA attempted to address the burden that the general aviation industry felt was being placed on single engine airplanes with low stall speeds. Their concern was that the certification requirements of 14 CFR part 23 were unnecessarily burdensome to simple, low speed airplanes like the Super 18-160.

- FAA action followed a rule making activity undertaken by the JAA, known as “Joint Aviation Requirements for Very Light Aeroplanes,” or JAR-VLA, dated April 26, 1990.
- The FAA and industry developed a simplified method to certificate light, single engine airplanes.

We understand the inherent level of safety that is fundamental to this class of airplane, and we believe that the use of an exemption with mitigating factors is a valid approach to showing no adverse safety effect for § 23.562.

In addition, we encourage manufacturers of this class of airplane to obtain a part 23 type certificate. We believe the level of certitude for crashworthiness for part 23 far exceeds that of a Civil Air Regulation 3 aircraft. We agree with Super 18 Corporation that this higher level of certitude may result in an increased level of safety for the Super 18-160 over a CAR 3 aircraft. While the applicant is not showing literal compliance to § 23.562, the applicant is providing suitable mitigating factors to the seats, restraint systems, fuel system, and airframe to ensure safety is not adversely affected.

As such, the FAA has accepted the information contained in the Petitioner's request for exemption, and agrees with their arguments for no adverse safety effect:

- A low stall speed of 45 knots or less resulting in a lower impact kinetic energy than an aircraft with a 61 knot stall-speed;
- A seating system that is designed to the item of mass longitudinal load factor for a 170-pound occupant, which exceeds current part 23 requirements;
- The use of a robust 4-point harness;
- A strike free head flail envelope;
- Enhanced crashworthiness of the fuel system;
- Improved survivable volume;
- Protection against submarining;
- A maximum occupant count of two.

In consideration of the foregoing, I find that a grant of exemption is in the public interest and will not adversely affect safety. Therefore, under the authority contained in Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, as amended, delegated to me by the Administrator (14 CFR 11.61), Super 18 Corporation is granted an exemption from § 23.562 of the Federal Aviation Regulations to the extent necessary to allow type certification of the Super 18-160 airplane without an exact showing of compliance with the requirements of § 23.562. For the Super 18-160, this exemption is subject to the following conditions and limitations:

1. The current Super 18 Corporation Model 18-160, and any future update to this model, must maintain a stall speed of no more than 45 knots when in the landing configuration.
2. This exemption is limited to the Super 18 Corporation Model 18-160 as equipped with the seats, restraints, attachments, and other alterations, as described in the petitioner's request for exemption. Significant changes to any of these elements may require additional testing and substantiation.

Issued in Kansas City, Missouri on July 9, 2009.



Kim Smith
Manager, Small Airplane Directorate
Aircraft Certification Service