

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

In the matter of the petition of *

*

LIBERTY AEROSPACE, INC. *

Regulatory Docket No. FAA-2006-24633

for exemption from 14 CFR Part 23, § 23.562 *

of the Federal Aviation Regulations *

DENIAL OF EXEMPTION

By an undated letter, Mr. Jason Russell, Chief Design Engineer, Liberty Aerospace, Inc., 1383 General Aviation Drive, Melbourne, FL 32935 petitioned for an exemption from compliance with 14 CFR Part 23, § 23.562 to permit Part 23, normal category type certification of the Liberty Model XL-2 airplane with an exemption to the emergency landing dynamic conditions requirements.

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

Section 23.562 requires Part 23 normal, utility and acrobatic airplane seat/restraint systems be designed to protect occupants by successful completion of dynamic tests as specified in this section, or be demonstrated by rational analysis supported by dynamic tests, in accordance with the test conditions in subparagraphs 23.562(b)(1) and (b)(2).

The petitioner supports its request with the following information:

The current model XL-2 is an EASA and Joint Airworthiness Requirement-Very Light Aircraft (JAR-VLA) class aircraft with a maximum weight below 1654 pounds, a flap down stall speed at or below 45 knots, and a maximum capacity of two occupants. JAR-VLA aircraft are limited to daytime Visual Flight Rules (VFR). In order to perform night VFR or Instrument Flight Rules (IFR) operations, a part 23 normal category type certificate is needed. To ensure a useful payload with IFR equipment installed, a 117 pound gross weight increase is needed. The gross weight increase and a stall speed at or below 49 knots will have no significant increase in impact severity during an accident

when compared to other normal category aircraft at the same weight with a certified stalling speed of 61 knots.

Each seat on the XL-2 will have a four-point harness and will be static tested to 18g. This item of mass load factor was introduced at the time 23.562 became a regulation and is viewed as a suitable alternative to dynamically testing items of mass. The successful static test to this level demonstrated that the strength of the occupant seating system is equivalent to the strength of an item of mass restraint. A seating system designed to an 18g static load exceeds the current forward static design requirement for a normal category part 23 aircraft seating system (9g). This static strength has demonstrated the structural adequacy of the seat, seat attachment hardware, the harness and the airframe attachment points of the harness. Also head strike test data shows a strike free flail envelope.

The FAA should consider these mitigating factors:

- A low gross weight of 1770 pounds, a 49 knot stall speed which is $(49^2/61^2)*100 = 45\%$ lower impact kinetic energy and 43% lower severity ratio when compared with a 1770 pound part 23 aircraft with a certified stalling speed of 61 knots.
- 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 flail envelope
- A maximum occupant count of two.

Public interest is served in that the exemption will allow for manufacturing and final assembly of the XL-2 with a higher gross weight, so the economy will experience tangible income benefits, employment positions will be created for production, and mechanics will benefit from routine maintenance and continued airworthiness. Also, a two seat IFR training plane will benefit flying schools through lower operating costs and will make IFR training more accessible to private pilots, improving safety. Last, the level of certitude for a normal category airplane far exceeds that of either an experimental homebuilt, Part 21 primary or sport plane category aircraft which may result in an increased level of safety for the XL-2 over these categories. Consequently, the XL-2 becomes a low cost alternative to a homebuilt, primary or sport pilot category aircraft capable of IFR or Night VFR operations with a possible increased level of safety.

Comments on published petition summary:

A summary of this petition for exemption was published in the FEDERAL REGISTER for public comment on May 30, 2006 (71 FR 30714). The comment period closed on June 19, 2006, and no comments were received.

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

To obtain this exemption, the petitioner must show, as required by § 11.25(b)(5) of the Federal Aviation Regulations, 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 carefully reviewed the information contained in the petitioner's request for exemption. The FAA does not agree with the petitioner's argument that the exemption will not adversely affect safety. The applicant proposes to use forward (longitudinal) static testing at twice the required g load as equivalent safety to dynamic testing. The 18g static testing is performed in one axis (longitudinal), which is not representative of a survivable emergency landing, so the static test does not provide an equal level of safety.

The Final Rule, Amendment 23-36, which incorporated Section 23.562 stated: *“One commenter suggests that a static test be required, in lieu of the proposed dynamic tests, which would require that first a minimum static load be reached before allowing any deformation of the seat, followed by an ultimate load test for which a determined amount of yielding must be evident. This commenter suggests that minimum load factors in the longitudinal axis be 8g prior to any permanent deformation and 12g for failure or excessive deformation which would impede rapid evacuation. The FAA does not agree because this procedure would not provide data for evaluating the occupant motion or loading criteria which would be required by the proposed rule. Experience has shown that static deformation requirements may conflict with the seat/restraint system performance under dynamic conditions. The FAA agrees with the concept of developing seat assemblies which will limit occupant loads by yielding at one predefined load while maintaining structural integrity up to another higher load; however, available static test methods alone cannot provide the data necessary to evaluate the occupant protection provisions of these seat/restraint systems.”*

The Model XL-2 no longer meets the requirements of JAR-VLA, and its advisory material that allowed the same exemption is not applicable to a normal category airplane. Although the mitigating factors of 18g forward static strength and four point harnesses are encouraging, they are not sufficient to meet the intent of § 23.562.

Other mitigating factors proposed include: (1) a maximum occupant capacity of two, (2) a strike free flail envelope, and (3) a kinetic energy level comparison of the XL-2 with another airplane of the same gross weight with a 61-knot stall speed. The first is of minimal benefit since there are other two-place airplanes with reciprocating engines and fixed gear that are used in general aviation operation and flight training. The second is based on Army data that was used to substantiate the JAR-VLA exemption, while compliance with § 23.562 will demonstrate Head Impact Criteria for the normal category XL-2. The third is a comparison with little relevance to current Part 23 airplanes since

the FAA is not aware of any two-place, normal category airplanes with reciprocating engines and fixed gear that have a 61-knot stall speed.

The proposed static testing cannot give an equal level of safety to dynamic testing for survivable emergency landings. Instead, it would adversely affect safety since accident history since the adoption of Amendment 23-36 demonstrates the safety improvement provided by the § 23.652 airworthiness standard in Part 23 airplanes.

Regarding the public interest, we agree that a two-place IFR (instrument flight rules) airplane would be useful to flight schools and their students as well as production personnel and mechanics. However, the argument that the XL-2 can provide a higher level of safety over homebuilt, primary and light sport category airplanes is immaterial. The comparison of safety levels must be to Part 23 normal category airplanes that have complied with § 23.562.

In consideration of the foregoing, I find that a grant of exemption, as requested, does not maintain the level of safety required by the rule from which the exemption is sought and does not serve the public interest. Therefore, pursuant to the authority of Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, as amended, delegated to me by the Administrator (14 CFR 11.53), the petition of Liberty Aerospace, Inc. for an exemption from 14 CFR Part 23, § 23.562 of the Federal Aviation Regulations is hereby denied.

Issued in Kansas City, Missouri on July 14, 2006.



Patrick R. Mullen
Acting Manager, Small Airplane Directorate
Aircraft Certification Service