

**DEPARTMENT OF TRANSPORTATION  
Federal Aviation Administration**

Large Agricultural Restricted Category Airplane Certification Topics, including Single Engine Airplane Certification Basis

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

**ACTION:** Notice, disposition of comments received on subject request for comment, published in Federal Register dated May 11, 2004 (69 FR 26206ff)

**SUMMARY:** The referenced notice requested comments on three particular topics concerning certification criteria for three different large airplane design proposals for restricted category aircraft to be used for agricultural and firefighting missions.

- (1) Certification criteria for a large twin engine restricted category agricultural airplane to be used for firefighting that does not impose all the transport category airplane airworthiness standards that are contained in 14 Code of Federal Regulations (CFR) part 25;
- (2) Consideration of the safety benefits for a large single engine restricted category agricultural airplane due to the characteristics of the airplane's usage in aerial application and firefighting;
- (3) Appropriate structural design criteria (particularly maximum weight and maximum limit maneuvering load factor) for a large single engine restricted category agricultural airplane.

NOTE: Subsequent to publishing the request for comment, FAA has elected to use the term "aerial dispensing of liquids" to describe its evaluation of equipment provisions for aircraft intended to be used for firefighting under the restricted category special purpose operation of forest and wildlife conservation (14 CFR §21.25(b)(2)). This is intended to avoid confusion over who approves firefighting operations. US Forest Service, Bureau of Land Management, and state forestry agencies approve firefighting operations and each has the final responsibility for its own firefighting operations. FAA approves the aircraft only for the dispensing function. The aircraft must be evaluated in its mission operating environment to ensure that "no feature or characteristic makes it unsafe." The language in this notice retains the terminology that was used in the original subject request for comments.

**Summary of FAA Response to Comments on the Proposal**

*Certification Criteria for a Twin-Engine Large Agricultural Restricted Category Airplane* – The FAA had proposed that the criteria be applicable to airplane design projects with maximum weight greater than 19,000 pounds. The FAA is changing this limit to airplane design projects with maximum weight greater than 22,000 pounds. The intention for this change is to permit use of Part 23 airworthiness standards for airplane design projects with approximately 1000 gallon payloads.

*Safety Benefits for Large Single-Engine Restricted Category Agricultural and Firefighting Airplanes* – The FAA intends to permit single-engine turboprop airplanes for these restricted category special purpose operations to weigh as much as 30,000 pounds. The FAA believes that turboprop engine reliability with respect to piston engines justifies this for restricted category airplanes. This is unchanged from the proposal.

*Appropriate Limit Maneuver Load Factor Criteria for Large Agricultural Restricted Category Airplanes* – Part 23 Subpart C – Structures airworthiness standards are acceptable for airplanes up to 22,000 pounds maximum weight, except that limit maneuver load factor is +3.3g with damage tolerance assessment, or +4.4g if fatigue substantiation does not use damage tolerance methodologies. Structural substantiation (static strength and fatigue) must address the maximum weight to be permitted in operation. Rational analysis to develop structural loads for Part 23 design load conditions will be required. Variances from Part 23 Subpart B – Flight airworthiness standards are permitted for maximum weight operations. Also, the maximum weight is not the required structural design condition for the emergency landing airplane turnover analysis, and for the airplane braking kinetic energy absorption requirements. These changes from the original FAA proposal are intended to simplify the design and certification of safe agricultural airplane design projects with approximately 1000 gallon payloads.

**DATES:** The original date of application for restricted category type certificate by Air Tractor, Inc. for its model AT-1002 airplane was October 29, 2002. The AT-1002 airplane is designed as a derivative of the AT-802 model airplane. These criteria were developed in lieu of using the certification basis of the AT-802 model airplane. For that reason, these criteria are applicable to the AT-1002 model airplane. Because of the length of time involved in the development of these criteria, in accordance with §21.17(c), the FAA is extending the effectivity of the AT-1002 restricted category type certificate application to October 28, 2008. These criteria will also be applicable to large agricultural airplane restricted category type certificate applications submitted to the FAA after October 28, 2005.

**FOR FURTHER INFORMATION CONTACT:** Mr. Steve Flanagan, Certification Procedures Branch, AIR-110, Aircraft Engineering Division, Aircraft Certification Service, Federal Aviation Administration, 800 Independence Avenue, SW., Room 815 Washington, DC 20591, telephone (202) 267-3549; fax (202) 267-5340; E-mail: [steve.flanagan@faa.gov](mailto:steve.flanagan@faa.gov).

**SUPPLEMENTARY INFORMATION:** For reference, the original proposal can be found on the FAA's Regulations and Guidance Library as proposed Part 21 policy. See PS-AIR100-2004-TELResCat Twin Engine Large Agricultural Restricted Category Airplane Certification Basis Proposal, and PS-AIR100-2004-LresCat Large Agricultural Restricted Category Airplane. (The sequence of the discussion in this document is the reverse of the original proposal. Reversing the order allows this discussion of comments to proceed from general to specific details as presented in the comments.) The comment

period for the proposals closed July 2, 2004. You may examine comments received on the proposal before and after the closing date, in Room 815, FAA Headquarters Building (FOB-10A), 800 Independence Avenue, SW., Washington, DC 20591, weekdays except Federal holidays, between 8:30 a.m. and 4:30 p.m.

### **Comments Received**

The FAA received nine written comments, including submittals from an agricultural aviation trade association, four operators, and the two United States manufacturers of agricultural airplanes. The most detailed comments came from the two manufacturers, both of whom are most concerned about the criteria that would be required by the FAA for airplanes weighing approximately 19,000 pounds, designed for 1,000 gallon hopper payloads. All comments agreed with the need for FAA to approve safe large single engine airplanes for agricultural use and firefighting. One operator stated a need for a 2000 gallon payload single engine airplane besides the 1000 gallon single engine airplane in the FAA's proposal.

### **Large Twin Engine Restricted Category Airplane**

Refer to the discussion titled "Twin Engine Large Agricultural Restricted Category Airplane Certification Basis Proposal – AT-2002 Project" for this topic. This can be found in the FAA's Regulations and Guidance Library as Part 21 policy. See PS-AIR100-2005-9-27-05-TELResCat Twin Engine Large Agricultural Restricted Category Airplane Certification Basis Proposal – AT-2002 Project.

One of the operators who submitted comments on the FAA proposal stated that the single engine, 1000 gallon payload airplane design proposal should meet Part 23 airworthiness standards. Like the other operators, this commenter agreed that a hybrid proposal would be more appropriate than Part 25 airworthiness standards for large restricted category agricultural airplanes.

### **Safety Benefits for Single Engine Restricted Category Agricultural and Firefighting Airplanes**

The agricultural aviation trade association distinguished between types of aerial application operations appropriate for twin engine airplanes. The trade association noted that the 800 gallon payload single engine restricted category airplane was originally thought to be too large for agricultural usage, but that over time an airplane of that size has been accepted for those operations as well as firefighting.

Comments from the operators and the manufacturers stated the need for large single engine agricultural airplanes with maximum weight of approximately 19,000 pounds, or, more to their point, airplanes designed for 1000 gallon payloads.

No comments were received concerning the proposal's statement that large single engine restricted category turboprop agricultural airplanes should weigh no more than 30,000 pounds.

### **Appropriate Criteria for 19,000 Pound (approximately 1,000 Gallon Payload) Single Engine Agricultural Airplane Design Proposals**

The manufacturer that had worked to develop this proposal objected to the FAA's statement that the hybrid proposal should be required for a 20,000 pound single engine agricultural airplane. This commenter (the applicant) stated that a revision of the criteria that was previously developed by the FAA for the applicant's 800 gallon payload airplane should be acceptable. The applicant agreed that a limit maneuver load factor of no less than +3.3g's is appropriate for a large agricultural airplane. The applicant stated that the concept of "baseline" and "maximum" weight is appropriate for certification of restricted category agricultural airplanes, and is safe because pilots know that their safety depends upon staying within operational limits that any manufacturer would establish.

The manufacturer that had not worked with the FAA to develop this proposal stated that the references to "baseline" and "maximum" weight in the proposal made the FAA's intentions confusing. This manufacturer stated that the concept of "baseline" and "maximum" weight suggests an acceptance of the concept of overload operations, and that FAA had said this would not be permitted for new airplane design proposals. Furthermore, this manufacturer said that the joint government and industry study team of 1993 – 1998 that was referred to in the FAA's proposal had not contested the FAA's position that approval for overweight operations would not be permitted on future airplane design proposals. This manufacturer believes that agricultural airplane operations with a full payload are risky enough without making structural safety dependent upon flight at low throttle or reduced power levels. This manufacturer believes the FAA should not reduce the structural protection provided by §23.303, Factor of safety, by permitting overload operations. From a structures perspective, this manufacturer states that designing aircraft structures to the maximum weight that will be experienced in service is a discipline that directly results in the level of safety that is expected by the aviation industry.

#### *Limit Maneuver Load Factor Criteria*

The FAA's intention for large agricultural airplanes is to require a limit maneuver load factor of +4.4g's if the airplane fatigue substantiation is not conducted using the damage tolerance methodologies of §23.573. Alternatively, if the airplane fatigue substantiation program uses damage tolerance evaluation methods, a limit maneuver load factor of +3.3g's will be permitted. As explained in the FAA's proposal, there is some data to suggest that these higher load levels are needed to provide a margin for the loads experienced in firefighting or agricultural airplane operations. The FAA believes that the detailed structural examination, and the mission specific airplane loads data that are required by damage tolerance methodologies will permit airplane structure designers to use a limit maneuver load factor of +3.3g for a large agricultural or firefighting airplane.

The applicant requested the FAA to provide some definition of the extent of the damage tolerance investigation the FAA expects from the applicant. The FAA expects the damage tolerance investigation to identify principal structural elements (PSE's) at least

considering the wing and the empennage. The FAA also expects that the damage tolerance investigation will include some flight loads validation by test, including the maximum operating weight permitted by the type certificate data sheet. Finally, the FAA expects the type certificate to establish safe life limits, which may only be extended based on data from high-time in-service airplane detailed inspections.

#### *Credit for Jettison of Disposable Load*

In the discussion for an appropriate certification basis for large agricultural restricted category airplanes, the applicant specifically identified three topics in which the CAM 8 operational overweight approval process had provided appropriate relief from normal category airplane airworthiness standards. First, agricultural airplane operations at the maximum flying weight need not be limited to the flying qualities of a standard normal category airplane. Second, using maximum weight for the design criteria for the airplane turnover analysis required by §23.561(d) would needlessly impose a significant weight penalty. Third, agricultural airplane operations are not consistent with the assumptions for maximum braking capability that are established in §23.735.

The FAA does see merit to the applicant's use of a weight less than maximum certificated weight with respect to certification of the restricted category airplane's flying qualities or performance. The FAA agrees that agricultural airplanes need not meet all of the minimum requirements of Part 23 Subpart B – Flight at the airplane maximum weight, although that would be a consequence of using the hybrid proposal. For the 1000 gallon payload airplane, the FAA agrees that Part 23 Subpart B – Flight requirements may be modified for the restricted category agricultural airplane because of an operating environment less stringent than that envisaged by the Part 23 normal category airplane airworthiness standards. As a result, the FAA has based its requirements on the applicant's proposal for modifying Part 23 Subpart B – Flight airworthiness standards to be used as certification criteria. Part 23 Subpart G – Operating Limitations and Information will reflect the modified criteria permitted for compliance to Subpart G requirements. The table at the end of this document records the resulting certification basis for Subpart B – Flight requirements, as well as other requirements that are modified to be appropriate for the large agricultural airplane. (See attached table “Large Agricultural Restricted Category Airplane - Part 23 Variances Permitted”.)

One commenter stated that the FAA should not permit agricultural aircraft to fly overloaded, in order to reduce fatigue cracking and unstable flight conditions which are certainly directly associated with overload flight operations. Fatigue cracking is addressed in Part 23 Subpart C – Structures airworthiness standards. Flight characteristics are addressed in Part 23 Subpart B – Flight airworthiness standards. The FAA believes that a restricted category agricultural airplane need not meet all of the limits defined in Part 23 Subpart B – Flight, and that permitting variance from these limits is an appropriate reduction in safety from normal category airworthiness standards. As stated in its proposal, the FAA agrees that overload operations by agricultural aircraft contributes to fatigue cracking, and aims to reduce that by establishing the structural certification criteria stated above and in its proposal.

The rationale for permitting this variance from normal category airplane airworthiness standards is that an operator can quickly dispose of payload in agricultural operations if necessary. The FAA has discussed with the applicant criteria for granting credit for jettison of disposable load. This will be permitted as discussed below. Otherwise, Subpart C – Structure certification will establish airplane structural limits based on design maximum weights according to §23.25(a)(1)(ii) and §23.321(b)(2).

FAA review of agricultural airplane accident records shows that emergency jettison of disposable loads does occur in practice. In discussion with the applicant, FAA had proposed to require that the hopper be capable of dumping its load within 30 seconds. The applicant responded that the proposed 30 second drop criteria would be ineffective in reducing impact loads for an airplane operating at 30 feet above ground level, so that an alternative criteria should be developed. The FAA has noted that for small airplanes, Transport Canada requires an applicant to demonstrate that 80% of disposable liquid payload must be jettisoned in 6 seconds or less to permit operating at weights in excess of the type certificated maximum weight. FAA believes that in light of the applicant's comment, this Transport Canada criteria is appropriate for the proposed large single engine agricultural restricted category airplane.

With respect to the other two topics (turnover analysis structural design criteria, and maximum brake capacity), the applicant contended that existing agricultural airplane crashworthiness design practice does not justify a more stringent design criteria. In considering this, FAA reviewed agricultural airplane accident records from the past ten years. Over this time period, the accident database shows 166 accidents in which the aircraft crashed inverted. Of the 166 accidents, 144 were nonfatal. Of the remaining 22 reports, only four of the accidents indicated conditions in which a more stringent structural design criteria may have affected the outcome. (Most of the 18 fatal accidents involved either extensive post crash fire, or airplane crash involving uncontrolled flight from an altitude of several hundred feet.) Based on this review, the FAA accepts the applicant's position that existing agricultural airplane crashworthiness design performance does not require a more stringent criteria that would be imposed by requiring that maximum weight be used for the emergency landing condition turnover analysis. FAA accepts that 75% of airplane maximum weight is acceptable as the design condition for this requirement (§23.562(d)). Comment on this particular subject from affected parties is welcome.

Similarly, the FAA reviewed agricultural airplane accident records to consider the applicant's position that current experience justifies the use of less than the maximum weight as criteria for satisfying §23.735, Brakes. The FAA reviewed Part 137 airplane accidents from January 1995 through May 2005. The review showed 14 accidents describing overrun, and 49 accidents describing aborted takeoff. One of the overrun accidents was fatal, and one of the aborted takeoff accidents was fatal. (These two accidents are included in the four fatal inverted airplane accidents noted above.) Based on this review, the FAA accepts the applicant's position that existing agricultural airplane crashworthiness design performance does not require a more stringent criteria that would be imposed by requiring that maximum weight be used for the main wheel brake kinetic

energy capacity rating. FAA accepts that 75% of airplane maximum weight is acceptable as the design condition for this requirement (§23.735). Comment on this particular subject from affected parties is also welcome.

A result of using current Part 23 airworthiness standards for the certification of 19,000 pound (1,000 gallon payload) single engine agricultural airplane design proposals is that neither Part 23 Appendix A nor Part 23 Appendix B certification criteria are applicable. Part 23 Appendix A simplified design load criteria are only applicable to aircraft weighing 6,000 pounds or less. Amendment 23-42 removed Part 23 Appendix B control surface loading design criteria from Part 23. Although these criteria have been used for small agricultural airplanes in the past, the FAA will not permit their use for the large (approximately 1000 gallon payload) single engine agricultural airplane. For the large (approximately 1000 gallon payload) single engine agricultural airplane design proposal, the FAA is requiring rational analysis using Part 23 control surface loading design conditions. The FAA is aware that preliminary results of rational analysis for horizontal tail surface loadings has resulted in some unexpectedly high tail load increment design conditions. In working with applicants for certification of large (approximately 1000 gallon payload) single engine agricultural airplane design proposals, FAA will determine if a special condition may be required to develop and document more appropriate, rationally based control surface design conditions as needed.

The applicant's comment requested that its 1000 gallon payload single engine agricultural airplane design proposal be permitted to use the variances from Part 23 established in Appendix 1 of Advisory Circular (AC) 21.25-1, Issuance of Type Certificate: Restricted Category Agricultural Airplanes, dated December 1, 1997. Also, the applicant requested use of the methods of compliance stated in the FAA's December 1, 1997 memorandum "Certification of Small, Single-Engine Piston or Turbopropeller Airplanes Used for Special Purpose Agricultural Airplanes Used for Special Purpose Agricultural Operations". Both of these documents were developed as part of the joint effort in 1993 – 1997 by the FAA and the agricultural airplane industry, and are acceptable for use in certification of approximately 1000 gallon payload agricultural airplane design proposals.

The applicant's comment to the FAA proposal stated the position that Part 23 requirements should be acceptable for certification of the single engine 1000 gallon payload agricultural airplane. In its proposal, the FAA had stated that an airplane with a maximum weight greater than 19,000 pounds would not be permitted to use Part 23 airworthiness standards. That limit was established as a policy decision, because §23.3(d) identifies 19,000 pounds as a maximum weight limit for commuter category airplanes.

Upon review of comments submitted by the public, FAA has qualitatively considered the safety benefits of its proposal, the costs to the agricultural airplane industry, and the benefit to the public for an approximately 1000 gallon payload large single engine restricted category airplane. FAA believes that the greatest safety benefit for the large restricted category agricultural airplane is obtained by requiring that the airplane static

strength structural analysis specifically address the maximum weight at which the airplane will be operated, and the airplane fatigue structural analysis specifically address the airplane loads developed by the agricultural airplane special purpose operation. In developing the twin-engine airplane certification basis proposal, the safety benefit of the Part 25 structures requirements in the FAA's proposal is to assure that dynamic effects are addressed in analysis of the flexible structures that usually are a consequence of larger size airplanes. Examples of specific requirements addressing these concerns are §25.305(c) and §25.341(b). The FAA agrees that the design of 1000 gallon payload single engine agricultural airplanes need not address these concerns if the airplane maximum weight remains appropriately limited. The FAA intends for this certification basis to apply to airplanes weighing 22,000 pounds or less. The FAA refers to approximately 1000 gallon payload airplanes to distinguish them from agricultural airplanes currently in production. FAA anticipates that the 22,000 pound airplane maximum weight limit will permit the design of 4,000 liter payload agricultural airplanes. A 4,000 liter payload translates to approximately 1057 gallons, and the FAA intends for these certification criteria to apply to this kind of airplane. For this reason, FAA agrees to permit large single engine agricultural restricted category airplanes with maximum weight of 22,000 pounds or less to be designed using Part 23 Subpart C requirements, rather than imposing the hybrid certification basis as originally stated by the FAA in its proposal. FAA believes that this change to the weight limit is appropriate, based upon its review of the initial work that developed the hybrid proposal, and by checking that against the different study efforts that supported the development of the commuter category airplane airworthiness standards. Specifically, the FAA confirmed that the 19,000 pound commuter category limit in Part 23 was set by policy rather than technical considerations. That policy relates to consideration of International Civil Aviation Organization (ICAO) Annex 8, "International Standards Airworthiness of Aircraft".

## **Conclusion**

*Certification Criteria for a Twin-Engine Large Agricultural Restricted Category Airplane* – Refer to the FAA's Regulations and Guidance Library, Part 21 policy. See PS-AIR100-2005-9-27-05-TELResCat Twin Engine Large Agricultural Restricted Category Airplane Certification Basis Proposal – AT-2002 Project.

*Safety Benefits for Large Single-Engine Restricted Category Agricultural and Firefighting Airplanes* – No comments were received opposing the FAA's proposal. Accordingly, the FAA intends to permit the development of single-engine turboprop airplanes for these restricted category special purpose operations, and intends to allow development of airplane designs weighing 30,000 pounds or less.

*Appropriate Certification Criteria for Large Agricultural Restricted Category Airplanes With 1,000 Gallon Payload Design Goal* – FAA will permit the use of Part 23 airworthiness standards for these airplane design proposals so long as the maximum weight of the airplane weighs 22,000 pounds or less. This weight limit is established because the acceptable variances from Part 23 requirements were developed based on evaluation of a fairly specific design proposal. The most significant criteria imposed by the FAA is the establishment of a design limit maneuver load factor of +4.4g with typical

fatigue analysis or fail-safe structural substantiation, or a design limit maneuver load factor +3.3g with certification to a damage tolerance analysis structural substantiation program. For the 22,000 pound (or less) single engine turbopropeller powered restricted category agricultural airplane, an applicant may use existing FAA published guidance material for small single-engine piston or turbopropeller powered restricted category certification. (This describes acceptable compliance methods, and identifies Part 23 airworthiness standards deemed inappropriate for the special purpose operation.) The certification basis for this airplane reflects these previously published guidance materials, and allows the applicant to use 75% of maximum weight to satisfy §23.562(d) and §23.735.

Issued in Washington, D.C. on September 27, 2005.

(signed by)

**David W. Hempe**

Manager, Aircraft Engineering Division

Aircraft Certification Service

		<b>Large Agricultural Restricted Category Airplane - Part 23 Variances Permitted</b>					
		Intended applicability limited to single-engine turbopropeller powered airplanes with maximum design speed of					
		260 knots or less and weighing 22,000 pounds or less					
		Critical Weight and CG determined by the applicant and agreed by the FAA.					
Subpart A - General							
§23.1	Applicability						
§23.2	Special Retroactive Requirements						
§23.3	Airplane Categories	Normal Category except as noted					
Subpart B - Flight							
§23.21	Proof of Compliance		X				
§23.23	Load Distribution Limits		X				
§23.25(a)	Weight Limits		X(1)	(1) §23.25(a)(ii) must include hopper fully loaded (by weight) with most heavy load			
§23.25(b)	Minimum weight		X				
§23.29	Empty wt & correspond'g c.g.		X(2)	(2) An empty wt/c.g. envelope shall be established to provide unrestricted use of fuel and hopper loading			
§23.31	Removable ballast		X				
§23.33	Prop speed and pitch limits		X				
§23.45(a)	General (performance)		X				
§23.45(b)	Performance altitude & temperature			Waived for agricultural operations			
§23.45(c)	Performance with cooling devices			Waived for agricultural operations			
§23.45(d)	Performance versus power available			Waived for agricultural operations			
§23.45(e)	Performance versus humidity			Waived for agricultural operations			
§23.45(f)	Takeoff & Landing		X				
§23.45(g)	Runway performance		X				
§23.49(a)	Stalling speed		X(3)	(3) Compliance with 23.49(c) & (d) and 23.562(d) must be made at weight with full fuel but hopper empty, if full hopper dump can be made within time TBD seconds (liquid or dry chemicals). Must evaluate adequate handling qualities during full hopper dump.			
§23.49(b)	Vso & Vs1 determinations		X				
§23.49(c)	Vso & Vs1 ramifications		X(3)				
§23.49(d)	Vso vs. 23.562(d)		X(3)				
§23.51	Takeoff speeds			Waived for agricultural operations			
§23.53	Takeoff performance		X	maximum weight and dispersal equipment with highest drag effect			
§23.63(a)	Climb: General		X				
§23.63(c)	Climb vs. weight-altitude-temp		X				
§23.65(b)	Climb:all engines operating		X(4)	(4) minimum climb gradient of 2.5 percent or 300 fpm whichever is greater			
				flap position and climb speed must be same as that used for §23.53(b)(2) at 50 ft;			
§23.69(a)	Enroute climb/descent		X				

§23.71	Glide: single-engine airplanes		X						
§23.73(b)	Reference approach speed		X						
§23.75	Landing distance					Waived for agricultural operations			
§23.77(b)	Balked landing					Waived for agricultural operations			
	NOTE: Determination of approximate takeoff and landing distances will be done, but not to the rigor of methods outlined in AC 23-8A. (Conservative factors to account for runway surface & slope effects.)								
	Effects of weight, altitude, and temperature will be provided, but not to the rigor of methods in AC 23-8A. (Limiting factors to identify maximums at which data is applicable.) (see §23.1587)								
§23.141	General (flight characteristics)		X						
§23.143	General (control & maneuver)		X(5)			(5) Except power-off landings with flaps extended may be done using applicant procedures			
§23.145	Longitudinal control		X						
§23.147(c)	Direct'nl & lat'l control		X						
§23.153	Control during landings		X						
§23.155	Elevator control force in maneuver		X						
§23.157	Rate of roll		X						
§23.161	Trim		X						
§23.171	General (stability)		X						
§23.173(a)	Static long stability		X						
§23.173(b)	Free return speeds		X						
§23.173(c)	Stick force perception		X						
§23.175	Demo static long stab		X						
§23.177	Stat direct'l & lat stab		X						
§23.181	Dynamic stability		X						
§23.201(a)	Wings level stall yaw & roll		X						
§23.201(b)	Stall definition		X						
§23.201(c)	Stall recovery		X						
§23.201(d)	Stall control criteria		X						
§23.201(e)	Stall eval configuration		X						
§23.203	Turning flt & accel turning stalls		X						
§23.207	Stall warning		X(6)			(6) §23.207(c) stall warning margin requirement			
						waived for agricultural operations (eliminate nuisance warnings)			
						§23.207(e) adequate advance stall warning margin to be FAA Flight Test Pilot judgment evaluation (stick shaker if needed)			
§23.221	Spinning					Waived for agricultural operations			
§23.231	Grd handling - long s&c		X						
§23.233	Grd handling - direct'l s&c		X						
§23.235	Operation on unpaved surfaces		X						
§23.251	Vibration & buffeting		X						
§23.253	High speed characteristics					Waived for agricultural operations			
	Subpart C - Structure								

§23.337(a)	Limit maneuver load factors	X(7)	(7) +4.4g, or +3.3g with damage tolerance evaluation of airplane structure
§23.561(d)	Turnover analysis	X(8)	(8) Analysis permitted to assume jettison of payload; 75% max wt design criteria
§23.562	Emergency landing dynamic cond	X(9)	(9) In lieu of dynamic tested seats, the following is acceptable:
			(1) hopper forward of cockpit/observer seats
			(2) eliminate cockpit protuberances/hard surfaces
			(3) required DOT or Mil-Spec protective headgear
			(4) minimum 5000 lb rating military type lap
			and shoulder harness (or equivalent)
			(5) observer seat provides same protection as pilot seat
	Subpart D - Design and Construction		
§23.629(f)	Flutter	X(10)	(10) dual actuators for tabs not required if surface is irreversible and minimum static strength margin equals or exceeds 4
§23.677(b)	Trim systems		Waived for agricultural operations
§23.735	Brakes	X(11)	(11) Analysis permitted to assume jettison of payload; 75% max wt design criteria
§23.775(e)	Windshields and windows		Waived for agricultural operations
§23.781(b)	Cockpit control knob shape		Waived for agricultural operations
§23.853(c)	Compartment interiors		Waived for agricultural operations
	Subpart E - Powerplant		
§23.901(d)	Installation (turbine in rain)	X(12)	(12) Specific test conditions identified for turboshaft engines not using §33.77 compliance data to address this requirement
§23.954	Fuel system lightning protection	X(13)	(13) Acceptable to address with AFM limitation prohibiting airplane operation in or around thunderstorms
§23.1043	Cooling tests	X(14)	(14) Specific test condition identified if propeller is feathered during normal agricultural operations on the ground
§23.1093	Induction system icing protection	X(15)	(15) Acceptable to address with AFM limitation prohibiting airplane in visible moisture below 40 degrees Fahrenheit
§23.1141(e)	Powerplant controls: general	X(16)	(16) Acceptable to address only single failures/malfunctions (not required to address probable combinations)
§23.1163(a)	Powerplant accessories	X(17)	(17) Each engine mount accessory must be acceptable for mounting on the engine involved and use the proper provision on the engines for mounting
	Subpart G - Operating Limitations and Information Variances (associated with Subpart B - Flight requirements)		
§23.1501	General	X	
§23.1505(a)	Airspeed limitations	X	
§23.1505(b)		X	
§23.1505(c)		X(18)	(18) Aircraft will meet all structural reqmts for Vno/Vne
§23.1505(c)(3)(i)		X(19)	(19) AFM will list weight(s) at which required climb gradient is met
§23.1545(a)		X(20)	(20) Bottom of green arc (flaps up) and bottom of white arc (flaps down)

						to be marked at maximum weight		
§23.1583	Operating limitations		X(21)	(21)	The airplane is not to be operated above its maximum certificated weight			
§23.1587	Performance information		X(22)	(22)	Provide takeoff performance distances showing groundroll distance plus			
					total distance to a 50-foot obstacle versus altitude and			
					temperature at maximum takeoff weight. Flight profile			
					to be the climb performance demonstrated for §23.65.			
					Max altitude and temperature for takeoff performance data			
					to be established as airplane operational limitations.			