Federal Aviation Administration
Aviation Rulemaking Advisory Committee

General Aviation Certification and Operations Issue Area
JAR/FAR 23 Harmonization Working Group

Task 3 – Powerplant

Task Assignment

Federal Aviation Administration

Aviation Rulemaking Advisory Committee; General Aviation and Business Airplane Subcommittee: JAR/FAR 23 Harmonization Working Group

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of establishment of JAR/FAR 23 Harmonization Working Group.

SUMMARY: Notice is given of the establishment of the JAR/FAR 23 Harmonization Working Group by the General Aviation and Business Airplane Subcommittee. This notice informs the public of the activities of the General Aviation and Business Airplane Subcommittee of the Aviation Rulemaking Advisory Committee.

FOR FURTHER INFORMATION CONTACT: Mr. William J. (Joe) Sullivan, Executive Director, General Aviation and Business Airplane Subcommittee, Aircraft Certification Service (AIR-3), 800 Independence Avenue, SW., Washington, DC 20591, telephone: (202) 267-9554; FAX: (202) 267-9562.

SUPPLEMENTARY INFORMATION: The Federal Aviation Administration (FAA) established an Aviation Rulemaking Advisory Committee (56 FR 2190, January 22, 1991) which held its first meeting on May 23, 1991 (56 FR 20492, May 3, 1991). The General Aviation and Business Airplane Subcommittee was established at that meeting to provide advice and recommendations to the Director, Aircraft Certification Service, FAA, regarding the airworthiness standards for standard and commuter category airplanes and engines in part 23 of the Federal Aviation Regulations, and parallel provisions of parts 91 and 135 of the Federal Aviation Regulations.

The FAA announced at the Joint Aviation Authorities (JAA)-Federal Aviation Administration (FAA) Harmonization Conference in Toronto, Ontario, Canada, (June 2-5, 1992) that it would consolidate within the Aviation Rulemaking Advisory Committee structure an ongoing objective to "harmonize" the Joint Aviation Requirements (JAR) and the Federal Aviation Regulations (FAR). Coincident with that announcement, the FAA assigned to the General Aviation and Business Airplane Subcommittee those rulemaking projects related to JAR/FAR 23 Harmonization which were then in the process of being coordinated between the JAA and the FAA. The Harmonization process included the intention to present the results of JAA/FAA coordination to the public in the form of a Notice of Proposed Rulemaking—an objective comparable to and compatible with that assigned to the Aviation Rulemaking Advisory Committee. The General Aviation and Business Airplane Subcommittee, consequently, established the JAR/FAR 23 Harmonization Working Group.

Specifically, the Working Group's tasks are the following: The JAR/FAR 23 Harmonization Working Group is charged with making recommendations to the General Aviation and Business Airplane Subcommittee concerning the FAA disposition of the following rulemaking subjects recently coordinated between the JAA and the FAA:

Task 1-Review JAR Issues: Review JAR 23 Issue No. 4 (which excludes commuter category airplanes) and No. 5 (which includes commuter category airplanes), and compare them with Amendment 23-42 to FAR 23, and the proposals in Notices 3 and 4 from the Part 23 Airworthiness Review. Identify technical differences between JAR 23 and FAR 23 which can be harmonized.

Task 2-Systems and Equipment: Based on the results of the Task 1 review, identify the changes to Subparts D and F of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Task 3-Powerplant: Based on the results of the Task 1 review, identify the changes to Subpart E of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Task 4-Flight Test: Based on the results of the Task 1 review, identify the changes to Subparts A, B and G of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Task 5-Airframe: Based on the results of the Task 1 review, identify the changes to Subparts C and D of FAR 23 that are appropriate for harmonization, and those provisions that should not be harmonized, if any.

Reports

A. Recommend time line(s) for completion of each task, including rationale, for Subcommittee consideration at the meeting of the subcommittee held following publication of this notice.

B. Give a detailed presentation to the subcommittee of the results of Task 1 before proceeding with Tasks 2-5.

C. Give a detailed conceptual presentation on Tasks 2-5 to the Subcommittee before proceeding with the work stated under item D, below. Each presentation should identify what proposed amendments will be included in each notice, and whether any additional notices will be need to be drafted in addition to the four identified in item D, below. These reports may be combined or presented separately at the discretion of the working group chair.

D. Draft a separate Notice of Proposed Rulemaking for Tasks 2-5 proposing new or revised requirements, a supporting economic analysis, and other required analysis, with any other collateral documents (such as Advisory Circulars) the Working Group determines to be needed.

E. Give a status report on each task at each meeting of the Subcommittee.

The JAR/FAR 23 Harmonization Working Group will be comprised of experts from those organizations having an interest in the task assigned to it. A working group member need not necessarily be a representative of one of the organizations of the parent General Aviation and Business Airplane Subcommittee or of the full Aviation Rulemaking Advisory Committee. An individual who has expertise in the subject matter and wishes to become a member of the working group should *write* the person listed under the caption "FOR FURTHER INFORMATION CONTACT" expressing that desire, describing his or her interest in the task, and the expertise he or she would bring to the working group. The request will be reviewed with the subcommittee chair and working group leader, and the individual advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the information and use of the Aviation Rulemaking Advisory Committee and its subcommittees are necessary in the public interest in connection with the performance of duties imposed on the FAA by law. Meetings of the full committee and any subcommittees will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the JAR/FAR 23 Harmonization Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on November 19, 1992.

William J. Sullivan,

Executive Director, General Aviation and Business Airplane Subcommittee, Aviation Rulemaking Advisory Committee.

[FR Doc. 92-28931 Filed 11-27-92; 8:45 am]

BILLING CODE 4910-13-M

Recommendation Letter

Mr. Anthony Broderick
Associate Administration for Regulation
and Certification-AVR-1
Federal Aviation Administration
800 Independence Ave.
Washington DC, 20591

208 Patterson St.
Falls Church, VA 22046

March 1, 1994

Dear Mr. Broderick:

The ARAC, General Aviation and Business Aircraft Issues Group met on February 8, 1994. It was the group recommendation that the enclosed Airframe, Flight, Powerplant and Systems JAR/FAR 23 Harmonization Draft Notices should be forwarded to FAA Washington for publication. Each notice has been reviewed and endorsed by FAA Kansas City and Washington Legal and is accompanied by an executive summary and economic analysis prepared by FAA.

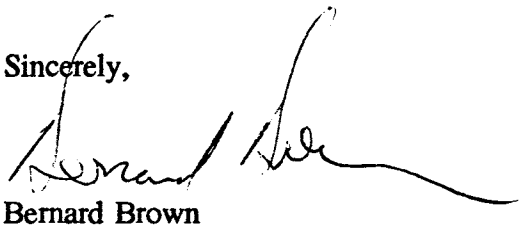
Also enclosed is a JAA letter to FAA dated January 20, 1994 to which is attached a table indicating the European study group disposition concerning text differences between JAR and FAR 23 following their review of notices 3 and 4 and the associated four draft harmonization notices. The FAA responses to the items listed which were endorsed by the issues group are also enclosed.

As you can see the JAR/FAR 23 and ARAC Working Groups with the support of the Kansas City Technical staff and the relevant FAA Staff in Washington have carried out an extremely thorough review over a considerable period of time. As you are undoubtedly aware prior to the formation of the four ARAC Working Groups, GAMA, AECMA, JAA, and the FAA had been working The JAR/FAR 23 Harmonization Program for approximately 2 years.

I believe all the people involved should be highly commended for a difficult and painstaking job very well done.

In view of the importance of the overall harmonization program every effort should be made to publish the NPRMS prior to the Annual JAA/FAA meeting in June.

Sincerely,



Bernard Brown
Asst. Chair, GABA Issues Group

cc John Colomy - FAA, Kansas City
Jim Dougherty - GAMA
Claude Schmitt - AECMA
Alain Leroy - JAA

Recommendation

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 23

[Docket No. ; Notice No.]

RIN: 2120-

Airworthiness Standards; Powerplant Proposals Based on European Joint Aviation Requirements Proposals

AGENCY: Federal Aviation Administration, DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes changes to the powerplant airworthiness standards for normal, utility, acrobatic, and commuter category airplanes. These proposals arise from the joint effort of the Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) to harmonize the Federal Aviation Regulations (FAR) and the Joint Aviation Requirements (JAR) for airplanes that will be certificated in these categories. The proposed changes would provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States under 14 CFR part 23 (part 23) and in the JAA countries under Joint Aviation Requirements 23 (JAR 23) simplifying airworthiness approvals for import and export purposes.

DATES: Comments must be submitted on or before [Insert date 120 days after date of publication in the Federal Register].

ADDRESSES: Comments on this notice should be mailed in triplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC-200), Docket No. ,

800 Independence Avenue, SW., Washington, DC 20591. Comments delivered must be marked Docket No. . Comments may be inspected in Room 915G weekdays between 8:30 a.m. and 5:00 p.m., except on Federal holidays.

In addition, the FAA is maintaining a duplicate information docket of comments in the Office of the Assistant Chief Counsel, ACE-7, Federal Aviation Administration, Central Region, 601 East 12th Street, Kansas City, Missouri 64106. Comments in the duplicate information docket may be inspected in the Office of the Assistant Chief Counsel weekdays, except Federal holidays, between the hours of 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Norman Vetter, ACE-112, Small Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, 601 East 12th Street, Kansas City, Missouri 64106; telephone (816) 426-5688.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of the proposed rule by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, or economic impact that might result from adopting the proposals in this notice are also invited. Substantive comments should be accompanied by cost estimates. Comments should identify the regulatory docket or notice number and should be submitted in triplicate to the Rules Docket address

specified above. All comments received on or before the specified closing date for comments will be considered by the Administrator before taking action on this proposed rulemaking. The proposals contained in this notice may be changed in light of comments received. All comments received will be available, both before and after the closing date for comments, in the Rules Docket for examination by interested persons. A report summarizing each FAA public contact concerned with the substance of this proposal will be filed in the docket. Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must include a preaddressed, stamped postcard on which the following statement is made: "Comments to Docket No. ." The postcard will be date stamped and returned to the commenter.

Availability of NPRM

Any person may obtain a copy of this Notice of Proposed Rulemaking (NPRM) by submitting a request to the Federal Aviation Administration, Office of Public Affairs, Attention: Public Inquiry Center, APA-200, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267-3484. Communications must identify the notice number of this NPRM.

Persons interested in being placed on the mailing list for future NPRM's should request, from the above office, a copy of Advisory Circular No. 11-2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Background

At the June 1990 meeting of the JAA Council (consisting of JAA members from European countries) and the FAA, the FAA Administrator committed the FAA to support the harmonization of the FAR with the JAR being developed for use by the European authorities who are members of the JAA. In response to this commitment, the FAA Small Airplane Directorate established an FAA Harmonization Task Force to work with the JAR 23 Study Group to harmonize part 23 and the proposed JAR 23. The General Aviation Manufacturers Association (GAMA) also established a JAR 23/part 23 Committee to provide technical assistance in this effort.

Following a review of the first draft of proposed JAR 23, members of the FAA Harmonization Task Force and the GAMA Committee met in Brussels, Belgium for the October 1990 meeting of the JAR 23 Study Group. Representatives from the Association Europeenne des Constructeures de Material Aerospatial (AECMA), an organization of European airframe manufacturers, also attended. The main agenda item for this meeting was the establishment of procedures to accomplish harmonization of the airworthiness standards for normal, utility, and acrobatic category airplanes. The JAA had decided that its initial rulemaking effort should be limited to these three categories and that commuter category airworthiness standards should be addressed separately.

After that meeting, technical representatives from each of the four organizations (GAMA, AECMA, FAA and JAA) met to resolve differences between the proposed JAR and part 23. This portion of

the harmonization effort involved a number of separate meetings of specialists in the flight, airframe, powerplant, and systems disciplines. These meetings showed that harmonization would require revisions to both part 23 and the proposed JAR 23.

Near the end of the effort to harmonize the normal, utility, and acrobatic category airplane airworthiness standards, the JAA requested and received recommendations from its member countries on proposed airworthiness standards for commuter category airplanes. The JAA and the FAA held specialist and study group meetings to discuss these recommendations, which resulted in proposals to revise portions of the part 23 commuter category airworthiness standards.

Unlike European rulemaking, where commuter category airworthiness standards are separate, for U.S. rulemaking it is advantageous to adopt normal, utility, acrobatic, and commuter category airworthiness standards simultaneously, since commuter category airworthiness standards are already contained in part 23. Accordingly, this NPRM proposes to revise the powerplant airworthiness standards for all part 23 airplanes.

During the part 23 harmonization effort, the FAA established an Aviation Rulemaking Advisory Committee (ARAC) (56 FR 2190, January 22, 1991), which held it first meeting on May 23, 1991 (56 FR 20492, May 3, 1991). The General Aviation and Business Airplane (GABA) Subcommittee was established at that meeting to provide advice and recommendations to the Director, Aircraft Certification Service, FAA, regarding the airworthiness standards

in part 23 as well as related provisions of parts 91 and 135 of the regulations.

The FAA announced, on June 2-5, 1992, at the JAA/FAA Harmonization Conference in Toronto, Ontario, Canada, that it would consolidate within the ARAC structure an ongoing objective to "harmonize" the JAR and the FAR. Coinciding with that announcement, the FAA assigned the GABA Subcommittee those rulemaking projects related to JAR/part 23 harmonization that were in final coordination between the JAA and the FAA. The harmonization process included the intention to present the results of JAA/FAA coordination to the public as NPRM's. Subsequently, the GABA Subcommittee established the JAR 23 Study Group.

The JAR 23 Study Group made recommendations to the GABA Subcommittee concerning the FAA's disposition of the rulemaking issues coordinated between the JAA and the FAA. The draft NPRM's previously prepared by the FAA harmonization team were made available to the harmonization working group to assist them in their effort.

The FAA received unsolicited comments from the JAA dated January 20, 1994, concerning issues that were left unresolved with the JAR 23 Study Group. The JAR/FAR 23 Harmonization Working Group did not address some of the unresolved issues because the JAA had not yet reached positions on those issues. Unresolved issues will be dealt with at future FAR/JAR Harmonization meetings. With respect to other issues unresolved by the JAR 23 Study Group, the JAR/FAR Harmonization Working Group recommendations did not reflect

harmonization, but reflected the technical discussion of the merits of each issue that had been thoroughly debated at the JAR/FAR 23 Harmonization meetings. (The Working Group Chairperson had been present at the Harmonization meetings.) The JAA comments have been placed in the docket for this proposal, and will be considered along with those received during the comment period.

Following completion of these harmonization efforts, the FAA determined that the proposed revisions to part 23 were too numerous for a single NPRM. The FAA decided to simplify the issues by issuing four NPRM's. These NPRM's address the airworthiness standards in the specific areas of systems and equipment, powerplant, flight, and airframe. These NPRM's propose changes in all seven subparts of part 23. Since there is some overlap, interested persons are advised to review all four NPRMs to identify all proposed changes to a particular section.

A notice of the formation of the JAR/FAR 23 Harmonization Working Group was published on November 30, 1992 (57 FR 56626). The group held its first meeting on February 2, 1993. These efforts resulted in the proposals for powerplant airworthiness standards contained in this notice. The GABA Subcommittee agreed with these proposals.

In addition to the initiatives described above, the FAA developed several rulemaking documents based on the 1983 Small Airplane Airworthiness Review Program. A number of the changes proposed in this document relate directly to final rule changes which were an outgrowth of the 1983 review. Amendment 23-43 (58 FR

18958, April 9, 1993) and Amendment 23-45 (58 FR 42136, August 6, 1993) are referenced in this document where relevant to the changes being proposed.

Discussion of the Proposals

Section 23.777 Cockpit controls.

The current requirements of § 23.777 address the location of powerplant controls on tandem-seated airplanes. For single-engine airplanes that are designed for a single cockpit occupant, the powerplant controls should be located in the same position as they are for tandem-seated airplanes. Therefore, § 23.777(c)(2) would be revised to include single-seated airplanes.

Section 23.779 Motion and effect of cockpit controls.

Current § 23.779(b)(1) provides requirements for "powerplant controls," including direction of travel and effect. This proposal would revise § 23.779(b)(1) by adding a new item "fuel" to the table. This proposal would require that any fuel shutoff control other than mixture must move forward to open.

Section 23.901 Installation.

Section 23.901(d)(1), as amended in Amendment 23-43, requires that each turbine engine installation must be constructed and arranged to result in vibration characteristics that do not exceed those established during the type certification of the engine. This requirement would be revised to add the word "carcass" before vibration. This change would restrict analyses to those vibrations that are caused by external excitation to the main engine frame or

"carcass." While the word "carcass" has not traditionally been used in this context in the United States, it is used in Europe and is proposed here in the interest of harmonization.

Section 23.901(d)(2), as amended in Amendment 23-43, would be revised by deleting the last sentence which reads: "The engine must accelerate and decelerate safely following stabilized operations under these rain conditions." This requirement is already provided for in the first sentence of paragraph (d)(2), which states that the turbine engine must be constructed and arranged to provide "continued safe operation."

Paragraph (e) of this section would be revised by adding the word "powerplant" in front of "installation" to make clear that it pertains to all powerplant installations.

Paragraph (e)(ii) would have the words "or equivalent approval" added in accordance with proposed revisions to § 23.905, which are discussed below.

Section 23.903 Engines.

This proposal would revise paragraphs (c) and (g) by adding the headings "Engine isolation" and "Restart capability," respectively. Current § 23.903 includes headings for paragraphs (a), (b), (d), (e), and (f) that identify the subject of each paragraph. This revision will provide this same identification for paragraphs (c) and (g).

The heading of paragraph (f) would be changed from "Restart capability" to "Restart envelope" since the paragraph addresses the

altitude and airspeed envelope for restarting the engines in flight.

Section 23.905 Propellers.

Section 23.905(a), which requires each propeller to have a type certificate, would be revised to require a type certificate or equivalent approval. This would allow a propeller to be installed and approved on a U.S. type certificated airplane if that propeller is approved under a procedure that is equivalent to the FAA type certification procedure. For example, some foreign propellers, approved as part of the airplane and not having a separate type certificate, could be approved without requiring an exemption to part 23 or obtaining a U.S. type certificate; but the "equivalent procedure" is not intended to be limited to a procedure of a foreign authority.

This proposal would provide an alternative approval process for propellers without reducing safety.

Section 23.907 Propeller vibration.

Current § 23.907(a) requires that each "propeller with metal blades or highly stressed metal components must be shown to have vibration stresses, in normal operating conditions, that do not exceed values" that are "safe for continuous operation." The proposed revision to paragraph (a) would change the applicability to propellers "other than a conventional fixed-pitch wooden propeller." This change is necessary because all metal and most composite propeller blades are highly stressed and need to be

evaluated for vibration. Only propellers with fixed-pitch wooden blades would be exempt from the vibration requirements.

Section 23.925 Propeller clearance.

Current § 23.925 requires that propeller clearance must be evaluated with the airplane at maximum weight, with the most adverse center of gravity and with the propeller in the most adverse pitch position. To make the requirement consistent with current certification practice, paragraph (a) would be revised to read that propeller clearance must be evaluated with the airplane at the most adverse combination of weight and center of gravity, and with the propeller in the most adverse pitch position.

Interested persons should additionally note that the FAA is also proposing a change to § 23.925(b). In the Airframe Harmonization notice, the FAA proposes to move the requirements in § 23.925(b) for tail wheels, bumpers, and energy absorption devices to § 23.497(c), Supplementary conditions for tail wheels, where the structural designer would expect to find such a requirement.

Section 23.929 Engine installation ice protection.

This proposal would replace the word "power" in § 23.929 in the phrase "without appreciable loss of power" with the word "thrust." The word "thrust" is more descriptive of the loss experienced when ice forms on a propeller.

Section 23.933 Reversing systems.

This proposal would revise § 23.933(a)(1) to agree with the corresponding turbojet and turbofan reversing system airworthiness standards of part 25. The purpose of thrust reversing systems for

part 23 airplanes is the same as that for part 25 airplanes. While there is no technical change, in the interest of harmonization part 23 would be changed to read the same as part 25. Also, this proposal would delete the word "forward" from paragraph (a)(3) since this word is not necessary. It corrects the error in paragraph (b)(2) to read "(b)(1)" instead of "(a)(1)."

Section 23.955 Fuel Flow.

Section 23.955(a) would be revised by deleting the word "and" where it occurs between paragraphs (1), (2), (3), and (4). This is a nonsubstantive editorial change. All four paragraphs are independent of each other and equally subordinate to paragraph (a).

Section 23.955(a)(3) would be revised by adding the word "probable" so that the requirement would read as follows: "If there is a flow meter without a bypass, it must not have any probable failure mode . . ." This addition of the word "probable" would clarify the intent of the requirement that only probable failures need be analyzed.

Section 23.959 Unusable fuel supply.

Current § 23.959 requires that the unusable fuel supply for each tank be established and states certain parameters for establishing the unusable supply. The current text of § 23.959 would be redesignated as paragraph (a); a proposed new paragraph (b) would require that the effect of any fuel pump failure on the unusable fuel supply also be established.

It has been industry practice to include in the Airplane Flight Manual an entry describing any additional unusable fuel

quantity that results from a fuel pump failure. This proposal would not require any change in the fuel quantity indicator marking required by § 23.1553.

Section 23.963 Fuel tanks: general.

Current § 23.963(b), which requires that each flexible fuel tank liner must be of an acceptable kind, would be revised by replacing the phrase "must be of an acceptable kind" with the phrase "must be shown to be suitable for the particular application." The word "acceptable" is inexact since all components of a type certificated airplane must be acceptable. This is a clarifying, nonsubstantive change. Also the reference to § 23.959 would be revised by changing it to § 23.959(a) to coincide with the proposed revision of § 23.959 discussed above.

Section 23.965 Fuel tank tests.

Section § 23.965(b)(3)(i) would be revised by changing the phrase "the test frequency of vibration cycles per minute is obtained by . . ." to "the test frequency of vibration is the number of cycles per minute obtained by . . ." This would clarify that it is the number of cycles per minute that is to be used during testing of a fuel tank. The frequency of vibration to be used during testing of a fuel tank on a non-propeller driven airplane has received differing interpretations during certification procedures.

Section 23.973 Fuel tank filler connection.

Current § 23.973(f) specifies a minimum diameter of the fuel filler opening for airplanes with turbine engines that are not

equipped with pressure fueling systems. The proposed paragraph (f) would remove the provision related to pressure fueling systems to make the regulation apply to all airplanes with turbine engines, including turbine engines that are equipped with pressure fueling systems. The need to restrict the fuel opening diameter on the top side of the fuel tank is not related to a function of whether or not the airplane is equipped with pressure refueling.

Section 23.975 Fuel tank vents and carburetor vents.

Current 23.975(a)(5), as amended in Amendment 23-43, requires that there be no undrainable points in any vent lines where moisture can accumulate and that any drain lines installed in the vent lines must discharge clear of that airplane and be accessible for drainage. This paragraph would be revised to clarify that there may be no points in any vent line where moisture can accumulate unless drainage is provided. The intent is to allow low spots in the fuel tank vent system if a drain is provided for each low spot.

Section 23.979 Pressure fueling systems.

Section 23.979(b) would be revised to add a requirement for commuter category airplanes that an automatic shutoff means must provide indication at each fueling station of failure of the shutoff means to stop fuel flow at the maximum level. This revision makes the commuter category automatic shutoff means requirements similar to the requirements for transport category airplanes in § 25.979.

Section 23.1001 Fuel jettisoning system.

This proposal would revise § 23.1001(b)(2) to redefine the speed at which the fuel jettisoning system tests should be conducted. In a separate notice, as identified in the background of this document, the FAA has determined that the best rate-of-climb speed no longer need be determined under part 23, and has proposed that it be eliminated from § 23.69(b). Accordingly, this proposal would redefine the climb speed as stated in § 23.1001(b)(2) to reference § 23.69(b) as proposed.

Section 23.1013 Oil tanks.

This proposal would delete the word "crankcase" in § 23.1013(d)(1), making this paragraph applicable to all engine installations.

Section 23.1041 General.

Current § 23.1041 under cooling requires that powerplant and auxiliary power unit cooling provisions must maintain the temperature of powerplant components and engine fluids within the limits established for those components and fluids to the maximum altitude for which approval is requested. This section would be revised to state "to the maximum altitude and maximum ambient atmospheric temperature conditions for which approval is requested."

For reciprocating engine powered airplanes, it has been the practice to correct the cooling temperatures to 100°F ambient temperature. In practice, turbine engine powered airplanes have been corrected to the maximum temperature for which approval is

requested. The standard would be revised to require all airplanes, regardless of engine type, to demonstrate adequate cooling at one maximum ambient atmosphere temperature for which approval is requested.

Section 23.1043 Cooling tests.

Section 23.1043(a)(3) would be revised to show that the minimum grade fuel requirement applies to both turbine and reciprocating engines and that the lean mixture requirement applies to reciprocating engines only. The introductory text of paragraph (a) would be simplified by deleting the requirement that compliance must be shown "under critical ground, water, and flight operating conditions to the maximum altitude for which approval is requested." This requirement is already contained in § 23.1041.

The requirement in the introductory text of paragraph (a), which states that, for turbo-charged engines, each turbocharger must be operated through the part of the climb profile for which turbo-charger operation is requested, would be moved to paragraph (a)(4) to improve the organization of the section.

Paragraph (a)(1) would not be substantively changed. It would be revised to be consistent with proposed changes to § 23.1041 and changes to the introductory text of paragraph (a) described above.

Paragraph (a)(2) is reworded without substantive change to make this language identical to the JAR.

Paragraph (a)(3) would be revised to clarify that the requirement for mixture settings applies to reciprocating engines

and that the mixture settings must be the leanest recommended for the climb. While this has been the case, it has not been explicitly stated in the rule. The "leanest recommended for climb" mixture setting is considered a normal operating condition.

Paragraph (a)(5) is removed because water taxi tests are required by § 23.1041 as amended by Amendment 23-43.

Paragraphs (c) and (d) would be revised by adding the requirement that cooling correction factors be determined for the appropriate altitude. This would codify current certification practice and increase safety by ensuring the proper correction factor is determined.

Section 23.1045 Cooling test procedures for turbine engine powered airplanes.

Current 23.1045(a)(3) requires that compliance with § 23.1041 must be shown by certain specified phases of operations: takeoff, climb, en route, and landing. It also specifies that the cooling tests must be conducted with the airplane in the configuration and under the operating conditions that are critical to cooling for each stage of flight. It also defines a "stabilized" temperature as having a rate of change of less than 2°F per minute.

Current paragraph (a) would be revised to state more generally that compliance with § 23.1041 must be shown for all phases of operations. Also, the airplane must be flown in the configuration, at the speeds, and following the procedures recommended in the Airplane Flight Manual for the relative stage of

flight that corresponds to the applicable performance requirements critical to cooling.

The purpose of this proposed revision is to clarify the cooling test procedures by specifying that all phases of operations, not only the four phases of flight, are to be evaluated for proper cooling.

Section 23.1047 Cooling test procedures for reciprocating engine powered airplanes.

This proposal would revise the cooling test procedures in § 23.1047 for reciprocating engine powered airplanes by deleting the specific procedures. Many of the current provisions in § 23.1047 provide procedures for conducting a cooling test that are inappropriate in the regulation. Experience has shown that such detailed procedures are not directly applicable to certain engine configurations and certain operating conditions. Guidance material is available that provides appropriate procedures for testing different types of engine configurations and for testing at different operating conditions.

Section 23.1091 Air induction system.

Current § 23.1091 requires the air induction system design protect against ingestion of foreign material located "on the runway, taxiway, or other airport operating surface." This proposal would require the air induction system design protect against foreign matter, from whatever source, "during takeoff, landing, and taxiing." This would codify current certification practice and increase safety by protecting against universal foreign matter rather than foreign matter from a restricted source.

Section 23.1093 Induction system icing protection.

Section 23.1093(c) would be revised by adding the heading "Reciprocating engines with Superchargers." This is being done to be consistent with paragraphs (a) and (b) of this section, which have headings.

Section 23.1105 Induction system screens.

Current § 23.1105 requires that any induction screens must be upstream of the carburetor. This requirement would be revised to include fuel injection systems. Some reciprocating engines incorporate a fuel injection system, and the same provisions required for a carburetor are necessary for a fuel injection system.

Section 23.1107 Induction system filters.

Current § 23.1107, which was added in Amendment 23-43, applies to reciprocating engine installations. The introductory section of this paragraph would be revised by deleting the reference to reciprocating engine installations to make the section

applicable to airplanes with either reciprocating or turbine engines. If a filter is installed in the induction system of a turbine powered airplane, the same provisions that apply to a reciprocating engine are necessary.

Section 23.1121 General.

This proposal would revise § 23.1121(g) by adding standards for APU exhaust systems; these were overlooked when APU standards were introduced into part 23 by Amendment 23-43. Prior to Amendment 23-43, applicants for type certification of part 23 airplanes having APU installations were required to comply with special conditions for those installations. Amendment 23-43 included a codification, albeit an incomplete one, of those special conditions.

Section 23.1141 Powerplant controls: general.

Current § 23.1141(b) requires that each flexible control be of an acceptable kind. This paragraph would be revised to replace the phrase "must be of an acceptable kind" with the phrase "must be shown to be suitable for the particular application." This is a clarifying, non-substantive change.

Section 23.1143 Engine controls.

Current § 23.1143(f) requires that if a power or thrust control incorporates a fuel shutoff feature, the control must have a means to prevent the inadvertent movement of the control into the shutoff position. Paragraph (f) would be revised to add that a fuel control (other than a mixture control) must also have such a means.

Section 23.1153 Propeller feathering controls.

Current § 23.1153 requires that if there are propeller feathering controls, each propeller must have a separate control, and each control must have a means to prevent inadvertent operation. This section would be revised because it does not matter whether the feathering controls are separate from the propeller speed and pitch controls as long as it is possible to feather each propeller separately.

Section 23.1181 Designated fire zones; regions included.

Current § 23.1181, which was added in Amendment 23-43, defines designated fire zones for reciprocating engines and turbine engines. Proposed new § 23.1181(b)(3) would add to the designated fire zones for turbine engines any complete powerplant compartments that do not have firewalls between compressor, accessory, combustor, turbine and tailpipe sections. The proposal would codify current certification practice and increase safety by ensuring that all appropriate regions of turbine engines are evaluated as designated fire zones.

Section 23.1183 Lines, fittings, and components.

Current § 23.1183(a) includes the requirement that flexible hose assemblies must be approved. This requirement in paragraph (a) would be revised by replacing the word "approved" with the words "shown to be suitable for the particular application." The revision clarifies what is required.

Section 23.1191 Firewalls.

Current § 23.1191(a) requires that each engine, auxiliary power unit, fuel-burning heater, and other combustion equipment intended for operation in flight must be isolated "by fire walls, shrouds, or equivalent means." Paragraph (b) of the section requires that each firewall or shroud must be constructed so that no hazardous quantity of liquid, gas, or flame can pass from the engine compartment to other parts of the airplane.

Paragraph (b) would be revised to define isolated compartment and to show that the provisions of paragraph (b) would also apply to APU's.

Section 23.1203 Fire detector system.

Current § 23.1203(e) requires that wiring and other components of each fire detector system in an engine compartment must be at least fire resistant. For accuracy, proposed § 23.1203(e) would replace the words "engine compartment" with "designated fire zone" to correct an oversight in the amendment and to make it consistent with § 23.1181.

Section 23.1305 Powerplant instruments.

Current § 23.1305(b)(3), as amended in Amendment 23-43, requires, for reciprocating engine-powered airplanes, a cylinder head temperature indicator for each air-cooled engine with cowl flaps; each airplane for which compliance with § 23.1041 is shown at a speed higher than V_Y; and each commuter category airplane.

The proposed revision to paragraph (b)(3) would delete paragraph (b)(3)(ii), which refers to compliance with § 23.1041.

The flight notice referenced above contains a proposal to delete the determination of the V_Y speed and this notice proposes a change that the engine cooling test of § 23.1047 be conducted at a speed recommended in the Airplane Flight Manual (AFM). Accordingly, other sections referencing the V_Y speed or the engine cooling test would also be amended.

The proposed revision would retain the requirement that a cylinder head temperature indicator is required for commuter category airplanes having reciprocating engines and for airplanes having air-cooled engines and cowl flaps.

Section 23.1337 Powerplant instruments.

Under the area of "Installation," the reference in § 23.1337(b)(1) to § 23.959 would be changed to § 23.959(a), in accordance with the revision to § 23.959 proposed in this notice. The revision would redesignate the existing § 23.959 text as § 23.959(a); there is no change in the requirement itself.

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and

Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this rule: (1) would generate benefits that would justify its costs and is not a "significant regulatory action" as defined in the Executive Order; (2) is not "significant" as defined in DOT's Policies and Procedures; (3) would not have a significant impact on a substantial number of small entities; and (4) would not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

The FAA has determined that the benefits of the proposed rule, though not directly quantifiable, would exceed the expected costs. Minor costs, ranging from $240 to $6,000 per certification, are projected for four of the provisions in this proposal. No costs are attributed to the other thirty-two provisions. The benefits of the proposed rule are considered below in four categories: (1) harmonization, (2) safety, (3) reduced need for special conditions, and (4) clarification.

Harmonization

The proposed rule, in concert with other rulemaking and policy actions, would provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States and the JAA member countries. Thirty-four of the thirty-six sections affected by the proposed rule would be harmonized. The

resulting greater uniformity of standards would simplify airworthiness approval for import and export purposes and reduce the cost of certification for airplanes seeking certification under both sets of regulations.

Safety

In addition to the harmonization benefits, five proposed changes would provide additional safety benefits. First, the proposed rule would revise § 23.933(a)(1) to more closely agree with the corresponding turbojet and turbofan reversing system airworthiness standards of part 25. The FAA estimates that this provision would necessitate an additional 100 hours of failure mode and effects analysis at an assumed cost rate of $60 per hour, including labor and overhead. The estimated $6,000 cost would apply to each certification. The FAA projects that no additional production or operating costs would result from this provision.

The primary potential benefit of the provision is the additional safety that could result from analyzing the feasible range of reverser system failures, the effects of those failures, and the corresponding capabilities necessary to correct the failure or circumvent its effects. Such an analysis would reduce the possibility that an unanticipated condition with catastrophic potential would remain in the system. In addition to the safety benefit, it is expected that some operating benefits and manufacturing economies would result from the uniformity of standards between parts 23 and 25. The FAA is not able to quantify

the potential benefits of this provision but holds that the benefits would exceed the expected minor costs.

Second, the proposed rule would add a new paragraph (b) to § 23.959 requiring that the effect of any fuel pump failure on the unusable fuel supply be determined. Though not previously required, it has been industry practice to include this information in the Airplane Flight Manual. The FAA estimates that the nominal cost of making this determination would be $240 per certification (4 hours of engineering analysis at $60 per hours). In addition, an insignificant cost ($1) would be incurred in adding a table entry to the manual for each airplane that is produced. The fact that the proposed requirement is already standard practice supports the FAA's position that the potential benefits of the provision would exceed the minor costs. The safety benefits of this provision would be derived from the assurance that this vital information would continue to be provided for future airplane models.

Third, under § 23.979, the proposed rule would add the requirement for commuter category airplanes that an indication be provided at each fueling station in the event of a failure of the shutoff means to stop fuel flow at the maximum level. The FAA estimates that the proposed required device would necessitate an incremental design and development cost of $3000 per certification (50 hours of engineering design at $60 per hour) and an additional nominal manufacturing cost of $10 per airplane. The benefit of the provision is the avoidance of a potentially catastrophic condition

whereby excess fuel could unknowingly be forced out of the contained fuel system by the pressure fueling system. The FAA holds that these potential benefits would exceed the minor associated costs.

Fourth, § 23.1041 would require that the powerplant cooling system must be able to maintain the specified operating temperatures of the powerplant components and fluids. The ambient temperature for testing reciprocating engine airplanes is currently required to be corrected to show the capacity of the cooling system at 100°F. Under the proposal, this temperature standard would be revised to the "maximum ambient temperature conditions for which approval is requested."

No costs are attributed to this provision. Reciprocating engine airplane manufacturers would continue to have the option to request approval for operations at the existing 100°F temperature. A decision to request approval for a higher temperature would necessitate demonstration of the capability of the cooling system at that temperature. That choice, however, would be made at the manufacturer's discretion and would be based on its decision that any associated incremental cooling system costs would be recovered in the marketplace. The potential benefit of this provision is the reduced likelihood that an inadequate cooling system would be relied on during high temperature operations.

Finally, § 23.1045(a) would be revised to state more generally that compliance with the cooling margin requirements of § 23.1041 must be shown for all phases of operation, as compared to

the four phases of flight currently listed. In effect, the proposal would add the taxi phase of operation.

The FAA estimates that the specific addition of the taxi phase would necessitate an incremental 5 hours of engineering analysis valued at $60 per hour, for a total of $300 per certification. The potential benefit of this provision is the enhanced safety that would result from evaluating the efficacy of the cooling system during the taxi phase of operation. In the taxi phase of operation, engine power settings and heat production generally may be lower than that experienced during flight, but available air circulation might also be lower. The heat mechanics of the two phases of operation are distinct and warrant separate evaluation. The FAA holds that the potential benefits of this provision would exceed the nominal associated costs.

Reduced Need for Special Conditions

The proposed rule includes five provision that would replace the need for processing certain parts or materials as special conditions because they have been considered novel or unusual design features. The subjects of these provisions include composite propellers, fuel injection systems for reciprocating engines, induction filters on turbine engines, fuel shutoff controls other than mixture controls, and auxiliary power units. No costs are attributed to these provisions. Formalization of the equivalent safety standards and requirements for these subjects

would obviate the need for special conditions actions and would simplify the certification process for manufacturers.

Clarification

Several unclear provisions of part 23 were revealed during the harmonization review. In response to this finding, the proposal includes a number of no-cost, editorial revisions that would clarify the existing requirements. These changes would benefit manufacturers by removing potential confusion about the specific standards and requirements necessary for product certification.

In summary, the FAA holds that each of the provisions, as well as the entire proposal, would be cost beneficial.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. Based on implementing FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, the FAA has determined that the proposed amendments would not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The proposed rule would not constitute a barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States. Instead, the proposed powerplant airworthiness standards have been harmonized with those of foreign aviation authorities and would lessen restraints on trade.

Federalism Implications

The regulations proposed herein would not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

The FAA proposes to revise the airworthiness standards to provide propulsion standards for normal, utility, acrobatic, and commuter category airplanes that are the same as the standards that will be proposed for the same category airplanes by the Joint Aviation Authorities in Europe. If adopted, the proposed revision would reduce the regulatory burden on the United States and European airframe manufacturers by relieving them of the need to

show compliance with different standards each time they seek certification approval of an airplane in a different country.

For the reasons discussed in the preamble, and based on the findings in the Regulatory Evaluation, the FAA has determined that this proposed regulation is not significant under Executive Order 12866. In addition, the FAA certifies that this proposal, if adopted, will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This proposal is not considered significant under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). An initial regulatory evaluation of the proposal has been placed in the docket. A copy may be obtained by contacting the person identified under "FOR FURTHER INFORMATION CONTACT."

List of Subjects

14 CFR Part 23

Aircraft, Aviation safety, Signs and symbols.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend part 23 of the Federal Aviation Regulations (14 CFR part 23) as follows:

PART 23--AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES

1. The authority citation for part 23 continues to read as follows:

Authority: 49 U.S.C. app. 1344, 1354(a), 1355, 1421, 1423, 1425, 1428, 1429, and 1430; 49 U.S.C. 106(g).

§ 23.777 [Amended]

2. Section 23.777(c)(2) is amended by adding the words "single and" between the words "for" and "tandem" in the first sentence.

§ 23.779 [Amended]

3. The table in § 23.779(b)(1) is amended by adding a new item between the items "mixture" and "carburetor air heat or alternate air" to read as follows:

(1) Powerplant controls	Motion and effect
* * *	
Fuel	Forward for open
* * *	

4. Section 23.901 is amended by revising paragraphs (d)(1), (d)(2) and (e)(1) to read as follows:

§ 23.901 Installation.

* * * * *

(d) * * *

(1) Result in carcass vibration characteristics that do not exceed those established during the type certification of the engine.

(2) Provide continued safe operation without a hazardous loss of power or thrust while being operated in rain for at least three minutes with the rate of water ingestion being not less than four percent, by weight, of the engine induction airflow rate at the maximum installed power or thrust approved for takeoff and at flight idle.

(e) The powerplant installation must comply with--

(1) The installation instructions provided under--

(i) The engine type certificate; and

(ii) The propeller type certificate or equivalent approval.

* * * * *

5. Section 23.903 is amended by adding headings to paragraphs (c) and (g), and by revising the heading of paragraph (f) to read as follows:

§ 23.903 Engines.

* * * * *

(c) Engine isolation. * * *

* * * * *

(f) Restart envelope. * * *

(g) Restart capability. * * *

§ 23.905 [Amended]

6. Section 23.905 is amended by adding the words "or equivalent approval" to the end of paragraph (a).

§ 23.907 [Amended]

7. Section 23.907(a) is amended by removing the words "with metal blades or highly stressed metal components" and replacing them with the words "other than a conventional fixed-pitch wooden propeller."

8. Section 23.925 is amended by revising the introductory text to read as follows:

§ 23.925 Propeller clearance.

Unless smaller clearances are substantiated, propeller clearances, with the airplane at the most adverse combination of weight and center of gravity, and with the propeller in the most adverse pitch position, may not be less than the following:

* * * * *

§ 23.929 [Amended]

9. Section 23.929 is amended by removing the word "power" and adding, in its place, the word "thrust."

10. Section 23.933 is amended by deleting the word "forward" where ever it is used in paragraph (a)(3); by revising the

reference in paragraph (b)(2) that reads "(a)(1)" to "(b)(1)"; and by revising paragraph (a)(1) to read as follows:

§ 23.933 Reversing systems.

(a) * * *

(1) Each system intended for ground operation only must be designed so that, during any reversal in flight, the engine will produce no more than flight idle thrust. In addition, it must be shown by analysis or test, or both, that--

(i) Each operable reverser can be restored to the forward thrust position; or

(ii) The airplane is capable of continued safe flight and landing under any possible position of the thrust reverser.

* * * * *

11. Section 23.955 is amended by revising paragraphs (a)(1) through (a)(4) to read as follows:

§ 23.955 Fuel flow.

(a) * * *

(1) The quantity of fuel in the tank may not exceed the amount established as the unusable fuel supply for that tank under § 23.959(a) plus that necessary to show compliance with this section.

(2) If there is a fuel flowmeter, it must be blocked during the flow test and the fuel must flow through the meter or its bypass.

(3) If there is a flowmeter without a bypass, it must not have any probable failure mode that would restrict fuel flow below the level required in this fuel demonstration.

(4) The fuel flow must include that flow needed for vapor return flow, jet pump drive flow, and for all other purposes for which fuel is used.

* * * * *

12. Section 23.959 is amended by designating the text of the section as paragraph (a), and by adding a new paragraph (b) to read as follows:

§ 23.959 Unusable fuel supply.

* * * * *

(b) In addition, the effect on the unusable fuel quantity as a result of a failure of any pump shall be determined.

13. Section 23.963 is amended by changing the reference in paragraph (e) from § 23.959 to § 23.959(a) and by revising paragraph (b) to read as follows:

§ 23.963 Fuel tanks: general.

* * * * *

(b) Each flexible fuel tank liner must be shown to be suitable for the particular application.

* * * * *

14. Section 23.965 is amended by revising paragraph (b) to read as follows:

§ 23.965 Fuel tank tests.

* * * * *

(b) * * *

(3) * * *

(i) If no frequency of vibration resulting from any r.p.m. within the normal operating range of engine or propeller speeds is critical, the test frequency of vibration is the number of cycles per minute obtained by multiplying the maximum continuous propeller speed in r.p.m. by 0.9 for propeller-driven airplanes, except that for non-propeller driven airplanes the test frequency of vibration is 2,000 cycles per minute.

* * * * *

15. Section 23.973(f) is revised to read as follows:

§ 23.973 Fuel tank filler connection.

* * * * *

(f) For airplanes with turbine engines, the inside diameter of the fuel filler opening must be no smaller than 2.95 inches.

16. Section 23.975(a)(5) is revised to read as follows:

§ 23.975 Fuel tank vents and carburetor vapor vents.

(a) * * *

(5) There may be no point in any vent line where moisture can accumulate with the airplane in either the ground or level

flight attitudes, unless drainage is provided. Any drain valve installed in the vent lines must discharge clear of the airplane and be accessible for drainage;

* * * * *

17. Section 23.979(b) is revised to read as follows:

§ 23.979 Pressure fueling systems.

* * * * *

(b) An automatic shutoff means must be provided to prevent the quantity of fuel in each tank from exceeding the maximum quantity approved for that tank. This means must--

(1) Allow checking for proper shutoff operation before each fueling of the tank; and

(2) For commuter category airplanes, indicate at each fueling station, a failure of the shutoff means to stop the fuel flow at the maximum quantity approved for that tank.

* * * * *

18. Section 23.1001 is amended by revising paragraph (b)(2) to read as follows:

* * * * *

§ 23.1001 Fuel jettisoning system.

* * * * *

(b) * * *

(2) A climb at the speed at which the one engine inoperative enroute climb data have been established in accordance with

§ 23.69(b), with the critical engine inoperative and the remaining engines at maximum continuous power; and

* * * * *

§ 23.1013 [Amended]

19. Section 23.1013 is amended by deleting the word "crankcase" in paragraph (d)(1).

§ 23.1041 [Amended]

20. Section 23.1041 is amended by adding the phrase "and maximum ambient atmospheric temperature conditions" between the words "maximum altitude" and "for which approval".

21. Section 23.1043(a), (c), and (d) are revised to read as follows:

§ 23.1043 Cooling tests.

(a) General. Compliance with § 23.1041 must be shown on the basis of tests, for which the following apply:

(1) If the tests are conducted under ambient atmospheric temperature conditions deviating from the maximum for which approval is requested, the recorded powerplant temperatures must be corrected under paragraphs (c) and (d) of this section, unless a more rational correction method is applicable.

(2) No corrected temperature determined under paragraph (a)(1) of this section may exceed established limits.

(3) The fuel used during the cooling tests must be of the minimum grade approved for the engine and, for a reciprocating engine, the mixture settings must be the leanest recommended for climb.

(4) For turbocharged engines, each turbocharger must be operated through that part of the climb profile for which operation with the turbocharger is requested.

(b) * * *

(c) Correction factor (except cylinder barrels). Temperatures of engine fluids and powerplant components (except cylinder barrels) for which temperature limits are established, must be corrected by adding to them the difference between the maximum ambient atmospheric temperature for the relevant altitude for which approval has been requested and the temperature of the ambient air at the time of the first occurrence of the maximum fluid or component temperature recorded during the cooling test.

(d) Correction factor for cylinder barrel temperatures. Cylinder barrel temperatures must be corrected by adding to them 0.7 times the difference between the maximum ambient atmospheric temperature for the relevant altitude for which approval has been requested and the temperature of the ambient air at the time of the first occurrence of the maximum cylinder barrel temperature recorded during the cooling test.

22. Section 23.1045(a) is revised to read as follows:

§ 23.1045 Cooling test procedures for turbine engine powered airplanes.

(a) Compliance with § 23.1041 must be shown for all phases of operation. The airplane must be flown in the configurations, at the speeds, and following the procedures recommended in the Airplane Flight Manual for the relevant stage of flight, and that correspond to the applicable performance requirements that are critical to cooling.

* * * * *

23. Section 23.1047 is revised to read as follows:

§ 23.1047 Cooling test procedures for reciprocating engine powered airplanes.

Compliance with § 23.1041 must be shown for the climb (or, for multiengine airplanes with negative one-engine-inoperative rates of climb, the descent) stage of flight. The airplane must be flown in the configurations, at the speeds and following the procedures recommended in the Airplane Flight Manual (AFM), and that correspond to the applicable performance requirements that are critical to cooling.

24. Section 23.1091 is amended by revising paragraph (c)(2) to read as follows:

§ 23.1091 Air induction system.

* * * * *

(c) * * *

(2) The airplane must be designed to prevent water or slush on the runway, taxiway, or other airport operating surfaces from being directed into the engine or auxiliary power unit air intake ducts in hazardous quantities. The air intake ducts must be located or protected so as to minimize the ingestion of foreign matter during takeoff, landing, and taxiing.

§ 23.1093 [Amended]

25. Section 23.1093 is amended by adding the heading "Reciprocating engines with Superchargers" to paragraph (c).

26. Section 23.1105 is amended by revising paragraph (a) to read as follows:

§ 23.1105 Induction system screens.

* * * * *

(a) Each screen must be upstream of the carburetor or fuel injection system.

* * * * *

27. Section 23.1107 is amended by revising the introductory text to read as follows:

§ 23.1107 Induction system filters.

If an air filter is used to protect the engine against foreign material particles in the induction air supply--

* * * * *

28. Section 23.1121(g) is revised to read as follows:

§ 23.1121 General.

* * * * *

(g) If significant traps exist, each turbine engine and auxiliary power unit exhaust system must have drains discharging clear of the airplane, in any normal ground and flight attitude, to prevent fuel accumulation after the failure of an attempted engine or auxiliary power unit start.

* * * * *

29. Section 23.1141(b) is revised to read as follows:

§ 23.1141 Powerplant controls: general.

* * * * *

(b) Each flexible control must be shown to be suitable for the particular application.

* * * * *

30. Section 23.1143(f) is amended by revising the introductory text to read as follows:

§ 23.1143 Engine controls.

* * * * *

(f) If a power or thrust control, or a fuel control (other than a mixture control) incorporates a fuel shutoff feature, the control must have a means to prevent the inadvertent movement of the control into the off position. The means must--

* * * * *

31. Section 23.1153 is revised to read as follows:

§ 23.1153 Propeller feathering controls.

If there are propeller feathering controls, whether or not they are separate from the propeller speed and pitch controls, it must be possible to feather each propeller separately. Each control must have means to prevent inadvertent operation.

32. Section 23.1181 is amended by adding a new paragraph (b)(3) to read as follows:

§ 23.1181 Designated fire zones; regions included.

* * * * *

(b) * * *

(3) Any complete powerplant compartment in which there is no isolation between compressor, accessory, combustor, turbine, and tailpipe sections.

* * * * *

§ 23.1183 [Amended]

33. Section 23.1183(a) is amended by removing the word "approved" in the next to the last sentence, and replacing it with the words "shown to be suitable for the particular application."

34. Section 23.1191 is amended by revising paragraph (b) to read as follows:

§ 23.1191 Firewalls.

* * * * *

(b) Each firewall or shroud must be constructed so that no hazardous quantity of liquid, gas, or flame can pass from the

compartment created by the firewall or shroud to other parts of the airplane.

* * * * *

35. Section 23.1203 is amended by revising paragraph (e) to read as follows:

§ 23.1203 Fire detector system.

* * * * *

(e) Wiring and other components of each fire detector system in a designated fire zone must be at least fire resistant.

* * * * *

§ 23.1305 [Amended]

36. Section 23.1305 is amended by removing paragraph (b)(3)(ii) and redesignating paragraph (b)(3)(iii) as paragraph (b)(3)(ii).

§ 23.1337 [Amended]

37. Section 23.1337 is amended by removing the reference to § 23.959 in paragraph (b)(1) and replacing it with § 23.959(a).

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revised May 4, 1993

revised November 12, 1993

revised January 11, 1994

U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Regulatory Evaluation for NPRM; Part 23, Airworthiness Standards; Powerplant

Date: MAY 27 1993

From: Manager, Aircraft Regulatory Analysis Branch, APO-320

Reply to Attn. of:

To: Manager, Regulations Section, ACE-112

6/2/93

Attached are the Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment for the subject NPRM. In addition, corresponding summaries are provided for use in the preamble of the notice.

If you have any questions, please contact Don Glasco, of my staff, at (202) 267-3344.

Ward L. Keech

Ward L. Keech

Attachments

AIRCRAFT REGULATORY ANALYSIS BRANCH, APO-320

OFFICE OF AVIATION POLICY, PLANS, AND MANAGEMENT ANALYSIS

REGULATORY EVALUATION, REGULATORY FLEXIBILITY DETERMINATION, AND TRADE IMPACT ASSESSMENT

POWERPLANT PROPOSALS BASED ON EUROPEAN JOINT AVIATION REQUIREMENTS PROPOSALS

Don Glasco
May 1993

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This regulatory evaluation examines the impacts of a proposed rule to amend part 23 of the Federal Aviation Regulations (FAR). The proposed rule would provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States and in the member countries of the European Joint Aviation Authorities (JAA).

Minor costs, ranging from $240 to $6,000 per certification, are projected for four of the provisions in this proposal. No costs are attributed to the other thirty-two provisions. The benefits of the proposal include: (1) harmonization, (2) safety, (3) reduced need for special conditions, and (4) clarification. The FAA holds that the benefits of the proposed rule, though not directly quantifiable, would exceed the expected costs.

The proposed amendments would not have a significant economic impact on a substantial number of small entities. In addition, the proposed rule would not constitute a barrier to international trade. The procedures have been harmonized with those of foreign aviation authorities and would, instead, lessen the restraints on trade.

AIRWORTHINESS STANDARDS; POWERPLANT PROPOSALS

BASED ON EUROPEAN JOINT AVIATION REQUIREMENTS PROPOSALS

I. Introduction

This regulatory evaluation examines the impacts of a proposed rule to amend part 23 of the Federal Aviation Regulations (FAR). The proposed rule would amend the powerplant airworthiness standards for normal, utility, acrobatic, and commuter category airplanes. The proposals result from a joint effort between the FAA and the European Joint Aviation Authorities (JAA) to harmonize the FAR and the JAA's Joint Aviation Requirements (JAR). The proposed changes would provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States and the JAA member countries. Thirty-four of the thirty-six sections affected by this proposal would be harmonized. The resulting greater uniformity of standards would simplify airworthiness approval for import and export purposes.

II. Background

At the June 1990 meeting between the JAA Council and the FAA, the FAA Administrator committed the agency to support the harmonization of the FAR with the JAR, which was being developed for use by the JAA member authorities in Europe. In response to this commitment, the FAA's Small Airplane Directorate established the Harmonization Task Force to work with the JAR 23 Study Group. The General Aviation Manufacturers Association (GAMA) also established a JAR/FAR 23 committee to provide

technical assistance in this effort.

In October 1990, a meeting was held to discuss the first draft of the proposed JAR 23. Participants included representatives from the FAA Harmonization Task Force, the GAMA Committee, the JAR 23 Study Group, and the Association Europeenne des Constructeures de Material Aerospatial (AECMA), an organization of European airframe manufacturers. Following that meeting, technical representatives from each of the four organizations met on several occasions to resolve differences between the proposed JAR and the FAR.

During this effort, the FAA established the Aviation Rulemaking Advisory Committee (ARAC) which held its first meeting in May 1991. The General Aviation and Business Airplane (GABA) Subcommittee was established at that meeting to provide advice and recommendations regarding the airworthiness standards of part 23 of the FAR and the related operating provisions of parts 91 and 135.

In June 1992, the FAA assigned to the GABA Subcommittee those rulemaking projects related to JAR/FAR 23 harmonization. In turn, the GABA Subcommittee established the JAR/FAR 23 Harmonization Working Group and charged the members with making recommendations concerning the FAA's disposition of the pertinent rulemakings. The group held its first meeting in February 1993.

Following completion of these harmonization activities, the FAA

determined that the proposed revisions to part 23 were too numerous for a single notice. The FAA decided that better public participation would be served by issuing four separate notices, addressing the airworthiness standards for systems, powerplants, flight, and airframes. This evaluation examines the impacts of the powerplant proposal.

III. Description and Evaluation of the Proposed Rule

Section 23.777 Cockpit controls. The current requirements of § 23.777 address the location of powerplant controls on tandem seated airplanes. The proposal would require that the powerplant controls for single engine airplanes that are designed for a single occupant be located in the same position as they are for tandem seated airplanes.

No costs are attributed to this provision. For new airplane models that will be certificated in the future, the location of powerplant controls would exact no additional design or manufacturing costs. The specified location is, to a large extent, existing industry practice. The potential benefits of this provision would derive from the consistent location of controls and the increased familiarity that would result for pilots switching between tandem and single occupant airplanes.

Section 23.779 Motion and effect of cockpit controls. Current § 23.779(b)(1) provides requirements for the direction of motion and the effect of certain powerplant controls. The proposal would add a specification of the direction of motion and effect for fuel shutoff

controls other than the mixture control. Such equipment is predominately found on European airplanes and their inclusion in the FAR is necessary for harmonization.

No costs are attributed to this provision. For new airplane models that will be certificated in the future, specification of the direction and effect of fuel shutoff controls would exact no additional design or manufacturing costs. In addition, these specifications are consistent with the effect of related powerplant controls and with current industry practice. The potential benefits of this proposal would derive from the consistent motion and effect of fuel shutoff controls whether they are or are not physically part of the mixture control.

Section 23.901 Installation. The proposal would make three minor changes to this section. First, it would clarify that the vibration investigation requirements in paragraph (d)(1) specifically pertain to the vibration of the carcass; i.e., main engine frame. Second, it would remove the unnecessary last sentence in paragraph (d)(2). Finally, it would add the word "powerplant" to paragraph (e) to clarify that the subject of the associated requirement is specifically the powerplant installation.

No costs are attributed to these provisions because they merely constitute editorial and clarification changes.

Section 23.903 Engines. The proposal would make three minor changes to this section: (1) an editorial clarification that paragraphs (a)(1) and (a)(2) apply, (2) an editorial addition of two paragraph headings for subject clarity and uniformity with other paragraphs, and (3) an editorial revision of an existing paragraph heading to better describe the actual subject matter in the paragraph.

No costs are attributed to the provisions because they merely constitute editorial and clarification changes.

Section 23.905 Propellers. Section 23.905(a), which requires each propeller to have a type certificate, would be revised to require a type certificate or equivalent approval. In some European countries, a propeller is approved as part of the airplane and does not have a separate certificate. Under the proposed rule, such propellers could be approved without having to obtain either an exemption to part 23 or a separate United States type certificate for the propeller.

No additional costs are attributed to this provision. The change would be cost relieving and would eliminate unnecessary administrative processing.

Section 23.907 Propeller vibration. Current § 23.907(a) requires that each propeller with metal blades or highly stressed metal components must be shown to have vibration stresses in normal operating conditions that do not exceed values that are safe for continuous operation. The

proposed revision would change the applicability of this paragraph to "propellers other than fixed pitch wooden propellers." In effect, the revision would make composite propellers subject to the requirements of the paragraph.

No costs are attributed to this provision. Previously, composite propellers have been considered as a novel or unusual design feature. The demonstration of safe vibration stress levels for composite propellers has been required (and in the absence of this proposal would continue to be required) under the special conditions provisions of § 21.16. In addition, existing § 23.907(b) requires proof of safe vibration characteristics for any type of propeller (except conventional, fixed-pitch, wood propellers) where the FAA finds such proof to be necessary.

Section 23.925 Propeller clearance. Current § 23.925 requires that propeller clearance must be evaluated with the airplane at maximum weight, with the most adverse center of gravity, and with the propeller in the most adverse pitch position. Consistent with original intention and current certification practice, the proposal would clarify that the three conditions must exist concurrently.

No costs are attributed to this provision. As a clarification of existing intent and practice, the proposal would not change the application of current standards.

Section 23.929 Engine installation ice protection. The proposed rule

would replace the word "power" in the phrase "without appreciable loss of power" with the word "thrust." The word "thrust" more precisely defines the critical loss of force that is experienced when ice forms on a propeller.

No costs are attributed to this editorial provision.

Section 23.933 Reversing systems. The proposed rule would make one significant and two editorial changes. In paragraph (a)(3) an unnecessary word would be deleted. Paragraph (b)(2) would be technically amended to correct a paragraph reference error. The significant change would revise § 23.933(a)(1) to more closely agree with the corresponding turbojet and turbofan reversing system airworthiness standards of part 25. The purpose and application of thrust reversing systems is the same for part 23 airplanes and part 25 airplanes.

Under the existing language of part 23, a reversing system must be designed so that no single failure or malfunction of the system would result in unwanted reverse thrust under any expected operation. The proposed standards carry a different underlying assumption. A reversing system would have to be designed so that during any reversal in flight, the engine would produce no more than flight idle thrust. In addition it would have to be shown that either the reverser could be restored to the forward thrust position, or that the airplane would be capable of continued safe flight and landing under any position of the thrust

reverser.

The FAA estimates that this provision would necessitate an additional 100 hours of "failure mode and effects" analysis at an assumed cost rate of $60 per hour, including labor and overhead. The estimated $6,000 cost would apply to each certification. The FAA projects that no additional production or operating costs would result from this provision.

The primary potential benefit of the provision is the additional safety that could result from analyzing the feasible range of reverser system failures, the effects of those failures, and the corresponding capabilities necessary to either correct the failure or circumvent its effects. Such an analysis would reduce the possibility that an unanticipated condition with catastrophic potential would remain in the system. In addition to the safety benefit, it is expected that operating benefits and manufacturing economies would result from the uniformity of standards between parts 23 and 25. The FAA is not able to quantify the potential benefits of this provision but holds that the benefits would exceed the expected minor costs.

Section 23.955 Fuel flow. The proposal would make two minor changes to this section. Paragraph (a) would be revised by deleting the word "and" between paragraphs (1) and (2), and between paragraphs (3) and (4). This would be a nonsubstantive editorial change since all four paragraphs are independent and equally subordinate to paragraph (a). In

addition, § 23.955(a)(3) would be revised by adding the word "probable" so that the phrase would read "... it must not have any probable failure mode..." This change would clarify the intent of the requirement.

No costs are attributed to these two provisions.

Section 23.959 Unusable fuel supply. Current §23.959 requires that the unusable fuel supply for each tank be determined. The proposal would redesignate the existing requirement as paragraph (a) and would add a new paragraph (b) requiring that the effect of any fuel pump failure on the unusable fuel supply also be determined.

Though not previously required, it has been industry practice to include this information in the Airplane Flight Manual. The FAA estimates that the nominal cost of making this determination would be $240 per certification (4 hours at $60 per hour). In addition, an insignificant cost ($1) would be incurred in adding a table entry to the manual for each airplane that is produced. The fact that the proposed requirement is already standard practice supports the FAA's position that the potential benefits of the provision would exceed the minor costs.

Section 23.963 Fuel tanks general. Current § 23.963(b) would be revised by replacing the descriptive requirement for flexible fuel tank liners from "must be of an acceptable kind" to "must be shown to be suitable for the particular application." The word "acceptable" is unspecific and redundant since all components of a type certificated

product must be acceptable. This would be a clarifying, nonsubstantive change. The proposal would also make a conforming cross reference change in accord with the proposed renumbering of § 23.959.

No costs are attributed to these two provisions.

Section 23.965 Fuel tank tests. The proposal would make a minor editorial change in paragraph (b)(3)(i) to clarify that the number of cycles per minute is used as the frequency of vibration test factor.

No costs are attributed to this provision.

Section 23.973 Fuel tank filler connection. Paragraph (c) would be revised to editorially emphasize the applicability of the requirements under § 23.975 (a). In addition, current paragraph (f) specifies the minimum diameter of the fuel filler opening for turbine engine airplanes that are not equipped for pressure fueling. The proposal would extend the applicability of this paragraph to all turbine engine airplanes.

No costs are attributed to this provision. The proposal would extend the applicability of the size standard to an additional category of airplanes, but that standard would not cause any additional costs to be incurred.

Section 23.975 Fuel tank vents and carburetor vents. The proposed rule would make a minor editorial change to clarify the intent of the

existing requirement that there may be no points in a vent line where moisture might accumulate unless drainage is provided for that point.

No costs are attributed to this provision since it is only a clarification of the existing requirement.

Section 23.979 Pressure fueling systems. Paragraph (b) would be revised to add the requirement for commuter category airplanes that an indication be provided at each fueling station in the event of a failure of the shutoff means to stop fuel flow at the maximum level.

The FAA estimates that the proposed required device would necessitate an incremental design and development cost of $3000 (50 hours at $60 per hour) per certification and an additional nominal manufacturing cost of $10 per airplane. The potential benefit of the provision is the avoidance of a potentially catastrophic condition whereby excess fuel could unknowingly be forced out of the contained fuel system by the pressure fueling system. The FAA holds that these potential benefits would exceed the minor associated costs.

Section 23.1001 Fuel jettisoning system. The proposal would revise the cross reference in § 23.1001(b)(2) in conformance with an associated amendment in the proposed notice for flight.

No costs are attributed to this provision.

Section 23.1013 Oil tanks. The proposal would delete the word "crankcase" in § 23.1013(d)(1), thereby making the paragraph applicable to turbine as well as reciprocating engines. The paragraph requires that oil tanks be vented from the top so that the connection isn't covered by oil under normal flight conditions.

No incremental costs are attributed to this provision. The standard reflects current industry practice and current FAA certification policy. In addition, the alternative of venting the oil tank from some position other than the top would be illogical and physically impracticable.

Section 23.1041 General. This section establishes the requirement that the powerplant cooling system must be able to maintain the temperature of the powerplant components and fluids. The ambient temperature for testing reciprocating engine airplanes is currently required to be corrected to show the capacity of the cooling system at 100°F. Under the proposal, this temperature standard would be revised to the "maximum ambient temperature conditions for which approval is requested."

No costs are attributed to this provision. Reciprocating engine airplane manufacturers have the option to request approval for operations at the existing 100°F temperature. A decision to request approval for a higher temperature would necessitate demonstration of the capability of the cooling system at that temperature. Such a decision, however, would be made at the manufacturer's discretion and would be based on its decision that any associated incremental cooling system

costs would be recovered in the marketplace or offset by other considerations.

Section 23.1043 Cooling tests. Section 23.1043(a) would be revised to show that the minimum grade fuel requirement applies to both turbine and reciprocating engines, and that the lean mixture requirement applies to reciprocating engines only. Also, the lead-in for paragraph (a) would be simplified by deleting a redundant conditions standard that would be established in proposed § 23.1041. The requirement in paragraph (a) regarding turbocharger operation through the climb profile would be moved to paragraph (a)(4) to improve the organization of the section.

Paragraph (a)(1) would be nonsubstantively revised to be consistent with the proposed changes to §23.1041 and paragraph (a) of this section. Minor editorial revisions would be made to paragraph (a)(2). Paragraph (a)(3) would be revised to clarify that the requirement for mixture settings applies to reciprocating engines and that the mixture setting must be the leanest recommended for the climb. This procedure has been standard industry practice but has not been explicitly included in the rule.

No costs are attributed to the proposed changes in this section.

Section 23.1045 Cooling test procedures for turbine engine powered airplanes. Paragraph (a) would be revised to state more generally that compliance with the cooling margin requirements of § 23.1041 must be

shown for all phases of operation, as compared to the four phases of flight currently listed. In effect, the proposal would add the taxi phase.

The FAA estimates that the specific addition of the taxi phase would necessitate an incremental 5 hours of engineering analysis valued at $60 per hour, for a total of $300 per certification. The potential benefit of this provision is the enhanced safety that would result from evaluating the efficacy of the cooling system during the taxi phase of operation. In the taxi phase of operation, engine power settings and heat production may be generally lower than that experienced during flight, but available air circulation might also be lower. The heat mechanics of the flight and taxi phases are distinct and warrant separate evaluation. The FAA holds that the potential benefits of this provision would exceed the nominal associated costs.

Section 23.1047 Cooling test procedures for reciprocating engine powered airplanes. The proposal would revise the cooling test procedures in § 23.1047 by deleting the specific procedures. Many of the current provisions in the section are not standards, but rather, are specific test procedures. Experience has shown that such detailed procedures are not directly applicable to certain engine configurations and operating conditions. Currently available guidance material has been prepared to provide appropriate procedures for different configurations and conditions.

No costs are attributed to the proposed change.

Section 23.1091 Air induction systems. Paragraph (c)(2) would be revised to correct the phrasing of the current rule from "auxiliary power with air inlet ducts" to "auxiliary power unit air intake ducts."

No costs are attributed to this provision.

Section 23.1093 Induction system icing protection. Paragraph (c) would be amended by adding a heading for clarification and for consistency with the format of the other paragraphs in this section.

No costs are attributed to this provision.

Section 23.1105 Induction system screens. This section currently requires that any induction screens must be upstream of the carburetor. As a result of the advances in technology since this provision was adopted, some reciprocating engines employ a fuel injection system rather than a carburetor. This requirement would be amended to include fuel injection systems.

No costs are attributed to this provision.

Section 23.1107 Induction system filters. Current §23.1107 defines the standards for air filters that are used to protect the engine against foreign particles in the induction air supply. As written, the rule

applies to reciprocating engines. Turbine powered airplanes typically employ different systems for such protection but the use of an air filter system is feasible. The proposed rule would remove the reference to reciprocating engines, thereby making the standards applicable to turbine engines as well.

No costs are attributed to this provision. In the absence of the proposed rule, the same or similar standards would be applied to an air filter in a turbine powered engine under the equivalent safety requirements for special conditions, § 21.16.

Section 23.1121 General. Current paragraph (g) of this section requires that drains be installed in exhaust system traps to prevent fuel accumulation after a failed turbine engine start. The proposal would clarify that this requirement also applies to auxiliary power units.

No costs are attributed to this provision. In the absence of the proposed rule, the same or similar standards would be applied to auxiliary power units under the equivalent safety requirements for special conditions, § 21.16.

Section 23.1141 Powerplant controls: general. Current § 23.1141(b) would be revised by replacing the descriptive requirement for flexible controls from "must be of an acceptable kind" to "must be shown to be suitable for the particular application." The word "acceptable" is

redundant since all components of a type certificated product must be acceptable. This would be a clarifying, nonsubstantive change.

No costs are attributed to this provision.

Section 23.1143 Engine controls. Current § 23.1143(f) requires that if a power or thrust control incorporates a fuel shutoff feature, the control must have a means to prevent its inadvertent movement to the shut position. The proposal would include this requirement for fuel controls other than mixture controls. Such equipment is predominately found on European airplanes and their inclusion in the FAR is necessary for harmonization.

No costs are attributed to this provision. In the absence of the proposed rule, the same standard would be applied under the equivalent safety requirements for special conditions, § 21.16.

Section 23.1153 Propeller feathering controls. Current § 23.1153 requires that if propeller feathering controls are installed on an airplane, each propeller must have a separate control. The proposal would add editorial emphasis that this requirement applies regardless of whether the propeller feathering controls are separate from the propeller speed and pitch controls.

No costs are attributed to this provision.

Section 23.1181 Designated fire zones; regions included. The current section defines designated fire zones for both reciprocating and turbine engines. The existing rule inadvertently omitted the case in turbine engines where the powerplant compartment may not have firewalls between the compressor, accessory, combustor, turbine, and tailpipe sections. The proposal would include this condition as being a designated fire zone.

No costs are attributed to this provision. It is consistent with existing practice.

Section 23.1183 Lines, fittings, and components. Current § 23.1183(a) includes the requirement that flexible hose assemblies must be approved. As stated, the requirement is redundant and unspecific. The proposal would replace the word "approved" with the phrase "shown to be suitable for the particular application."

No costs are attributed to this provision. The proposed change would clarify what is required.

Section 23.1191 Firewalls. Paragraph (b) of the section requires that each firewall or shroud must be constructed so that no hazardous quantity of liquid, gas, or flame can pass from the engine compartment to other parts of the airplane. Under the proposal, paragraph (b) would be revised by deleting the word "engine" and restating the paragraph so that the provision would apply to auxiliary power units also.

No costs are attributed to this provision. In the absence of the proposed rule, the same or similar standards would be applied to auxiliary power units under the equivalent safety requirements for special conditions, § 21.16.

Section 23.1203 Fire detector system. Current § 23.1203(e) requires that wiring and other components of each fire detection system in an engine compartment must be at least fire resistant. For the purposes of accuracy and consistency with current terminology, the proposal would replace the words "engine compartment" with "designated fire zone."

No costs are attributed to this provision.

Section 23.1305 Powerplant instruments. Existing § 23.1305(b)(3) requires a cylinder head temperature indicator for reciprocating engine airplanes where any of three conditions is met. One of those conditions is where compliance with § 23.1041 (powerplant cooling) is shown at a speed higher than the "best rate of climb" speed. The proposal would delete this condition as a warrant for requiring a cylinder head temperature indicator. The proposed revision to § 23.1047 specifies that the test must be flown in the configurations, at the speeds, and following the procedures recommended in the Airplane Flight Manual. This would remove the necessity for a cylinder head temperature indicator.

No additional costs are attributed to this provision. It would be cost

relieving.

Section 23.1337 Powerplant instruments. The reference to § 23.959 would be changed to § 23.959(a) in conformance with the proposed revision of § 23.959.

No costs are attributed to this provision.

IV. Comparison of Costs and Benefits

The FAA holds that the benefits of the proposed rule, though not directly quantifiable, would exceed the expected costs. Minor costs, ranging from $240 to $6,000 per certification, are projected for four of the provisions. No costs are attributed to the other thirty-two provisions. The benefits of the proposed rule are considered below in four categories: (1) harmonization, (2) safety, (3) reduced need for special conditions, and (4) clarification.

A. Harmonization

The proposed changes, in concert with other rulemaking and policy actions, would provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States and the JAA member countries. Thirty-four of the thirty-six sections affected by this proposal would be harmonized. The resulting greater uniformity of standards would simplify airworthiness approval for import and export

purposes.

B. Safety

In addition to the harmonization benefits, five provisions of the proposal would provide additional safety benefits. First, the proposed rule would revise § 23.933(a)(1) to more closely agree with the corresponding turbojet and turbofan reversing system airworthiness standards of part 25. The FAA estimates that this provision would necessitate an additional 100 hours of failure mode and effects analysis at an assumed cost rate of $60 per hour, including labor and overhead. The estimated $6,000 cost would apply to each certification. The FAA projects that no additional production or operating costs would result from this provision.

The primary potential benefit of the provision is the additional safety that could result from analyzing the feasible range of reverser system failures, the effects of those failures, and the corresponding capabilities necessary to correct the failure or circumvent its effects. Such an analysis would reduce the possibility that an unanticipated condition with catastrophic potential would remain in the system. In addition to the safety benefit, it is expected that operating benefits and manufacturing economies would result from the uniformity of standards between parts 23 and 25. The FAA is not able to quantify the potential benefits of this provision but holds that the benefits would exceed the expected minor costs.

Second, the proposed rule would add a new paragraph (b) to § 23.959 requiring that the effect of any fuel pump failure on the unusable fuel supply be determined. Though not previously required, it has been industry practice to include this information in the Airplane Flight Manual. The FAA estimates that the nominal cost of making this determination would be $240 per certification (4 hours at $60 per hour). In addition, an insignificant cost ($1) would be incurred in adding a table entry to the manual for each airplane that is produced. The fact that the proposed requirement is already standard practice supports the FAA's position that the potential benefits of the provision would exceed the minor costs. The safety benefits of this provision would be derived from the assurance that this vital information would continue to be provided for future airplane models.

Third, under § 23.979, the proposed rule would add the requirement for commuter category airplanes that an indication be provided at each fueling station in the event of a failure of the shutoff means to stop fuel flow at the maximum level. The FAA estimates that the proposed required device would necessitate an incremental design and development cost of $3000 per certification (50 hours at $60 per hour) and an additional nominal manufacturing cost of $10 per airplane. The benefit of the provision is the avoidance of a potentially catastrophic condition whereby excess fuel could unknowingly be forced out of the contained fuel system by the pressure fueling system. The FAA holds that these potential benefits would exceed the minor associated costs.

Fourth, § 23.1041 establishes the requirement that the powerplant cooling system must be able to maintain the temperature of the powerplant components and fluids. The ambient temperature for testing reciprocating engine airplanes is currently required to be corrected to show the capacity of the cooling system at 100°F. Under the proposal, this temperature standard would be revised to the "maximum ambient temperature conditions for which approval is requested."

No costs are attributed to this provision. Reciprocating engine airplane manufacturers would continue to have the option to request approval for operations at the existing 100°F temperature. A decision to request approval for a higher temperature would necessitate demonstration of the capability of the cooling system at that temperature. That choice, however, would be made at the manufacturer's discretion and would be based on its decision that any associated incremental cooling system costs would be recovered in the marketplace or offset by other considerations. The potential benefit of this provision is the reduced likelihood that an inadequate cooling system would be relied on during high temperature operations.

Finally, paragraph (a) of § 23.1045 would be revised to state more generally that compliance with the cooling margin requirements of § 23.1041 must be shown for all phases of operation, as compared to the four phases of flight currently listed. In effect, the proposal would add the taxi phase.

The FAA estimates that the specific addition of the taxi phase would necessitate an incremental 5 hours of engineering analysis valued at $60 per hour, for a total of $300 per certification. The potential benefit of this provision is the enhanced safety that would result from evaluating the efficacy of the cooling system during the taxi phase of operation. In the taxi phase of operation, engine power settings and heat production may be generally lower than that experienced during flight but available air circulation might also be lower. The heat mechanics of the two conditions are distinct and warrant separate evaluation. The FAA holds that the potential benefits of this provision would exceed the nominal associated costs.

C. Reduced Need for Special Conditions

The proposal includes five provisions that would replace the need for special conditions processing of certain parts or materials that were previously considered as novel or unusual design features. The subjects of these provisions include composite propellers, fuel injection systems for reciprocating engines, induction filters on turbine engines, fuel shutoff controls other than mixture controls, and auxiliary power units. No additional costs are attributed to these provisions. Formalization of the equivalent safety standards and requirements for these subjects would obviate the need for special conditions actions and would simplify the certification process for manufacturers.

D. Clarification

Several unclear provisions of part 23 were revealed during the harmonization review. In response to this finding, the proposed rule includes a number of no-cost, editorial revisions that would clarify the existing requirements. These changes would benefit manufacturers by removing potential confusion about the specific standards and requirements necessary for product certification.

V. Outline Summary of Provisions

The following table lists the sections that would be affected by the proposed rule and the projected cost and benefit of each. The FAA holds that each of the provisions, as well as the entire proposal, would be cost beneficial.

Section	COST	BENEFITS
Section 23.777 Cockpit controls.	None.	Consistent location of controls.
Section 23.779 Motion and effect of cockpit controls.	None.	Consistent direction and effect of fuel shutoff controls.
Section 23.901 Installation.	None.	Editorial clarification.
Section 23.903 Engines.	None.	Editorial clarification.
Section 23.905 Propellers.	None.	Cost relieving to accommodate European practice.

SECTION	COST	BENEFITS
Section 23.907 Propeller vibration.	None.	Replaces need for Special Conditions action.
Section 23.925 Propeller clearance.	None.	Clarification of existing requirement.
Section 23.929 Engine installation ice protection.	None.	Clarification of existing requirement.
Section 23.933 Reversing systems.	$6,000 per certification. No unit production or operating costs.	Safety. Reduced likelihood of reverser system malfunction accident.
Section 23.955 Fuel flow.	None.	Editorial clarification.
Section 23.959 Unusable fuel supply.	$240 per certification. Insignificant ($1) cost per production unit.	Safety. Reduced likelihood of fuel related accident following fuel pump failure.
Section 23.963 Fuel tanks general.	None.	Clarification and conforming section reference.
Section 23.965 Fuel tank tests.	None.	Clarification.
Section 23.973 Fuel tank filler connection.	None.	Editorial emphasis and standardization of equipment.
Section 23.975 Fuel tank vents and carburetor vents.	None.	Editorial clarification.
Section 23.979 Pressure fueling systems.	$3,000 per certification and $10 per production unit.	Safety. Reduced likelihood of excess spilled fuel accident.
Section 23.1001 Fuel jettisoning system.	None.	Conforming section reference.

SECTION	COST	BENEFITS
Section 23.1013 Oil tanks.	None.	Specification of current practice as a standard.
Section 23.1041 General.	None.	Minor safety. Reduced likelihood of insufficient cooling capacity.
Section 23.1043 Cooling tests.	None.	Editorial clarification.
Section 23.1045 Cooling test procedures for turbine engine powered airplanes.	$300 per certification.	Minor safety. Reduced likelihood of insufficient cooling during taxiing.
Section 23.1047 Cooling test procedures for reciprocating engine powered airplanes.	None.	Removal of inapplicable test procedures.
Section 23.1091 Air induction systems.	None.	Editorial clarification.
Section 23.1093 Induction system icing protection.	None.	Editorial clarification.
Section 23.1105 Induction system screens.	None.	Clarification and avoidance of need for Special Conditions action.
Section 23.1107 Induction system filters.	None.	Avoidance of need for Special Conditions action.
Section 23.1121 General.	None.	Avoidance of need for Special Conditions action.
Section 23.1141 Powerplant controls: general.	None.	Editorial clarification.

SECTION	COST	BENEFITS
Section 23.1143 Engine controls.	None.	Avoidance of need for Special Conditions action to accommodate European practice.
Section 23.1153 Propeller feathering controls.	None.	Clarification by editorial emphasis.
Section 23.1181 Designated fire zones; regions included.	None.	Technical correction of inadvertent omission.
Section 23.1183 Lines, fittings, and components.	None.	Editorial clarification.
Section 23.1191 Firewalls.	None.	Avoidance of need for Special Conditions action on APU's.
Section 23.1203 Fire detector system.	None.	Editorial change for conformance with terminology.
Section 23.1305 Powerplant instruments.	None.	Cost relieving and conforming. Removal of no longer necessary instrument requirement.
Section 23.1337 Powerplant instruments.	None.	Conforming reference change.

VI. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would have a significant

economic impact, either detrimental or beneficial, on a substantial number of small entities. Based on implementing FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, the FAA has determined that the proposed rule would not have a significant economic impact on a substantial number of small entities.

VII. Trade Impact Assessment

The proposed rule would not constitute a barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States. Instead, the proposed powerplant airworthiness standards have been harmonized with foreign aviation authorities and would lessen restraints on trade.

Regulatory Evaluation Summary

For Insertion Into the Preamble

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment

Three requirements pertain to the economic impacts of regulatory changes to the FAR. First, Executive Order 12291 directs Federal agencies to promulgate new regulations or modify existing regulations only if the potential benefits to society outweigh the potential costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Finally, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this rule: (1) would generate benefits exceeding costs and is neither major as defined in the Executive Order nor significant as defined in DOT's Policies and Procedures; (2) would not have a significant impact on a substantial number of small entities; and (3) would lessen restraints on international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

The FAA holds that the benefits of the proposed rule, though not directly quantifiable, would exceed the expected costs. Minor costs, ranging from $240 to $6,000 per certification, are projected for four of

the provisions in this proposal. No costs are attributed to the other thirty-two provisions. The benefits of the proposed rule are considered below in four categories: (1) harmonization, (2) safety, (3) reduced need for special conditions, and (4) clarification.

Harmonization

The proposed rule, in concert with other rulemaking and policy actions, would provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States and the JAA member countries. Thirty-four of the thirty-six sections affected by the proposed rule would be harmonized. The resulting greater uniformity of standards would simplify airworthiness approval for import and export purposes.

Safety

In addition to the harmonization benefits, five provisions would provide additional safety benefits. First, the proposed rule would revise § 23.933(a)(1) to more closely agree with the corresponding turbojet and turbofan reversing system airworthiness standards of part 25. The FAA estimates that this provision would necessitate an additional 100 hours of failure mode and effects analysis at an assumed cost rate of $60 per hour, including labor and overhead. The estimated $6,000 cost would apply to each certification. The FAA projects that no additional production or operating costs would result from this provision.

The primary potential benefit of the provision is the additional safety that could result from analyzing the feasible range of reverser system failures, the effects of those failures, and the corresponding capabilities necessary to correct the failure or circumvent its effects. Such an analysis would reduce the possibility that an unanticipated condition with catastrophic potential would remain in the system. In addition to the safety benefit, it is expected that some operating benefits and manufacturing economies would result from the uniformity of standards between parts 23 and 25. The FAA is not able to quantify the potential benefits of this provision but holds that the benefits would exceed the expected minor costs.

Second, the proposed rule would add a new paragraph (b) to § 23.959 requiring that the effect of any fuel pump failure on the unusable fuel supply be determined. Though not previously required, it has been industry practice to include this information in the Airplane Flight Manual. The FAA estimates that the nominal cost of making this determination would be $240 per certification (4 hours at $60 per hour). In addition, an insignificant cost ($1) would be incurred in adding a table entry to the manual for each airplane that is produced. The fact that the proposed requirement is already standard practice supports the FAA's position that the potential benefits of the provision would exceed the minor costs. The safety benefits of this provision would be derived from the assurance that this vital information would continue to be provided for future airplane models.

Third, under § 23.979, the proposed rule would add the requirement for commuter category airplanes that an indication be provided at each fueling station in the event of a failure of the shutoff means to stop fuel flow at the maximum level. The FAA estimates that the proposed required device would necessitate an incremental design and development cost of $3000 per certification (50 hours at $60 per hour) and an additional nominal manufacturing cost of $10 per airplane. The benefit of the provision is the avoidance of a potentially catastrophic condition whereby excess fuel could unknowingly be forced out of the contained fuel system by the pressure fueling system. The FAA holds that these potential benefits would exceed the minor associated costs.

Fourth, § 23.1041 establishes the requirement that the powerplant cooling system must be able to maintain the temperature of the powerplant components and fluids. The ambient temperature for testing reciprocating engine airplanes is currently required to be corrected to show the capacity of the cooling system at 100°F. Under the proposal, this temperature standard would be revised to the "maximum ambient temperature conditions for which approval is requested."

No costs are attributed to this provision. Reciprocating engine airplane manufacturers would continue to have the option to request approval for operations at the existing 100°F temperature. A decision to request approval for a higher temperature would necessitate demonstration of the capability of the cooling system at that temperature. That choice, however, would be made at the manufacturer's

discretion and would be based on its decision that any associated incremental cooling system costs would be recovered in the marketplace. The potential benefit of this provision is the reduced likelihood that an inadequate cooling system would be relied on during high temperature operations.

Finally, paragraph (a) of § 23.1045 would be revised to state more generally that compliance with the cooling margin requirements of § 23.1041 must be shown for all phases of operation, as compared to the four phases of flight currently listed. In effect, the proposal would add the taxi phase.

The FAA estimates that the specific addition of the taxi phase would necessitate an incremental 5 hours of engineering analysis valued at $60 per hour, for a total of $300 per certification. The potential benefit of this provision is the enhanced safety that would result from evaluating the efficacy of the cooling system during the taxi phase of operation. In the taxi phase of operation, engine power settings and heat production may be generally lower than that experienced during flight but available air circulation might also be lower. The heat mechanics of the two conditions are distinct and warrant separate evaluation. The FAA holds that the potential benefits of this provision would exceed the nominal associated costs.

Reduced Need for Special Conditions

The proposed rule includes five provisions that would replace the need for special conditions processing of certain parts or materials that were previously considered as novel or unusual design features. The subjects of these provisions include composite propellers, fuel injection systems for reciprocating engines, induction filters on turbine engines, fuel shutoff controls other than mixture controls, and auxiliary power units. No costs are attributed to these provisions. Formalization of the equivalent safety standards and requirements for these subjects would obviate the need for special conditions actions and would simplify the certification process for manufacturers.

Clarification

Several unclear provisions of part 23 were revealed during the harmonization review. In response to this finding, the proposal includes a number of no-cost, editorial revisions that would clarify the existing requirements. These changes would benefit manufacturers by removing potential confusion about the specific standards and requirements necessary for product certification.

In summary, the FAA holds that each of the provisions, as well as the entire proposal, would be cost beneficial.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 23

[Docket No. 27804; Amendment No. 23–51]

RIN 2120–AE60

Airworthiness Standards; Powerplant Rules Based on European Joint Aviation Requirements

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This final rule amends the powerplant airworthiness standards for normal, utility, acrobatic, and commuter category airplanes. This amendment completes a portion of the Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) effort to harmonize the Federal Aviation Regulations and the Joint Aviation Requirements (JAR) for airplanes certificated in these categories. This amendment will provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States under 14 CFR part 23 and in the JAA countries under Joint Aviation Requirements 23, simplifying international airworthiness approval.

EFFECTIVE DATE: March 11, 1996.

FOR FURTHER INFORMATION CONTACT: Norman Vetter, ACE–111, Small Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, 601 East 12th Street, Kansas City, Missouri 64106; telephone (816) 426–5688.

SUPPLEMENTARY INFORMATION:

Background

This amendment is based on Notice of Proposed Rulemaking (NPRM) No. 94–19 (59 FR 33822). All comments received in response to Notice 94–19 have been considered in adopting this amendment.

This amendment completes part of an effort to harmonize the requirements of part 23 and JAR 23. The revisions to part 23 in this amendment pertain to powerplants. Three other final rules are being issued in this **Federal Register** that pertain to airworthiness standards for systems and equipment flight, and airframe. These related rulemakings are also part of the harmonization effort. Interested persons should review all four final rules to ensure that all revisions to part 23 are recognized.

The harmonization effort was initiated at a meeting in June 1990 of the JAA Council (consisting of JAA members from European countries) and the FAA, during which the FAA Administrator committed the FAA to support the harmonization of the U.S. regulations with the JAR that were being developed. In response to the commitment, the FAA Small Airplane Directorate established an FAA Harmonization Task Force to work with the JAR 23 Study Group to harmonize part 23 with the proposed JAR 23. The General Aviation Manufacturers Association (GAMA) also established a JAR 23 and part 23 committee to provide technical assistance.

The FAA, JAA, GAMA, and the Association Europeene des Constructeurs de Material Aerospatial (AECMA), an organization of European airframe manufacturers, met on several occasions in a continuing harmonization effort.

Near the end of the effort to harmonize the normal, utility, and acrobatic category airplane airworthiness standards, the JAA requested and received recommendations from its member countries on proposed airworthiness standards for commuter category airplanes. Subsequent JAA and FAA meetings on this issue resulted in proposals that were reflected in Notice 94–19 to revise portions of the part 23 commuter category airworthiness standards. Accordingly, this final rule adopts the powerplant airworthiness standards for all part 23 airplanes.

In January 1991, the FAA established the Aviation Rulemaking Advisory Committee (ARAC) (56 FR 2190, January 22, 1991). At an FAA/JAA Harmonization Conference in Canada in June 1992, the FAA announced that it would consolidate the harmonization effort within the ARAC structure. The FAA assigned to ARAC the rulemakings related to JAR and part 23 harmonization, which ARAC assigned to the JAR 23/FAR 23 Harmonization Working Group. The proposals for powerplant airworthiness standards contained in Notice No. 94–19 were a result of both the working group's efforts and the efforts at harmonization that occurred before the formation of the working group.

The JAA submitted comments to the FAA on January 20, 1994, in response to the four draft proposals for harmonization of the part 23 airworthiness standards. The JAA submitted comments again during the comment period of the NPRM. At the April 26, 1995, ARAC JAR/FAR 23 Harmonization Working Group meeting, the JAA noted that many of the comments in the January 20 letter had been satisfied or were no longer relevant. The few remaining items concern issues that are considered beyond the scope of this rulemaking, and, therefore, will be dealt with at future FAA/JAA Harmonization meetings.

Discussion of Comments

General

Interested persons were invited to participate in the development of these final rules by submitting written data, views, or arguments to the regulatory docket on or before October 28, 1994. Four commenters responded to Notice 94–19. Two commenters (Transport Canada and the Air Line Pilots Association) expressed overall support for the proposed changes. The JAA stated its overall support while commenting on specific proposed changes. The fourth commenter (Beechcraft) commented on several specific sections. The specific comments of JAA and Beechcraft are discussed in detail in this document and include an FAA response and a description of any changes to the final rule language. Other minor technical and editorial changes have been made to the proposed rules based on relevant comments received, consultation with the ARAC, and further review by the FAA.

Discussion of Amendments

Section 23.777 Cockpit Controls

The FAA proposed to revise § 23.777(c)(2) so that for single-engine airplanes designed for a single cockpit occupant, the powerplant controls would be located in the same position as they are for airplanes with tandem seats.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.779 Motion and Effect of Cockpit Controls

The FAA proposed to revise § 23.779(b)(1) by adding a new item, "fuel," to the "motion and effect" table to require that any fuel shutoff control other than mixture must move forward to open.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.901 Installation

The FAA proposed to revise § 23.901(d)(1), which concerns turbine engine installation and vibration characteristics that do not exceed those established during the type certification of the engine. The FAA proposed to add the word "carcass" before vibration in this paragraph in order to restrict analyses to those vibrations that are caused by external excitation to the

main engine frame or "carcass." While the word "carcass" has not traditionally been used in this context in the United States, it is used in Europe and was proposed in the interest of harmonization.

The FAA proposed to revise § 23.901(d)(2) by deleting the last sentence, which reads: "The engine must accelerate and decelerate safely following stabilized operations under these rain conditions." This requirement is already provided for in the first sentence of paragraph (d)(2), which states that the turbine engine must be constructed and arranged to provide "continued safe operation."

The FAA proposed to revise paragraph (e) of this section by adding the word "powerplant" in front of "installation" to make clear that it pertains to all powerplant installations. The FAA proposed to revise paragraph (e)(1) by adding the word "installation" in front of "instruction" to make clear which instructions are applicable.

The FAA proposed that new paragraph (e)(1)(i) contain the requirement for an engine type certificate currently set forth in paragraph (e)(1). The FAA proposed that paragraph (e)(1)(ii) continue the current requirement for a propeller type certificate, and to allow an equivalency finding for certain propellers not type certificated in the United States. This revision was proposed to be consistent with the proposed revisions to § 23.905, Propellers.

No comments were received on the proposals. However, as discussed below, the FAA has determined that the proposed amendment to § 23.905(a) concerning propellers should be withdrawn. Consequently, proposed revisions to § 23.901(e) are no longer appropriate and are being withdrawn.

The proposal is adopted with the above change.

Section 23.903 Engines

The FAA proposed to revise § 23.903 (c) and (g) by adding the headings "Engine isolation" and "Restart capability," respectively, in order to identify the subjects of these paragraphs as is done for the other paragraphs in this section. The FAA also proposed to change the heading of paragraph (f) from "Restart capability" to "Restart envelope" since the paragraph addresses the altitude and airspeed envelope for restarting the engines in flight.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.905 Propellers

The FAA proposed to revise § 23.905(a) to permit approval, on part 23 airplanes, of propellers by a means other than the currently required type certificate.

Comment: Beechcraft objects to what it characterizes as "an unknown method of compliance." Beechcraft states that it appears that the economic burden of certification would be placed on the end user of the propeller without any guidance as to the means of compliance. Beechcraft asserts that experience indicates that equivalent level of safety findings are very subjective, that propellers would be certificated to various standards, and that this creates a liability for the aircraft manufacturer. Beechcraft believes that uniform airworthiness standards should be maintained and that "an aircraft manufacturer could not, for economic and liability reasons, afford to purchase a propeller without a type certificate, U.S. or foreign."

FAA Response: The FAA re-evaluated the proposal and determined that public interest would be best served if the proposal were withdrawn. Therefore, the FAA is withdrawing the proposal and will consider it for future rulemaking action.

Section 23.907 Propeller Vibration

The FAA proposed to revise § 23.907(a) to require that propellers "other than a conventional fixed-pitch wooden propeller" be evaluated for vibration. Fixed-pitch wooden propellers are not highly stressed, as are all metal and most composite propeller blades.

No comments were received on this proposal and it is adopted as proposed.

Section 23.925 Propeller Clearance

The FAA proposed to revise § 23.925 to require that propeller clearance must be evaluated with the airplane at the most adverse combination of weight and center of gravity, and with the propeller in the most adverse pitch position. This revision would make the requirement consistent with current certification practice.

Comment: The JAA pointed out that, under the JAR, the clearances provided in this section are intended to represent minimum values and that it had previously rejected the introductory text language that states "Unless smaller clearances are substantiated * * *."

FAA Response: The language quoted by the JAA is in present § 23.925 and would not be affected by the proposed change. The FAA acknowledges that the introductory language cited by the JAA has been previously identified as an area of known disharmony between the two sets of regulations that would not be affected by the proposed revisions.

No comments other than the JAA acknowledgment of disharmony were received on the changes proposed for this section in Notice 94–19, and the proposal is adopted as proposed.

Section 23.929 Engine Installation Ice Protection

The FAA proposed to replace the word "power" in § 23.929 in the phrase "without appreciable loss of power" with the word "thrust" because "thrust" is more descriptive of the loss experienced when ice forms on a propeller.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.933 Reversing Systems

The FAA proposed to revise § 23.933(a)(1) so that these provisions correspond to the turbojet and turbofan reversing system airworthiness standards of part 25.

The FAA also proposed to delete as unnecessary the word "forward" from paragraph (a)(3).

No comments were received on the proposals, and they are adopted as proposed.

Section 23.955 Fuel Flow

The FAA proposed to revise § 23.955(a) by deleting the word "and" where it occurs between the subparagraphs. Each of the four paragraphs is independent and all of them apply under paragraph (a).

The FAA also proposed to revise § 23.955(a)(3) by adding the word "probable" so that the requirement would read as follows: "If there is a flow meter without a bypass, it must not have any probable failure mode * * *." The addition of the word "probable" would clarify the intent of the requirement that only probable failures need be analyzed.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.959 Unusable Fuel Supply

The FAA proposed that the text of § 23.959 be redesignated as paragraph (a), and proposed the addition of a new paragraph (b) to require that the effect of any fuel pump failure on the unusable fuel supply be established. This change would not require any change in the fuel quantity indicator marking required by § 23.1553.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.963 Fuel Tanks: General

The FAA proposed to clarify § 23.963(b), which concerns fuel tank liners, by replacing the phrase "must be of an acceptable kind" with the phrase "must be shown to be suitable for the particular application." Also, the FAA proposed to revise the cross reference in this section to coincide with the proposed revision of § 23.959 discussed above.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.965 Fuel Tank Tests

The FAA proposed to revise § 23.965(b)(3)(i) by changing the phrase "the test frequency of vibration cycles per minute is obtained by * * *" to "the test frequency of vibration is the number of cycles per minute obtained by * * *" to clarify that it is the number of cycles per minute that is to be used during testing of a fuel tank.

No comments were received on the proposal. After further review of the proposal, however, the FAA determined that the second portion of paragraph (b)(3)(i), which includes the test frequency vibration cycles, should be redesignated as paragraphs (b)(3)(i) (A) and (B), and that the phrase "except that" should be removed and the word "and" added in its place. This would not be a substantive revision.

The proposal is adopted with the above change.

Section 23.973 Fuel Tank Filler Connection

The FAA proposed to revise § 23.973(f) by removing the language that limits its applicability so that the regulation would apply to all airplanes with turbine engines, including turbine engines that are equipped with pressure fueling systems.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.975 Fuel Tank Vents and Carburetor Vents

The FAA proposed to revise the first sentence of § 23.975(a)(5) to clarify that there may be no point in any vent line where moisture can accumulate unless drainage is provided. The FAA explained that the intent of this requirement is to allow low spots in the fuel tank vent system if a drain is provided for each low spot.

Comment: No comments were received concerning the proposed revision of the first sentence of § 23.975(a)(5). However, the JAA submitted a comment on the second sentence, for which no change was proposed. That sentence currently reads, "Any drain valve installed in the vent lines must discharge clear of the airplane and be accessible for drainage." The JAA's comment is threefold. First, JAA states that, in smaller, less complex part 23 airplanes, whether a vent will remain clear in all phases of operation cannot be guaranteed. Second, JAA states that, on more complex part 23 airplanes, "considerations of inaccessibility during operation of an aircraft when the need for a drain valve has been considered essential, has very often resulted in the acceptance of automatic valves that drain back into the fuel tank." Finally, JAA states that drainage/discharge clear of the airplane is not in accord with environmental concerns.

FAA Response: The FAA has concluded after reviewing the JAA comment and after discussions within the ARAC working group that further clarification of this drainage requirement is appropriate, since the rule language was never intended to limit discharge to an external drain valve. Therefore, the last sentence of § 23.975(a)(5), as adopted, reads "Any drain valve installed must be accessible for drainage."

Section 23.979 Pressure Fueling Systems

The FAA proposed to revise § 23.979(b) to require, for commuter category airplanes, an indication at each fueling station of failure of the automatic shutoff means. This revision would make the commuter category automatic shutoff means requirements similar to the requirements for transport category airplanes in § 25.979.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1001 Fuel Jettisoning System

The FAA proposed to revise § 23.1001(b)(2) to redefine the speed at which the fuel jettisoning system tests should be conducted by referencing § 23.69(b). The JAA states that a comparable change will be made to JAR 23.

No other comments were received, and this proposal is adopted as proposed.

Section 23.1013 Oil Tanks

The FAA proposed to delete the word "crankcase" in § 23.1013(d)(1) to make this paragraph applicable to all engine installations.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1041 General

The FAA proposed to revise § 23.1041, under the "Cooling" heading, to require, for all airplanes regardless of engine type, a demonstration of adequate cooling at one maximum ambient atmosphere temperature for which approval is requested.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1043 Cooling Tests

The FAA stated in the preamble to Notice 94–19 that it proposed to revise § 23.1043(a)(3) to show that the minimum grade fuel requirement applies to both turbine and reciprocating engines and that the lean mixture requirement applies to reciprocating engines only.

The FAA proposed to simplify the introductory text of paragraph (a) by deleting the requirement that compliance must be shown "under critical ground, water, and flight operating conditions to the maximum altitude for which approval is requested" since this requirement is already contained in § 23.1041.

The FAA proposed to improve the organization of the section by moving to paragraph (a)(4) the requirement in the introductory text of paragraph (a) that for turbocharged engines, each turbocharger must be operated through the part of the climb profile for which turbocharger operation is requested.

The FAA proposed a non-substantive change to paragraph (a)(1) to make it consistent with proposed changes to § 23.1041.

The FAA proposed to reword paragraph (a)(2) without substantive change to make this language identical to the JAR.

The FAA proposed to revise paragraph (a)(3) to clarify that the requirement for mixture settings applies to reciprocating engines and that the mixture settings must be the leanest recommended for the climb. The FAA pointed out that the "leanest recommended for climb" mixture setting is considered a normal operating condition.

The FAA proposed to remove paragraph (a)(5) because water taxi tests are already required by § 23.1041 as amended by Amendment 23–43 (58 FR 18958, April 9, 1993).

The FAA proposed to revise paragraphs (c) and (d) by adding the requirement that cooling correction factors be determined for the appropriate altitude. This proposed change was intended to codify current certification practice and increase safety by ensuring that the proper correction factor is determined.

Comment: Beechcraft comments that the minimum fuel requirement of present paragraph (a)(3) should be deleted for turbine engines since there are not real measurable differences for turbine engine fuel as there are for reciprocating engine fuel.

FAA Response: The proposed rule did not contain any change to the minimum fuel grade requirements and the preamble statement may be unclear. The FAA agrees with the Beechcraft statement that today, turbine engine fuels are not graded. Since no change was proposed in this wording in the NPRM and since the present wording has not effect on the use of turbine engine fuels, no change is made for this final rule. However, after discussion within the ARAC Working Group, the FAA has determined that paragraph (a)(3) can be clarified by moving the second part of the sentence concerning mixture settings for reciprocating engines to a new paragraph (a)(5). This is not considered a substantive change to the proposed language, but a clarification of a current requirement.

The only comment received on the changes proposed for § 23.1043 concerned paragraph (a)(3), and that paragraph is adopted as explained above. The remaining changes are adopted as proposed.

Section 23.1045 Cooling Test Procedures for Turbine Engine Powered Airplanes

The FAA proposed to clarify § 23.1045(a) by stating more generally that (1) compliance with § 23.1041 must be shown for all phases of operations, not only the four listed phases: takeoff, climb, enroute, and landing; and that (2) the airplane must be flown in the configuration, at the speeds, and following the procedures recommended in the Airplane Flight Manual for the relative stage of flight that corresponds to the applicable performance requirements critical to cooling.

No comments were received on the proposals, and they are adopted as proposed.

Section 23.1047 Cooling Test Procedures for Reciprocating Engine Powered Airplanes

The FAA proposed to revise the cooling test procedures in § 23.1047 for reciprocating engine powered airplanes by deleting the specific procedures because experience has shown that some of the listed detailed procedures are not directly applicable to certain engine configurations and certain operating conditions.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1091 Air Induction System

The FAA proposed to revise § 23.1091(c)(2) to require that air induction system design protect against foreign matter, from whatever source, "during takeoff, landing, and taxiing" rather than be limited, as is the present rule, to foreign material located on the runway, taxiway, or other airport operating surfaces.

Comment: Beechcraft comments that increasing the scope of the foreign material environment poses very difficult technical questions and potentially costly solutions. Beechcraft states that it is extremely difficult to compensate for and protect against airborne debris and also states its concern that the proposed rule language gives no guidance as to the levels of protection that are necessary.

FAA Response: As stated in the NPRM preamble, the proposed language is consistent with current certification practice and, therefore, would not be a significant new burden on aircraft manufacturers. However, it was not the FAA's intent to create an opportunity for an extreme interpretation of this rule, as suggested by Beechcraft. To clarify the intent, and after discussion within the ARAC Working Group, the FAA has added the words "hazard of" to the second sentence of § 23.1091(c)(2) to make it clear that the intent of the rule is to minimize the hazard of ingestion of foreign matter rather than to require zero ingestion.

This proposal is adopted with the change explained above.

Section 23.1093 Induction System Icing Protection

The FAA proposed to revise § 23.1093(c) by adding the heading "Reciprocating engines with superchargers" so that this paragraph would be consistent with paragraphs (a) and (b) of this section, which have headings.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1105 Induction System Screens

The FAA proposed to revise § 23.1105 to include fuel injection systems, since some reciprocating engines incorporate a fuel injection system and the same provisions required for a carburetor are necessary for a fuel injection system.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1107 Induction System Filters

The FAA proposed to revise the introductory text of § 23.1107 by deleting the reference to reciprocating engine installations to make the section applicable to airplanes with either reciprocating or turbine engines.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1121 General

The FAA proposed to revise § 23.1121(g) by adding standards for APU exhaust systems because these standards were overlooked when APU standards were introduced into part 23 by Amendment 23–43 (58 FR 18958, April 9, 1993).

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1141 Powerplant Controls: General

The FAA proposed to clarify § 23.1141(b), which concerns flexible controls, by replacing the phrase "must be of an acceptable kind" with the phrase "must be shown to be suitable for the particular application."

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1143 Engine Controls

The FAA proposed to revise § 23.1143(f) to add a requirement that a fuel control (other than a mixture control) must have a means to prevent the inadvertent movement of the control into the shutoff position.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1153 Propeller Feathering Controls

The FAA proposed to revise § 23.1153 to require that it be possible to feather each propeller separately, in order to prevent inadvertent operation.

After further review of the proposal, the FAA decided to remove the phrase "whether or not they are separate from the propeller speed and pitch controls" and add the word "installed" in its place. The meaning is maintained without the deleted phrase, which would be redundant.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1181 Designated Fire Zones; Regions Included

The FAA proposed new § 23.1181(b)(3) to add as a designated fire zone for turbine engines "any complete powerplant compartment in which there is no isolation between compressor, accessory, combustor, turbine and tailpipe sections."

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1183 Lines, Fittings, and Components

The FAA proposed to clarify the intent of § 23.1183(a), which concerns the approval of flexible hose assemblies, by replacing the word "approved" with the words "shown to be suitable for the particular application."

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1191 Firewalls

The FAA proposed to amend § 23.1191(b) to require that each "firewall or shroud must be constructed so that no hazardous quantity of liquid, gas, or flame can pass from the compartment created by the firewall or shroud to other parts of the airplane." The intent of the proposed change was to clarify that the requirement applies to any compartment created by a firewall or shroud.

Comment: The JAA states that the additional wording proposed to be added to paragraph (b) is superfluous and will not be proposed for JAR 23.

FAA Response: The FAA has determined that the proposed change to § 23.1191(b) is needed to retain the intent of the rule and that it will not create a technical disharmony between the two bodies of regulation.

This proposal is adopted as proposed.

Section 23.1203 Fire Detector System

The FAA proposed to revise § 23.1203(e), which concerns the wiring and other components of each fire detector system in an engine compartment, by replacing the words "fire zone" with "designated fire zone" to make the wording consistent with § 23.1181.

No comments were received on the proposal, and it is adopted as proposed.

Section 23.1305 Powerplant Instruments

The FAA proposed to revise § 23.1305(b)(3), concerning cylinder head temperature indicators, by deleting paragraph (b)(3)(ii), which refers to compliance with § 23.1041 at a speed higher than V_Y, to be consistent with a general deletion of the requirements for a determination of the V_Y speed.

No comments were received on the proposal. However, after further review, the FAA has determined that it would be simpler to remove the text of paragraph (b)(3)(ii) and to reserve paragraph (b)(3)(ii) for future use in order to avoid confusion that could come from redesignation of paragraph (b)(3)(iii).

The proposal is adopted as explained above.

Section 23.1337 Powerplant Instruments

The FAA proposed to change the reference in § 23.1337(b) to "§ 23.959" to "§ 23.959(a)" to conform the reference to a revision of § 23.959 made elsewhere in this document.

No comments were received on the proposal, and it is adopted as proposed.

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment

Changes to federal regulations must undergo several economic analyses. First, Executive Order 12866 directs Federal agencies to promulgate new regulations or modify existing regulations only if the potential benefits to society justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Finally, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these assessments, the FAA has determined that this rule: (1) Will generate benefits exceeding its costs and is "significant" as defined in Executive Order 12866; (2) is "significant" as defined in DOT's Policies and Procedures; (3) will not have a significant impact on a substantial number of small entities; and (4) will not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

Comments Related to the Economics of the Proposed Rule

Two comments were received regarding the economic impact of the proposals; one concerning an existing regulation (§ 23.1043 Cooling tests) and one concerning a new proposal (§ 23.1091 Air induction systems). Both of these comments, as well as the FAA's responses, are included above in the section "Discussion of Amendments."

Regulatory Evaluation Summary

The FAA has determined that the benefits of the final rule, though not directly quantifiable, will exceed the expected costs. Minor costs, ranging from $240 to $6,000 per certification, are projected for four of the provisions. No costs are attributed to the other provisions. The benefits of the final rule are considered below in four categories: (1) Harmonization, (2) safety, (3) reduced need for special conditions, and (4) clarification.

Harmonization

These changes, in concert with other rulemaking and policy actions, will provide nearly uniform powerplant airworthiness standards for airplanes certificated in the United States and the JAA member countries. The resulting greater uniformity of standards simplifies airworthiness approval for import and export purposes.

Safety

In addition to the harmonization benefits, five provisions of the rule provide additional safety benefits. First, the final rule revises § 23.933(a)(1) to more closely agree with the corresponding turbojet and turbofan reversing system airworthiness standards of part 25. The FAA estimates that this provision will necessitate an additional 100 hours of failure mode and effects analysis at an assumed cost rate of $60 per hour, including labor and overhead. The estimated $6,000 cost applies to each certification. The FAA projects that no additional production or operating costs will result from this provision.

The primary potential benefit of the provision is the additional safety that could result from analyzing the feasible range of reverser system failures, the effects of those failures, and the corresponding capabilities necessary to correct the failure or circumvent its effects. Such an analysis could reduce the possibility that an unanticipated condition with catastrophic potential would remain in the system. In addition to the safety benefit, it is expected that operating benefits and manufacturing economies will result from the uniformity of standards between parts 23 and 25. The FAA is not able to quantify the potential benefits of this provision but has determined that the benefits will exceed the expected minor costs.

Second, the final rule adds a new paragraph (b) to § 23.959 requiring that the effect of any fuel pump failure on the unusable fuel supply be determined. Though not previously required, it has been industry practice to include this information in the Airplane Flight Manual. The FAA estimates that the nominal cost of making this determination will be $240 per certification (4 hours at $60 per hour). In addition, an insignificant cost ($1) will be incurred in adding a table entry to the manual for each airplane that is produced. The fact that this requirement is already standard practice supports the FAA's position that the potential benefit of the provision exceed the minor costs. The safety benefits of this provision

derive from the assurance that this vital information will continue to be provided for future airplane models.

Third, under § 23.979, the final rule adds the requirement for commuter category airplanes that an indication be provided at each fueling station in the event of a failure of the shutoff means to stop fuel flow at the maximum level. The FAA estimates that the required device will necessitate an incremental design and development cost of $3,000 per certification (50 hours at $60 per hour) and an additional nominal manufacturing cost of $10 per airplane. The benefit of the provision is the avoidance of a potentially catastrophic condition whereby excess fuel could unknowingly be forced out of the contained fuel system by the pressure fueling system. The FAA has determined that these potential benefits will exceed the minor associated costs.

Fourth, § 23.1041 establishes the requirement that the powerplant cooling system must be able to maintain the temperature of the powerplant components and fluids. The ambient temperature for testing reciprocating engine airplanes is currently required to be corrected to show the capacity of the cooling system at 100°F. Under the amendment, this temperature standard is revised to the "maximum ambient temperature conditions for which approval is requested."

No costs are attributed to this provision. Reciprocating engine airplane manufacturers will continue to have the option to request approval for operations at the existing 100°F temperature. A decision to request approval for a higher temperature would necessitate demonstration of the capability of the cooling system at that temperature. That choice, however, will be made at the manufacturer's discretion and will be based on its decision that any associated incremental cooling system costs would be recovered in the marketplace or offset by other considerations. The potential benefit of this provision is the reduced likelihood that an inadequate cooling system would be relied on during high temperature operations.

Finally, paragraph (a) of § 23.1045 is revised to state more generally that compliance with the cooling margin requirements of § 23.1041 must be shown for all phases of operation, as compared to the four phases of flight currently listed. In effect, the amendment adds the taxi phase.

The FAA estimates that the specific addition of the taxi phase will necessitate an incremental 5 hours of engineering analysis valued at $60 per hour, for a total of $300 per certification. The potential benefit of this provision is the enhanced safety that could result from evaluating the efficacy of the cooling system during the taxi phase of operation. In the taxi phase of operation, engine power settings and heat production may be generally lower than that experienced during flight, but available air circulation might also be lower. The heat mechanics of the two conditions are distinct and warrant separate evaluation. The FAA has determined that the potential benefits of this provision will exceed the nominal associated costs.

Reduced Need for Special Conditions

The final rule includes five provisions that will replace the need for "special conditions" processing of certain parts or materials that were previously considered as novel or unusual design features. The subjects of these provisions include composite propellers, fuel injection systems for reciprocating engines, induction filters on turbine engines, fuel shutoff controls other than mixture controls, and auxiliary power units. No additional costs are attributed to these provisions. Formalization of the equivalent safety standards and requirements for these subjects obviates the need for special conditions actions and simplifies the certification process for manufacturers.

Clarification

Several unclear provisions of part 23 were revealed during the harmonization review. In response to this finding, the final rule includes a number of no-cost, editorial revisions that clarify the existing requirements. These changes benefit manufacturers by removing potential confusion about the specific standards and requirements necessary for certification.

In summary, the FAA has determined that each of the amendments, as well as the final rule as a whole, will be cost beneficial.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. Based on implementing FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, the FAA has determined that this rule will not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment

The final rule will not constitute a barrier to international trade, including the export of American airplanes to foreign countries and the import of foreign airplanes into the United States. Instead, the amended powerplant airworthiness standards have been harmonized with foreign aviation authorities and will reduce restraints on trade.

Federalism Implications

The regulations herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

The FAA is revising the airworthiness standards to provide propulsion standards for normal, utility, acrobatic, and commuter category airplanes to harmonize them with the standards that have been adopted for the same category airplanes by the Joint Aviation Authorities in Europe. The revisions will reduce the regulatory burden on the United States and European airplane manufacturers by relieving them of the need to show compliance with different standards each time they seek certification approval of an airplane in the United States or in a country that is a member of the JAA.

For the reasons discussed in the preamble, and based on the findings in the Regulatory Evaluation, the FAA has determined that this rule is significant under Executive Order 12866. In addition, the FAA certifies that this rule will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This rule is considered significant under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). A regulatory evaluation of the rule has been placed in the docket. A copy may be obtained by contacting the person identified under **FOR FURTHER INFORMATION CONTACT.**

List of Subjects in 14 CFR Part 23

Aircraft, Aviation safety, Signs and symbols.

The Amendments

In consideration of the foregoing, the Federal Aviation Administration amends 14 CFR part 23 as follows:

PART 23—AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES

1. The authority citation for part 23 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

§ 23.777 [Amended]

2. Section 23.777(c)(2) is amended by adding the words "single and" between the words "for" and "tandem".

3. The table in § 23.779(b)(1) is amended by adding a new item between the items "mixture" and "carburetor air heat or alternate air" to read as follows:

§ 23.779 Motion and effect of cockpit controls.

* * * * *

(b) * * *

	Motion and effect
(1) *Powerplant controls:*	
* * * * *	
Fuel	Forward for open.
* * * * *	

4. Section 23.901 is amended by revising paragraphs (d)(1) and (d)(2) to read as follows:

§ 23.901 Installation.

* * * * *

(d) * * *

(1) Result in carcass vibration characteristics that do not exceed those established during the type certification of the engine.

(2) Provide continued safe operation without a hazardous loss of power or thrust while being operated in rain for at least three minutes with the rate of water ingestion being not less than four percent, by weight, of the engine induction airflow rate at the maximum installed power or thrust approved for takeoff and at flight idle.

* * * * *

5. Section 23.903 is amended by adding headings to paragraphs (c) and (g), and by revising the heading of paragraph (f) to read as follows:

§ 23.903 Engines.

* * * * *

(c) *Engine isolation.* * * *

* * * * *

(f) *Restart envelope.* * * *

(g) *Restart capability.* * * *

§ 23.907 [Amended]

6. Section 23.907(a) introductory text is amended by removing the phrase "with metal blades or highly stressed metal components" and adding the phrase "other than a conventional fixed-pitch wooden propeller" in its place.

7. Section 23.925 introductory text is revised to read as follows:

§ 23.925 Propeller clearance.

Unless smaller clearances are substantiated, propeller clearances, with the airplane at the most adverse combination of weight and center of gravity, and with the propeller in the most adverse pitch position, may not be less than the following:

* * * * *

§ 23.929 [Amended]

8. Section 23.929 is amended by removing the word "power" and adding, in its place, the word "thrust".

9. Section 23.933 is amended by removing the word "forward" in the two instances in which it is used in paragraph (a)(3); by removing the reference in paragraph (b)(2) that reads "(a)(1)" and adding the reference "(b)(1)" in its place; and by revising paragraph (a)(1) to read as follows:

§ 23.933 Reversing systems.

(a) * * *

(1) Each system intended for ground operation only must be designed so that, during any reversal in flight, the engine will produce no more than flight idle thrust. In addition, it must be shown by analysis or test, or both, that—

(i) Each operable reverser can be restored to the forward thrust position; or

(ii) The airplane is capable of continued safe flight and landing under any possible position of the thrust reverser.

* * * * *

10. Section 23.955 is amended by revising paragraphs (a)(1) through (a)(4) to read as follows:

§ 23.955 Fuel flow.

(a) * * *

(1) The quantity of fuel in the tank may not exceed the amount established as the unusable fuel supply for that tank under § 23.959(a) plus that quantity necessary to show compliance with this section.

(2) If there is a fuel flowmeter, it must be blocked during the flow test and the fuel must flow through the meter or its bypass.

(3) If there is a flowmeter without a bypass, it must not have any probable failure mode that would restrict fuel flow below the level required for this fuel demonstration.

(4) The fuel flow must include that flow necessary for vapor return flow, jet pump drive flow, and for all other purposes for which fuel is used.

* * * * *

11. Section 23.959 is amended by designating the current text of the section as paragraph (a) and by adding a new paragraph (b) to read as follows:

§ 23.959 Unusable fuel supply.

* * * * *

(b) The effect on the usable fuel quantity as a result of a failure of any pump shall be determined.

12. Section 23.963 is amended by removing the reference in paragraph (e) that reads "§ 23.959" and adding the reference "§ 23.959(a)" in its place, and by revising paragraph (b) to read as follows:

§ 23.963 Fuel tanks: general.

* * * * *

(b) Each flexible fuel tank liner must be shown to be suitable for the particular application.

* * * * *

13. Section 23.965 is amended by revising paragraph (b)(3)(i) to read as follows:

§ 23.965 Fuel tank tests.

* * * * *

(b) * * *

(3) * * *

(i) If no frequency of vibration resulting from any rpm within the normal operating range of engine or propeller speeds is critical, the test frequency of vibration is:

(A) The number of cycles per minute obtained by multiplying the maximum continuous propeller speed in rpm by 0.9 for propeller-driven airplanes, and

(B) For non-propeller driven airplanes the test frequency of vibration is 2,000 cycles per minute.

* * * * *

14. Section 23.973(f) is revised to read as follows:

§ 23.973 Fuel tank filler connection.

* * * * *

(f) For airplanes with turbine engines, the inside diameter of the fuel filler opening must be no smaller than 2.95 inches.

15. Section 23.975(a)(5) is revised to read as follows:

§ 23.975 Fuel tank vents and carburetor vapor vents.

(a) * * *

(5) There may be no point in any vent line where moisture can accumulate with the airplane in either the ground or level flight attitudes, unless drainage is

provided. Any drain valve installed must be accessible for drainage;

* * * * *

16. Section 23.979(b) is revised to read as follows:

§ 23.979 Pressure fueling systems.

* * * * *

(b) An automatic shutoff means must be provided to prevent the quantity of fuel in each tank from exceeding the maximum quantity approved for that tank. This means must—

(1) Allow checking for proper shutoff operation before each fueling of the tank; and

(2) For commuter category airplanes, indicate at each fueling station, a failure of the shutoff means to stop the fuel flow at the maximum quantity approved for that tank.

* * * * *

17. Section 23.1001(b)(2) is revised to read as follows:

§ 23.1001 Fuel jettisoning system.

* * * * *

(b) * * *

(2) A climb, at the speed at which the one-engine-inoperative enroute climb data have been established in accordance with § 23.69(b), with the critical engine inoperative and the remaining engines at maximum continuous power; and

* * * * *

§ 23.1013 [Amended]

18. Section 13.1013(d)(1) is amended by removing the word "crankcase".

§ 23.1041 [Amended]

19. Section 23.1041 is amended by adding the phrase "and maximum ambient atmospheric temperature conditions" between the phrases "maximum altitude" and "for which approval".

20. Section 23.1043 is amended by revising paragraphs (a), (c), and (d) to read as follows:

§ 23.1043 Cooling tests.

(a) *General.* Compliance with § 23.1041 must be shown on the basis of tests, for which the following apply:

(1) If the tests are conducted under ambient atmospheric temperature conditions deviating from the maximum for which approval is requested, the recorded powerplant temperatures must be corrected under paragraphs (c) and (d) of this section, unless a more rational correction method is applicable.

(2) No corrected temperature determined under paragraph (a)(1) of this section may exceed established limits.

(3) The fuel used during the cooling tests must be of the minimum grade approved for the engine.

(4) For turbocharged engines, each turbocharger must be operated through that part of the climb profile for which operation with the turbocharger is requested.

(5) For a reciprocating engine, the mixture settings must be the leanest recommended for climb.

* * * * *

(c) *Correction factor (except cylinder barrels).* Temperatures of engine fluids and powerplant components (except cylinder barrels) for which temperature limits are established, must be corrected by adding to them the difference between the maximum ambient atmospheric temperature for the relevant altitude for which approval has been requested and the temperature of the ambient air at the time of the first occurrence of the maximum fluid or component temperature recorded during the cooling test.

(d) *Correction factor for cylinder barrel temperatures.* Cylinder barrel temperatures must be corrected by adding to them 0.7 times the difference between the maximum ambient atmospheric temperature for the relevant altitude for which approval has been requested and the temperature of the ambient air at the time of the first occurrence of the maximum cylinder barrel temperature recorded during the cooling test.

21. Section 23.1045(a) is revised to read as follows:

§ 23.1045 Cooling test procedures for turbine engine powered airplanes.

(a) Compliance with § 23.1041 must be shown for all phases of operation. The airplane must be flown in the configurations, at the speeds, and following the procedures recommended in the Airplane Flight Manual for the relevant stage of flight, that correspond to the applicable performance requirements that are critical to cooling.

* * * * *

22. Section 23.1047 is revised to read as follows:

§ 23.1047 Cooling test procedures for reciprocating engine powered airplanes.

Compliance with § 23.1041 must be shown for the climb (or, for multiengine airplanes with negative one-engine-inoperative rates of climb, the descent) stage of flight. The airplane must be flown in the configurations, at the speeds and following the procedures recommended in the Airplane Flight Manual, that correspond to the applicable performance requirements that are critical to cooling.

23. Section 23.1091(c)(2) is revised to read as follows:

§ 23.1091 Air induction system.

* * * * *

(c) * * *

(2) The airplane must be designed to prevent water or slush on the runway, taxiway, or other airport operating surfaces from being directed into the engine or auxiliary power unit air intake ducts in hazardous quantities. The air intake ducts must be located or protected so as to minimize the hazard of ingestion of foreign matter during takeoff, landing, and taxiing.

§ 23.1093 [Amended]

24. Section 23.1093 is amended by adding the heading *"Reciprocating engines with Superchargers"* to paragraph (c).

25. Section 23.1105(a) is revised to read as follows:

§ 23.1105 Induction system screens.

* * * * *

(a) Each screen must be upstream of the carburetor or fuel injection system.

* * * * *

26. Section 23.1107 introductory text is revised to read as follows:

§ 23.1107 Induction system filters.

If an air filter is used to protect the engine against foreign material particles in the induction air supply—

* * * * *

27. Section 23.1121(g) is revised to read as follows:

§ 23.1121 General.

* * * * *

(g) If significant traps exist, each turbine engine and auxiliary power unit exhaust system must have drains discharging clear of the airplane, in any normal ground and flight attitude, to prevent fuel accumulation after the failure of an attempted engine or auxiliary power unit start.

* * * * *

28. Section 23.1141(b) is revised to read as follows:

§ 23.1141 Powerplant controls: general.

* * * * *

(b) Each flexible control must be shown to be suitable for the particular application.

* * * * *

29. Section 23.1143(f) is amended by revising the introductory text to read as follows:

§ 23.1143 Engine controls.

* * * * *

(f) If a power, thrust, or a fuel control (other than a mixture control)

incorporates a fuel shutoff feature, the control must have a means to prevent the inadvertent movement of the control into the off position. The means must—

* * * * *

30. Section 23.1153 is revised to read as follows:

§ 23.1153 Propeller feathering controls.

If there are propeller feathering controls installed, it must be possible to feather each propeller separately. Each control must have a means to prevent inadvertent operation.

31. Section 23.1181 is amended by adding a new paragraph (b)(3) to read as follows:

§ 23.1181 Designated fire zones; regions included.

* * * * *

(b) * * *

(3) Any complete powerplant compartment in which there is no isolation between compressor, accessory, combustor, turbine, and tailpipe sections.

* * * * *

§ 23.1183 [Amended]

32. Section 23.1183(a) is amended by removing the word "approved" in the next to the last sentence, and adding the phrase "shown to be suitable for the particular application" in its place.

33. Section 23.1191(b) is revised to read as follows:

§ 23.1191 Firewalls.

* * * * *

(b) Each firewall or shroud must be constructed so that no hazardous quantity of liquid, gas, or flame can pass from the compartment created by the firewall or shroud to other parts of the airplane.

* * * * *

34. Section 23.1203(e) is revised to read as follows:

§ 23.1203 Fire detector system.

* * * * *

(e) Wiring and other components of each fire detector system in a designated fire zone must be at least fire resistant.

* * * * *

§ 23.1305 [Amended]

35. Section 23.1305(b)(3)(ii) is removed and reserved.

§ 23.1337 [Amended]

36. Section 23.1337(b)(1) is amended by removing the reference "§ 23.959" and adding the reference "§ 23.959(a)" in its place.

Issued in Washington, DC, on January 29, 1996.

David R. Hinson,

Administrator.

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