Proposed Rules

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This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 23

[Docket No. CE214; Notice No. 23–04–02–SC]

Special Conditions: Thielert Aircraft Engines GmbH, Cessna Model 172 Series; Diesel Cycle Engine Using Turbine (Jet) Fuel

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This proposes special conditions for the Cessna 172 series airplane. This airplane, as modified by Thielert Aircraft Engines GmbH, will have a novel or unusual design feature(s) associated with the installation of a diesel cycle engine utilizing turbine (jet) fuel. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for installation of this new technology engine. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the exiting airworthiness standards.

DATES: Comments must be received on or before December 22, 2004.

ADDRESSES: Comments on this proposal may be mailed in duplicate to: Federal Aviation Administration, Regional Counsel, ACE–7, Attention: Rules Docket, Docket No. CE214, 901 Locust, Room 506, Kansas City, Missouri 64106, or delivered in duplicate to the Regional Counsel at the above address. Comments must be marked: CE214. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: Pete Rouse, Federal Aviation Administration, Aircraft Certification Service, Small Airplane Directorate, ACE–111, 901 Locust, Kansas City, Missouri, 816–329–4135, fax 816–329–4090.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of these proposed special conditions by submitting such written data, views, or arguments, as they may desire. Communications should identify the regulatory docket or notice number and be submitted in duplicate to the address specified above. All communications received on or before the closing date for comments will be considered by the Administrator. The proposals described in this notice may be changed in light of the comments received. All comments received will be available in the Rules Docket for examination by interested persons, both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Persons wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must include with those comments a self-addressed, stamped postcard on which the following statement is made: ''Comments to CE214.'' The postcard will be date stamped and returned to the commenter.

Background

On February 11, 2002, Thielert Aircraft Engines GmbH, of Lichtenstein, Germany applied for a supplemental type certificate to install a diesel cycle engine utilizing turbine (jet) fuel in the Cessna Model 172. The Cessna Model 172, currently approved under Type Certificate No. 3A12 is a four-place, high wing, fixed tricycle landing gear, conventional planform airplane. The Cessna 172 airplanes to be modified have gross weights in the range of 2300 to 2558 pounds in the normal category. The affected series of airplanes have been equipped with various gasoline reciprocating engines of 160 to 180 horsepower.

In anticipation of the reintroduction of diesel engine technology into the small airplane fleet, the FAA issued Policy Statement PS–ACE100–2002–004 on May 15, 2003, which identified areas of technological concern involving introduction of new technology diesel engines into small airplanes. For a more detailed summary of the FAA's development of diesel engine requirements, refer to this policy.

The general areas of concern involved the power characteristics of the diesel engines, the use of turbine fuel in an airplane class that has typically been powered by gasoline fueled engines, the vibration characteristics and failure modes of diesel engines. These concerns were identified after review of the historical record of diesel engine use in aircraft and a review of the 14 CFR part 23 regulations, which identified specific regulatory areas that needed to be elevated for applicability to diesel engine installations. These concerns are not considered universally aplicable to all types of possible diesel engines and diesel engine installations. However, after review of the Thielert installation, the Thielert engine type, and the requirements applied by the Lufthart Bundesamt, and applying the provisions of the diesel policy, the FAA proposed these fuel system and engine related special conditions. Other special conditions issued in a separate notice included special conditions for HIRF and application of § 23.1309 provisions to the Full Authority Digital Engine Control (FADEC).

Type Certification Basis

Under the provisions of § 21.101, Thielert Aircraft Engines GmbH must show that the Cessna Model 172, as changed, continues to meet the applicable provisions of the regulations incorporated by reference in Type Certificate No. 3A13 or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the ''original type certification basis.'' The regulations incorporated by reference in Type Certificate No. 3A13 are as follows:

The certification basis of models 172K, 172L, 172M, 172N, and 172P is:

Part 3 of the Civil Air Regulations effective November 1, 1949, as amended by 3–1 through 3–12. In addition, effective S/N 17271035 and on, 14 CFR part 23, § 23.1559, effective March 1, 1978. 14 CFR part 36, dated December 1, 1969, plus Amendments 36–1 through 36–5 for Model 172N; 14 CFR part 36, dated December 1, 1969, plus Amendments 36–1 through 36–12 for Model 172P through 172Q. In addition, effective S/N 17276260 and on, 14 CFR

part 23, § 23.1545(a), Amendment 23–23, dated December 1, 1978, including:

Equivalent Safety Items for:

Airspeed Indicator—CAR 3.757

Operating Limitations—CAR 3.778(a)

The certification basis for the model 172R is:

Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23–1 through 23–6, eccept as follows:

14 CFR part 23, §§ 23.423; 23.611; 23.619; 23.623; 23.689; 23.775; 23.871; 23.1323; and 23.1563, as amended by Amendment 23–7. 14 CFR part 23, §§ 23.807 and 23.1524, as amended by Amendment 23–10. 14 CFR part 23, §§ 23.507; 23.771; 23.853(a), (b) and (c); and 23.1365, as amended by Amendment 23–14. 14 CFR part 23, § 23.951, as amended by Amendment 23–15. 14 CFR part 23, §§ 23.607; 23.675; 23.685; 23.733; 23.787; 23.1309 and 23.1322, as amended by Amendment 23–17. 14 CFR part 23, § 23.1301, as amended by Amendment 23–20. 14 CFR part 23, §§ 23.1353; and 23.1559, as amended by Amendment 23–21. 14 CFR part 23, §§ 23.603; 23.605; 23.613; 23.1329 and 23.1545, as amended by Amendment 23–23. 14 CFR part 23, §§ 23.441 and 23.1549, as amended by Amendment 23–28. 14 CFR part 23, §§ 23.779 and 23.781, as amended by Amendment 23–33. 14 CFR part 23, §§ 23.1; 23.51 and 23.561, as amended by Amendment 23–34. 14 CFR part 23, §§ 23.301; 23.331; 23.351; 23.427; 23.677; 23.701; 23.735; and 23.831, as amended by Amendment 23–42. 14 CFR part 23, §§ 23.961; 23.1093; 23.1143(g); 23.1147(b); 23.1303; 23.1357; 23.1361 and 23.1385, as amended by Amendment 23–43. 14 CFR part 23.562(a), 23.562(b)2, 23.562(c)1, 23.562(c)2, 23.562(c)3, and 23.562(c)4, as amended by Amendment 23–44. 14 CFR part 23, §§ 23.33; 23.53; 23.305; 23.321; 23.485; 23.621; 23.655 and 23.731, as amended by Amendment 23–45; and 14 CFR part 36, dated December 1, 1969, as amended by Amendments 36–1 through 36–21.

Equivalent Safety Items for:

Induction System Icing Protection—14 CFR 23.1093

Throttle Control—14 CFR 23.1143(g)

Mixture Control—14 CFR 23.1147(b)

The type certification basis for the modified airplanes is as stated previously with the following modifications: The certification basis for the model 172S is:

Part 23 of the Federal Aviation Regulations effective February 1, 1965, as amended by 23–1 through 23–6, except as follows:

14 CFR part 23, §§ 23.423; 23.611; 23.619; 23.623; 23.689; 23.775; 23.871; 23.1323; and 23.1563, as amended by Amendment 23–7. 14 CFR part 23, §§ 23.807 and 23.1524, as amended by Amendment 23–10. 14 CFR part 23, §§ 23.507; 23.771; 23.853(a), (b) and (c); and 23.1365, as amended by Amendment 23–14. 14 CFR part 23, § 23.951, as amended by Amendment 23–15. 14 CFR part 23, §§ 23.607; 23.675; 23.685; 23.733; 23.787; 23.1309 and 23.1322, as amended by Amendment 23–17. 14 CFR part 23, § 23.1301, as amended by Amendment 23–20. 14 CFR part 23, §§ 23.1353 and 23.1559, as amended by Amendment 23–21. 14 CFR part 23, §§ 23.603; 23.605; 23.613; 23.1329 and 23.1545, as amended by Amendment 23–23. 14 CFR part 23, §§ 23.441 and 23.1549, as amended by Amendment 23–28. 14 CFR part 23, §§ 23.779 and 23.781, as amended by Amendment 23–33. 14 CFR part §§ 23.1; 23.51 and 23.561, as amended by Amendment 23–34. 14 CFR part 23, §§ 23.301; 23.331; 23.351; 23.427; 23.677; 23.701; 23.735; and 23.831, as amended by Amendment 23–42. 14 CFR part 23, §§ 23.961; 23.1093; 23.1143(g); 23.1147(b); 23.1303; 23.1357; 23.1361 and 23.1385, as amended by Amendment 23–43. 14 CFR part 23, §§ 23.562(a); 23.562(b)2; 23.562(c)1; 23.562(c)2; 23.562(c)3; and 23.562(c)4, as amended by Amendment 23–44. 14 CFR part 23, §§ 23.33; 23.53; 23.305; 23.321; 23.485; 23.621; 23.655 and 23.731, as amended by Amendment 23–45.

14 CFR part 36, dated December 1, 1969, as amended by Amendments 36–1 through 36–21.

Equivalent Safety Items for:

Induction System Icing Protection—14 CFR 23.1093

Throttle Control—14 CFR 23.1143(g)

Mixture Control—14 CFR 23.1147(b)

14 CFR part 23, at Amendment level 23–51, applicable to the areas of change:

14 CFR part 23, §§ 23.1; 23.3; 23.21; 23.23; 23.25; 23.29; 23.33; 23.45; 23.49; 23.51; 23.53; 23.63; 23.65; 23.69; 23.71; 23.73; 23.77; 23.141; 23.143; 23.145; 23.151; 23.153; 23.155; 23.171; 23.173; 23.175; 23.177; 23.201; 23.221; 23.231; 23.251; 23.301; 23.303; 23.305; 23.307; 23.321; 23.335; 23.337; 23.341; 23.343; 23.361; 23.363; 23.371; 23.572; 23.573; 23.574; 23.601; 23.603; 23.605; 23.607; 23.609; 23.611; 23.613; 23.619; 23.621; 23.623; 23.625; 23.627; 23.629; (at Amendment 23–6 for Cessna 172 models R and S; Civil Aviation Regulation 3.159 applies to all other models); 23.773; 23.777; 23.777(d); 23.779; 23.779(d); 23.781; 23.831; 23.863; 23.865; 23.867; 23.901; 23.901(d)(1); 23.903; 23.905; 23.907; 23.909; 23.925; 23.929; 23.939; 23.943; 23.951; 23.951(c); 23.954; 23.955; 23.959; 23.961; 23.963; 23.965; 23.967; 23.969; 23.971; 23.973; 23.973(f); 23.975; 23.977; 23.991; 23.993; 23.994; 23.995; 23.997; 23.997(a)(2), in place of §§ 23.997(a)(1); 23.999; 23.1011; 23.1013; 23.1015; 23.1017; 23.1019; 23.1021; 23.1023; 23.1041; 23.1043; 23.1047; 23.1061; 23.1063; 23.1091; 23.1093; 23.1103; 23.1107; 23.1121; 23.1123; 23.1141; 23.1143; 23.1145; 23.1163; 23.1165; 23.1181; 23.1182; 23.1183; 23.1191; 23.1193; 23.1301; 23.1305; 23.1309; 23.1311; 23.1321; 23.1322; 23.1327; 23.1331; 23.1337; 23.1351; 23.1353; 23.1357; 23.1359; 23.1361; 23.1365; 23.1367; 23.1381; 23.1431; 23.1461; 23.1501; 23.1519; 23.1521; 23.1527; 23.1529; 23.1541; 23.1543; 23.1549; 23.1551; 23.1555; 23.1557; 23.1567; 23.1581; 23.1583; 23.1585; 23.1587; and 23.1589.

Equivalent levels of safety for:

Cockpit controls—23.777(d)

Motion and effect of cockpit controls—23.779(b)

Liquid Cooling—23.1061

Ignition switches—23.1145

The type certification basis includes exemption, if any; equivalent level of safety findings, if any; and the special conditions adopted by this rulemaking action.

In addition, if the regulations incorporated by reference do not provide adequate standards with respect to the change, the applicant must comply with certain regulations in effect on the date of application for the change. The type certification basis for the modified airplanes is as stated previously with the following modifications:

If the Administrator finds that the applicable airworthiness regulations (*i.e.*, part 23) do not contain adequate or appropriate safety standards for the Cessna Model 172 because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Cessna Model 172 must comply with the part 23 noise certification requirements of 14 CFR part 36.

Special conditions, as appropriate, as defined in § 11.19, are issued in

accordance with § 11.38, and become part of the type certification basis in accordance with § 21.101.

Special conditions are initially applicable to the model for which they are issued. Should the applicant apply for a supplemental type certificate to modify any other model included on the same type certificate to incorporate the same novel or unusual design feature, the special conditions would also apply to the other model under the provisions of § 21.101.

Novel or Unusual Design Features

The Cessna Model 172 will incorporate the following novel or unusual design features: The Cessna Model 172, as modified by Thielert Aircraft Engines GmbH, will incorporate an aircraft diesel engine utilizing turbine (jet) fuel.

Applicability

As dicussed above, these special conditions are applicable to the Cessna Model 172. Should Thielert Aircraft Engines GmbH apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. 3A13 to incorporate the same novel or unusual design feature, the special conditions would apply to that model as well under the provisions of § 21.101.

Conclusion

This action affects only certain novel or unusual design features on one model series of airplane. It is not a rule of general applicability, and it affects only the applicant who applied to the FAA for approval of these features on the airplane.

List of Subjects in 14 CFR Part 23

Aircraft, Aviation safety, Signs and symbols.

Citation

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113 and 44701; 14 CFR 21.16 and 21.101; and 14 CFR 11.38 and 11.19.

Discussion

The major concerns identified in the development of FAA policy deal with the installation of the diesel engine and its vibration levels under normal operating conditions and with one cylinder inoperative, the accommodation of turbine fuels in airplane systems that have generally evolved based on gasoline requirements, the anticipated use of a FADEC to control the engine, and the appropriate limitations and indications for a diesel engine powered airplane. The general concerns associated with the Thielert modification are as follows:

Installation and Vibration Requirements
Fuel and Fuel System Related Requirements
FADEC and Electrical System Requirements
Limitations and Indications

Installation and Vibration Requirements: These special conditions include requirements similar to the requirements of § 23.901(d)(1) for turbine engines. In addition to the requirements of § 23.901 applied to reciprocating engines, the applicant will be required to construct and arrange each diesel engine installation to result in vibration characteristics that do not exceed those established during the type certification of the engine; and do not exceed vibration characteristics that a previously certificated airframe structure has been approved for, unless such vibration characteristics are shown to have no effect on safety or continued airworthiness. The engine limit torque design requirements as specified in § 23.361 are also modified.

An additional requirement to consider vibration levels and/or effects of an inoperative cylinder was imposed. Also, a requirement to evaluate the engine design for the possibility of, or effect of, liberating high-energy engine fragments, in the event of a catastrophic engine failure, was added.

Fuel and Fuel System Related Requirements: Due to the use of turbine fuel, this airplane must comply with the requirements in § 23.951(c).

Section 23.961 will be complied with using the turbine fuel requirements. These requirements will be substantiated by flight-testing as described in Advisory Circular AC 23–8B, Flight Test Guide for Certification of Part 23 Airplanes.

This special condition specifically requires testing to show compliance to § 23.961 and adds the possibility of testing non-aviation diesel fuels.

To ensure fuel system compatability and reduce the possibility of misfueling, and discounting the first clause of § 23.973(f) referring to turbine engines, the applicant will comply with § 23.973(f).

Due to the use of turbine fuel, the applicant will comply with § 23.977(a)(2), and § 23.977(a)(1) will not apply. ''Turbine engines'' will be interpreted to mean ''aircraft diesel engine'' for this requirement. An additional requirement to consider the possibility of fuel freezing was imposed.

Due to the use of turbine fuel, the applicant will comply with § 23.1305(c)(8).

Due to the use of turbine fuel, the applicant must comply with § 23.1557(c)(1)(ii). Section 23.1557(c)(1)(ii) will not apply. ''Turbine engine'' is interpreted to mean ''aircraft diesel engine'' for this requirement.

FADEC and Electrical System Requirements: The electrical system must comply with the following:

- In case of failure of one power supply of the electrical system, there will be no significant engine power change. The electrical power supply to the FADEC must remain stable in such a failure.
- The transition from the actual engine net (FADEC) to the remaining electrical system with the consumer's avionics, communication etc. should be made by a single point only. If several transitions (*e.g.*, for redundancy reasons) are needed, then the number of the transitions must be kept as small as possible.
- There must be the ability to separate the FADEC power supply (alternator) from the battery and from the remaining electrical system.
- In case of loss of alternator power the installation must guarantee that the battery will provide the power for an appropriate time after appropriate warning to the pilot.
- FADEC, alternator and battery must be interconnected in an appropriate way, so that in case of loss of battery power, the supply of the FADEC is guaranteed by the alternator.

Limitations and Indications: Section 23.1305(a) and § 23.1305(b)(2) will apply, except that propeller revolutions per minute (RPM) will be displayed. Sections 23.1305(b)(4), 23.1305(b)(5) and 23.1305(b)(7) are deleted. Additional critical engine parameters for this installation that will be displayed include the following:

(1) Power setting, in percentage, and
(2) Fuel temperature.

Due to the use of turbine fuel, the requirements for § 23.1521(d), as applicable to fuel designation for turbine engines, will apply.

The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for Cessna Model 172 airplanes modified by Thielert Aircraft Engines GmbH.

1. Engine Torque (Provisions Similar to § 23.361, Paragraphs (b)(1) and (c)(3))

(a) For diesel engine installations, the engine mounts and supporting structure must be designed to withstand the following:

(1) A limit engine torque load imposed by sudden engine stoppage due to malfunction or structural failure.

The effects of sudden engine stoppage may alternately be mitigated to an acceptable level by utilization of isolators, dampers clutches and similar provisions, so that unacceptable load levels are not imposed on the previously certificated structure.

(b) The limit engine torque to be considered under paragraph 14 CFR part 23, § 23.361(a) must be obtained by multiplying the mean torque by a factor of four for diesel cycle engines.

(1) If a factor of less than four is utilized, it must be shown that the limit torque imposed on the engine mount is consistent with the provisions of § 23.361(c), that is, it must be shown that the utilization of the factors listed in § 23.361(c)(3) will result in limit torques being imposed on the mount that are equivalent or less than those imposed by a conventional gasoline reciprocating engine.

2. Powerplant—Installation (Provisions Similar to § 23.901(d)(1) for Turbine Engines)

Considering the vibration characteristics of diesel engines, the applicant must comply with the following:

(a) Each diesel engine installation must be constructed and arranged to result in vibration characteristics that—

(1) Do not exceed those established during the type certification of the engine; and

(2) Do not exceed vibration characteristics that a previously certificated airframe structure has been approved for—

(i) Unless such vibration characteristics are shown to have no effect on safety or continued airworthiness, or

(ii) Unless mitigated to an acceptable level by utilization of isolators, dampers clutches and similar provisions, so that unacceptable vibration levels are not imposed on the previously certificated structure.

3. Powerplant—Fuel System—Fuel System With Water Saturated Fuel (Compliance With § 23.951 requirements)

Considering the fuel types used by diesel engines, the applicant must comply with the following:

Each fuel system for a diesel engine must be capable of sustained operation throughout its flow and pressure range with fuel initially saturated with water at 80 °F and having 0.75cc of free water per gallon added and cooled to the most critical condition for icing likely to be encountered in operation.

Methods of compliance that are acceptable for turbine engine fuel systems requirements of § 23.951(c) are also considered acceptable for this requirement.

4. Powerplant—Fuel System—Fuel System Hot Weather Operation (Compliance With § 23.961 Requirements)

In place of compliance with § 23.961, the applicant must comply with the following:

Each fuel system must be free from vapor lock when using fuel at its critical temperature, with respect to vapor formation, when operating the airplane in all critical operating and environmental conditions for which approval is requested. For turbine fuel, or for aircraft equipped with diesel cycle engines that use turbine or diesel type fuels, the initial temperature must be 110 °F, −0°, +5° or the maximum outside air temperature for which approval is requested, whichever is more critical.

The fuel system must be in an operational configuration that will yield the most adverse, that is, conservative results.

To comply with this requirement, the applicant must use the turbine fuel requirements and must substantiate these by flight-testing, as described in Advisory Circular AC 23–8B, Flight Test Guide for Certification of Part 23 Airplanes.

5. Powerplant—Fuel System—Fuel Tank Filler Connection (Compliance With § 23.973(f) Requirements)

In place for compliance with § 23.973(e) and (f), the applicant must comply with the following:

For airplanes that operate on turbine or diesel type fuels, the inside diameter of the fuel filler opening must be no smaller than 2.95 inches.

6. Powerplant—Fuel System—Fuel Tank Outlet (Compliance With § 23.977 Requirements)

In place of compliance with § 23.977(a)(1) and (a)(2), the applicant will comply with the following:

There must be a fuel strainer for the fuel tank outlet or for the booster pump. This strainer must, for diesel engine powered airplanes, prevent the passage of any object that could restrict fuel flow or damage any fuel system component.

7. Powerplant—Powerplant Controls and Accessories—Engine Ignition Systems (Compliance With § 23.1165 Requirements)

Considering that the FADEC provides the same function as an ignition system for this diesel engine, in place of compliance to § 23.1165, the applicant will comply with the following:

The electrical system must comply with the following requirements:

(a) In case of failure of one power supply of the electrical system, there will be no significant engine power changes. The electrical power supply to the FADEC must remain stable in such a failure.

(b) The transition from the actual engine electrical network (FADEC network) to the remaining electrical system should be made at a single point only. If several transitions (for example, redundancy reasons) are needed, then the number of the transitions must be kept as small as possible.

(c) There must be the ability to separate the FADEC power supply (alternator) from the battery and from the remaining electrical system.

(d) In case of loss of alternator power the installation must guarantee that the battery will provide the power for an appropriate time after appropriate warning to the pilot. This period must be at least 120 minutes.

(e) FADEC, alternator and battery must be interconnected in an appropriate way, so that in case of loss of battery power, the supply of the FADEC is guaranteed by the alternator.

8. Equipment—General—Powerplant Instruments (Compliance With § 23.1305 Requirements)

In place of compliance with § 23.1305, the applicant will comply with the following: The following are required powerplant instruments:

(a) A fuel quantity indicator for each fuel tank, installed in accordance with § 23.1337(b).

(b) An oil pressure indicator.

(c) An oil temperature indicator.

(d) A tachometer indicating propeller speed.

(d) A coolant temperature indicator.

(f) An indicating means for the fuel strainer or filter required by § 23.997 to indicate the occurrence of contamination of the strainer or filter before it reaches the capacity established in accordance with § 23.997(d).

Alternately, no indicator is required if the engine can operate normally for a specified period with the fuel strainer exposed to the maximum fuel contamination as specified in MIL–

5007D and provisions for replacing the fuel filter at this specified period (or a shorter period) are included in the maintenance scheduled for the engine installation.

(g) Power setting, in percentage.

(h) Fuel temperature.

(i) Fuel flow (engine fuel consumption).

9. Operating Limitations and Information—Powerplant Limitations—Fuel Grade or Designation (Compliance With § 23.1521(d) Requirements)

Instead of compliance with § 23.1521(d), the applicant must comply with the following:

The minimum fuel designation (for diesel engines) must be established so that it is not less than that required for the operation of the engines within the limitations in paragraphs (b) and (c) of § 23.1521.

10. Markings and Placards—Miscellaneous Markings and Placards—Fuel, Oil, and Coolant Filler Openings (Compliance With § 23.1557(c)(1) Requirements)

Instead of compliance with § 23.1557(c)(1), the applicant must comply with the following:

Fuel filler openings must be marked at or near the filler cover with—

For diesel engine-powered airplanes—

(a) The words ''Jet Fuel''; and

(b) The permissible fuel designations, or references to the Airplane Flight Manual (AFM) for permissible fuel designations.

(c) A warning placard or note that states the following or similar:

''Warning—this airplane equipped with an aircraft diesel engine, service with approved fuels only.''

The colors of this warning placard should be black and white.

11. Powerplant—Fuel System—Fuel-Freezing

If the fuel in the tanks cannot be shown to flow suitably under all possible temperature conditions, then fuel temperature limitations are required. These will be considered as part of the essential operating parameters for the aircraft and must be limitations.

(1) The takeoff temperature limitation must be determined by testing or analysis to define the minimum cold-soaked temperature of the fuel that the airplane can operate on.

(2) The minimum operating temperature limitation must be determined by testing to define the minimum operating temperature acceptable after takeoff (with minimum takeoff temperature established in (1) above).

12. Powerplant Installation—Vibration Levels

Vibration levels throughout the engine operating range must be evaluated and:

(1) Vibration levels *imposed on the airframe* must be less than or equivalent to those of the gasoline engine; or

(2) Any vibration level that is higher than that imposed on the airframe by the replaced gasoline engine must be considered in the modification and the effects on the technical areas covered by the following paragraphs must be investigated: 14 CFR part 23, §§ 23.251; 23.613; 23.627; 23.629 (or CAR 3.159, as applicable to various models); 23.572; 23.573; 23.574 and 23.901.

Vibration levels imposed on the airframe can be mitigated to an acceptable level by utilization of isolators, dampers clutches and similar provisions, so that unacceptable vibration levels are not imposed on the previously certificated structure.

13. Powerful Installation—One Cylinder Inoperative

It must be shown by test or analysis, or by a combination of methods, that the airframe can withstand the shaking or vibratory forces imposed by the engine if a cylinder becomes inoperative. Diesel engines of conventional design typically have extremely high levels of vibration when a cylinder become inoperative. Data must be provided to the airframe installer/modifier so either appropriate design considerations or operating procedures, or both, can be developed to prevent airframe and propeller damage.

14. Powerplant Installation—High Energy Engine Fragments

It may be possible for diesel engine cylinders (or portions thereof) to fail and physically separate from the engine at high velocity (due to the high internal pressures). This failure mode will be considered possible in engine designs with removable cylinders or other non-integral block designs. The following is required.

(1) It must be shown that the engine construction type (massive or integral block with nonremovable cylinders) is inherently resistant to liberating high energy fragments in the event of a catastrophic engine failure; or,

(2) It must be shown by the design of the engine, that engine cylinders, other engine components or portions thereof (fragments) cannot be shed or blown off of the engine in the event of a catastrophic engine failure; or

(3) It must be shown that all possible liberated engine parts or components do not have adequate energy to penetrate engine cowlings; or

(4) Assuming infinite fragment energy, and analyzing the trajectory of the probable fragments and components, any hazard due to liberated engine parts or components will be minimized and the possibility of crew injury is eliminated. Minimization must be considered during initial design and not presented as an analysis after design completion.

Issued in Kansas City, Missouri, on November 1, 2004.

James E. Jackson,

Acting Manager, Small Airplane Directorate, Aircraft Certification Service.

[FR Doc. 04–25697 Filed 11–19–04; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2004–19444; Directorate Identifier 2004–CE–33–AD]

RIN 2120–AA64

Airworthiness Directives; Pacific Aerospace Corporation, Ltd. Model 750XL Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to adopt a new airworthiness directive (AD) for all Pacific Aerospace Corporation, Ltd. (Pacific Aerospace) Model 750XL airplanes. This proposed AD would require you to replace any type TLP–D or TLED rivets on the aileron pushrod ends and elevator control pushrod ends. This proposed AD results from mandatory continuing airworthiness information (MCAI) issued by the airworthiness authority for New Zealand. We are issuing this proposed AD to replace the above identified rivets on the aileron pushrod ends and elevator control pushrod ends, which, if not replaced, could result in loose mechanical elements in the control systems. This could lead to control anomalies and loss of airplane control.

DATES: We must receive any comments on this proposed AD by December 27, 2004.

ADDRESSES: Use one of the following to submit comments on this proposed AD:

- *DOT Docket Web site:* Go to *http://dms.dot.gov* and follow the