(SAE) recommended practice J211/1, ''Instrumentation for Impact Test-Part 1-Electronic Instrumentation.''

(c) The occupant must not interact with the armrest or other seat components in any manner significantly different than would be expected for a forward-facing seat installation.

4. *Pelvis Criteria:*

Any part of the load-bearing portion of the bottom of the ATD pelvis must not translate beyond the edges of the seat bottom seat-cushion supporting structure.

5. *Femur Criteria:*

Axial rotation of the upper leg (about the Z-axis of the femur per SAE Recommended Practice J211/1) must be limited to 35 degrees from the nominal seated position. Evaluation during rebound does not need to be considered.

6. *ATD and Test Conditions:*

Longitudinal tests conducted to measure the injury criteria above must be performed with the FAA Hybrid III ATD, as described in SAE 1999–01–1609, ''A Lumber Spine Modification to the Hybrid III ATD for Aircraft Seat Tests.'' The tests must be conducted with an undeformed floor, at the most-critical yaw cases for injury, and with all lateral structural supports (*e.g.* armrests or walls) installed.

Note: The applicant must demonstrate that the installation of seats via plinths or pallets meets all applicable requirements. Compliance with the guidance contained in policy memorandum PS–ANM–100–2000–00123, ''Guidance for Demonstrating Compliance with Seat Dynamic Testing for Plinths and Pallets,'' dated February 2, 2000, may be applied.

7. *Head Injury Criteria:*

The HIC value must not exceed 1000 at any condition at which the pretensioner does or does not deploy, up to the maximum severity pulse that corresponds to the test conditions specified in § 25.562. Tests must be performed to demonstrate this, taking into account any necessary tolerances for deployment.

When an airbag is present in addition to the pretensioner restraint system, and the anthropomorphic test dummy (ATD) has no apparent contact with the seat/structure but has contact with the airbag, a HIC unlimited score in excess of 1000 is acceptable provided the HIC15 score (calculated in accordance with 49 CFR 571.208) for the contact is less than 700. ATD head contact with the seat or other structure, through the airbag, or contact subsequent to contact with the airbag, requires a HIC value that does not exceed 1000.

8. *Protection During Secondary Impacts:*

The pretensioner activation setting must be demonstrated to maximize the probability of the protection being available when needed, considering secondary impacts.

9. *Protection of Occupants Other than 50th Percentile:*

Protection of occupants for a range of stature from a 2-year-old child to a 95th percentile male must be shown. For shoulder harnesses that include pretensioners, protection of occupants other than a 50th percentile male may be shown by test or analysis. In addition, the pretensioner must not introduce a hazard to passengers due to the following seat configurations:

(a) The seat occupant is holding an infant.

(b) The seat occupant is a child in a child-restraint device.

(c) The seat occupant is a pregnant woman.

10. *Occupants Adopting the Brace Position:*

Occupants in the traditional brace position when the pretensioner activates must not experience adverse effects from the pretensioner activation.

11. *Inadvertent Pretensioner Actuation:*

(a) The probability of inadvertent pretensioner actuation must be shown to be extremely remote (*i.e.,* average probability per flight hour of less than 10^{-7}).

(b) The system must be shown not susceptible to inadvertent pretensioner actuation as a result of wear and tear, or inertia loads resulting from in-flight or ground maneuvers likely to be experienced in service.

(c) The seated occupant must not be seriously injured as a result of inadvertent pretensioner actuation.

(d) Inadvertent pretensioner activation must not cause a hazard to the airplane, nor cause serious injury to anyone who may be positioned close to the retractor or belt (*e.g.,* seated in an adjacent seat or standing adjacent to the seat).

12. *Availability of the Pretensioner Function Prior to Flight:*

The design must provide means for a crewmember to verify the availability of the pretensioner function prior to each flight, or the probability of failure of the pretensioner function must be demonstrated to be extremely remote (*i.e.,* average probability per flight hour of less than 10^{-7}) between inspection intervals.

13. *Incorrect Seat Belt Orientation:*

The system design must ensure that any incorrect orientation (twisting) of the seat belt does not compromise the pretensioner protection function.

14. *Contamination Protection:*

The pretensioner mechanisms and controls must be protected from external contamination associated with that which could occur on or around passenger seating.

15. *Prevention of Hazards:*

The pretensioner system must not induce a hazard to passengers in case of fire, nor create a fire hazard, if activated.

16. *Functionality After Loss of Power:*

The system must function properly after loss of normal airplane electrical power, and after a transverse separation in the fuselage at the most critical location. A separation at the location of the system does not have to be considered.

Issued in Kansas City, Missouri, on December 9, 2024.

Patrick R. Mullen,

Manager, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service.

[FR Doc. 2024–29442 Filed 12–12–24; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 27

[Docket No. FAA–2024–0875; Special Conditions No. 27–058–SC]

Special Conditions: Skyryse, Robinson Helicopter Company Model R66 Helicopter; Interaction of Systems and Structures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for the Robinson Helicopter Company (Robinson) Model R66 helicopter. This helicopter, as modified by Skyryse, will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for normal category helicopters. This design feature is a novel control input and fly-by-wire (FBW) system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Effective December 13, 2024.

FOR FURTHER INFORMATION CONTACT: Daniel Moore, Airframe Section, AIR–622, Technical Policy Branch, Policy and Standards Division, Aircraft

Certification Service, Federal Aviation Administration, 901 Locust, Kansas City, MO 64106; telephone (303) 342–1066; email *Daniel.E.Moore@faa.gov.*

SUPPLEMENTARY INFORMATION:

Background

On April 10, 2023, Skyryse applied for a supplemental type certificate for removal of the mechanical control system and installation of a computer controlled flight control system in the Model R66 helicopter. The Robinson Model R66 helicopter, currently approved under Type Certificate No. R00015LA, is a single engine normal category rotorcraft. The maximum take-off weight is 2,700 pounds, with a maximum seating capacity of five passengers.

Type Certification Basis

Under the provisions of 14 CFR 21.101, Skyryse must show that the Robinson Model R66 helicopter, as changed, continues to meet the applicable provisions of the regulations listed in Type Certificate No. R00015LA or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations do not contain adequate or appropriate safety standards for the Robinson Model R66 helicopter because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

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, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Robinson Model R66 helicopter must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Feature

The Robinson Model R66 helicopter will incorporate the following novel or unusual design feature:

Novel control input and FBW system.

Discussion

Skyryse has proposed to install an FBW flight control system (FCS) intended to replace the current hydraulicly boosted mechanical primary FCS, on a Robinson Model R66 helicopter. FBW systems are new to part 27 rotorcraft and as such, the rotorcraft FCS will now contain control functions that affect the static strength of rotorcraft structure.

These special conditions would give the applicant an option to offset the structural factor of safety based on the probability of system failure. These special conditions apply to systems that can induce loads on the airframe or change the response of the rotorcraft to maneuvers or to control inputs, as a result of failure. Some potential examples include part 27 rotorcraft equipped with FBW or fly-by-light FCSs, autopilots, stability augmentation systems, load alleviation systems, flutter control systems, fuel management systems, and other systems that either directly or as a result of failure or malfunction affect structural performance.

The FAA has issued special conditions for the interaction of systems and structures to other aircraft in the past (parts 23, 25, and 29). Active flight control systems are capable of providing automatic responses to inputs from sources other than the pilots. These automatic systems may become inoperative or may operate in a degraded mode, which could impact the loads envelope and rotorcraft static strength.

Therefore, it is necessary to determine the structural factors of safety and operating margins such that the joint probability of structural failures due to application of loads during system malfunctions is not greater than that found in rotorcraft equipped with earlier technology control systems. To achieve this objective, it is necessary to define the failure conditions with their associated frequency of occurrence in order to determine the structural factors of safety and operating margins that will ensure an acceptable level of safety.

The special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Discussion of Comments

The FAA issued Notice of Proposed Special Conditions No. 27–24–01–SC for the Robinson Model R66 helicopter, as modified by Skyryse, which was published in the **Federal Register** on August 28, 2024 (89 FR 68833).

No comments were received, and the special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions are applicable to the Robinson R66 helicopter. Should Skyryse apply at a later date for a supplemental type certificate to modify any other model included on Type Certificate No. R00015LA to incorporate the same novel or unusual design feature, these special conditions would apply to that model as well.

Under standard practice, the effective date of final special conditions would be 30 days after the date of publication in the **Federal Register**. However, as the certification date for the Robinson R66 helicopter, as modified by Skyryse, is imminent, the FAA finds that good cause exists to make these special conditions effective upon publication.

Conclusion

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

List of Subjects in 14 CFR Part 27

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

Authority Citation

The authority citation for these special conditions is as follows:

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

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for the Robinson R66 helicopter, as modified by Skyryse.

Interaction of Systems and Structures

For rotorcraft equipped with systems that affect structural performance, either directly or as a result of a failure or malfunction, the influence of these systems and their failure conditions must be taken into account when showing compliance with the requirements of subparts C and D of part 27 of title 14 of the Code of Federal Regulations (14 CFR).

The following criteria must be used for showing compliance with these special conditions:

(a) The criteria defined herein only address the direct structural consequences of the system responses

and performance. They cannot be considered in isolation but should be included in the overall safety evaluation of the rotorcraft. These criteria may, in some instances, duplicate standards already established for this evaluation. These criteria are only applicable to structures whose failure could prevent continued safe flight and landing. Specific criteria that define acceptable limits on handling characteristics or stability requirements, when operating in the system degraded or inoperative mode, are not provided in these special conditions.

(b) Depending upon the specific characteristics of the rotorcraft, additional studies may be required that go beyond the criteria provided in these special conditions in order to demonstrate the capability of the rotorcraft to meet other realistic conditions such as alternative gust or maneuver descriptions for a rotorcraft equipped with a load alleviation system.

(c) The following definitions are applicable to these special conditions.

(1) *Structural performance:* Capability of the rotorcraft to meet the structural requirements of 14 CFR part 27.

(2) *Flight limitations:* Limitations that can be applied to the rotorcraft flight conditions following an in-flight occurrence and that are included in the flight manual (*e.g.,* speed limitations, avoidance of severe weather conditions, etc.).

(3) *Operational limitations:* Limitations, including flight limitations that can be applied to the rotorcraft operating conditions before dispatch (*e.g.,* fuel, payload, and master minimum equipment list limitations).

(4) *Failure condition:* The term failure condition is the same as that used in § 27.1309; however, these special conditions apply only to system failure conditions that affect the structural performance of the rotorcraft (*e.g.,* system failure conditions that induce loads, change the response of the rotorcraft to inputs such as gusts or pilot actions, or lower flutter margins).

Effects of Systems on Structures

(a) *General.* The following criteria will be used in determining the influence of a system and its failure conditions on the rotorcraft structure.

(b) *System fully operative.* With the system fully operative, the following apply:

(1) Limit loads must be derived in all normal operating configurations of the system from all the limit conditions specified in subpart C of this part (or used in lieu of those specified in subpart C of this part), taking into account any special behavior of such a system or associated functions or any effect on the structural performance of the rotorcraft that may occur up to the limit loads. In particular, any significant nonlinearity (rate of displacement of control surface, thresholds, or any other system nonlinearities) must be accounted for in a realistic or conservative way when deriving limit loads from limit conditions.

(2) The rotorcraft must meet the strength requirements of part 27 (static strength, residual strength), using the specified factors to derive ultimate loads from the limit loads defined above. The effect of nonlinearities must be investigated beyond limit conditions to ensure the behavior of the system presents no anomaly compared to the behavior below limit conditions. However, conditions beyond limit conditions need not be considered when it can be shown that the rotorcraft has design features that will not allow it to exceed those limit conditions.

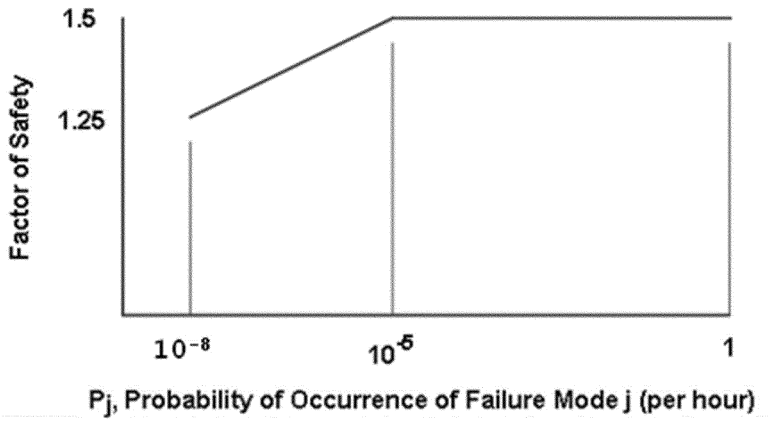
(3) The rotorcraft must meet the flutter requirements of § 27.629.

(c) *System in the failure condition.* For any system failure condition not shown to be extremely improbable, the following apply:

(1) At the time of occurrence. Starting from 1-g level flight conditions, a realistic scenario, including pilot corrective actions, must be established to determine the loads occurring at the time of failure and immediately after the failure.

(i) For static strength substantiation, these loads multiplied by an appropriate factor of safety that is related to the probability of occurrence of the failure, are ultimate loads to be considered for design. The factor of safety is defined in figure 1.

Figure 1. Factor of safety at the time of occurrence.



(ii) For residual strength substantiation, the rotorcraft must be able to withstand two thirds of the ultimate loads defined in paragraph (c)(1)(i) of these special conditions.

(iii) Freedom from flutter and divergence must be shown under any condition of operation including:

(A) Airspeeds up to 1.11 V_{NE} (power on and power off).

(B) Main rotor speeds from 0.95 × the minimum permitted speed up to 1.05 × the maximum permitted speed (power on and power off).

(C) The critical combinations of weight, center of gravity position, load factor, altitude, speed, and power condition.

(iv) For failure conditions that result in excursions beyond operating limitations, freedom from flutter and divergence must be shown to increased speeds, so that the margins intended by paragraph (c)(1)(iii) of these special conditions are maintained.

(v) Failures of the system that result in forced structural vibrations (oscillatory failures) must not produce loads that could result in detrimental deformation of primary structure.

(2) For the continuation of the flight. For the rotorcraft in the system failed state, and considering any appropriate reconfiguration and flight limitations, the following apply:

(i) The loads derived from the following conditions (or used in lieu of the following conditions) at speeds up to V_{NE} (power on and power off) (or the speed limitation prescribed for the remainder of the flight) and at the minimum and maximum main rotor speeds (if applicable) must be determined:

(A) The limit symmetrical maneuvering conditions specified in §§ 27.337 and 27.339;

(B) The limit gust conditions specified in § 27.341;

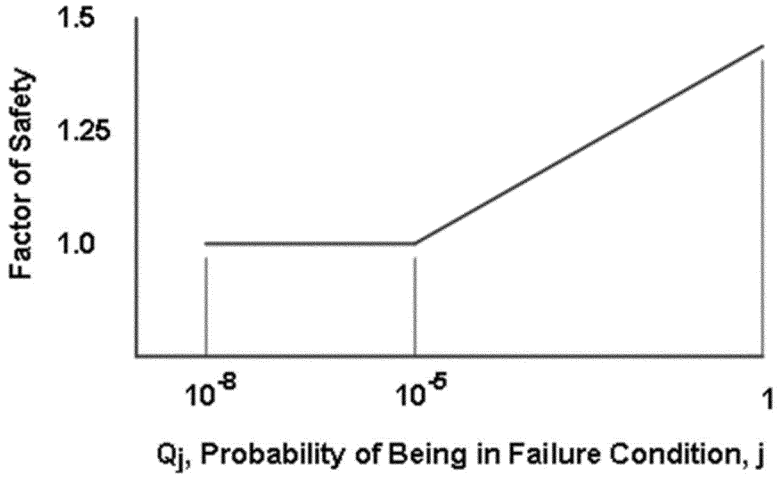
(C) The limit yaw maneuvering conditions specified in § 27.351;

(D) The limit unsymmetrical conditions specified in § 27.427; and

(E) The limit ground loading conditions specified in § 27.473.

(ii) For static strength substantiation, each part of the structure must be able to withstand the loads in paragraph (c)(2)(i) of these special conditions multiplied by a factor of safety depending on the probability of being in this failure state. The factor of safety is defined in figure 2.

Figure 2. Factor of safety for continuation of flight.



$Qj = (Tj)(Pj)$

where:

Qj = Probability of being in failure condition j
Tj = Average time spent in failure condition j (in hours)
Pj = Probability of occurrence of failure mode j (per hour)

Note: If Pj is greater than 10^{-3} per flight hour, then a 1.5 factor of safety must be applied to all limit load conditions specified in subpart C.

(iii) For residual strength substantiation, the rotorcraft must be able to withstand two thirds of the ultimate loads defined in paragraph (c)(2)(ii) of these special conditions.

(iv) If the loads induced by the failure condition have a significant effect on fatigue or damage tolerance, then their effects must be taken into account.

(v) Freedom from flutter and divergence must also be shown up to 1.11 V_{NE} (power on and power off), including any probable system failure condition combined with any damage required or selected for investigation by either § 27.571(e) or § 27.573(d).

(3) Consideration of certain failure conditions may be required by other sections of 14 CFR part 27 regardless of calculated system reliability. Where analysis shows the probability of these failure conditions to be extremely improbable, criteria other than those specified in this paragraph may be used for structural substantiation to show continued safe flight and landing.

(d) *Failure indications.* For system failure detection and indication, the following apply:

(1) The system must be checked for failure conditions, not shown to be extremely improbable, that degrade the structural capability below the level required by part 27 or that significantly reduce the reliability of the remaining operational portion of the system. As far as reasonably practicable, the flight crew must be made aware of these failures before flight. Certain elements of the control system, such as mechanical and hydraulic components, may use special periodic inspections, and electronic components may use daily checks, in lieu of detection and indication systems to achieve the objective of this requirement. These other means of detecting failures before flight are considered certification maintenance requirements and must be limited to components that are not readily detectable by normal detection and indication systems, and where service history shows that inspections will provide an adequate level of safety.

(2) The existence of any failure condition, not shown to be extremely improbable, during flight that could significantly affect the structural capability of the rotorcraft and for which the associated reduction in airworthiness can be minimized by suitable flight limitations, must be signaled to the flight crew. For example, failure conditions that result in a factor of safety between the rotorcraft strength and the loads of subpart C of this part, below 1.25, or flutter and divergence margins below 1.11 V_{NE} (power on and

power off), must be signaled to the crew during flight.

(e) *Dispatch with known failure conditions.* If the rotorcraft is to be dispatched in a known system failure condition that affects structural performance, or that affects the reliability of the remaining operational portion of the system to maintain structural performance, then the provisions of these special conditions must be met, including the provisions of paragraph (b) of these special conditions for the dispatched condition and paragraph (c) of these special conditions for subsequent failures. Expected operational limitations may be taken into account in establishing Pj as the probability of failure occurrence for determining the safety margin in figure 1. Flight limitations and expected operational limitations may be taken into account in establishing Qj as the combined probability of being in the dispatched failure condition and the subsequent failure condition for the safety margins in figure 2. These limitations must be such that the probability of being in this combined failure state and then subsequently encountering limit load conditions is extremely improbable. No reduction in these safety margins is allowed if the subsequent system failure rate is greater than 10^{-3} per flight hour.

Issued in Kansas City, Missouri, on November 21, 2024.

Patrick R. Mullen,

Manager, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service.

[FR Doc. 2024–27713 Filed 12–12–24; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2024–2553; Project Identifier MCAI–2024–00674–T; Amendment 39–22908; AD 2024–25–06]

RIN 2120–AA64

Airworthiness Directives; Airbus SAS Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; request for comments.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for all Airbus SAS Model A318 series airplanes; Model A319–111, –112, –113, –114, –115, –131, –132, –133, –151N, –153N, and –171N airplanes; Model A320 series airplanes; and Model A321 series airplanes. This AD was prompted by reports of jamming of, or inability to open, the main landing gear (MLG) door during maintenance operations. This AD requires repetitive inspection of the MLG doors, and, depending on findings, accomplishment of applicable corrective actions, and prohibits the installation of affected parts as specified in a European Union Aviation Safety Agency (EASA) AD, which is incorporated by reference. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective December 30, 2024.

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of December 30, 2024.

The FAA must receive comments on this AD by January 27, 2025.

ADDRESSES: You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- *Federal eRulemaking Portal:* Go to *regulations.gov.* Follow the instructions for submitting comments.
- *Fax:* 202–493–2251.
- *Mail:* U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- *Hand Delivery:* Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

AD Docket: You may examine the AD docket at *regulations.gov* under Docket No. FAA–2024–2553; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory continuing airworthiness information (MCAI), any comments received, and other information. The street address for Docket Operations is listed above.

Material Incorporated by Reference:

- For EASA material identified in this AD, contact EASA, Konrad-Adenauer-Ufer 3, 50668 Cologne, Germany; telephone +49 221 8999 000; email *ADs@easa.europa.eu;* website *easa.europa.eu.* You may find this material on the EASA website at *ad.easa.europa.eu.*
- You may view this material at the FAA, Airworthiness Products Section, Operational Safety Branch, 2200 South 216th St., Des Moines, WA. For information on the availability of this material at the FAA, call 206–231–3195. It is also available at *regulations.gov* under Docket No. FAA–2024–2553.

FOR FURTHER INFORMATION CONTACT: Timothy P. Dowling, Aviation Safety Engineer, FAA, 1600 Stewart Avenue, Suite 410, Westbury, NY 11590; telephone 206–231–3667; email *timothy.p.dowling@faa.gov.*

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under the **ADDRESSES** section. Include ''Docket No. FAA–2024–2553; Project Identifier MCAI–2024–00674–T'' at the beginning of your comments. The most helpful comments reference a specific portion of the final rule, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this final rule because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to *regulations.gov,* including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this final rule.

Confidential Business Information

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this AD contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this AD, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as ''PROPIN.'' The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this AD. Submissions containing CBI should be sent to Timothy P. Dowling, Aviation Safety Engineer, FAA, 1600 Stewart Avenue, Suite 410, Westbury, NY 11590; telephone 206–231–3667; email *timothy.p.dowling@faa.gov.* Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Background

EASA, which is the Technical Agent for the Member States of the European