

U.S. Department of Transportation  
Federal Aviation Administration

Subject: INFORMATION: Compliance with § 25.571(e) Discrete Source Damage (Uncontained Engine Failure) date: SEP 1, 1993

From: Manager, Transport Airplane Directorate,  
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To: Managers, Aircraft Certification Office, ANM-100S, ANM-100L

The purpose of the following guidance material is to establish a common interpretation of § 25.571(e) of the Federal Aviation Regulations as it applies to continued safe flight and landing during which likely structural damage occurs as a result of uncontained engine failure.

FAR 25.571(e) requires that the airplane must be capable of continued safe flight with "likely" structural damage resulting from an uncontained engine failure. This need not be interpreted to mean the worst case scenario that could possibly occur. There seems to be some confusion in this regard. In responding to a commenter who thought the word "likely" in the lead-in of the proposed § 25.571(e) was not necessary, the FAA disagreed by saying that "the word likely has a substantive probability connotation in this context." The assumption is that the engine failure event will occur but there is some latitude in defining the location and extent of damage inflicted by the engine debris.

For most airplane designs, there are rotor segment trajectories for which continued safe flight and landing cannot be guaranteed for every failure scenario. For example, the fuselage on some airplanes can not withstand penetration by one-third rotor disc through the crown skins or belly skins without failure. Generally, compliance with this requirement has been determined by a qualitative assessment based on known failure cases. More recently, manufacturers have conducted a quantitative risk assessment using the JAR interpretative material in ACJ 25.903(d)(1) to show compliance with § 25.571(e).

The intent of § 25.571(e) is to ensure survival of the airplane with any likely damage resulting from an engine failure. It was not intended, for this evaluation, that the crown skins and belly skins would be exempt from rotor strikes. However, if the combined probability of all structural damage, including crown and belly skin damage, resulting from failure of any engine rotor has no greater chance than 1 in 20 of producing catastrophic results, the design meets the airworthiness requirements of this regulation. The strength levels to be used in evaluating the structural strength after discrete source damage are defined in AC 25.571-1A. Freedom from flutter should be substantiated up to  $V_D/M_D$ .

In addition to the structural strength requirements following a rotor burst, vital controls and systems within the strike zone of engine rotor segments must be protected to the extent that the airplane has every reasonable chance of continued safe flight and landing. Protection is usually achieved by physical separation and functional isolation of the systems. AC 20-128 provides the engine burst criteria to use in showing compliance with the § 25.903(d)(1) requirement to minimize the hazard to the airplane in the event of an engine rotor failure. The total level of risk from all damage cases should be assessed. In recent certification programs, the FAA has accepted the risk levels provided in ACJ 25.903(d)(1).

Signed by  
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