



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2020-0542; Project Identifier AD-2020-00582-E; Amendment 39-21351; AD 2020-25-09]

RIN 2120-AA64

Airworthiness Directives; Pratt & Whitney Division Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for all Pratt & Whitney Division (PW) PW4164, PW4164-1D, PW4168, PW4168-1D, PW4168A, PW4168A-1D, and PW4170 model turbofan engines with a certain outer combustion chamber assembly and 3rd stage low-pressure turbine (LPT) duct segments installed. This AD was prompted by reports of damaged or failed 3rd stage LPT duct segments on PW engines with the Talon IIB outer combustion chamber assembly configuration installed. This AD requires removing and replacing certain 3rd stage LPT duct segments. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: For service information identified in this final rule, contact Pratt & Whitney Division, 400 Main Street East, Hartford, CT 06118; phone: (800) 565-0140; email: help24@pw.utc.com; website: <https://fleetcare.pw.utc.com>. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (781) 238-7759. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2020-0542.

Examining the AD Docket

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2020-0542; 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, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Carol Nguyen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7655; fax: (781) 238-7199; email: carol.nguyen@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to all PW PW4164, PW4164-1D, PW4168, PW4168-1D, PW4168A, PW4168A-1D, and PW4170 model turbofan engines with a certain outer combustion chamber assembly and 3rd stage LPT duct segments installed. The NPRM published in the *Federal Register* on June 12, 2020 (85 FR 35812). The NPRM was prompted by multiple reports of damaged or failed 3rd stage LPT duct segments that resulted in engine surges, in-flight shutdowns, diversions, and air turnbacks. The reports were attributed to elevated gas path temperature at the outer diameter of the turbine flowpath and high-pressure turbine (HPT) 2nd stage blade outer air seal spallation, which led to the distortion and liberation of 3rd stage LPT duct segments. In the NPRM, the FAA proposed to require removing and replacing certain 3rd stage LPT duct segments. The FAA is issuing this AD to address the unsafe condition on these products.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from two commenters. The commenters were Air Line Pilots Association, International (ALPA) and Delta Air Lines, Inc. (Delta). ALPA supported the proposal without change. Delta supported the proposal but recommended certain changes. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request to the Revise Compliance or Definition

Delta requested that the FAA revise paragraph (g) of this AD to require replacement of duct segments that have operated with more than 2,500 cycles with a Talon IIB combustor. Alternatively, Delta requested the FAA revise paragraph (i) of this AD to define an “engine shop visit” as “removal and disassembly of the HPT module.” Delta noted several industry events have occurred related to the failure of 3rd stage LPT duct segments, also commonly called outer transition ducts (OTDs), on PW4000-100 engines with Talon IIB combustors. Prior information from the design approval holder indicates that industry failures have occurred only on parts that have operated more than 3,000 flight cycles with a Talon IIB combustor.

Delta further noted that paragraph (g) of the proposed rule would require that duct segments with certain part numbers be removed and replaced with new parts at every engine shop visit, defined in paragraph (i) as the “induction of an engine into the shop for maintenance involving the separation of pairs of major mating flanges.” Per this definition, engines with few cycles in service since prior OTD replacement would require installation of new hardware, even for minor repairs where maintenance of the LPT would not have otherwise been required.

Additionally, Delta commented that OTD replacement requires significant teardown of the LPT module, which will result substantial fallout and repair costs for unrelated hardware. Delta reasoned that the proposed rule would require repetitive replacement of low-time duct segments at substantial financial burden to achieve minimal risk reduction. Since industry experience has demonstrated duct segment liberation to occur on hardware above 3,000 flight cycles, Delta concluded that sufficient data should exist to establish an allowable service life that maintains an acceptable level of safety.

Delta also noted that while a cycle-based requirement would be preferable, defining an engine shop visit as “removal and disassembly of the HPT module” would maintain an acceptable level of safety. Delta commented that requiring replacement of low-time duct segments during minor repairs presents a substantial financial burden for minimal risk reduction.

The FAA disagrees with revising paragraph (g) or (i) of this AD. Requiring

removal of the 3rd stage LPT duct segments at the next HPT overhaul does not adequately address the unsafe condition. The FAA's risk assessment assumed that the 3rd stage LPT duct segments would be replaced at every shop visit, which provides an acceptable level of safety. Operators may propose to the FAA an alternative method of compliance in accordance with paragraph (j) of this AD. The FAA did not change this AD.

Request to Require Removed Duct Segments be Discarded, Scrapped, or Mutilated

Delta requested that the FAA revise paragraph (g) of this AD to require that 3rd stage LPT duct segments that have been removed from service be discarded, scrapped, or mutilated. Delta reasoned that the rule would apply only to PW4000-100 engines with certain combustors, but the subject part numbers are certified for installation in other engine models. Delta expressed concern that without a requirement to discard or scrap the removed duct segments, they could potentially be installed in a PW4000-94 or non-Talon-IIB PW4000-100 engine or sold to an operator without knowledge of their prior operation with a Talon IIB combustor.

The FAA disagrees with Delta's request. When parts are removed from service due to an AD, they are unserviceable unless the AD specifies otherwise. Unserviceable parts are not airworthy and should be disposed of in a manner that does not allow them to be returned to service. Operators must ensure only serviceable parts are installed on engines before approving the aircraft for return to service. The FAA did not change this AD.

Request to Include Available Fleet Data

Delta requested that the FAA update the proposed rule to reflect the available fleet data, which shows that failure of 3rd stage LPT duct segments has only occurred after 3,000 cycles or greater in operation on engines with a Talon IIB combustor. Delta stated that the Discussion paragraph of the proposed rule does not provide prior service history of LPT duct segments that have failed in-service. Delta further noted that prior communications from the design approval holder indicate that industry failures occurred on parts that operated 3,000 flight cycles or more under exposure to the higher-than-

expected temperatures with a Talon IIB combustor installed.

The FAA disagrees. The Discussion paragraph of the NPRM provides an adequate discussion of the failure in service of 3rd stage LPT duct segments. The FAA did not change this AD.

Request to Update Service Information

Delta requested that the FAA add PW Service Bulletin (SB) PW4G-100-72-220 to the Related Service Information paragraph of this AD. Delta noted that the accomplishment of SB PW4G-100-72-220 installs a Talon IIB combustor, and 3rd stage duct segments operated on a post-SB engine would be subject to the proposed rule as well.

The FAA agrees and has added PW SB PW4G-100-72-220 to the Related Service Information paragraph of this AD.

Conclusion

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes, and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

Related Service Information

The FAA reviewed PW SB No. PW4G-100-72-214, dated December 15, 2011; PW SB No. PW4G-100-72-219, Revision 1, dated October 5, 2011; PW SB No. PW4G-100-72-253, dated November 24, 2014; and PW SB No. PW4G-100-72-220, Revision 4, dated September 30, 2011. PW SB No. PW4G-100-72-214 introduces the Talon IIB outer combustion chamber assembly that reduces the combustor exit temperature levels at the outer diameter of the combustor. PW SB No. PW4G-100-72-219 describes procedures for installing the Advantage70 engine upgrade kit to improve engine reliability and fuel consumption, and to reduce maintenance costs. PW SB No. PW4G-100-72-253 describes procedures for replacing the outer combustion chamber assembly waspaloy nuts. PW SB PW4G-100-72-220 describes procedures for installing the Advantage70 engine upgrade

kit to improve engine reliability and fuel consumption, reduce maintenance costs, and convert engine thrust rating.

Costs of Compliance

The FAA estimates that this AD affects 99 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this AD:

Estimated costs

Action	Labor Cost	Parts Cost	Cost per product	Cost on U.S. operators
Remove and replace 3rd stage LPT duct segments	56 work-hours x \$85 per hour = \$4,760	\$85,000	\$89,760	\$8,886,240

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect 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.

For the reasons discussed above, I certify that this AD:

(1) Is not a “significant regulatory action” under Executive Order 12866,
(2) Will not affect intrastate aviation in Alaska, and
(3) 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.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

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

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

2020-25-09 Pratt & Whitney Division: Amendment 39-21351; Docket No. FAA-2020-0542; Project Identifier AD-2020-00582-E.

(a) Effective Date

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to all Pratt & Whitney Division (PW) PW4164, PW4164-1D, PW4168, PW4168-1D, PW4168A, PW4168A-1D, and PW4170 model turbofan engines that have 3rd stage low-pressure turbine (LPT) duct segments, part number (P/N) 50N434-01 or P/N 50N450-01 installed, and have the Talon IIB outer combustion chamber assembly, P/N 51J500 or P/N 51J381, installed.

(d) Subject

Joint Aircraft System Component (JASC) Code 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by reports of damaged or failed 3rd stage LPT duct segments on PW engines with the Talon IIB outer combustion chamber assembly configuration installed. The FAA is issuing this AD to prevent failure of the 3rd stage LPT duct segments. The unsafe condition, if not addressed, could result in uncontained release of LPT blades and vanes, damage to the engine, and damage to the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Action

At every engine shop visit after the effective date of this AD, remove from service the 3rd stage LPT duct segments, P/N 50N434-01 and P/N 50N450-01, and replace them with parts with zero flight cycles.

(h) Terminating Action

Removal of the 3rd stage LPT duct segments, P/N 50N434-01 and P/N 50N450-01, and their replacement with parts having P/Ns other than P/N 50N434-01 and P/N 50N450-01, constitutes terminating action for the repetitive replacement required by paragraph (g) of this AD.

(i) Definition

For the purpose of this AD, an "engine shop visit" is the induction of an engine into the shop for maintenance involving the separation of pairs of major mating engine flanges (lettered flanges). The separation of engine flanges solely for the purpose of transportation without subsequent engine maintenance does not constitute an engine shop visit.

(j) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in Related Information. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(k) Related Information

For more information about this AD, contact Carol Nguyen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7655; fax: (781) 238-7199; email: carol.nguyen@faa.gov.

(l) Material Incorporated by Reference

None.

Issued on December 2, 2020.

Lance T. Gant, Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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