

**UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356**

In the matter of the petition of

The Boeing Company

for an exemption from §§ 25.901(c) and
25.981(a)(3) of Title 14, Code of Federal
Regulations

Regulatory Docket No. FAA-2012-1132

TIME-LIMITED PARTIAL GRANT OF EXEMPTION

By letter dated August 18, 2014, Douglas M. Lane, Director, Regulatory Administration, The Boeing Company, P.O. Box 3707, Seattle, WA 98124, petitioned the Federal Aviation Administration (FAA) for an amendment to Exemption No. 10767, issued on May 17, 2013. That exemption granted Boeing time-limited, partial relief from the requirements of §§ 25.901(c) and 25.981(a)(3) of Title 14, Code of Federal Regulations (14 CFR) for planned changes to the fuel quantity indication system (FQIS) for the fuel quantity processor unit (FQPU) parts obsolescence modification on the Boeing Models 767-200/-300/-300F/-400ER. The petitioner requests an amendment to Exemption No. 10767 to extend it until 2019 to provide coverage through the end of the currently committed 767-300 and -300F production activity.

The petitioner requests relief from the following regulation(s):

Section 25.901(c) – Installation.

(c) For each powerplant and auxiliary power unit installation, it must be established that no single failure or malfunction or probable combination of failures will jeopardize the safe operation of the airplane except that the failure of structural elements need not be considered if the probability of such failure is extremely remote.

Section 25.981(a)(3) – Fuel tank ignition prevention.

(a) No ignition source may be present at each point in the fuel tank or fuel tank system where catastrophic failure could occur due to ignition of fuel or vapors. This must be shown by:

(3) Demonstrating that an ignition source could not result from each single failure, from each single failure in combination with each latent failure condition not shown to be extremely remote, and from all combinations of failures not shown to be extremely

improbable. The effects of manufacturing variability, aging, wear, corrosion, and likely damage must be considered.

Related section of 14 CFR:

Section 25.1309 – *Equipment, systems, and installations*, states that required equipment, systems, and installations be designed to ensure that they perform their intended functions under any foreseeable operating condition and that the occurrence of any failure condition that would prevent the continued safe flight and landing of the airplane be extremely improbable.

The petitioner supports the request with the following information:

This section quotes the relevant information from the petitioner’s request. The complete petition is available at the Department of Transportation’s Federal Docket Management System (FDMS) on the Internet at <http://www.regulations.gov> in Docket No. FAA-2012-1132.

Description of Issue:

Background:

The 767 Fuel Quantity Processor Unit (FQPU) uses digital ARINC 429 busses to receive/transmit data to the flight deck, EICAS and refueling panels through two redundant Input/Output Channel (IOC) circuit cards. The current production IOC card utilizes many integrated electronic microchips to transmit and receive the ARINC 429 data. One of the microchips, which is involved with communication to the flight deck and refueling panel, has been out of production for several years, and the supply has now become exhausted.

In February 2012 the FQPU supplier informed Boeing that the supply of this particular ARINC 429 chip used on the two IOC cards and also on the [built-in test equipment] BITE card will run out in late 2012 and that there were no sources for procurement of the current chip. The supplier initiated a contract with another chip manufacturer to develop a replacement chip to the unchanged requirements of the original chip as defined by the supplier’s Specification Control Document. The new chip, by requirement, is an identical form-fit-function replacement to the current production chip. In August 2012, Boeing and the supplier reviewed the existing stores of parts and determined the existing supply would support production through January 2013 with a possible extension into March 2013.

In the previous exemption application for this subject, The Boeing Company communicated that if showing full compliance to 25.901(c) Amendment Level 25-126 and 25.981(a)(3) Amendment Level 25-125 for the FQIS at the system level was required due to replacing this obsolescent chip with an identical form-fit-function chip, then a significant number of changes would be required to the FQIS intrinsically safe side wiring. The previous exemption was granted as a time-limited exemption (reference exemption number 10767), expiring in 2016, after which full compliance of the FQIS would be required. Since the issuance of the time limited exemption, The Boeing

Company has been working on a FQIS that would meet the requirements and has quantified the design change required and the cost of the new design. Based on these findings the Boeing Company is petitioning for a new time limited exemption to address the remaining production of the 767-300 and -300F.

Discussion:

This new petition for a time limited exemption is being made since full compliance to these rules for the 767 would require extensive system design changes which do not substantially improve the safety of the current airplane design, are economically prohibitive given the remaining production of the 767-300 and -300F and are not in the public's interest. In conjunction with this petition The Boeing Company is proposing to incorporate significant improvements to newly produced 767 airplanes that will increase the level of safety by addressing both ignition sources and exposure time.

Boeing proposes that all new production airplanes incorporate design changes similar to the center fuel tank wire separation being developed by SB 767-28-XXXX which will be required by AD for all 767 freighters that do not have NGS. These wire separation changes would be implemented on all new production airplanes one year after the exemption is granted. Boeing will further address ignition sources by requiring a three tank, 750 hour BITE check, similar to instructions for the center wing tank provided in a SB 767-28-0118 for freighters without NGS, and being required by AD. The proposed BITE instructions would apply to all tanks.

All newly produced 767 airplanes, since line number 993 in July 2010, address flammability exposure time with the incorporation of a center tank fuel tank flammability reduction system, the Nitrogen Generation System (NGS). This addresses exposure time as required for all 767 in-service passenger airplanes and adds flammability reduction systems for all freighter airplanes since line number 993.

In the previously granted time limited exemption, the FAA stated that current fuel tank safety airworthiness standards rely upon a balanced approach of precluding ignition sources that could form in the fuel tanks and limiting fuel tank flammability exposure time. The aforementioned fuel tank wire separation, BITE check and flammability reduction system will address both exposure time and ignition sources for all newly produced 767 airplanes, both passenger and freighter.

This time limited exemption is being sought for the no single plus latent (greater than extremely remote) as is stated in §25.981(a)(3) and interpreted by the FAA for §25.901(c). Exemption is also being sought for the non-environmental aspects of §25.901(c) provided by FAA interpretation, and the explicit §25.981(a)(3) requirements of manufacturing variability, aging, wear, corrosion, and likely damage, as these considerations are already covered by factory manufacturing processes, and airline maintenance of the type design of airplane. Exemption is requested to apply through the end of 2019 to provide coverage through the end of the currently committed 767-300 and -300F production activity and potential incremental sales. The 767-2C, which will be produced beyond 2019, will be fully compliant to these requirements.

Statement of Public Interest:

In support of this petition, Boeing is proposing to address both ignition sources and exposure time in the center tank (NGS on all newly produced airplanes). In-service airplanes are currently required to address either exposure time (passenger airplanes) or ignition sources (freighter airplanes) but not both. This approach addresses both aspects, incorporating improvements to address both ignition sources and exposure time.

All new production airplanes will incorporate design changes similar to the center fuel tank wire separation being developed by SB 767-28-XXXX which will be required by AD for all 767 freighters that do not have NGS. These wire separation changes will be implemented on all new production airplanes one year after the exemption is granted and will be made with the guidance of 28-AWL-09. In addition, Boeing is proposing a three tank, 750 hour BITE check, similar to instructions for the center tank provided in SB767-28-0118 for freighters without NGS, and being required by AD. These changes will address ignition sources on all newly produced 767 airplanes.

All newly produced 767 airplanes, since line number 993 in July 2010, address flammability exposure time with the incorporation of a center tank fuel tank flammability reduction system, the Nitrogen Generation System (NGS). This addresses exposure time as required for all 767 in-service passenger airplanes and adds flammability reduction systems for all freighter airplanes since line number 993.

By addressing both exposure time and ignition sources, newly produced 767 airplanes will use a balanced approach and achieve a higher level of safety than any in-service 767 airplane. Design changes that would be required to be fully compliant would not provide a significant benefit or increased level of safety for new production airplanes that incorporate the proposed wire separation, BITE check, and have the Nitrogen Generation System (NGS) installed. Additionally, the costs associated with these changes would not be commensurate with the increased level of safety and would be economically prohibitive given the relatively small number of additional production aircraft that would be burdened with these costs. These changes would include the following:

- New system architecture and extensive airplane wiring changes to ensure adequate wire separation throughout the fuel quantity indication system.
- In-tank component changes (new brackets, potential need for shorter probes, revised in-tank wire harness and retention means).
- Software changes related to Fuel Tank Gauging Function and Safety function if shorter probes are required.

Release of new Boeing design architecture requirements, supplier development and qualification of new software and hardware to be fully compliant would negatively affect offerability of the 767-300 and 300F airplanes. These design changes would also affect only one customer and result in an undesirable configuration mix for that customer, driving maintenance complexity and increased operational costs.

Finally, the associated design proposal in support of this petition for exemption will implement center tank FQIS limited wire separation and a three tank FQIS BITE check earlier than other alternatives, approximately one year after grant of the petition. This will provide important enhancements to airplane safety earlier, and on more production airplanes. Please note, relief is not being sought for the 767-2C, which will be fully compliant with a new FQIS, and is anticipated to be the only minor model produced for the next several decades.

Granting this time limited exemption is in the public interest for the aforementioned reasons and will:

1. Promote continued production of the 767 airplane after May 17, 2016, currently forecasted to end in 2019. All production airplanes will address fuel tank safety with incorporation of wire separation, scheduled health checks, and a fuel tank inerting system (NGS). A grant of exemption will also provide significant economic benefit to the public in the form of continued 767 production and support efficient, safe operation by our customers by providing a consistent fleet configuration.
2. The proposal for this exemption request of implementing the center tank FQIS limited wire separation and three tank FQIS BITE check can be accomplished on an earlier schedule, (proposed to be one year after the exemption is granted) enhancing safety earlier on more airplanes.

Statement of No Adverse Effect on Safety:

The replacement of the existing ARINC 429 chip with the new replacement chip does not adversely affect the safety of the current system. There is no threat to fuel tank ignition from the IOCs within the FQPU because there is no electrical conductor connection between the boards with the obsolete chip and the fuel tank. Hence, the change has no relation to fuel tank ignition prevention, does not impact line replaceable unit (LRU) or system level failure modes, effects, or probabilities relative to fuel tank ignition and therefore has no affect [sic] on the safety of the system and has no impact to airplane safety.

The 767 FQIS was found to be compliant to §25.901(c) during airplane type certification for the FQIS change in 1992 and since then Boeing has completed the SFAR88 safety assessment and has increased the airplane fuel system safety with installation of a hot short protector for the densitometer and with installation of a NGS for the center fuel tanks. The proposed change to address the previous time limited exemption has no impact on any of the SFAR88 related assessments.

Even prior to the implementation of NGS which further reduces any risk, the Boeing assessment was that the risks for the 767 FQIS installation were extremely improbable, which is the typical industry and CFR §25.1309 standard for an acceptable safety for systems.

The Boeing approach to incorporate design changes to add center fuel tank fuel wire separation, a three tank 750 hour BITE check, and installation of NGS on all newly produced 767 airplanes will provide for an improved safety margin over the existing, approved in-service fleet. These changes are also proposed to be done one year after grant of exemption, thereby incorporating changes to more airplanes than possible under the existing time limited exemption.

Request to Waive Publication and Comment:

Given the time-sensitive nature of this request for exemption, Boeing respectfully requests that the FAA waive the “publication and comment” step in the process for making a final decision on this exemption. In addition to the timeliness concern, it is the Boeing position that the safety-associated aspects related to this system have been fully vetted in the public forum as part of the SFAR88 project and the previous time-limited partial exemption (reference exemption number 10767). Expedited treatment is necessary to prevent interruption to 767 production deliveries.

Privileges of the Exemption Outside the United States:

Per 14 CFR 11.81(h), Boeing requests that the privileges of this exemption be extended outside the United States. This extension of privileges is necessary for operations based within foreign countries having bilateral agreements with the United States accepting FAA 14 CFR part 25 as their airworthiness standards for transport category aircraft.

Conclusion:

Boeing is petitioning for a time-limited exemption from the provisions of 14 CFR 25.901(c)[25-126] and 14 CFR 25.981(a)(3)[25-125] at the system level as they apply to the FQIS installed on the 767-300 and 767-300F airplanes for the FQPU parts obsolescence change described above. The proposed center fuel tank wire separation, FQIS three tank, 750 hour BITE check, and incorporation of NGS for all 767 production airplanes will further improve fuel tank safety and reduce fleet safety risks. Exemption is requested to apply through the end of 2019 to provide coverage through the end of the currently committed 767-300 and -300F production activity. The 767-2C, which will be produced beyond 2019, will be fully compliant to these requirements.

Supplemental information

The FAA requested supplemental information from Boeing regarding the estimated date that service instructions would be available, and an estimated maximum number of airplanes for which the exemption would apply that would be produced prior to the end of 2019. Boeing responded that the currently estimated date for availability of service instructions (Wire Separation Service Bulletin) is August 24, 2015 and will be no later than December 18, 2015. They stated, “The maximum number of airplanes that would be produced from expiration of the current Exemption No. 10767 in May 2016 through the end of 2019 (firm orders) is estimated to be 37 – 25 current orders through 2018 with a potential to sell and deliver 12 more freighters in 2019.”

Federal Register publication

Although the petitioner requested that action on its petition not be delayed for publication in the *Federal Register*, the FAA found that the petition, if granted, would set a precedent. Therefore, to allow an opportunity for the public to comment on the petition, a summary of it was published in the *Federal Register* on January 20, 2015 (80 FR 2774). We received one comment from the National Air Traffic Controllers Association (NATCA) National Safety Committee. The commenter does not agree that the requirements of 14 CFR 11.81(e) for granting an extension to the original exemption have been met and feels the petitioner did not provide sound justification showing the extension would be in the public interest. NATCA recommended the FAA not grant the extension.

The following paragraphs summarize the relevant information from NATCA's comment. The complete comment is available in Docket No. FAA-2012-1132 on the FDMS website.

NATCA contends that granting a permanent exemption would not provide a level of safety at least equal to that provided by the rule from which Boeing seeks the exemption and, therefore, does not meet the requirement of § 11.81(e) for granting an exemption. NATCA notes that the petitioner's planned changes do not comply with the ignition prevention standards of §§ 25.901(c) and 25.981(a). NATCA believes that the design proposed by the petitioner represents a significant reduction in the level of safety as compared to a design that would fully comply with the rules.

NATCA did not agree with the petitioner's justification for granting an amendment to the original exemption because it is based primarily on the cost of developing a compliant design and a statement of no adverse effect on safety because of flammability reduction features required by separate regulations. The costs associated with compliance are not a consideration for meeting the level of safety criteria in § 11.81(e) for granting an exemption. The FAA's 2008 rulemaking required fuel tank flammability reduction in 767 production in addition to a separate ignition prevention requirement in § 25.981. Therefore, the commenter contends the flammability reduction system should not be a consideration in the public interest argument when evaluating extending relief from certain ignition source protection proposed in this petition.

NATCA disagrees with the petitioner's proposal to incorporate a design change that partially complies just prior to the original exemption's May 17, 2016 expiration date for full compliance as a means to provide the public interest required by § 11.81(d).

NATCA also asserts that Boeing has produced airplanes with a known unsafe condition with regard to FQIS wiring under the original exemption and notes that the petitioner has not provided FAA-requested service instructions to mitigate the unsafe condition as required by 14 CFR 21.99 and 183.69(d). NATCA requested the FAA provide documentation of any enforcement action the FAA is taking against the petitioner for failure to provide the required service instructions.

NATCA requested the FAA provide details, including documentation of communication, regarding any corrective actions the FAA and the petitioner, as well as other design approval holders, have established to address unsafe conditions associated with FQIS for the proposed

airworthiness directive (AD) for the Boeing Model 757 series airplanes and other airplanes, including the 767, with similar FQIS vulnerabilities.

Therefore, NATCA recommended the FAA not grant the petition for extension of the original exemption beyond the current expiration date. NATCA requested additional information be included in the docket.

The FAA's analysis

The FAA agrees with the petitioner's statement of public interest for granting the extension of the original exemption from May 17, 2016 until the end of production of 767-300F cargo airplanes, currently scheduled through December 31, 2019. We partially agree with the commenter and have determined granting an extension to the exemption for passenger airplanes past the current limit of May 17, 2016 is not in the public interest. In making this determination, we considered the comment, and we partially agree with the commenter that the extension should not be granted because partial wire separation for one fuel tank would not provide a level of safety equivalent to direct compliance. If the petitioner intends to continue to offer the 767 passenger airplane for future production and sales, they should account for the resources, time, and cost they would need to bring the airplanes into full compliance in making such arrangements. Boeing has been aware of its obligation to address potential fuel tank ignition sources associated with its FQIS since at least 2002, when it identified those ignition sources as required by Special Federal Aviation Regulation No. 88. The three-year extension provided by the current time-limited exemption was adequate to enable Boeing to comply if it intended to do so. Based on these considerations, we cannot make a finding that granting an extension for passenger airplanes is in the public interest.

We partially agree with the commenter's request that we not include the flammability reduction means (FRM) in our decision to grant the exemption since the system is required by separate regulations. The petitioner must incorporate FRM in production to support their U.S. customers' operating rules in 14 CFR 121.1117(b), therefore installation of FRM alone is not sufficient to justify granting an exemption. However, meeting the existing requirement for fuel tank FRM by inerting the center wing fuel tank on newly produced 767-300F airplanes in combination with reducing the risk of fuel tank ignition through partial wire separation and enhanced maintenance for the FQIS will provide an adequate level of safety for 767 cargo airplane operations. As stated in the original exemption, cargo airplanes are excluded from the requirement to retrofit FRM into the existing fleet of transport airplanes. Introduction of 767-300F cargo airplanes that have FRM and partial wire separation for the center tank FQIS, which are safer than older cargo airplanes that are not required to be retrofitted with FRM, will increase overall fleet safety and is in the public interest. Additional public interest considerations include Boeing's ability to offer the 767-300F at a price that could result in more sales of airplanes with the safety enhancement of FRM, stimulating the economy and reducing cargo shipping costs. We also agree with the commenter and did not consider the petitioner's argument that earlier introduction of airplanes modified with design improvements compared to the requirement of the original exemption should be considered as part of the public interest analysis. Nevertheless, we do concur with the petitioner's proposal to incorporate these changes, as they would enhance safety as compared to the existing design.

Boeing has confirmed their commitment made in the original exemption to provide the service instructions necessary to support modification to the 767 FQIS on in-service airplanes in a timely manner. They provided an estimated timeframe of between August 24 and December 18, 2015, for availability of service instructions that will enhance the safety of existing airplanes in the fleet.

The commenter requested the FAA provide additional information regarding any enforcement action the FAA is taking against the petitioner for non-compliance to §§ 21.99 and 183.69; communications with the petitioner on the subject of the NPRM for the 757 FQIS AD; and information on pending ADs for other models. We have determined these issues are outside the scope of the petition for exemption. Information regarding the 757 FQIS AD is provided in the docket (FAA-2012-0187) for that action. We note that the NPRM for the 757 FQIS AD identifies installation of FRM as a means to effectively mitigate the unsafe condition. Boeing has included FRM on all newly-delivered 767 airplanes since 2010, which mitigates the unsafe condition associated with FQIS on those airplanes.

The original exemption included discussion and provisions for newly manufactured and in-service airplanes. We have included a provision in this partial grant of exemption that clarifies our intent to allow operators to replace FQPUs of in-service airplanes without requiring operators to bring those airplanes into full compliance at the expiration of this time-limited partial exemption. As discussed earlier, the FQIS on in-service airplanes may be subject to future actions resulting from rulemaking to address unsafe conditions.

The FAA's decision

In consideration of the foregoing, I find that granting a partial extension to the original partial grant of exemption for cargo-only airplanes is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701 delegated to me by the Administrator, The Boeing Company is hereby granted a time-limited exemption from 14 CFR 25.901(c) and 25.981(a)(3) in order to accomplish the following design changes:

1. Incorporate center fuel tank wire separation, wire shielding, and a 750-hour interval fault check of the center tank FQIS on all newly produced 767-300F airplanes; and
2. Optional replacement of the ARINC 429 chip within the FQPU's IOC cards and the BITE card for in-service and production 767-200/-300/-300F/-400ER airplanes.

The following conditions and dates apply:

1. The design changes described in item 1 above must be accomplished within one year of the granting of this exemption.
2. Boeing must submit for FAA approval the service instructions modifying the 767 FQIS as requested by the FAA in accordance with §§ 21.99 and 183.69 by December 18, 2015. This exemption will expire on that date unless Boeing has submitted approvable service instructions.

3. The expiration date of May 17, 2016, established in the original exemption continues to apply to 767-200/-300/-400ER airplanes, subject to condition 2.
4. This time-limited exemption for newly produced 767-300F airplanes expires on December 31, 2019, subject to condition 2.

Upon the expiration dates of this time-limited exemption established in items 3 and 4 above for the specified models:

- The FQIS on all newly-produced 767 series airplanes must comply with §§ 25.901(c), Amendment 25-46, and 25.981(a)(3), Amendment 25-102, or later amendments; and
- Airplane owners and operators are not required by this exemption to replace FQPUs installed as replacement parts on in-service airplanes and may continue to replace FQPUs in accordance with each airplane's type design approved under the conditions of this exemption.

All conditions of the original exemption apply.

Issued in Renton Washington, on May 4, 2015.

/s/ Jeffrey E. Duven

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