

<b>EASA</b>	<b>COMMENT RESPONSE DOCUMENT</b>
	<b>Proposed Special Condition E-xx on CS 25.1193 - “Engine cowl retention” (Applicable to Large Aeroplane)</b>

**Commenter 1 : Airbus**

**Comment # [1] – Scope of application**

Airbus understands this Special Condition would have only been applicable to a given aeroplane type (i.e. Single Aisle Type fitted with New Engine Options (NEO)), and not to all Large Aeroplane as written in the title.

**Comment :**

Can EASA clarify its choice ?

**EASA response:**

*Noted. EASA confirm the intention is to apply the Special Condition to all large aeroplanes under the provisions of Part 21.A.16B(a)(3). While the in-service experience is not as conclusive as in the Airbus single aisle fleet, it appears most transport aeroplane manufacturers had event(s) on at least one design.*

**Comment # [2] – Special Condition**

Airbus would like to propose the following amendments in order to clarify the following aspects of the Special Condition.

**Comment :**

The current wording :

*(f) (4) Be designed such as any single failure of the most critically loaded latching, locking or retention device should not result in failure of the complete latching system and fan cowl departure, so the remaining latching, locking or retention device shall be able to sustain limit loads as per 25.571(b)*

is proposed to be amended as followed :

*(f)(4) `Be designed such as any single failure of ~~the most critically loaded latching, locking or retention device~~ **one single latch or hinge** should not result in failure of the complete latching system and fan cowl departure, so the remaining ~~latching, locking or retention device~~ **latches or hinges** shall be able to sustain limit loads as per 25.571(b)`*

**EASA response:**

**Noted. Another commenter made the point (f)(4) was largely redundant with (f)(1)(i) and the complete sub paragraph has therefore been removed.**

## **Commenter 2 : Boeing**

### **Comment # [1] – General Comment**

A special condition is a regulation that applies to a particular aircraft design. A “generic” special condition to address an apparent lack of specific requirements in response to incidents in a particular fleet of airplanes is in fact the creation of a new rule with wide applicability. Therefore, the process for issuing new rules should be followed.

#### **Comment :**

Unilateral EASA regulatory action such as this would create an un-harmonized requirement. This activity should be coordinated with the Federal Aviation Administration and the applicable FAA regulations to ensure that there are common certification requirements for engine cowls.

Boeing’s fleet experience does not indicate that the Boeing cowling design criteria are deficient with regard to cowl retention under normal operation, single failures, or inadvertent failure to latch. No unsafe condition related to loss of cowling as a result inadequate design criteria or latch maintenance error has been identified on Boeing airplanes. Compliance to the proposed regulations for properly maintained structure would not have prevented any of the cowl liberation events experienced in the Boeing fleet in the last 20 years. Accordingly, additional industry-wide rule making is not warranted.

We urge EASA to reconsider this proposed action.

**EASA response:**

*Partially agreed. EASA action is prompted by in service events, in which the number of occurrences and the potential hazard indicates that the risk is sufficiently high and of concern to justify action across all designs. This is in line with past or current regulatory authorities actions, under the provisions of part 21, for instance associated with fuel tank safety or lithium batteries.*

*It is EASA intention to launch a rule making task, but pending this, a Special Condition will be be raised on a risk based approach, considering previous in-service experience and the aircraft intrinsic characteristics, including latch visibility. For instance, it appears rear mounted nacelles are less prone to the issue; this might be attributed to the better visibility they allow on the latching system. The SC might not be raised in such cases.*

*Regarding fan cowl separation, while the records available to EASA indicate that the highest occurrence rates lies with Airbus Single Aisle aircraft, events are recorded on other fleets (other Airbus aircraft, Boeing, Bombardier, Embraer, Sukhoi, etc.). It shall be noted that for most of those products, EASA is only a validating authority and does not have access to the in-service event database allowed by being the primary certificating authority as for Airbus projects. A quick search on Internet database has indicated events that also affected Boeing aircraft:*

- *On 12 August 2010, fan cowl separated in flight from a Boeing 717 operated by Air Tran, shortly after take-off from Dayton (USA).*
- *On 18 July 2010, the fan cowl of THY 737-800 opened during landing in Vienna.*
- *On 8 March 2014, the fan cowl of GOL 737-800 opened during climb.*

*This list is far from being exhaustive and is only providing a couple of examples in order to establish Boeing products might also be affected by the issue the proposed Special Condition is attempting to address.*

### **Comment # [2] – Special Condition**

The issue being addressed by this Special Condition is fan cowl retention.

The noted reason for this new regulation is to address fan cowl failure events in service. As written, the proposed requirement could be misinterpreted to apply to other cowling structure, such as thrust reversers. Hence, Boeing would like to propose the following amendments in order to clarify the following aspects of the Special Condition.

#### **Comment :**

The current wording :

*(f) The retention system for each removable or openable cowling must—*

is proposed to be amended as followed :

*(f) The retention system for each ~~removable or openable~~ fan cowling must—*

**EASA response:**

***Partially accepted. The in-service record does not indicate there is an issue with thrust reverser cowls. Since restricting the scope of the generic Special Condition to fan cowling only might prove too restrictive (it might be applied to some turboprop installation, for instance) ; the Special Condition will be reworded by adding a note to that effect.***

**Comment # [3] – Special Condition**

Cowl retention for engine fire can be adequately addressed by a showing of compliance with 25.1193(e)(1).

Cowl retention for engine case burnthrough is adequately addressed by showing compliance with 25.903(d)(1). Engine case burnthrough is not applicable for fan cowling. Expansion of this requirement to the thrust reverser could adversely affect the safety of the installation.

Changing the proposed requirement from minimization of hazard, as currently required by 25.903(d)(1), to a prescribed design condition for the thrust reverser inner wall would drive the need for additional reinforcement and/or insulation. These changes would reduce the likelihood that the jet of high temperature, high pressure gas would locally puncture the cowling. Local puncture of the cowling reduces overall risk by reducing the threat to the primary structure in the zone. Additionally, redesign of the cowling would result in an appreciable design penalty in terms of weight, cost, complexity, and maintenance burden. Boeing does not consider this penalty justified, since it would not improve the safety of the airplane. Within Boeing’s service experience, no engine case burnthrough event has ever resulted in a cowl opening or liberating in flight.

Cowl retention for duct rupture is already adequately addressed by 25.1103(d).

Hence, Boeing would like to propose the following amendments in order to clarify the following aspects of the Special Condition.

**Comment :**

The current wording :

*(ii) Engine compartment fire, engine case burnthrough, or rupture of any pressurized components within the nacelle. These conditions will not be considered associated to single latch or hinge structural path loss.*

is proposed to be deleted.

**EASA response:**

***Accepted; this was carried over from the 1989 FAA NPRM, but does not fall within the scope of the in-service experience EASA is trying to address. This requirement will be removed from the Special Condition and might be discussed in the forthcoming harmonization process, shall one be initiated.***

**Comment # [4] – Special Condition**

Boeing requests deletion of the “manual dexterity” requirement unless a standard unit of measurement can be established. The intent of the requirement is met by “readily accessible” and 25.1193(f)(3).

**Comment :**

The current wording :

*(2) Have readily accessible means of closing and securing the cowling that do not require excessive force or manual dexterity; and*

is proposed to be amended as follows :

*(2) Have readily accessible means of closing and securing the cowling that do not require excessive force ~~or manual dexterity~~; and*

**EASA response:**

*Not accepted. EASA appreciate there is no proper criteria for manual dexterity, but has been confronted to some designs stretching the expectations put on average maintenance crew well beyond the normal. In most if not all cases, the need for dexterity was not with the latch design itself, but rather with the lack of proper instructions for continued airworthiness allowing proper maintenance (rigging/shimming/etc) of the cowl retention system.*

**Comment # [5] – Special Condition**

Verification that the cowling is secured should be required only if the cowling has been opened.

**Comment :**

The current wording :

*(3) Have a reliable means for effectively verifying that the cowling is secured prior to each take-off.*

is proposed to be amended as follows :

(3) Have a reliable means for effectively verifying that the cowling is secured prior to each take-off *following opening*.

**EASA response:**

*Not accepted. EASA understands the commenter intention is to limit the application of the proposed requirement to flight following cowl opening. While this might appear as common sense, a review of the in-service experience shows that in a number of cases the opening of the fan cowls was not properly recorded. This includes occurrences where maintenance was initiated on one engine or airframe, interrupted, and concluded on the adjacent airframe, or on the opposite engine on the same aircraft. In such circumstances, and in many other cases, relying on the proper recording of cowl opening to ensure they are effectively closed afterward would not be sufficient.*

**Comment # [6] – Special Condition**

The proposed 25.1193(f)(4) is redundant to 25.1193(f)(1)(i).

**Comment :**

The current wording :

*(4) Be designed such as any single failure of the most critically loaded latching, locking or retention device should not result in failure of the complete latching system and fan cowl departure, so the remaining latching, locking or retention device shall be able to sustain limit loads as per 25.571(b)*

is proposed to be deleted.

**EASA response:**

*Accepted. (f)(4) will be deleted.*

**Commenter 3 : Rolls Royce**

**Comment # [1] – General Comment**

It is noted the proposed Special Condition expands the existing CS 25.1193 requirement, however, this requirement comes under the CS 25 sub-section: Powerplant Fire Protection.

**Comment :**

It is noted the scope of the proposed Special Condition goes beyond just Powerplant Fire Protection issues.

**EASA response:**

*Noted; however in the absence of other requirement addressing engine cowls, as in line with the 1989 FAA NPRM, 25.1193 was retained as the most appropriate vehicle for the requirement.*

**Comment # [2] – General Comment**

References to “cowling” are not consistent.

**Comment :**

Sometimes referring to “engine cowl” (in the title), “fan cowl” and “cowling”. The term should be generic and consistently used, noting CS 25.1193 already consistently uses the term “cowling”.

If the intention is to restrict these additional requirements to just “engine cowling(s)” then this should be clearly stated.

**EASA response:**

*Accepted. The Special Condition wording has been reviewed.*

**Comment # [3] – Special Condition**

The term ‘*minimize*’ has to be reconsider :

*(e)(4) Each aeroplane must be designed and constructed to **minimize** any inflight opening or loss of fan cowling which could prevent continued safe flight and landing.*

**Comment :**

The term “*minimize*” has no clear objective standard for the evaluation of compliance and can therefore be subject to differing

interpretations by both manufacturers and regulators. An alternative would be to quote an appropriate rate of occurrence in place of minimise?

**EASA response:**

*Not accepted. While EASA would certainly prefer to rely on the word ‘preclude’ instead of ‘minimize’ (or ‘minimise’), it might unfortunately not be practical. In addition, it shall be noted the term "minimize" is already used in the regulations such as 25.903(d) and should be well understood.*

**Comment # [4] – Special Condition**

The term “removable and openable cowling” is used :

*(f) The retention system for each **removable or openable cowling** must—*

the intent being to address large cowls such as fan cowls (fan cowl doors), however, there are also small access panels on the engine nacelle that can be removed for infrequent access

**Comment :**

The frequency of cowl opening must be a key consideration in the safety case. Is the intention to include or exclude such small, infrequently opened, nacelle access panels?

**EASA response:**

*Accepted. The in-service events the Special Condition is addressing involve fan cowl doors. While smaller panels are also known for being lost in flight, the risk they represent for the airframe or for third parties has not prompted yet any safety recommendation. It is therefore proposed to focus the action on the larger engine cowls.*

*It shall be noted that one of the issue identified from investigations following Airbus single aisle in-service events is the lack of small access panel allowing IDG oil servicing. Consequently, frequent fan cowl openings are required (typically, weekly), thereby increasing the opportunity for human error to occur.*

**Commenter 4 : GE**

**Comment # [1] – General**

Special Conditions are appropriately issued to address novel or unusual features of a particular aircraft design. They are not rules of general applicability; they affect only the applicant who applied for approval of these features new/unusual on its airplanes. [GE] request that the normal process for issuing new rules be followed in lieu of issuing these Special Conditions.

**Comment :**

Unilateral EASA regulatory action such as this would also create an un-harmonized requirement. We consider that this activity should be coordinated with the Federal Aviation Administration and the applicable FAA regulations to ensure that there are common certification requirements for engine cowls.

**EASA response:**

*Not accepted. This Special Condition is raised under the provision of Part 21.A.16B(a)(3), which reads: “The Agency shall prescribe special detailed technical specifications, named special conditions, for a product, if the related airworthiness code does not contain adequate or appropriate safety standards for the product, because .... Experience from other similar products in service or products having similar design features, has shown that unsafe conditions may develop”.*

*EASA (and before JAA) had systematically considered fan cowl separation constitutes an unsafe condition, for the airframe itself (recent experience has shown that there is hazard from fuel loss and uncontrolled fire), or for third parties (over-flight (?), or to other aircraft if separation occurs and leaves debris on a runway). Airworthiness Directives have been issued when design fixes were available.*

*The issuance of the Special Condition is fully justified from both regulatory and safety points of views. EASA remains committed to subsequently harmonise the corresponding requirement with other foreign authorities, including FAA, TCCA and ANAC.*

*As noted above in the response to another comment, EASA is considering launching a rulemaking tak. However, pending the outcome of this activity, a the proposed Special Condition will be raised on specific project, using a risk based approach, considering previous in-service experience as well as the intrinsic product characteristics, including the visibility on the latching system. The SC should be applied otherwise including to designs offering poor latch visibility, typically wing mounted engines with minimal ground clearance. The criticality of cowl liberation might also be taken into account (for instance, in case of pusher propellers).*

**Comment # [2] – General**

GE’s fleet experience does not indicate that the GE Aviation cowling design criteria are deficient with regard to cowl retention under normal operation, single failures, or inadvertent failure to latch

**Comment :**

The rate and consequences of fan cowl departures in the GE fleet would not meet the Part 39 criteria defining an Unsafe Condition. Compliance with the proposed Special Conditions for properly maintained structure would not have prevented any of the cowl liberation events experienced in the GE fleet in the last 10 years.

***EASA response:***

*Not accepted. Fan cowl being an airframe part, it is unclear to which designs the commenter is referring. For instance, CFMI is normally associated with GE, and the in-service experience is not in line with the comment above.*

*Events involving nacelle housing 100% GE engines for which a detailed investigation reports have been issued include the 17 March 2000 event in Vancouver involving an A330-200 operated by Canada 3000 (ref. BSTC A00P00400) and the event which occurred on 23 February 2010 at Jersey involving an Embraer 195 operated by Flybe (AAIB bulletin 10/2010). Both examples clearly involve maintenance issues which the proposed Special Condition is addressing.*

-

***Comment # [3] – Special Condition***

Paragraph: 25.1193(f)1 (i) : The historical record shows that fan cowl departure is driven by failure to latch multiple/all latches, not by failure to secure a single latch. This requirement will not reduce the incidence of fan cowl departures.

**Comment :**

The current wording :

*(i) Improper fastening of any single latching, locking, or other retention device, or the failure of single latch or hinge;*

is proposed to be deleted.

***EASA response:***

*Not accepted. Most designs are currently tolerant to the failure of any latch, or to the failure to latch any one latch. The proposed rule is simply translating*

*this design criteria to ensure it is becoming a standard. It is therefore proposed to maintain this fail safe requirement in the Special Condition.*

**Comment # [4] – Special Condition**

Paragraph: 25.1193(f)1 (ii) : The historical role played by undercowl fire, case burnthrough or rupture of pressurized components is minimal; the requirement will not reduce the incidence of fan cowl departures. Requiring robustness to rupture of pressurized components such as engine casings will greatly increase the weight of fan cowls, so that they do much more damage if they impact the airplane.

**Comment :**

The current wording :

*(ii) Engine compartment fire, engine case burnthrough, or rupture of any pressurized components within the nacelle. These conditions will not be considered associated to single latch or hinge structural path loss.*

is proposed to be deleted.

**EASA response:**

*Accepted; this was carried over from the FAA NPRM, but does not fall within the scope of the in-service experience EASA is trying to address.*

**Comment # [5] – Special Condition**

Paragraph: 25.1193(f)3 : It will be difficult for the applicant to predict whether the design provision is “reliable”, since visual observation by multiple qualified ramp personnel is not considered reliable by EASA, according to the statement of issue . GE requests this provision be deleted unless the required reliability can be established and is achievable without negative safety consequences..

**Comment :**

The current wording :

*25.1193(f)(3) Have a reliable means for effectively verifying that the cowling is secured prior to each take-off.*

is proposed to be deleted.

**EASA response:**

*Not accepted. EASA does not fully appreciate the difficulty for an engine manufacturer to address some of the subjectivity associated with aircraft certification issues. The Special Condition is indeed raised to address nacelles for which the latching system does not offer sufficient conspicuity, due to their geometrical characteristics (for instance, latches at the bottom of a large diameter nacelle with minimal ground clearance) or due to their opening mechanism, such as nacelle with cowls showing no or little gap even if latches are not properly engaged and latched. Hence, the commenter proposal to remove what is the core of the proposed Special Condition cannot be accepted.*

**Comment # [6] – Special Condition**

Paragraph: 25.1193(f)(4) : The proposed 25.1193(f)(4) is redundant to 25.1193(f)(1)(i).

**Comment :**

The current wording :

*25.1193(f)(4) Be designed such as any single failure of the most critically loaded latching, locking or retention device should not result in failure of the complete latching system and fan cowl departure, so the remaining latching, locking or retention device shall be able to sustain limit loads as per 25.571(b)*

is proposed to be deleted.

**EASA response:**

*Accepted. §(f)(4) is being deleted.*

**Commenter 5 : Aerospace Industry Association**

**Comment # [1] – General**

Special Conditions normally address novel or unusual features of a particular aircraft design. This Special Condition appears to have wide applicability more akin to that of a formal rule.

**Comment :**

AIA respectfully requests that action contemplated by this proposed Special Condition be issued through the formal EASA process for the issuance of new rules, where its application and implications can be more fully addressed by the industry and by other civil aviation authorities.

***EASA response:***

*Noted. The proposed Special Condition is raised under the provisions of part 21.A.16B(a)(3). In addition, EASA will consider this subject for inclusion in its rulemaking program. EASA intention is to launch a formal rulemaking process; however, it is a long lead time activity and pending its outcome this Special condition will be raised to address the adverse in-service experience.*

**Comment # [2] – General**

AIA agrees with many of its industry members that the increase in latch complexity required by this action has the potential to greatly reduce reliability and could, in fact, have adverse safety consequences.

**Comment :**

Special Condition does not address the most common scenario with fan cowl departures and thus would not achieve its stated safety objective.

***EASA response:***

*Noted. EASA considers that there is no evidence to suggest that the technology required for typical solutions is not available, nor could it be envisioned to be unreliable and therefore not have (unidentified) adverse safety consequences. In the absence of any precise rational supporting why the Special Condition would not achieve its safety objective, any further response is difficult to provide.*

**Comment # [3] – General**

EASA noted in its request for comments in the present action, the FAA issued NPRM 89-25 proposing the introduction of cowl latch retention requirements, including cockpit indication for unclosed latches. While EASA noted that "(t)he final rule was however never published," it does not reference the FAA's published reason for the withdrawal, cited below:

*‘The FAA is involved in eliminating unnecessary differences and harmonizing where practical similar requirements with the JAA and Transport Canada. The FAA finds that including the issues of Notice No. 89-25 within harmonization efforts assigned to ARAC will contribute to a more complete analysis of*

*the issues and will better serve the public interest. We will propose future changes to the Code of Federal Regulations to achieve harmonization through an NPRM with an opportunity for public comment. Therefore, the FAA withdraws Notice No. 89-25, (54 FR 38610) published September 19, 1989.’*

Thus, the FAA concluded that this issue would best be addressed through collaboration and harmonization initiatives and, if necessary, a formal rulemaking process.

**Comment :**

EASA action in this area should be closely coordinated with the U.S. Federal Aviation Administration (FAA) and other international civil aviation authorities to ensure a harmonized approach to this issue. A coordinated discussion of the underlying issues that includes input from manufacturers and civil aviation authorities that have examined engine cowl retention over the years would produce a more effective result and better enhance aircraft safety in the long term.

AIA strongly urges EASA to reconsider its proposed action to issue the above-referenced generic Special Condition. Should EASA decide that action in this area is necessary, it should do so only through the formal EASA rulemaking process and closely coordinate such action with other civil aviation authorities.

***EASA response:***

***Noted; EASA intention is to launch a rulemaking task and harmonisation remaining a priority for EAS, foreign aviation authorities will be involved, including FAA. However, EASA prime concern is also to address quickly unsafe condition. The burden associated with developing fully harmonised requirements is a proven fact; it cannot be a prerequisite as it would delay safety initiative.***