

SUBJECT: **Personal Electronic Devices' (PEDs)' Lithium Battery Fires on the Flight Deck**

REQUIREMENTS incl. Amdt.: CS 25.831, CS 25.851, 25.853, 25.855, 25.857, 25.863, 25.1309, 25.1360, 25.1453(a)(2), 25.1453(b)(1), 25.1501, 25.1541, 25.1581, 25.1585 at Amdt. 26

ASSOCIATED IM/MoC¹: Yes / No

ADVISORY MATERIAL:

Reference Documents: FAA report DOT/FAA/TC-16/37 "Summary of FAA Studies Related to the Hazards Produced by Lithium Cells in Thermal Runaway in Aircraft Cargo Compartments"

INTRODUCTORY NOTE:

The following Special Condition (SC) has been classified as important and as such shall be subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

IDENTIFICATION OF ISSUE:

In recent years, EASA has made significant efforts to address the threat associated to thermal runaways of rechargeable and non-rechargeable lithium batteries that are certified as part of the aircraft design.

Nonetheless, a significant amount of Personal Electronic Devices (PEDs), not included in the configuration of the certified aircraft, are brought on board by crew members, passengers, or as part of the cargo. PEDs are equipment that can consume electrical energy, either provided from internal sources such as batteries (rechargeable or non-rechargeable), or by aircraft power sources. PEDs include but are not limited to mobile phones, tablets, laptop computers, power banks, e-cigarettes and spare batteries.

Transportation of PEDs on Large Aeroplanes is addressed in the EASA Air Ops rules. According to CAT.GEN.MPA.140, "the operator shall not permit any person to use a portable electronic device (PED) that could adversely affect the performance of the aircraft's systems and equipment, and shall take all reasonable measures to prevent such use". Portable EFBs are considered as controlled PEDs (C-PEDs). A 'Controlled portable electronic device (C-PED)' is a PED subject to administrative control by the operator that uses it. This includes tracking the allocation of the devices to specific aircraft or persons and ensuring

¹ In case of SC, the associated Interpretative Material and/or Means of Compliance may be published for awareness only and they are not subject to public consultation.

that no unauthorised changes are made to the hardware, software, or databases. According to AMC1 CAT.GEN.MPA.140, batteries in C-PEDs should meet at least one of the following standards: ETSO-C142a, RTCA DO-311, UL1642, UL 2054, UL 60950-1, IEC 62133.

PEDs powered by lithium batteries are commonly transported on the flight deck of Large Aeroplanes, e.g. electronic flight bags (EFB) or devices carried by the flight crew for personal convenience.

Lithium batteries that power PEDs, including C-PEDs, can go into thermal runaway. A thermal runaway may result in the release of heat, smoke, flames and in some cases in explosion. FAA report DOT/FAA/TC-16/37 shows how a lithium cell in thermal runaway may experience a rapid and uncontrolled temperature rise, with peaks that may exceed 760° C.

The increasing number of lithium batteries contained in PEDs carried by the flight crew on commercial transport aircraft results in a higher risk of in-flight lithium battery fire on the flight deck.

Typical locations for PEDs on the flight deck may be the available stowage compartments or mounting brackets. PEDs lithium batteries may be connected to a power supply unit available on the flight deck, or even to a power bank.

On certain aircraft, the flight deck storage boxes may be located in close proximity to critical systems, such as oxygen lines routed on the flight deck.

In case of a battery/cell thermal runaway, the flight deck would become potentially affected by generation of heat, smoke and flames, as well as by explosions. Additionally, a battery fire affecting critical aircraft systems (e.g. oxygen lines) may be catastrophic.

While CS 25.1585(a)(3) already request that *“Operating procedures must be furnished for –*

...

(3) Emergency procedures for foreseeable but unusual situations in which immediate and precise action by the crew may be expected to substantially reduce the risk of catastrophe”, the existing specifications included in CS-25 do not explicitly address the battery fire risk described above.

EASA has acknowledged that the use of PEDs on the flight deck is a common practice and, to address the risk of PED battery fire on the flight deck, has developed the special conditions and the related means of compliance that are detailed below.

EASA is aware that future evolution of the design of PEDs may have an impact on the risk associated to their use/stowage on the flight deck. This may result in the need to reconsider and update the content of these special conditions and the associated means of compliance.

Considering all the above, the following Special Condition is proposed:

Special Condition**Personal Electronic Devices' (PEDs') Lithium Battery Fires on the Flight Deck**

- 1) The emergency procedures to be followed in case of Personal Electronic Devices (PEDs) lithium battery fire on the flight deck must be specified considering the different threats (i.e. heat, smoke, fire and explosion) associated to a potential PED battery thermal runaway event.
- 2) Adequate training must be specified for the flight- and cabin crew addressing such emergency procedures.
- 3) The emergency equipment required to effectively follow the procedures established to meet above SC 1) must be readily accessible to the flight crew or the cabin crew, as applicable.
- 4) The design of each stowage compartment and each mounting bracket on the flight deck, must be evaluated by means of a fire hazard assessment supported by test evidence to determine its suitability to place or stow PEDs.
- 5) Placards must be installed to allow the identification of stowage locations and mounting brackets inside the flight deck that are determined to be suitable for PED stowage according to above SC 4).

Means of Compliance

The associated Means of Compliance is published for awareness only and is not subject to public consultation.

MOC to SC 1

The emergency procedures required to meet special condition 1) should be included in the AFM and should be developed considering the following guidance:

- a. The PED may be located in the EFB holder or may be in the personal belongings of the flight crew - both cases need to be addressed.
- b. A PED fire on the flight deck could be potentially catastrophic and therefore the emergency procedures should involve either the removal of the PED from the flight deck or placing the PED in a safe stowage that is readily on the flight deck.
- c. The need to use liquids to cool the PED battery as part of the fire-fighting procedure.
- d. The likelihood that cabin crew members can actively participate to the fire-fighting procedure should be evaluated.
- e. The procedure should make clear whether it is required for the aircraft to land as soon as possible.

MOC to SC 3

The emergency procedures that address special condition 1) should foresee the use of emergency equipment (e.g. specific gloves) necessary to move an overheated PED to a defined location on the flight deck or in the passenger cabin. The designated stowage location of such equipment should be within easy reach of each flight crew member.

MOC to SC 4

The hazard assessment required by SC 4) should cover all the consequences of a thermal runaway event, such as for example:

- a. Smoke and toxic gases released from the PED, taking into account the effects of the implementation of the applicable flight deck smoke evacuation procedure.
- b. The need to remove the PED from the flight deck, if applicable.
- c. The consequences of the use of liquids to cool the PED as part of the fire-fighting procedure.
- d. The impact of the battery fire on the physical integrity of stowage boxes or mounting brackets.
- e. The potential for corrosive leakage from the PED battery.

The hazard assessment should be performed considering a representative lithium battery fire in terms of heat, smoke and toxic gases generation. In absence of any other justification, it should be assumed that in a thermal runaway of a representative PED battery temperatures as high as 760° C could be reached and that the event could have a duration of at least 2 minutes. The proximity of critical systems (e.g. oxygen systems, wire bundles, other batteries, etc.) that could be affected by direct flame impingement or heat transfer should be taken into account.

MOC to SC 5

Based on the outcome of the hazard assessment required by special condition 4), it should be determined whether to mark the stowage compartments that are not suitable for PED storage, or, alternatively, to identify the stowage compartments that have been established to be suitable for PED storage. Text such as “Not

Consultation Paper
Special Condition

Doc. No. : SC-G25.1585-01
Issue : 1
Date : 10 December 2021
Proposed Final
Deadline for comments: 22 Jan 2022

suitable for equipment containing lithium battery or *“Suitable for equipment containing lithium battery”* should be used for the marking, or any other equivalent text found acceptable by EASA.