



Safety Information Bulletin

Operations

SIB No.: 2015-19

Issued: 05 October 2015

Subject: Transport of Lithium Batteries as Cargo by Air

Ref. Publications:

- [EASA Safety Information Bulletin \(SIB\) No. 2010-30R1](#).
- (ICAO) Electronic Bulletin (EB) No. 2011/7, dated 15 February 2011.
- [ICAO Document 9284](#), *Technical Instructions for the Safe Transport of Dangerous Goods by Air*.
- [Federal Aviation Administration \(FAA\) Safety Alert for Operators \(SAFO\) 10017](#), dated 08 October 2010.
- [Report](#) of the Third Multidisciplinary Lithium Battery Transport Coordination Meeting, 28 to 30 July 2015, Montreal, Canada.
- Airbus In-Service Information (ISI) 00.00.00182 Transport Of Dangerous Goods, Lithium Batteries (see Appendix 1).
- Boeing guidance to operators, dated 17 July 2015.

Applicability:

- All Operators transporting or intending to transport lithium type¹ batteries as cargo on passenger and/or freighter aircraft.²
- National Aviation Authorities performing oversight of the above mentioned operators.

Description:

Lithium batteries may have been the cause of, or contributed to, uncontrolled fires in cargo that lead to the loss of 3 freighter aircraft between 2006 and 2011.

Subsequently, the [FAA](#) performed tests that led to the decision of the ICAO Dangerous Goods Panel to prohibit the carriage of lithium metal batteries (UN 3090) as cargo on passenger aircraft.

This prohibition does not include lithium metal batteries contained in, or packed with equipment (UN 3091).

Lithium metal batteries can continue to be transported in freighter aircraft, and lithium ion batteries (under UN 3480 and 3481) can be transported as cargo both in freighter and passenger aircraft under the provisions of the Technical Instructions for the Safe Transport of Dangerous Goods by Air.

¹ For the purpose of this SIB, battery/cell types to be considered are both Lithium-ion (Li-ion) and Lithium-metal.

² This SIB does not address lithium batteries carried by passengers or crew members in carry-on or checked baggage, or lithium batteries contained in equipment installed onboard the aircraft.

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The ICCAIA³ has expressed concerns that high density shipments of lithium batteries, even if packed and transported in accordance with the currently applicable Technical Instructions, could originate or contribute to the development of a cargo fire that may exceed the limited capabilities of cargo compartment fire protection systems.

Aircraft manufacturers have recommended to ICAO that appropriate packaging and shipping standards be established to more safely transport lithium ion batteries/cells as cargo on passenger and freighter aircraft. Until that time, the manufacturers recommend that high density shipments of lithium ion batteries/cells should not be allowed as cargo on passenger aircraft. IFALPA⁴ has requested the latter recommendation be extended to freighter aircraft. Both IFALPA and ICCAIA further recommend that appropriate requirements be established to ship lithium metal batteries/cells as cargo in freighter aircraft.

Subsequently, Airbus and Boeing have released information messages addressed to their customers warning them of the potential for a fire involving high density shipments of lithium batteries to exceed the capability of aircraft cargo compartment fire protection systems. Both manufacturers recommended in their notices that operators conduct a safety risk assessment before accepting to carry lithium batteries as cargo⁵.

Tests recently performed by the FAA W. J. Hughes Technical Center (Tech Center) demonstrated that the involvement of a very limited number of lithium batteries/cells in a cargo fire may generate explosions that would compromise the integrity of the cargo liners and/or the rapid decompression panels of large aeroplane cargo compartments.

Such an explosion in a Class C cargo compartment could reduce significantly the effectiveness of the cargo fire suppression system leading to a rapid fire escalation, which would cause a catastrophic event.

Based on further evidence from the FAA Tech Center, it is now essential to develop packaging standards that could limit the involvement of lithium batteries/cells in a cargo fire starting either inside or outside the packaging. The quantity of lithium batteries/cells allowed in each package is to be defined depending on the specific lithium battery/cell type being shipped as well as on their state of charge.

Accordingly, ICAO continues working to find a suitable solution to appropriately address the risks posed by the transport of lithium batteries/cells by air, with the aim of improving the packaging and shipping provisions contained in the Technical Instructions for the Safe Transport of Dangerous Goods by Air.

At this time, the safety concern described in this SIB does not warrant the issuance of a safety measure under Regulation (EU) [965/2012](#), Annex II, ARO.GEN.135(c).

Recommendation(s):

Operators are responsible for the acceptance, loading, and actual transport of dangerous goods in accordance with the Technical Instructions.

Until safer methods of packaging and transporting are established and implemented, EASA strongly recommends that operators, before engaging in the transport of lithium batteries/cells as cargo in passenger or freighter aircraft, conduct a safety risk assessment in order to establish whether the risk is manageable.

Such an assessment should contain information on the types and quantities of lithium batteries/cells being transported, as well as on their state of charge, and consider the very limited capability of aeroplanes cargo compartment fire protection systems to control a lithium battery fire. In performing the assessment, the

³ International Coordination Council for Aerospace Industry Associations (ICCAIA)

⁴ International Federation of Airline Pilot Associations (IFALPA)

⁵ Airbus ISI is attached to this SIB. Contact Boeing to obtain copy of Boeing guidance to operators.

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possibility that lithium batteries/cells may be affected by fires originating from other sources shall be considered.

EASA also recommends National Aviation Authorities to include this element in their oversight programme.

This recommendation comes in addition to the EASA Safety Information Bulletin (SIB) No. 2010-30R1.

Contact(s):

For further information contact the EASA Safety Information Section, Certification Directorate.

E-mail: ADs@easa.europa.eu.

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Appendix 1

WISE

In-Service Information

AIRBUS

TRANSPORT OF DANGEROUS GOODS, LITHIUM BATTERIES

Reference: **00.00.00182** First Issue Date: **24-JUL-2015** Last Publication Date: **24-JUL-2015**

ATA: **00-00**

A/C Type : **A300 ; A300-600 ; A310 ; A318 ;
A319 ; A320 ; A321 ; A330 ; A340 ; A340-500 ;
A340-600 ; A350 ; A380 ; AST**

This ISI article cancels and supersedes Service Information Letter SIL 00-066.

Purpose:

This ISI article is released to provide reference on the practices and documentation related to the carriage of Lithium Batteries as air cargo.

The number of Lithium Batteries carried as part of Airfreight has exponentially grown over the last decades. Lithium Batteries are sensitive Dangerous Goods and may experience Thermal Runaways under certain circumstances. Therefore the probability of having lithium batteries involved in a cargo fire, either as the initiating or as a fuel source, if involved in a fire initiated by other cargo has increased. Globally, several cargo incidents are reported each year where lithium batteries have been involved.

In response to fatal accidents on cargo aircraft, which according to the manifest were transporting lithium batteries, the European Aviation Safety Agency (EASA) published a Safety Information Bulletin (SIB) 2010-30 which in turn refers to a Federal Aviation Administration (FAA) Safety Alert For Operators (SAFO) 10017 covering the precautions to be taken with the transport of lithium batteries by air.

As this issue is related to the operation of the aircraft, target audience of this ISI article includes passenger and cargo operators, freight shippers and forwarders.

Engineering Support

First Issue Date: **24-JUL-2015** Last Publication Date: **24-JUL-2015**

1. Applicability

All aircraft, all models including Airbus Freighter aircraft.

2. Background

2.1 ANALYSIS

Current dangerous goods regulations covering the carriage of lithium batteries do not consider all characteristics of a lithium battery fire. This includes the requirement for packaging to contain the fire and heat, containment of high flammable gases that come from thermal runaway, rapid disassembly of the batteries, the impact of carriage of large quantity of

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Appendix 1

lithium batteries with consequence of fire propagation from one package to another and the limitations of the current fire protection systems.

A growing body of test data has identified that existing cargo compartment fire protection systems certified to EASA CS 25.857 and US CFR Part 25.857 (CS/CFR Part 25) regulations are unable to suppress or contain a fire involving high density of lithium batteries. This results in a reduced time available for safe flight and landing of an aircraft to a diversion airport

It has been shown that the quantity of heat, smoke and fumes produced by a lithium battery fire is significantly greater than that produced by a fire involving general cargo. Furthermore as thermal runaway progresses throughout the packages of batteries in the compartment, the fume and smoke production rate continues to increase.

The key characteristics of lithium battery fires, as against general cargo fires, is the phenomenon of thermal runaway leading to high temperatures and release of electrolyte gases which can create an explosive atmosphere. This can exceed, and render ineffective, the required Halon concentration for fire suppression and other control mechanism. There is the high likelihood of consequential significant structural damage to the aircraft.

Further information on the investigations performed is available on the FAA website: <http://www.fire.tc.faa.gov/systems/Lithium-Batteries>.

2.2 STATUS OF INDUSTRY POSITION

The results of tests completed by the FAA led to the decision of the ICAO Dangerous Goods Panel to prohibit the carriage of lithium metal batteries of all types, as cargo on passenger aircraft from the beginning of 2015.

Proposals now being considered at industry level to mitigate against the risk induced by the carriage of high density packages of Lithium Ion Batteries are being led by the ICCAIA (International Coordination Council of Aerospace Industries Association). The ICCAIA proposals which are under discussion with ICAO on the means to implement, include the recommendation to prohibit the carriage as cargo of high density packages of lithium ion batteries and cells (such as defined by UN3480) on passenger aircraft until such time as safer methods of transport including appropriate packaging and shipping requirements are established and followed.

The proposals are also looking at establishing appropriate packaging and shipping requirements to ensure safer shipment of lithium metal and lithium ion batteries as cargo on freighter aircraft. (Refer to ICAO DGP-WG/15-WP – <http://www.icao.int/safety/DangerousGoods/DGPWG15/DGPWG.15.WP.004.5.en.pdf> released on 10 March 2015).

3. Recommendation

The following guidance relating to the shipping of Lithium Batteries is available:

3.1 AUTHORITIES' DOCUMENTATION:

- European Aviation Safety Agency (EASA) Safety Information Bulletin (SIB) 2010-30R1
- Federal Aviation Administration (FAA) Safety Alert For Operators (SAFO) 10017
- Civil Aviation Authority (CAA) Flight Operations Communication FODCOM 30/2010

All documents are available on the internet or can be requested from the applicable airworthiness authority.

3.2 GENERAL GUIDANCE WITH REGARDS TO THE TRANSPORT OF DANGEROUS GOODS

The transport of dangerous goods (also known as hazardous goods) in passenger and cargo aircraft is regulated by the ICAO, "Technical Instructions for the Safe Transport of Dangerous Goods" and the IATA "Dangerous Goods Regulations (DGR)". These documents are updated on a yearly basis. Airbus advises cargo operators and shippers to consult the last validated edition of this documentation as the binding reference. They provide, amongst other things, the identification code for the goods to be transported (UN number), special provisions for the packaging of the goods and a list of national airworthiness authorities for dangerous goods transport. It has to be noted that the IATA Dangerous Goods Regulations fully comply with the ICAO regulations.

Furthermore additional regulations from national aviation authorities may apply to the carriage of Lithium batteries, and these shall also be considered.

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Appendix 1

AIRBUS POSITION

Airbus is not in a position to provide recommendations on the transport of Dangerous Goods including Lithium Batteries, considering that:

- The sole responsibility for the preparation of the shipments of dangerous goods lies with the shipper/operator.
- The responsibility for the acceptance, loading and the actual transport of dangerous goods is with the operator.

Regarding the carriage of high quantities of lithium batteries as cargo, Airbus recommends that operators conduct a full risk assessment, taking into account factors such as industry available information and guidance. The assessment should consider other mitigating factors, for example but not exhaustive:

- The quantity and density of lithium battery shipment
- The type of lithium batteries to be shipped
- The separating of lithium battery shipments into smaller and separated groupings to minimize the size of a potential battery fire
- Who the supplier/shipper of lithium batteries is and their quality control
- The identification and notification of all shipments of lithium batteries (especially Section II)
- Accepting only lithium battery shipments that comply with applicable regulations (ICAO and/or local regulations)
- Provision of customer education materials to increase awareness on the safe shipping of lithium batteries and to minimize undeclared battery shipments
- Training and education of employees regarding regulations, handling procedures, the dangers of mishandling, and methods to identify lithium battery shipments
- The capabilities of the aircraft cargo compartment in which the batteries are to be carried.
- Use of the most efficient means that are available for containment of Lithium Battery fires.
- Consideration of the routing of the flight, and location of nearest diversionary airfield.
- The likely location of the pallets/containers in the cargo hold, and their proximity to key aircraft systems, such as Gaseous Oxygen systems and Additional Center Tanks
- Segregation of any lithium battery shipments from other dangerous goods that present a fire hazard (e.g. Class 3 flammable liquid shipments) to minimize the effects of a lithium battery fire and the potential for involving lithium batteries in adjacent cargo fire events
- Potential sources of ignition within the cargo compartment.
- Consider establishing a policy to notify the flight crew of all lithium battery shipments (including exempted shipments, Section II) so the flight crew is aware of the potential hazard.

Attention should also be given to latest information released through Airworthiness Authorities

4. Way forward

Airbus is working together with industry partners, but also with ICAO and other regulatory bodies to find proper mitigation means for the safe shipment of lithium battery as cargo. At industry level the focus is on developing a performance packaging standards for safe battery shipment.

For the future, new storage energy devices (e.g. fuel cells, ...) should also be considered by a risk assessment which has the aircraft limitations in mind, before getting transported as cargo by air.

5. Procurement information

- Orders for the ICAO and IATA documents should be made at the following addresses:
ICAO, Reproduction, Sales and External Distribution Services (RSED)
999 University Street, Montréal, Quebec H3C 5H7, Canada

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Appendix 1

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6. Correspondence

For availability of the mentioned Airbus manuals, operators and interested third parties are requested to contact AIRBUS by using TechRequest tool (within AirbusWorld portal).

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