IATA Lithium Battery Workshop

29 – 30 October, Amsterdam, Netherlands
Thank you to all our sponsors!
Day 1 Summary & Chairman Remarks

Geoff Leach
Director
DG Office UK
Shipper’s Responsibility
Group Exercise

What is the shipper stating when they sign the Shipper’s Declaration?

What is enough due diligence for a shipper?
What Are You Signing for?

INSTRUCTIONS:

Each table has a packing instruction. One of:

UN 3480 Section IA, UN 3480 Section IB, UN 3481 Section I PI 966, UN 3481 Section I PI 967, UN 3090 Section IA, UN 3090 Section IB, UN 3091 Section I PI 969, or UN 3091 Section I PI 970.

Identify all your responsibilities when signing the Shipper’s Declaration for your shipment.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.

Name of Signatory

Date

Signature

(See warning above)

Breakout: 20 minutes
Present: 5 minutes
I Hereby Declare That:

1. Any state and operator specific requirements have been complied with
2. Information was provided to staff involved in preparation of shipment
3. Training was provided to staff involved in preparation of shipment
4. All lithium cells and batteries are correctly classified and:
   5. Have passed the UN Tests and Criteria Manual 38.3 tests
   6. Are protected against violent rupture (Section I / IA only)
   7. Are equipped with a means of protection against external short circuit (Section I / IA only)
   8. Are equipped with a means to prevent reverse current flow (Section I / IA only)
   9. Are manufactured under a quality management programme
I Hereby Declare That:

10. The test summary is available (from 1 January 2020)
11. All Special Provisions have been complied with
12. Packing requirements for the type of packaging have been complied with
13. Only packagings permitted by the Packing Instruction have been used
14. Cells and batteries are in inner packagings that completely enclose them
15. Packaging capable of withstanding the normal conditions of transport
16. Adequate cushioning material have been used
I Hereby Declare That:

17. UN spec packaging meets PG II requirements (Packing Instruction 965, 966, 968, 970)

18. UN spec packaging is being used in the manner intended (i.e. as tested) (Packing Instruction 965, 966, 968 and 969)

19. Packagings (and package) are capable of meeting a 1.2 m drop test (Packing Instruction 965 / 968 Section IB)

20. Outer packagings are strong and rigid (Packing Instruction 965 and 968 Section IB)

21. Lithium metal batteries and cells are packed in non-combustible cushioning material in a rigid metal intermediate or outer packaging (Packing Instruction 969 Section I)
I Hereby Declare That:

22. Overpacks / packages do not contain other incompatible dangerous goods
23. Quantity limits have not been exceeded
24. Number of cells or batteries in each package does not exceed the number required for the equipment’s operation plus two spare sets of cells or batteries (Packing Instruction 966 and 969)
25. Equipment is protected against inadvertent operation (Packing Instruction 967 and 970)
26. Batteries are protected against short circuit
27. UN spec packagings are marked appropriately
I Hereby Declare That:

28. All required marks are applied and are:
   29. In the correct location
   30. Not obscured
   31. Not reduced in effectiveness by other words
   32. Durable
   33. Able to withstand open weather exposure
   34. Displayed on a contrasting background

35. Only marks and labels of the correct specification have been used

36. Appropriate labels have been affixed
I Hereby Declare That:

37. Irrelevant marks and labels have been removed
38. Overpacks are correctly marked and labelled (if applicable)
39. The transport document (shipper’s declaration) has been completed correctly
40. The air waybill contains the required information; and
41. For PI 965, IA and IB that the lithium ion cells or batteries are at no more than 30% SoC.
Networking break 10:30 – 11:00

Kindly sponsored by;
Safety Risk Assessment
A case study on preventative mitigations

Edwin Boon
Safety Compliance Manager
KLM Cargo
The 5 Compliance Commitments
Lithium Battery Workshop

Ed Boon
Safety Compliance Manager, KLM Cargo
Risk management in aviation

Doc 9859
Safety Management Manual
Fourth Edition, 2018

Doc 9284
Technical Instructions for the Safe Transport of Dangerous Goods by Air
2019-2020 Edition

International Civil Aviation Organization

Air France KLM Martinair Cargo

Freight made personal
Operator safety risk assessment

DGP/27 – WP/22

1.5 The work of the FLTOPCS-SG resulted in the document cargo compartment safety for Annex 6 as well as associated guidance material proposed for inclusion in a new document (Doc 10102 — Guidance for Safe Operations of Aeroplane Cargo Compartments). It is expected that the change to Annex 6 to add Chapter 15 will be adopted by Council later this year with an applicability date of 5 November 2020.

1.6 Paragraph 15.1.1 of Chapter 15 includes the following: “The State of the operator shall ensure that the Operator establishes policy and procedures for the transport of items in the cargo compartment which include the conduct of a specific safety risk assessment.”

• ICAO Technical Instructions mentions 164 “assessments”
• 3 are “safety risk assessments”
• ALL are about the operator

1.7 CONDUCTING SAFETY RISK ASSESSMENTS

Operators engaged in commercial air transport operations should include a safety risk assessment process for the transport of dangerous goods as part of their approved safety management system to comply with Annexes 6 — Operation of Aircraft and 19. This safety risk assessment should include appropriate information to result in implementation of safety measures that ensure the safe transport of dangerous goods including lithium batteries and cells as cargo.

ICAO doc. 9284 Ch.1 / 7-1-3

Warsaw Convention 1929 + Montreal Convention 1999

Shipper Responsibilities

Art. 6. ....... to meet the formalities of customs, police and similar public authorities, shall deliver a document indicating the nature of the cargo.

Art. 16.1: The Shipper is responsible for the correctness of the particulars and statements relating to the cargo, ....

Art. 16.1: The shipper must furnish such information and such documents as are necessary to meet the formalities of customs, police and any other public authorities before the cargo can be delivered to the consignee.

Airline Responsibilities

Art. 6. This provision creates for the carrier no duty, obligation or liability resulting therefrom

Art. 16.2: The carrier is under no obligation to enquire into the correctness or sufficiency of such information or documents.

IATA-ACOPS Industry conf. 30oct 2019 – Efficiencies. By KLM
Risk methodologies

- Hazard finding
- Risk analysis
- Risk assessment
- Risk mitigation
KLM risk analysis scheme

Service Delivery
- Environmental Safety
- Operational Safety
- Operational Security

Identification
- Changes
- Reports
- Non Compliance
- Occurrence

Prioritization
- Predictive
- Proactive
- Reactive

Analysis (SIRA)
- SI Safety Issue
- RA Risk Analysis

Assessment
- Risk Assessment
- Risk Mitigation
- Risk Acceptance

All collected safety data:
- Categorized
- ERC values

Safety Promotion & Assurance

Performance Monitoring

ERC

Risk Register
What keeps you awake at night?

Five compliance commitments:

• We know what we transport
• Catch discrepancies as early as possible
• No! … means NO!
• Prepare for continuous change
• Integrate & innovate
We (need to) know what we transport!

Common hazards:

- Ambiguous shipment commodity descriptions
- e-Commerce
- Mail / Hybrid solutions
- Counterfeit
- Undeclared / misdeclared
- Poor quality manufactured batteries
When we **don’t** know what we transport!

- Cargo appearing as mail
- Intended to become mail after arrival at AWB destination
- UN3481 on the LB mark
- UN3480 inside (unmarked)
Actions: Level 1 inspection

Immediate actions taken:
• Report filed to CAAC
• Auditor on the scene within 48 hours
• Closed station for all freight containing electronics and batteries
• Warehouse inspection and supply chain survey with local KLM staff and GHA staff
Join up with security
Initial intervention

- In concert with security provider started 100% "piece level screening"
- Security staff operating scanner is also trained on DG
- Additional instruction to look for anomalies and apparent difference in AWB commodity data and scanner image

- 100% piece level screening
- Search for blue images with battery shape appearance
- Scan these images searching for:
  - Loose batteries (no equipment in vicinity)
  - Batteries that appear similar by shape and seem packed together
- Stop suspect shipments
- Open and search packages and intercept:
  - Batteries WITHOUT equipment (UN3480 and UN3090)
  - Loose batteries
  - When possible, check the "state of charge" of batteries without equipment (powerbanks may have a capacity display indicating the state of charge)
  - Intercept UN3481 and 3091 >100 Wh capacity, unless they are declared with a Dangerous Goods Declaration
  - Packages containing lithium batteries that have no markings as per IATA DGR
Building a trusted supply chain

Long term strategy on solving the larger problem

• Initiated program to release customers (i.e. freight forwarders) based on risk profile
• Full alignment/integration with local security but on forwarder level
• Large amount on shipper built ULD’s causes need to implement at forwarder level
• Specific attention to co-loading
• Additional focus on data!!!
It is a common problem!

- Other EU airline warehouse
- Same appearance
- Same destination
- Same shipper
The duty to investigate

For this we need; data, data, data . . .

- eDGD
- DG Autocheck
  but also;
- Shipper / forwarder information
- Network and routing information

AND

Harmonized Commodity Description and Coding System (HS-codes)

8506 50
Catch discrepancies as early as possible
No! . . . means NO!

Today’s supply chain complexity is huge:

• Embargo
• Complex networks / partners / alliances / interline
• Operator variations
• OK2FWD procedures
• Local restrictions
• Export certificates
• Transit permits
• Etc.
Using available industry solutions?

**Cargo XML messaging**

- Customs Status Notification
- Via XML messaging
- Stop shipment at Ground Handler *at origin*
- Shipment unable to move until issue resolved
Prepare for continuous change

Role of the authority

Maintaining safety becomes increasingly difficult for a single entity in the supply chain (the operator)

- Ensuring flight safety remains with the operator
- Authority reaction to threat remains; increase regulations
- Mitigation measures for operators are still largely at the “right” side of the bow-tie
- A supply chain approach is needed to move to the left
Integrate (& innovate)

Integration of supply chain solutions could be effective:

https://www.cpsc.gov/Recalls
Safety Risk Assessment
Control Mitigations

Christophe Requile
Coordinator Standards
Cargolux
Operational mitigation solution for the carriage of lithium batteries

Christophe Requile

IATA LIBAT Workshop Amsterdam OCT 19
Founded in March 1970: over 45 years of experience in all-cargo services

Operating a modern and energy-efficient fleet of 30 aircraft (Boeing 747F)

2,027 employees worldwide (incl. Cargolux Italia)
1,436 employees in Luxembourg

Dual Hub Strategy with Zhengzhou Airport initiated in 2014

→ Europe’s #1 all cargo carrier, #5 worldwide
• Halon system is not enough to stop a Lithium Battery fire!
  o “Fire suppression agent: the current fire suppression systems for class C cargo compartments use Halon 1301. Halon 1301 is not expected nor designed to fully extinguish an aircraft fire. It is designed to suppress a fire, reducing the heat and energy intensity of the fire and to prevent re-ignition of the suppressed fire, to allow the aircraft to safely land at the nearest suitable airport. Halon is not effective for any type of metal fire, resulting in very limited effect for fires involving lithium metal batteries. Halon also has limited effectiveness on a lithium ion battery fire. This agent is not able to stop/prevent lithium ion- and lithium metal battery thermal runaway, nor does it prevent propagation of thermal runaway from one cell to the next.”
    - Dangerous Goods Panel (DGP) working group meeting, May 2015, Montreal

• 18 minutes to land once the fire has started
Result:
CV03/CV04
Full ban on UN3480/3090 in 2015
Multi-layered approach: additional barrier required

New set up to ensure compliance with the regulations

Development of the Fire Containment Cover
Complying with the regulation: A real challenge
As per IATA DG regulation:

3.9.2.6.1 Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form must be assigned to UN 3090, UN 3091, UN 3480, or UN 3481, as appropriate. They may be transported under these entries if they meet the following provisions:

(a) each cell or battery is of the type proved to meet the requirements of each test of the UN Manual of Tests and Criteria, Part III, subsection 38.3. Cells and batteries manufactured according to a type meeting the requirements of subsection 38.3 of the UN Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in these Regulations. Cell and battery types only meeting the requirements of the UN Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled.

Note:
Batteries, including those which have been refurbished or otherwise altered, must be of a type proved to meet the testing requirements of the Manual of Tests and Criteria, Part III, subsection 38.3, irrespective of whether the cells of which they are composed are of a tested type.

(b) each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to transport;

(c) each cell and battery is equipped with an effective means of preventing external short circuits;

(d) each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);

(e) cells and batteries must be manufactured under a quality management program that includes:

1. a description of the organizational structure and responsibilities of personnel with regard to design and product quality;
2. the relevant inspection and test, quality control, quality assurance and process operation instructions that will be used;
3. process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;
4. quality records, such as inspection reports, test data, calibration data and certificates. Test data must be kept and made available to the appropriate national authority upon request;
5. management reviews to ensure the effective operation of the quality management programme;
6. a process for control of documents and their revision;
7. a means for control of cells or batteries that are not conforming to the type tested as mentioned in (a) above;
8. training programmes and qualification procedures for relevant personnel; and
9. procedures to ensure that there is no damage to the final product.

Note:
In house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in 1. to 9. above must be properly recorded and traceable. A copy of the quality management programme must be made available to the appropriate national authority upon request.
Ensuring compliance

Shipper/Forwarder

Battery manufacturer

Airline validation
Ensuring compliance

- Manufacturer: UN38.3, QMS
- Shipper: DGD, UN38.3, QMS
- Forwarder: AWB, DGD, UN38.3, QMS
- Airline validation
TRACEABILITY IS KEY
Proactive & reactive barriers
• Specific training provided to staff at selected gateways.

• Ground Engineer specifically trained to analyze UN38.3 and QMS documentation.

• DG specialists gathering all documentation from booking staff and ensuring the batteries are approved.
• Electronic Cargolux Regulations

• Online tool accessible for the whole network

• All procedures gathered into one portal
CV conducted a comprehensive Safety Risk Assessment to identify the hazards, determine the level of risk and explore potential solutions.

3 actions:

1. Containing
2. Extinguishing
3. Cooling
The fire was fully contained and developed very slowly due to oxygen starvation by the FCC and cooling by the gel packs. It was totally extinguished by the gel in less than 12 hours.
Overview

- No interline accepted
- Batteries
- Tested as per UN38.3
- Manufactured under a quality management system

Booking

Acceptance
- No ULD in SBU accepted
- Documents checked
- Packages checked for damages

Build-Up
- Packages checked for damages
- Apply segregation rule
- Deploy FCC and gel

Loading
- ULD inspected for damage

Flight
- FCC
- Diversion
- Oxygen Mask and EVAS
We challenge our clients to ensure compliance with the regulations and avoid counterfeits batteries.

But UN38.3 and Quality Management System are not well known amongst the supply chain.

Neither the forwarder, nor the shipper are battery specialists.

Battery manufacturers not yet accustomed to share these information:
- “Why would you need our QMS?”

QMS only guarantees the battery was safe when it was new!
Lithium batteries in Airmail
• UPU published a list of Postal Operators allowed to accept UN3481 in airmail

• Postal Operators must obtain prior approval from the Civil Aviation of the country where the Airmail is accepted

What is safer? Approved or non Approved? Does it make a difference?

Acceptance process not harmonized

Screening process not guaranteed by Postal operators
Reaching out to the industry

- Represented at the IATA Air Mail Board
- Creation of the IATA Air Mail Safety working group
  - Reviewing existing regulation
  - Share safety initiatives and outcome
  - Reach out to regulator with proposal for improvement

The current state of the Postal safety is not up to airline standards

Relying solely on airport screening capabilities is no acceptable
Lithium Batteries in Ecommerce
“He (Glyn Hughes, IATA Global Head of Cargo) showed a scanned AWB for a Philippine Airlines consignment of leather cases, chargers and screen protectors, which clearly stated “no batteries, no magnets”. In fact, the shipment contained thousands (300 boxes, weighing six tonnes) of lithium batteries, which were not packed properly, labelled or declared. Fortunately the shipment was discovered smoking in a warehouse before loading.”
<table>
<thead>
<tr>
<th>Nature and Quantity of Goods (incl. Dimensions or Volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E PACKETS</td>
</tr>
</tbody>
</table>

- So many different commodities, does not fit on AWB

- “Guidelines on acceptable and unacceptable terms for the description of goods for exit and entry summary declarations.” from EU commission

- DGR 2.2.2 “**Hidden dangerous goods**: Cargo Declared under a general description may contain hazardous articles that are not apparent”
Commodities?
• **We **MUST** know what we are transporting**

  • List of suspicious commodities available online.
    ➢ Triggers challenging questions at booking

  • Generic description of the goods = **no go!**

• Cargo aimed at being transformed into Mail at later stage?
  ➢ must **provide detailed list of commodities!**

• Systematic X-ray screening at critical Ecommerce gateways
Carriers have implemented pro-active barriers to ensure batteries were not counterfeit and reactive barriers to maintain a lithium fire under control.

- Limit of an FCC is about Watt Hour Rating
- LIBAT in cargo are in KG and section IA/IB/II

Legitimate manufacturers, shippers and forwarders are doing their best to comply with airlines’ increasing requirements

- Were they the initial target when drafting these processes?
- Aren’t we “punishing” the wrong stakeholders?
1. Lithium batteries are still not easily detected by X-ray machines

2. Relying solely on Airport and Airlines is not acceptable

3. Postal/Cargo hybrids are by-passing most safety barriers
   - How are CAAs monitoring their Postal Operator?
   - General commodity description must be stopped by carriers
   - Handling of airmail/Hybrids is not suitable for Dangerous Goods

4. “Trust the shipper”
   - But who is the shipper?
As an industry, we should focus on undeclared Dangerous Goods instead of hammering legitimate stakeholders with additional requirements.

Carriers/Operators cannot tackle this on their own, we need the whole supply chain to analyze the gaps and to provide solutions.
Ecommerce, Postal/cargo hybrids and BUPs are the critical areas of risk.

Risk mitigation is the whole supply chain responsibility, not just the carrier/GHA.
Thank you!
Networking Lunch 12:30 – 14:00

Kindly sponsored by;

iSHARE
Where are we with test standards for fire-resistant containment covers / fire containment bags?

**Moderator:**
Candy Chan  
Manager Dangerous Goods Standards  
IATA

**Panelists:**
Tharindu Senanayaka,  
Business Unit Manager Cargo, Amsafe Bridport

Peter Chittenden,  Cabin Safety Expert, EASA

Kim Melville,  Senior Director Global Airside and Standards,  
Head of Safety, DHL Express
What are the current standards?

SAE AS6278, ISO 19281:2016

Tested with Class A fire

Developed for Class B, E, F cargo compartments
What are the current standards?

SAE AS6453, TSO C203, TSO C90e

Tested with Class A fire

Developed for Class B, E, F cargo compartments
FIRE CONTAINMENT SOLUTIONS – R&D AND TESTING

Tharindu Senanayake
30th October, 2019
INTRODUCTION

The Specialist in Aviation Restraint and Safety Technology products including

- Tarian® Armour System
- 9G aircraft barrier nets, with smoke/thermal protection
- Fire containment products

- Tier 1 supplier to Airbus, Boeing, etc.
- World leader in cargo restraint equipment
- Leading supplier to Defence forces worldwide
WHY IS FIRE CONTAINMENT A REQUIREMENT?

Declared Li-ion Bulk Shipments

- Flammable gas release
- Even at 30% SOC, a 2600mAh 18650 battery cell releases 1.5 liters of flammable gas

Undeclared Li-ion content

- Rechargeable device sales rising
- Cross Border E-Commerce rising
- Increase in individual shipments
- DG shipments are complex and expensive
- Risk of fires that cannot be stopped by existing Halon systems
WHAT IS FCC/ FRC ETC.? WHAT IS THE OPTIMUM SOLUTION?

- **FCC** – Fire Containment Cover (for palletized loads)
- **FRC** – Fire Resistant Container (for ULD containers)
- **FCB** – Fire Containment Bag
- **CFCC** – Container Fire Containment Cover (used over ULD containers)

Developed as a solution to UDG, Lithium battery shipments, mobile electronics (10+ years at ASB)

- **TSO-C203** certified (FAA/EASA) and meets SAE AS6453 & ISO 14186 requirements

- **FRC** – ISO 19281 released, AS8992 WIP

\[\text{Tested with Class ‘A’ fire & Lithium-ion battery fire}\]

- **Palletized main deck cargo** – Class E & B (optional for Class C and other compartments)

- **Extensive trials & testing fed back into design**

- **Already in revenue service and trials**
  (UPS, LH, Blue Dart, Cathay Pacific, DHL, etc.)
FCC LITHIUM-ION FIRE TESTS

**AmSafe Bridport (INTERNAL) TEST**
- Test spec defined by Operator and ASB
- FCC dimensions 125” x 96” x 96” height
- Qty of 1,500 Lithium-ion batteries
- 18650 type cells – 2600mAh, 3.7V, SOC 70%-90%
- Battery boxes placed in 3 positions
- Result: **PASS**
  - All batteries vented
  - No external flames beyond limits
  - Peak temperatures measured 4” away below 204°C (400°F)

**FAA (EXTERNAL) TEST**
- Test method defined by FAA (no standardised test)
- FCC dimensions 125” x 96” x 96” height
- Qty of 1,000 Lithium-ion batteries
- 18650 type cells – 3000mAh, 3.7V, SOC 30%-40%
- Battery boxes placed in 1 position, pallet corner
- Result: **FAIL**
  - Batteries escaped confines of FCC / pallet
  - All batteries vented
  - No external flames beyond limits
  - Peak temperatures measured 4” away below 204°C (400°F)
FCC MIXED CLASS LOAD FIRE TEST (INTERNAL)

- FCC solution for OEM aircraft conversion project. Test method defined by OEM and FAA, and test witnessed by FAA-DER.
- FCC dimensions 108” x 88” x 96” height, 463L pallet compatible
- Class A material, Class B flammable fluid (3.75-liter ethanol), Class D (300 lithium-ion batteries)
- Two tests conducted; Damaged and Repaired condition.
- Result: PASS (both tests)
  - No flame penetration / burn-through
  - Peak temperatures measured 4” away below 204°C (400°F)
  - External flames within allowable limits
FIRE CONTAINMENT BAG (FCB)

- A derivative of the FCC, developed for smaller cargo loads
- Uses same technology as FCC, and will contain Class ‘A’ and Lithium-ion fires for up to 6 hours
- Allows smoke to be released, ensuring detection systems continue to activate
- Can be used as an ‘OVERPACK’ at any stage of supply chain
- Enabled airlines to lift battery shipment embargo
- Protected aircraft in real life fire
FCB LITHIUM-ION FIRE TESTS (EXTERNAL)

- Testing conducted by the FAA
- FCB dimensions 24” x 24” x 20”
- Qty of 1,000 Lithium-ion batteries
- 18650 type cells – 3000mAh, 3.7V, SOC 30%-40%
- Load consisted only of batteries
- Result: PASS
  - All batteries vented
  - No external flames
  - No batteries escaped
CONTAINER FIRE CONTAINMENT COVER (CFCC)

- A derivative of the FCC, developed as a solution for use over standard ULD Containers.
- Customizable to all ULD contours.
- Already in revenue service and trials
Test spec defined by Operator and ASB

AKE metal container with metal door, in new condition

Mixed Class Load
- Class A material (36 boxes with shredded paper)
- Class B flammable fluid (2.0-liter ethanol)
- Class D (2,000 lithium-ion batteries)

18650 type cells – 2600mAh, 3.7V, SOC 50%
Result: PASS

- 6 hour fire containment
- >75% of batteries vented
- No flame penetration / burn through
- No external flames
- Peak temps 4” away below 204°C (400°F)
- 4 min 30 sec – initial smoke visible
- Peak internal temp – 548°C (1018°F)
- Side & Door peak temp (4” away) – <34°C (93°F)
- Peak Surface temp – 70°C (158°F)
- Container fire damaged beyond limits
Test spec defined by Operator and ASB

AMJ metal container with fabric door, in used condition

Mixed Class Load
- Class A material (144 boxes with shredded paper)
- Class B flammable fluid (4.0-liter ethanol)
- Class D (5,400 lithium-ion batteries)

18650 type cells – 2600mAh, 3.7V, SOC 50%

FCB with 400 cells, included into test load

Test Plan Revision
- Phase I (4 hours)
- Phase II (‘worst case’ configuration)
  - Open pull flaps
  - Unsealed cover
CFCC MIXED CLASS LOAD FIRE TESTS (AMJ)

Result: **PASS (Phase I)**
- 4 hour fire containment
- No flame penetration / burn through
- No external flames
- Peak temps 4” away below 204°C (400°F)
- 1 min 20 sec – initial smoke visible
- Peak internal temp – 581°C (1078°F)
- Peak external temp – 88°C (190°F)
- Container fire damaged beyond limits
Result: **Phase II**

- +35min test terminated
- >75% of batteries vented
- Fabric failure / burn-through
- External flames
- Battery ejections

- Peak internal temp – 1000°C+ (1832°F)
- Peak external temp – 88°C (190°F)
- Peak temps 4" away above 204°C (400°F)
- FCB compromised & all 400 cells vented
Thank you for your time
DHL EXPRESS — OUR APPROACH TO LITHIUM BATTERIES

Kim Melville - Senior Director Global Airside and Standards

October 2019
1. We have 10 recorded (smoke, Fire, Fumes) SFF shipment incidents in the last 4 years within the DHL Express global transport network, 2 of these were on-board aircraft.

2. In July 2015 DHL Air presented the risks of Smoke, Fire & Fumes (SFF) from cargo at the Inaugural DHL Global Airside Safety Management Conference. This resulted in the formation of a DHL Global SFF Workgroup chaired by Global Airside Department.

3. The DHL Express Global SFF working group now comprises of 16 members from the main DHL Express airlines plus representatives from Global Aviation Risk, DHL Restricted Commodities and the DHL Network Equipment Group.
4. DHL SFF workgroup achievements to date;

- Achieved a cross-airline understanding of the risks presented by modern energy storage devices and developed several mitigation actions, EVAS, Full Face Oxygen masks, Separation of Batteries from Flammables, use of Class ‘C’ Cargo Compartments when available. See Bow-Tie mitigations slide.
- Produced Airline and DHL group Risk Assessments and Risk Registers for routine review & amendment.
- Identified ‘high risk’ DHL Express air routes: HKG-DEL is high risk, large quantities of ACL batteries for phones. Trial commenced for use of FCCs on this sector.
- Established a DHL minimum specification for fire retardant ULD’s (due to lack of industry specifications) introduced 8000+ DHL developed ULD’s with enhanced fire containment design features into service (total global inventory of over 30,000 units ), all new ULD’s will meet this specification.
- Initiated Fire Containment Bag (FCB) trial on the UK-US-UK route lanes from May 2018 for Network assessment of FCB handling. 52 FCBs fully introduced into the AP network to enable movement of PI965s within the region.
- Produce articles and communications on the subject throughout the organisation to highlight the risk and mitigation strategy.
Progressive Safety Mitigation – Bow Tie

Threat

- Incorrectly Accepted Batteries
- Hidden/ Misdeclared Batteries
- Mishandled

Prevention

- DG Technical Instructions
- Staff Training & Awareness
- Only Approved Li Shipper Accounts
- Improved Security Screening for Hidden Li Detection

Hazard

- Cargo Fire

Recovery

- Emergency Vision Assurance Systems
- Full Face Oxygen Masks
- Crew Emergency Training
- Li Segregation From Flammables

Consequence

- Possible Fatality
- Possible Hull Damage
- Possible Cargo Loss

DHL Express | Oct2019
Progressive Safety Mitigation – Bow Tie

Threat
- Incorrectly Accepted Batteries
- Hidden / Misdeclared Batteries
- Mishandled Batteries

Hazard
- Use of ‘Class C’ Aircraft compartments when available
- Deployment of FCC’s & FRC’s
- Definition of Bulk & Volume?

Prevention

Recovery
- Possible Fatality
- Possible Hull Damage
- Possible Cargo Loss

Consequence
Fire Containment Bags (FCBs)

- 52 AmSafe FCBs deployed into the AP region after initial trials on the US-EU transatlantic sector and further trials within the AP Network proved successful.

- FCC’s initially trialled on HKG-DEL sectors however further trials are required before a decision can be made on operational viability of the FCC.

- FCBs are a mixture of 0.5m³ or 1m³ in volumetric capacity so only capable of transporting relatively small numbers of small shipments.
Enhanced Fire Resistant Containers

• All new containers purchased by DHL will have enhanced fire resistant properties implemented as standard.

• Enhanced properties are designed to restrict the inflow of oxygen into the container so as to starve the fire of fuel (oxygen).

• Proven to contain a full scale Class A (paper based) fire.

• Next focus area is to look at active fire suppression within the container.
THANK YOU
IATA Lithium Battery Workshop
Amsterdam 29 to 30 October, 2019

Fire Containment Covers/Fire Resistant Containers/Fire Resistant Bags

Peter Chittenden
EASA
Certification Directorate
ICAO has prohibited transport of lithium batteries as cargo on passenger aircraft until controls are put into place which establish an acceptable level of safety.

Performance-based packaging standard is identified as one such control & SAE G27 committee has been working since February 2016.

EASA and European Commission initiated SABATAIR project to input into G27 work, support development of battery transport safety risk assessment approaches, and to identify/assess additional mitigating measures.

External fire threat is identified as additional risk that needs addressing.

Considerations in work. G27 package itself might provide protection in some cases, or perhaps use of FCC/FRC/FRB meeting additional requirements.
Thank You
E-Commerce and Mail
A Risk or Opportunity?

Moderator:
Bart Pouwels
Head of Cargo
Amsterdam Schiphol Airport

Panelists:
Dawn Wilkes, Security Program Manager, UPU
Alex McCulloch,
International Standards Dangerous Goods Manager, UPS
James Wyatt, General Manager, aeroconcept
Networking break 15:30 – 16:00

Kindly sponsored by;

[Logo of Viking, Packing Specialist]
Q & A Session
Questions

➢ Lithium Batteries Risk Mitigation - Prevention Controls - Future Development
Questions

➢ Lithium Batteries Risk Mitigation - Prevention Controls - Future Development

➢ How to transport defective lithium power banks from consumers (consumer complaints) back to manufacturer?
Questions

➢ Lithium Batteries Risk Mitigation - Prevention Controls - Future Development

➢ How to transport defective lithium power banks from consumers (consumer complaints) back to manufacturer?

➢ What are airlines and freight forwarders going to do to ensure that lithium cell and battery manufacturers have made available the Lithium Battery Test Summary Document?
Questions

➢ What obligation do lithium battery powered product manufacturers have to verify that the Lithium Battery Test Summary Document is available?
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➢ Has there been any further consideration of defining a consignment related to application of P967?
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➢ Has there been any further consideration of defining a consignment related to application of P967?

➢ When will there be separate UN numbers for lithium batteries contained in equipment and shipped with equipment?
Questions

➢ The transport of e-commerce shipments that are sent in so-called postal shipments under the exception of UN3481 Lithium ion batteries in equipment. It has been established that UN3481 Lithium ion batteries with equipment and also frequent power banks falling under UN3480 Lithium ion batteries are also sent in the bags in question. These bags were sent on PAX. Also is the question when is the shipment in a mail bag actually mail? Is that only from DPO to DPO?
Thank you

David Brennan
brennand@iata.org
www.iata.org/dangerousgoods
Closing Remarks

Geoff Leach
Director
DG Office UK
IATA CARGO EVENTS

6 – 8 October 2020
Manchester, UK

Save the date!
Thank you to all our sponsors!