



**FedEx Express Shipping
Requirements and Safety Mitigation
International Battery Seminar and
Exhibit**

**T J Leech, Manager Dangerous
Goods FedEx Express**

March 21, 2017

FedEx Express Expectations and Requirements

- Follow IATA Dangerous Goods Regulations for Shipping Lithium Cells and Batteries
- Air
 - UN 3480/3090: Section 1A/IB Lithium Cells and Batteries - FedEx no longer accepts UN 3480/3090 Section II batteries (1/1/17)
 - All UN 3090 Lithium Metal Batteries (standalone) – Must be pre-approved by FedEx Express (FX-05)
 - UN 3481/3091, Section II batteries must include UN number adjacent to lithium battery label/markings on 7/1/17 (FX-05)
- U.S. Regulations (49 CFR Harmonized with IATA Regulations)
 - PHMSA harmonization delayed, however use of new markings, labels, etc. allowed without enforcement



Requirements

- International Declaration for Non-Dangerous Goods (Customs Clearance in some countries)
- New restrictions: Passenger airlines no longer allow transport of standalone batteries (impacts FedEx interline ability to many locations)
- IATA Special Provision A154: Defective batteries for safety reasons, or damaged batteries are forbidden for transport (Samsung Note 7)
- Logging devices (temperature recorders, etc., accepted without lithium battery marking/labeling)
- Hoverboards with batteries installed are accepted as UN 3171 battery powered vehicle in original packaging only.

SHIPPER'S DECLARATION FOR ARTICLES NOT DESIGNATED AS DANGEROUS GOODS
Batteries contained in this shipment falls under the scope of Special Provisions ADR/IMDG (SP 188) or Packing Instructions IATA (P1 965 to 970)

SHIPPER	AIRWAYBILL N°
CONSIGNEE	CARRIER FEDEX
This package contains Lithium cells or batteries in the following configuration (Tick only one box):	
<input checked="" type="checkbox"/> Lithium Ion - Maximum of * 20 Watt-hours per cell; and * 100 Watt-hours per battery <input type="checkbox"/> Cells or batteries ONLY (ICAO/IATA UN3480, PI965, Section II) - Cells or batteries in a package, without electronic equipment <input type="checkbox"/> Packed WITH EQUIPMENT (ICAO/IATA UN3481, PI966, Section II) - Cells or batteries contained in a package with associated electronic equipment <input type="checkbox"/> Contained IN EQUIPMENT (ICAO/IATA UN3481, PI967, Section II) - Cells or batteries installed in equipment	<input checked="" type="checkbox"/> Lithium Metal- Maximum of * 1 gram of lithium metal per cell; and * 2 grams of lithium per battery <input type="checkbox"/> Cells or batteries ONLY (ICAO/IATA UN3090, PI968, Section II) - Cells or batteries in a package, without electronic equipment <input type="checkbox"/> Packed WITH EQUIPMENT (ICAO/IATA UN3091, PI969, Section II) - Cells or batteries contained in a package with associated battery-powered equipment- with the batteries not installed in the equipment <input type="checkbox"/> Contained IN EQUIPMENT (ICAO/IATA UN3091, PI970, Section II) - Cells or batteries installed in equipment
• This consignment does not contain any defective batteries for safety reasons • This package must be handled with care. A flammability hazard exists if the package is damaged. • If this package is damaged in transportation, it must not be loaded until the condition of the contents can be verified. The batteries contained in this package must be inspected for damage and may only be repacked if they are intact and protected against short circuits. • For more information about the batteries contained in this package, call the following telephone number: Contact phone Number: +	
I hereby declare that the contents of this consignment despite the product name and appearance, are exempted from designation as Dangerous Goods restricted for air transportation according to the applicable international and national government regulations.	Name: Export Date: Signature

Fedex/Comlift CDG/
Version 2 - 20/09/2012

Training

- Each person involved in shipping and/or handling dangerous goods must be trained
- Recurrent training must occur every two years. Exception: In the U.S., the Department of Transportation (DOT), as competent authority, allows training for shippers every three years.
- Dangerous Goods Seminar Support: Connie Snow (cpsnow@fedex.com). Training: <http://www.fedex.com/us/hazardous-materials/training/index.html>
- FedEx/Labelmaster “Lithium Battery Advisor” On-line (coming June 2017)



Aircraft Safety Technology



FY14 Improvements & Updates

1	Checklist/Quick Reference Handbook (QRH)/Minimum Equipment List (MEL) Review/Update
2	Pilot/Human Factors Analysis & Classification System (HFACS)
3	Head Up Display/Enhanced Flight Vision System (HUD/EFVS)
4	Emergency Vision Assurance System (EVAS)
5	Electronic Flight Bag (EFB) / iPad
6	Carbon Dioxide (CO ²) Monitors
7	Automated External Defibrillator (AED)
8	Container Mods
9	Fire Containment Cover
10	Fire Suppression System (FSS)

FY13 and Earlier Improvements & Updates

11	Traffic Collision Avoidance System (TCAS)	14	Enhanced Ground Proximity Warning System (EGPWS)
12	Full Face Mask	15	Fire Curtain or Rigid Cargo Barrier
13	Walk Around Oxygen Bottle	16	Protected Extended Range Operation with 2-Engine Airplane (ETOPS) Oxygen

EVAS (a self contained system restoring pilot visibility of critical flight instrumentation during a cockpit smoke event)

Normal Cockpit Visibility	Uncontrolled Smoke – No Visibility	Uncontrolled Smoke –EVAS Visibility
		
<p>➤ EVAS enables pilot control of the aircraft by displacing smoke and providing a clear vision of basic instruments and flight path</p>		

EVAS Unit and Aircraft Operation

- Each EVAS unit consists of an Inflatable Vision Unit and a battery powered blower to inflate the unit.
- Provides vision to flight path and basic instrumentation during periods of no visibility due to smoke in the cockpit.



Aircraft Safety

FedEx Fire Suppression Systems and Controls

- New loading criteria by aircraft type and fire suppression systems available
- Participating with regulatory agencies and industry standards committees
 - FAA, ICAO, Commercial Aviation Team, Society of Automotive Engineers, International Organization for Standards, European Aviation Safety Agency

✈️ Cargo Foam

Note: In long-haul over water aircraft, such as B-777/MD-11

✈️ Fire Containment Cover



FedEx Testing of Gel Packs in Packaging

Lithium metal and lithium ion batteries burn testing with gel packs



Thermal events - sparks and flames blow through box

CR123



18650



33550
D size



Gel packs prevented jets of sparks and flames from exiting box. Only cell experiencing thermal runaway vented.

Summary Aircraft DG Manifest

10 DANGEROUS GOODS SYSTEM 07/12/13
WBP020 AIRCRAFT DG MANIFEST 08:26:57

FEDEX EXPRESS GOC - (901)397-8040 (US) / (901)397-8065 (NON-US)

FLT: LEG DATE: ORIG: DEST: EQUIP: CONFIG: ACFT:
0023-12 07/12/2013 MEM ANC B777F 27-POS N854FD

	CLASS	DESCRIPTION	WT(KG)
ACCESSIBLE	2.1	FLAMMABLE GAS	1.21000
	2.2	NONFLMBL GAS W/O CAO	30.00000
	3	FLAMMABLE LIQUID	89.32600
	4.1	FLAMMABLE SOLID	0.65200
	5.1	OXIDIZER	3.89000
	8	CORROSIVE	433.54300
INACCESSIBLE	2.2	NONFLMBL GAS W/O CAO	102.37500
	6.1	TOXIC (PG III)	11.60000
	6.1	TOXIC (PG I & II)	4.95000
	9	MISCELLANEOUS	200.25500
	9	UN1845 DRY ICE 9	148.70000

(-----)
(ICE-MAIN DECK: 148.70000 FWD 0.00000 AFT 0.00000 ABK 0.00000)
(MAX- 1640.0 454.0 0.0 0.0)
(-----)

ALERT: LIVE ANIMALS ON BOARD IN POSITIONS: ABK ABK
MAX TOTAL DRY ICE LIMIT: 454 KG

PREPARING RAMP AGENT: GEORGE BONNER EMP NO: 104817
I CERTIFY THAT ALL DGS LISTED ON THE DG MANIFEST ARE LOADED IN APPROVED
POSITIONS ON THE AIRCRAFT AND THAT COMPARTMENT LIMITATIONS HAVE BEEN OBSERVED
IN ACCORDANCE WITH FEDEX EXPRESS POLICY AND GOVERNMENT REGULATIONS.

DG SPECIALIST: _____ EMP NO: _____
I CERTIFY THAT THE ACCESSIBLE DANGEROUS GOODS ULD(S) HAVE NO EVIDENCE OF DAMAGED
OR LEAKING PACKAGES AND THE PACKAGES ARE PROPERLY LOADED AND SECURED WITHIN THE
ULD IN ACCORDANCE WITH FEDEX EXPRESS POLICY AND GOVERNMENT REGULATIONS.

CAPTAIN SIGNATURE: _____ EMP NO: _____
I HAVE REVIEWED THE INFORMATION LISTED IN THE A/C DG MANIFEST. I WILL HAVE
ACCESS TO THE ENTIRE DG MANIFEST FOR THIS FLIGHT.

TECH / FUEL STOPS - ENTER LOCATION ID AND INITIALS: _____ / _____
INITIALS SIGNIFY NO DG SHIPMENTS WERE REMOVED FROM THE AIRCRAFT.

END OF AIRCRAFT SUMMARY

Aircraft Position DG Manifest

ADS210
WBP020

DANGEROUS GOODS SYSTEM
AIRCRAFT DG POSITION SUMMARY

07/12/13
08:26:57

FEDEX EXPRESS GOC - (901)397-8040 (US) / (901)397-8065 (NON-US)

FLT: 0023-12 LEG DATE: 07/12/2013 ORIG: MEM DEST: ANC EQUIP: B777F CONFIG: 27-POS ACFT: N854FD

POS	ASSET #	CLASS	DESCRIPTION	SUBRISK	WT/AMT
2L	PMC91386FX	2.1	FLAMMABLE GAS		1.21000
		2.2	NONFLMBL GAS W/O CAO		0.06000
		2.2	NONFLMBL GAS W/O CAO	5.1	30.00000
		3	FLAMMABLE LIQUID	6.1,8	89.32600
		4.1	FLAMMABLE SOLID		0.65200
		5.1	OXIDIZER	6.1,8	3.89000
		6.1	TOXIC (PG I & II)		0.10000
		8	CORROSIVE	3	433.54300
		(-----)			
		(CLASS 3 REQUIRES SEPARATION FROM 5.1)			
		(-----)			
4L	AMJ55999FX	2.2	NONFLMBL GAS W/O CAO		64.00000
6L	AMJ43844FX	2.2	NONFLMBL GAS W/O CAO		4.00000
		6.1	TOXIC (PG III)		8.00000
		9	MISCELLANEOUS		26.53000
9L	AMJ45968FX	2.2	NONFLMBL GAS W/O CAO		4.00500
		6.1	TOXIC (PG I & II)		4.35000
		6.1	TOXIC (PG III)		0.50000
		9	UN1845 DRY ICE 9		126.70000
		9	MISCELLANEOUS		46.35000
11L	AMJ44129FX	2.2	NONFLMBL GAS W/O CAO		3.00000
		9	UN1845 DRY ICE 9		1.00000
		9	MISCELLANEOUS		21.76000
13L	AMJ45624FX	2.2	NONFLMBL GAS W/O CAO		27.24000
		6.1	TOXIC (PG III)		3.00000
		6.1	TOXIC (PG I & II)		0.50000
		9	UN1845 DRY ICE 9		8.00000
		9	MISCELLANEOUS		3.45000
8R	AMJ54889FX	9	MISCELLANEOUS		3.00000
9R	AMJ57367FX	9	MISCELLANEOUS		21.00000
10R	AMJ41919FX	9	MISCELLANEOUS		60.02000
11R	AMJ43834FX	6.1	TOXIC (PG III)		0.10000
		9	UN1845 DRY ICE 9		13.00000
		9	MISCELLANEOUS		8.14500
ABK	BULK54902	2.2	NONFLMBL GAS W/O CAO		0.07000
ABK	BULK54907	9	MISCELLANEOUS		10.00000

END OF POSITION SUMMARY



Shipment DG Manifest

ADS210
WBF020

DANGEROUS GOODS SYSTEM
AIRCRAFT DG POSITION DETAIL

07/12/13
08:26:57

DG SPECIALIST: JOY BLACK EMP NO: 745688
I CERTIFY THAT NO DAMAGED OR LEAKING PACKAGES HAVE BEEN LOADED WITHIN THE ULD
AND THAT THE PACKAGES ARE PROPERLY LOADED AND SECURED WITHIN THE ULD IN
ACCORDANCE WITH FEDEX EXPRESS POLICY AND GOVERNMENT REGULATIONS.

FEDEX EXPRESS GOC - (901)397-8040 (US) / (901)397-8065 (NON-US)

FLT: LEG DATE: ORIG: DEST: EQUIP: ACFT: POSN: ASSET#:
0023-12 07/12/2013 MEM ANC B777F N854FD 10R AMJ41919FX

UN/ID#, PROPER SHIPPING NAME, CLASS (SUBRISK), PG, WT/AMT UM, (CAO), PIECES
<ERG> AUTHORIZATION (IF APPLICABLE) -----
RADNUC(S) (IF APPLICABLE), PHYS/CHEM FORM, ACTVTY A/M, TI, CSI, RAD LBL
AWB# URSA SHIPPER NAME EMERGENCY TELEPHONE#

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.,
<9L> (HEXAFLUOROANTIMONATE SALT, TRIARYLSULFONIUM SALT), 9, III, 500.00000
ML, 1 PIECE
478536806231 TSJX MICROCHEM CORP 8004249300

ID8000, CONSUMER COMMODITY, 9, 1.00000 KG G, 1 PIECE
<9L> 562339908602 ITMA FEDERAL EXPRESS 800-535-5053

ID8000, CONSUMER COMMODITY, 9, 9.48000 KG G, 1 PIECE
<9L> 862561148323 FUKA ADVANCTEC 5617234689

ID8000, CONSUMER COMMODITY, 9, 9.48000 KG G, 1 PIECE
<9L> 871641793085 FUKA ADVANCTEC 5617234689

ID8000, CONSUMER COMMODITY, 9, 14.28000 KG G, 1 PIECE
<9L> 871641793096 FUKA ADVANCTEC 5617234689

ID8000, CONSUMER COMMODITY, 9, 9.58000 KG G, 1 PIECE
<9L> 871641793100 FUKA ADVANCTEC 5617234689

ID8000, CONSUMER COMMODITY, 9, 6.14000 KG G, 1 PIECE
<9L> 871641793111 FUKA ADVANCTEC 5617234689

ID8000, CONSUMER COMMODITY, 9, 9.56000 KG G, 1 PIECE
<9L> 871641793122 FUKA ADVANCTEC 5617234689

END OF DATA FOR THIS ASSET. NEXT ASSET CONTINUED ON NEXT PAGE.

FedEx Express Resources/Contact Information

- **FedEx Express Lithium Battery Job Aid (detailed guidance)**
http://images.fedex.com/us/services/pdf/LithiumBattery_Overview.pdf
- **Lithium Battery Service Limitations**
http://images.fedex.com/us/services/pdf/LithiumBatteries_Limitations.pdf
- **Packaging Battery Shipments Job Aid**
http://images.fedex.com/us/services/pdf/packaging/BatteryShipment_fxcom.pdf
- **Lithium Battery Conversion Calculations**
http://images.fedex.com/us/services/pdf/LithiumBattery_JobAid.pdf
- **Lithium Battery Acceptance Checklist**
http://images.fedex.com/us/services/pdf/DG_LBChecklist_2015.pdf
- **Lithium Metal Battery Approval Process**
http://www.fedex.com/us/service-guide/ship-dg-hazmat/dangerous-goods/how-to-ship.html?fx-faq=Lithium_Batteries_Section_IA_IB
- **Personal Help With Lithium Battery Shipping**
DG Hotline: 1-800-463-3339, prompt 81, 4; dghotline@fedex.com, tjleech@fedex.com