

FedEx Express Shipping Requirements and Safety Mitigation

International Battery Seminar and Exhibit

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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 preapproved by FedEx Express (FX-05)
 - UN 3481/3091, Section II batteries must include UN number adjacent to lithium battery label/marking 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

	SHIPPER	AIRWAYBILL N°		
LED			LED	
NOT RESTRICT	CONSIGNEE	FEDEX	NOT RESTRICTED	
ž	This package contains Lithium cells or batteries in the following configuration (Tick only one box):			
RICTED	Lithium Ion - Maximum of * 20 Watt-hours per cell; and * 100 Watt-hours per battery	Lithium Metal— Maximum of * 1 gram of lithium metal per cell; and * 2 grams of lithium per battery		
	Cells or batteries ONLY (ICAO/IATA UN3480 , PI965, Section II) - Cells or batteries in a package, without electronic equipment	Cells or batteries ONLY (ICAO/IATA UN3090, PI968, Section II) - Cells or batteries in a package, without electronic equipment	RICTED	
NOT RESTRIC	☐ Packed WITH EQUIPMENT (ICAO/IATA UN3481, PI966, Section II) - Cells or batteries contained in a package with associated electronic equipment	□ Packed <u>WITH EQUIPMENT</u> (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	NOT RESTRICTEI	
Z	☐ Contained <u>IN EQUIPMENT</u> (ICAO/IATA UN3481, PI967, Section II) - Cells or batteries installed in equipment	Contained IN EQUIPMENT (ICAO/IATA UN3091, PI970, Section II) - Cells or batteries installed in equipment	Z	
NOT RESTRICTED	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: +		NOT RESTRICTED	
R	I hereby declare that the contents of this	Name:	RE	
NOT	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 governement regulations.	Export Date: Signature	NOT	

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



Training

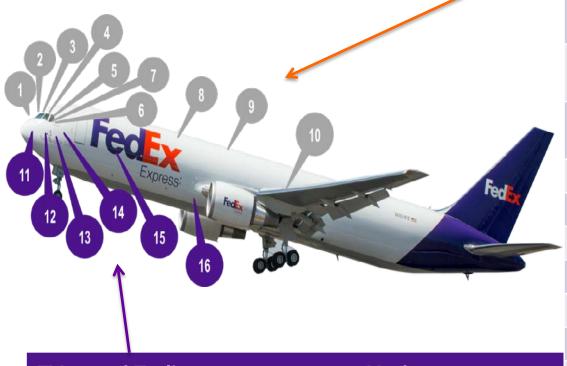
- Each person involved in shipping and/or handling dangerous goods must be trained
- Recurrent training must occur every two years.
 Exception: In the U.S., the Department of Transportation (DOT), as competent authority, allows training for shippers every three years.
- Dangerous Goods Seminar Support: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







Aircraft Safety Technology



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



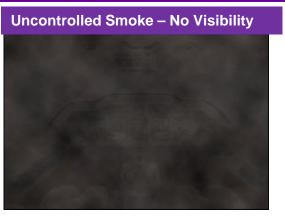
FY14 Improvements & Updates

- 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 (CO²) Monitors
- 7 Automated External Defibrillator (AED)
- 8 Container Mods
- 9 Fire Containment Cover
- 10 Fire Suppression System (FSS)

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







> EVAS enables pilot control of the aircraft by displacing smoke and providing a clear vision of basic instruments and flight path

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.





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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

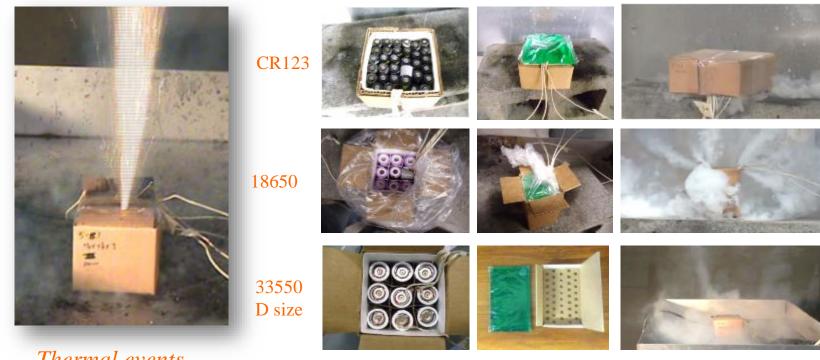
FireContainmentCover





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

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



Summary Aircraft DG Manifest

10 WBP020	DANGEROUS GOODS SYSTEM AIRCRAFT DG MANIFEST	07/12/13 08:26:57			
FEDEX EXPRESS GOC - (901)397-8040 (US) / (901)397-8065 (NON-US)					
FLT: LEG DATE: 07/12/201	ORIG: DEST: EQUIP: 3 MEM ANC B777F	CONFIG: ACFT: 27-POS N854FD			
CLASS	DESCRIPTION	WT(KG)			
2.2 3 4.1 5.1	FLAMMABLE GAS NONFLMBL GAS W/O CAO FLAMMABLE LIQUID FLAMMABLE SOLID OXIDIZER CORROSIVE	1.21000 30.00000 89.32600 0.65200 3.89000 433.54300			
6.1 6.1 9 9	NONFLMBL GAS W/O CAO TOXIC (PG III) TOXIC (PG I & II) MISCELLANEOUS UN1845 DRY ICE 9	102.37500 11.60000 4.95000 200.25500 148.70000			
(ICE-MAIN DECK (MAX-	: 148.70000 FWD 0.000000 AFT 1640.0 454.0	0.00000 ABK 0.00000) 0.0 0.0)			
	ANIMALS ON BOARD IN POSITIONS: OTAL DRY ICE LIMIT: 454 KG	ABK ABK			
POSITIONS ON THE AI	I: GEORGE BONNER DGS LISTED ON THE DG MANIFEST A RCRAFT AND THAT COMPARTMENT LIN FEDEX EXPRESS POLICY AND GOVERN	MITATIONS HAVE BEEN OBSERVED			
I CERTIFY THAT THE .	ACCESSIBLE DANGEROUS GOODS ULD(AND THE PACKAGES ARE PROPERLY ITH FEDEX EXPRESS POLICY AND GO	(S) HAVE NO EVIDENCE OF DAMAGED LOADED AND SECURED WITHIN THE			
	INFORMATION LISTED IN THE A/C E DG MANIFEST FOR THIS FLIGHT.	EMP NO: DG MANIFEST. I WILL HAVE			
	- ENTER LOCATION ID AND INITIA DG SHIPMENTS WERE REMOVED FROM				
END OF AIRCRAFT SUM	MARY				



Aircraft Position DG Manifest

ADS210 WBP020	DANGEROUS GOOD AIRCRAFT DG POS	S SYSTEM SITION SUMMARY	07/12/13 08:26:57	
FEDEX EXPRESS GOC - (901)397-8040 (US) / (901)397-8065 (NON-US)				
FLT: LEG DATE 0023-12 07/12/20	ORIG: DEST: EQ	QUIP: CONFIG: 27-POS	ACFT: N854FD	
POS ASSET # CLAS	SS DESCRIPTION	SUBRISK	WT/AMT	
2.2 3 5.: 6.: 8 (C	FLAMMABLE GAS NONFLMBL GAS W/O CAC NONFLMBL GAS W/O CAC FLAMMABLE LIQUID FLAMMABLE SOLID OXIDIZER TOXIC (PG I & II) CORROSIVE	5.1 6.1,8 6.1,8 3 1	,)	
4L AMJ55999FX 2.2	NONFLMBL GAS W/O CAC		64.00000	
6.3	NONFLMBL GAS W/O CAC TOXIC (PG III) MISCELLANEOUS	0 	4.00000 8.00000 26.53000	
6.3	NONFLMBL GAS W/O CAC TOXIC (PG I & II) TOXIC (PG III) UN1845 DRY ICE 9 MISCELLANEOUS) 	4.00500 4.35000 0.50000 126.70000 46.35000	
11L AMJ44129FX 2.2 9 9	NONFLMBL GAS W/O CAC UN1845 DRY ICE 9 MISCELLANEOUS		3.00000 1.00000 21.76000	
6.3	NONFLMBL GAS W/O CAC TOXIC (PG III) TOXIC (PG I & II) UN1845 DRY ICE 9 MISCELLANEOUS		27.24000 3.00000 0.50000 8.00000 3.45000	
8R AMJ54889FX 9	MISCELLANEOUS	I	3.00000	
9R AMJ57367FX 9	MISCELLANEOUS	1	21.00000	
10R AMJ41919FX 9	MISCELLANEOUS	I	60.02000	
11R AMJ43834FX 6.3 9 9	UN1845 DRY ICE 9		0.10000 13.00000 8.14500	
ABK BULK54902 2.2	NONFLMBL GAS W/O CAC		0.07000	
ABK BULK54907 9	MISCELLANEOUS	I	10.00000	
END OF POSITION SUMMARY				



Shipment DG Manifest

ADS210 WBP020	DANGEROUS GOODS SYSTEM AIRCRAFT DG POSITION DETAIL	07/12/13 08:26:57			
DG SPECIALIST: JOY BLACK 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 (I	NON-US)			
FLT: LEG DATE: ORI 0023-12 07/12/2013 MEM	G: DEST: EQUIP: ACFT: 1 ANC B777F N854FI	POSN: ASSET#: D 10R AMJ41919FX			
<pre><erg> AUTHORIZATION (I</erg></pre>	NAME, CLASS (SUBRISK), PG, WT/AM F APPLICABLE) PLICABLE), PHYS/CHEM FORM, ACTVT SA SHIPPER NAME				
<pre><9L> (HEXAFLUOROANTIM ML, 1 PIECE</pre>	HAZARDOUS SUBSTANCE, LIQUID, N.O MONATE SALT, TRIARYLSULFONIUM SALT BJX MICROCHEM CORP				
ID8000, CONSUMER COMMODI <9L> 562339908602 IT	TY, 9, 1.00000 KG G, 1 PIECE MA FEDERAL EXPRESS	800-535-5053			
ID8000, CONSUMER COMMODI <9L> 862561148323 FU	TY, 9, 9.48000 KG G, 1 PIECE JKA ADVANCTEC	5617234689			
ID8000, CONSUMER COMMODI <9L> 871641793085 FU	TY, 9, 9.48000 KG G, 1 PIECE JKA ADVANCTEC	5617234689			
ID8000, CONSUMER COMMODI <9L> 871641793096 FU	TTY, 9, 14.28000 KG G, 1 PIECE JKA ADVANCTEC	5617234689			
ID8000, CONSUMER COMMODI <9L> 871641793100 FU	TTY, 9, 9.58000 KG G, 1 PIECE JKA ADVANCTEC	5617234689			
ID8000, CONSUMER COMMODI <9L> 871641793111 FU	TTY, 9, 6.14000 KG G, 1 PIECE JKA ADVANCTEC	5617234689			
ID8000, CONSUMER COMMODI <9L> 871641793122 FU	TTY, 9, 9.56000 KG G, 1 PIECE JKA 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-fag=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



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