



**DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/17)**

Montreal, 24 to 28 April 2017

- Agenda Item 5: Specific work items identified by the Air Navigation Commission:**
**5.3: Mitigating risks posed by the carriage of lithium batteries by air (ANC job card
DGP.003.01)**

SAMSUNG NOTE 7 RECALL RESPONSE

(Presented by John M. Godfrey, Senior Vice-President Public Policy, Samsung
Electronics America, Inc.)

SAMSUNG NOTE 7

RECALL RESPONSE

Samsung Electronics for the ICAO DGP-WG '17 Meeting
April 26th, 2017

Galaxy Note7



Samsung Announces Cause of Galaxy Note7 Incidents in Press...

01.22.17

[GALAXY NOTE7, NEWS RELEASES](#)

Samsung Expands Recall of Galaxy Note7 Devices to Include Original

FAA lifts airline notification on Galaxy Note7

01.10.17

[GALAXY NOTE7, OFFICIAL STATEMENTS](#)

Galaxy Note7 Update

11.04.16

[GALAXY NOTE7, OFFICIAL STATEMENTS](#)

Samsung Will Ask All Partners to Stop

Samsung Taking Bold Steps to Increase Galaxy Note7 Device Returns

12.09.16

[GALAXY NOTE7, OFFICIAL STATEMENTS](#)

Statement on the U.S. Department of Transportation's new...

10.14.16

[GALAXY NOTE7, OFFICIAL STATEMENTS](#)



SAMSUNG

1 **GET THE PHONES BACK
FROM OUR CUSTOMERS**

2 **GET TO THE BOTTOM
OF THE PROBLEM**



97%

**OF NOTE7s HAVE
BEEN RETURNED
GLOBALLY**



At Samsung, nothing is more important than the safety of our customers and the devices they depend on – the most personal, indispensable technology in our lives.”

- PRESIDENT D.J. KOH

SAMSUNG

OVER

COMMUNICATION
TO CUSTOMERS

SAMSUNG

OVER 23 MILLION

Text messages & push notifications



SAMSUNG

FIRMWARE UPDATES

to limit battery capacity

60% CAP



0% CAP



NOTE7 EXCHANGES AT AIRPORTS

700
ENGINEERS

SAMSUNG



SAMSUNG

FULL SCALE DIGITAL RECALL

SAMSUNG

Round-the-clock repeated charge and discharge cycles on more than

200,000 & 30,000

GALAXY NOTE7 DEVICES

INDIVIDUAL BATTERIES





Abnormal

Normal

Main Cause

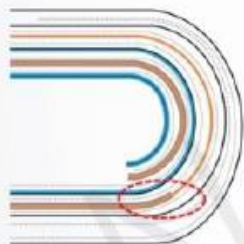


The negative electrode was deflected in the upper-right corner of the battery

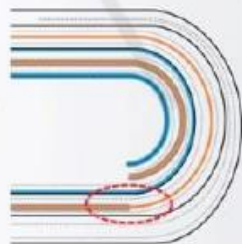


The negative electrode is not deflected

Additional contributing factor



The tip of the negative electrode was incorrectly located in the curve, not the planar area



The tip of the negative electrode is correctly located within the planar area



Abnormal

Normal

Main Cause



High welding burrs on the positive electrode resulted in the penetration of the insulation tape and separator which then caused direct contact between the positive tab with the negative electrode



The positive tab is appropriately attached to the positive electrode

Negative Electrode
Separator
Insulation Tape
Positive Tab
Positive Electrode

Additional contributing factor



A number of batteries were missing insulation tape

Insulation Tape



Batteries with sufficient insulation tape

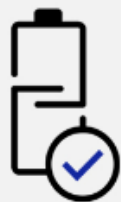
INNOVATION

BEYOND INDUSTRY STANDARDS

SAMSUNG

8-POINT BATTERY SAFETY CHECK TEST

8-Point Battery Safety Check Test



Durability Test

It starts with enhanced battery testing, including overcharging tests, nail puncture tests and extreme temperature stress tests.



Visual Inspection

We visually inspect each battery under the guideline of standardized and objective criteria.



X-Ray

We use X-ray to see the inside of the battery for any abnormalities.



Charge and Discharge Test

The batteries undergo a large-scale charging and discharging test.



TVOC Test

(Total Volatile Organic Compound)
We test to make sure there isn't the slightest possibility of leakage of the volatile organic compound.



Disassembling Test

We disassemble the battery to assess its quality, including the battery tab welding and insulation tape conditions.



Accelerated Usage Test

We do an intensive test simulating accelerated consumer usage scenarios.



ΔOCV Test

(Delta Open Circuit Voltage)
We check for any change in voltage throughout the manufacturing process from component level to assembled device.

MULTI-LAYER SAFETY MEASURES



Battery Safety Design Standard

Improved safety standards for the materials in design of the battery



Hardware Design

Adding new brackets around battery for protection



Software Algorithm

Improved algorithms for governing battery charging temperature, charging current, and charging duration



EXPERTISE REINFORCEMENT

GLOBAL QUALITY INNOVATION OFFICE





**Formed an independent organization directly reporting to the CEO,
leading quality and manufacturing-related innovation activities**





COMPONENT TEAM

**Established an organization under the Mobile Communication Business
that is fully responsible for development, inspection, and quality control of core components**

3rd PARTY INSPECTION STATUS (Certification)

☐ Obtained all certifications that are required by major countries and standards

Country/ Region	Standards	
IEC/Europe		IEC 62133/EN 62133
Korea		KC 62133
US		UL 1642 (Cell)
		UL 2054 (Pack)
		CTIA (IEEE 1725)

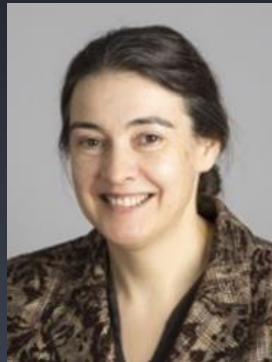
Country/ Region	Standards	
Japan		JIS C 8714
India		IS 16046
Taiwan		CNS 15364
China		GB 31241
Transportation		UN 38.3

BATTERY ADVISORY SAFETY BOARD

BATTERY ADVISORY SAFETY BOARD

□ Formed an external committee of academic and research experts to maintain an unbiased view on product safety

- Advised the Note 7 battery incident cause analysis, and is conducting studies on enhancing safety of Samsung's future products



Clare Grey Ph.D.

Professor in Chemistry at the University of Cambridge

Expert on lithium-ion battery and its microstructural analysis



Gerbrand Ceder Ph.D.

Professor in Material Engineering at University of California, Berkeley

Expert on material science (focusing on lithium-ion), participated in the United States government-driven projects on battery issues



Yi Cui Ph.D.

Professor in Material Engineering at Stanford University

Expert on lithium-ion battery components



Toru Amazutsumi Ph.D.

CEO of Amaz Techno-consultant (Battery R&D Consultant)

Expert on battery industry (former Director of battery development at SANYO Electric Co., Ltd.)

INNOVATION

**WITH A STRONGER COMMITMENT TO
SAFETY AND QUALITY**

SAMSUNG



**We are an organization
that takes great pride
in our ability to listen,
learn, and improve.”**

- PRESIDENT D.J. KOH