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NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

LITHIUM BATTERY REGULATION TIMELINE

Lithium Battery Regulation Timeline

Year / Agency

Unless otherwise stated, the year listed is the year a regulation change appeared in the published manual (49 CFR & ICAO TI). Actual Federal Register publishing dates and voluntary compliance dates may be earlier.

1970's DOT

- Lithium batteries are transported by exemption only and are regarded as a "Flammable Solid-Dangerous When Wet". Some exemptions for very small batteries exempt them from the Hazardous Materials Regulations (HMR).

1980 DOT

- The previous individual DOT exemptions for small lithium batteries are codified as an exception in the HMR. "*Lithium batteries, see 173.206(f)"* appears in italics in the Hazardous Materials Table (HMT). No proper shipping name, UN #, or hazard class is assigned. 49 CFR 173.206 is the packaging section for lithium compounds and other hazard class 4 materials required to be labeled "Dangerous When Wet". 173.206(f) **provides an exception to the HMR for small lithium batteries**—very much similar to the exception that exists today. Lithium batteries not meeting the exception can only be transported under exemption.

1983 DOT

- "Lithium batteries for disposal" appears as a proper shipping name in 49 CFR under the now defunct "ORM-C" hazard class. These batteries are forbidden on all aircraft.

By 1989* ICAO

- Proper shipping names for lithium batteries appear in the List of Dangerous Goods in the ICAO Technical Instructions (TI).
- **They are assigned to hazard class 4.3 (Dangerous When Wet)**.
- There are not yet UN numbers.
- Liquid cathode batteries are forbidden on passenger aircraft.
- Solid cathode batteries are **allowed on passenger aircraft**, 5 kg gross weight per package.
- Cargo aircraft package limit is 35 kg gross.
- Packing Instruction (PI) 406 describes tests for the batteries (not UN tests) and requires the batteries to be packed in fiberboard boxes and then placed in a UN1A2 steel drum. Tested solid cathode batteries don't need the steel drum.
- Special Provision A45 excepts small lithium batteries from the TI.
- **US variation 25 states that batteries that don't meet A45 are forbidden from transport in the US unless approved by RSPA**.

[*] *The 1989-90 edition is the earliest copy of the ICAO Technical Instructions examined. These ICAO regulations and exceptions for lithium batteries may have preceded 1989.*

1989 UN

- The UN model regulations adopt lithium battery proper shipping names and assigns UN numbers: "Lithium batteries" (UN 3090) and "Lithium batteries contained in equipment" (UN 3091).
- **They are assigned to hazard class 9** instead of 4.3 based on the belief that these batteries, now hermetically sealed, would not allow the lithium metal inside to be exposed to water during transport.

1990 DOT

- Italicized "*Battery, lithium*" replaces "*Lithium batteries*" in the HMT. 173.206(f) is still the referenced paragraph for the exception.

1991 ICAO

- The ICAO TI adopts the UN proper shipping names, UN numbers, and miscellaneous hazard classification for lithium batteries.
- "Solid cathode" and "liquid cathode" are still separately listed but now appear as non-bold text, making them optional parts of the proper shipping names.
- Packing instructions change little.
- US variation 25 remains.

1991 DOT

- The Lithium Battery **proper shipping names** ("…Solid/Liquid Cathode" and "…contained in equipment") **are adopted, as are the UN numbers and hazard class 9**.
- Per special provision A12, they are forbidden on passenger aircraft without RSPA approval.
- The cargo aircraft limit is 0.5 kg for packages of batteries and 5 kg for batteries in equipment.
- 49 CFR 173.185 is the new section for lithium batteries. The exceptions for small lithium batteries move from 173.206 to 173.185.

1993 ICAO

- Variation US 25 changes: Rechargeable lithium batteries still need RSPA approval to fly if they don't meet the A45 exceptions, but other lithium batteries can fly on cargo aircraft under the ICAO regs without RSPA approval. RSPA approval is still required for any non-excepted batteries on passenger aircraft.

1993 DOT

- The "solid/liquid cathode" part of the PSN's go into italics making their use optional.

- Special Provision (SP) 29 explains that lithium batteries are forbidden on passenger aircraft unless approved by RSPA.
- The cargo aircraft package limit is raised to 35 kg gross.

1995 ICAO

- Variation US 25 changes to US 11.
- Lithium batteries "packed" with equipment added as a PSN.
- PI 903 now describes hermetically sealed (instead of "solid cathode") as the types of batteries that don't need to be in a UN1A2 drum.
- SP A45 adds exception for larger lithium batteries that are UN tested and have no more than 5g per cell, 25g per battery.

1995 DOT

- "Solid/liquid cathode" italicized text is removed from PSN's.
- Column 9A of the HMT **allows lithium batteries on passenger aircraft** (5 kg per package).
- 173.185 grants exception for larger lithium batteries that are UN tested and have no more than 5g per cell, 25g per battery.

1997 ICAO

- "Solid/liquid cathode" no longer appears as additional descriptive text after the "lithium batteries" PSN in the Dangerous Goods List. Now there is one "Lithium batteries" entry for both of them and 5 kg gross per package is allowed on passenger aircraft (previously liquid cathode was forbidden on pax aircraft).
- No US variations are cited for lithium batteries.
- Fiberboard boxes in a UN1A2 steel drum is no longer a requirement for any type of lithium battery (just regular UN packaging).

1997 DOT

- The lithium batteries "packed" with equipment PSN appears in the HMT.

1997 DOT

- RSPA issues an opinion letter to PolyStor Corp., indicating that lithium ion batteries are classified per the requirements of 49 CFR 173.185 and only excepted from the HMR if they meet the exception criteria in 173.185.

1999 LAX incident

- Two pallets of small lithium batteries (120,000 cells) burst into fire after being unloaded from a passenger aircraft in Los Angeles. Fire reignites after initial suppression. The batteries were the small types excepted from the regulations by DOT and ICAO so there was no indication that the packages contained potentially hazardous materials.

2000 DOT

- In response to the LAX incident and NTSB recommendations, RSPA issues an advisory notice urging caution when handling and transporting excepted lithium batteries. Many companies start voluntarily adding additional safety markings to their packages of excepted lithium batteries.

2001 ICAO

- PI 903 indicates that it applies to all lithium batteries including lithium ion and lithium polymer batteries.
- Special Provision A8 is introduced and excepts lithium ion batteries that are new, uncycled, and uncharged if the electrolyte is not a hazmat or if it can't flow from a ruptured case.

2001 DOT

- Lithium "ion" batteries and "equivalent lithium content" are included in the text of 173.185.

2001 UN

- Based on US proposals, the UN Recommendations are revised and the exceptions for small lithium batteries are tightened up:
  - All batteries must be UN tested
  - The exception for medium sized batteries (5g/25g) is dropped.
  - For packages containing 24 cells or 12 batteries, additional requirements apply (Does not apply to batteries contained in equipment):
    - Marking package to indicate it contains lithium batteries and the procedures to follow if package is damaged
    - Accompanying documentation indicating contents and procedures to follow if package is damaged
    - The package must be able to pass a drop test without the batteries being damaged or shifting that would allow cells/batteries to contact each other.
    - Package can't exceed 30 kg gross weight.

2002 DOT

- RSPA issues an NPRM on lithium batteries (HM-224C; 67 FR 15510; 4/2/2002) that proposes to tighten up the exceptions for lithium batteries consistent with the revisions to the UN Recommendations.

2003 ICAO

- Based on US proposals, and consistent with the amendments to the UN Recommendations, the ICAO TI are revised and the exceptions for small lithium batteries are tightened up.

- Special provisions A88 and A99 are introduced. A88 allows new prototype batteries to be shipped by cargo aircraft with approval. A99 allows the 35 kg package limit for cargo aircraft to be exceeded with approval.

- PI 903 adds paragraph (g), which allows, with approval, lithium batteries greater than 12 kg to forgo inner packagings and UN-spec outer packagings if they are in a strong impact-resistant outer packaging.
- Special Provision A8 (containing exceptions for some lithium ion batteries) is removed.

2003 DOT

- Special Provisions A54 and A55 appear in the HMT. A54 allows new prototype batteries to be shipped by cargo aircraft with RSPA approval. A55 allows the 35 kg package limit for cargo aircraft to be exceeded with RSPA approval.

2005 DOT

- PHMSA issues interim final rule banning primary lithium batteries (non-rechargeable) as cargo on passenger-carrying aircraft. All packages of primary lithium batteries (regardless of transportation mode) must be marked to indicate that they may not be loaded on passenger aircraft. (See 69 FR 75208, 12/15/04.)