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**AIRCRAFT STOWAGE
PROCEDURES
FOR
BATTERY POWERED
WHEELCHAIRS**

in conformance with
DOT hazardous materials regulations
(49 CFR Parts 171, 172, 173, 175)

United States Architectural & Transportation
Barriers Compliance Board
1331 F Street, N.W. ● Suite 1000
Washington, D.C. 20004-1111

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Prepared for:

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In September, 1986, the Architectural and Transportation Barriers Compliance Board (ATBCB) sponsored a research project to survey and document policies, procedures and practices for stowing wheelchairs and other mobility aids on aircraft. The resulting technical paper, *Mobility Aid Stowage*, identified a broad range of industry experience in reducing barriers faced by disabled air travelers. The purpose of the project was to identify policies, procedures and practices currently used by air carriers which were effective in eliminating or reducing those barriers. Where complete practices could not be identified, the contractor synthesized procedures from existing ones. The resulting recommendations, if correctly implemented by the air industry, should contribute greatly to improving access to air travel opportunities for disabled persons.

One of the most complicated barriers to overcome, and the one which has generated the most inconsistent practices among air carriers, is the proper safe stowage of battery powered wheelchairs. In part, this is due to confusion about hazardous materials regulations and the changing nature of power wheelchairs.

The technical paper devoted a separate section to a detailed procedure for handling power wheelchairs. The procedure outlined is derived from practices currently being used by several foreign and domestic air carriers with good success. The procedure described is fully consistent with U.S. Department of Transportation Hazardous Materials regulations codified at 49 CFR Parts 171, 172, 173, and 175. If implemented properly, it should allow for the safe and efficient transport of battery powered wheelchairs.

To more easily respond to requests to the ATBCB for technical assistance on this topic, the procedure has been published separately in this pamphlet.

For further information on access for persons with disabilities, or for a copy of the report from which the information in this brochure was derived, contact the ATBCB Office of Technical and Information Services, 1111 18th Street, NW, Washington, D.C. 20036 or call (202) 653-7848 (voice or TDD).

Step 1: Determine the Orientation in Which the Wheelchair Will be Stowed

A wheelchair should be stowed standing upright if possible. If it cannot fit in the cargo compartment standing upright, it can be laid on its side so that it does fit. The stowage position most often determines how the battery must be stowed.

The dimensions of the cargo compartment access door may require the wheelchair to be tipped sideways to fit through the door—a factor which also influences battery stowage.

You need to compare the dimensions of the wheelchair to (1) those of the cargo compartment in which the wheelchair will be placed and (2) the cargo compartment access door.

Therefore:

- You need to determine if the wheelchair can be loaded and stowed:

standing upright vs. on its side vs. not at all

- You can determine the overall wheelchair dimensions by one or more of the following methods:

- a) Ask the passenger
- b) Measure the wheelchair

- You can determine the aircraft cargo compartment and access door dimensions by one or more of the following methods:

- a) See the Operating Manual, Page _____.
(to be supplied by each airline)
- b) Ask cargo handlers to take measurements

If the wheelchair can be loaded and stowed upright:

GO TO STEP 3

If the wheelchair cannot be loaded or stowed upright:

GO TO STEP 2

Step 2: Determine if the Wheelchair Battery is “SPILLABLE” or “NON-SPILLABLE”

Batteries are categorized as a hazardous material by the U.S. Dept. of Transportation’s Material Transportation Bureau (MTB). U.S. DOT regulations specify methods for battery stowage on aircraft partially as a function of the battery type. There are two major types of batteries used in electric wheelchairs:

Most common type: **Lead acid batteries**
“Spillable”

A lead acid battery is filled with a fluid called electrolyte. Electrolyte is highly corrosive. It can leak or spill out of the battery unless the battery is packaged and handled properly.

Less common type: **Gel-cell battery**
“Non-Spillable”

A gel-cell battery is filled with electrolyte which is formulated in a gel or “jelly” state. The gel will not leak or spill out of gel-cell batteries.

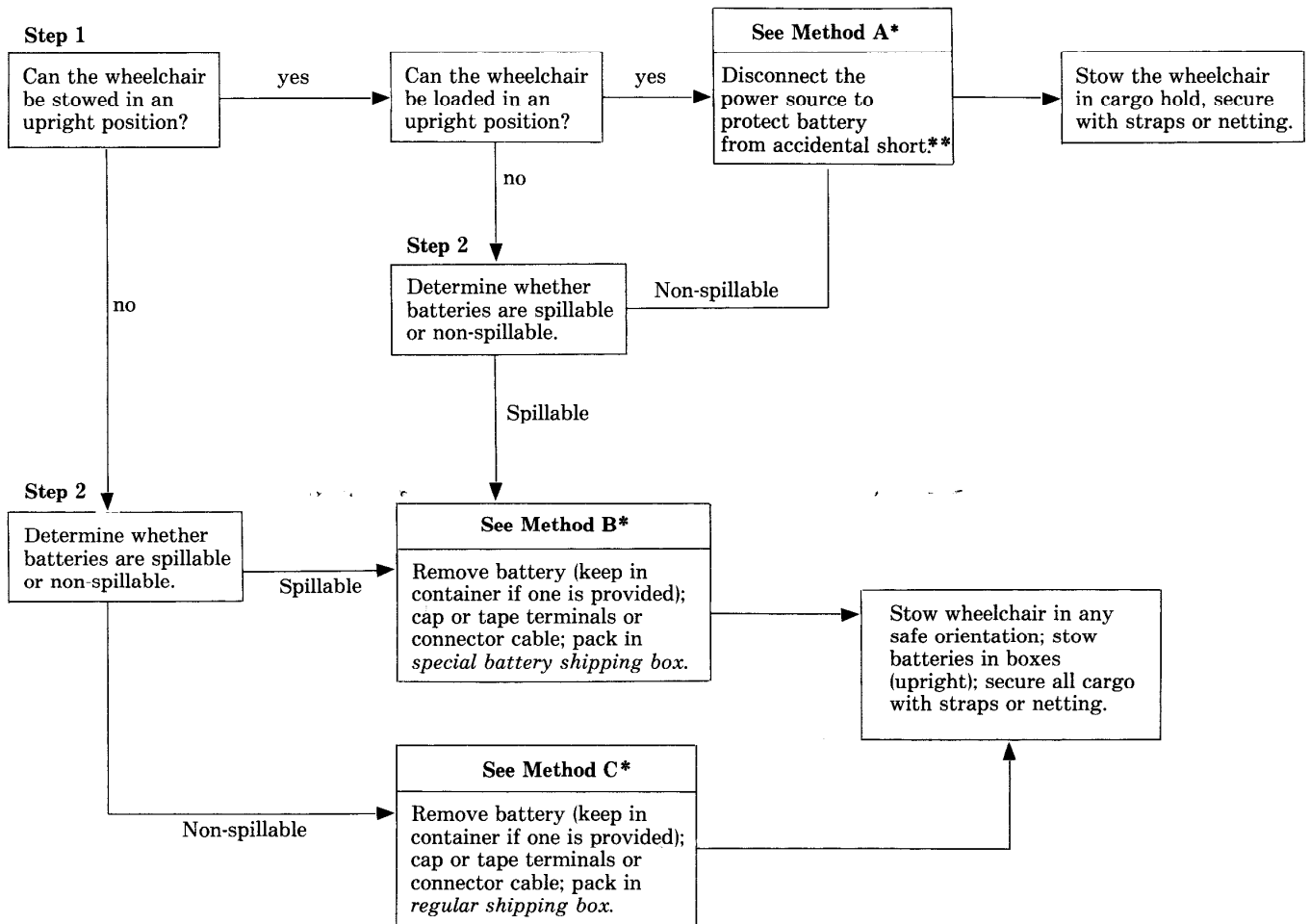
You can determine what type of battery powers the wheelchair by one or more of the following methods:

- a) Inspect the battery for the label “Gel-Cell”
- b) Ask the passenger
- c) Open battery vents to determine if they are filled with electrolyte fluid or a gelled substance

Step 3: Implement the Proper Method for Stowing the Battery

Based on the findings from Steps 1 & 2, you need to determine the proper method for stowing the battery from the chart on pages 6-7.

Process for Selecting Wheelchair Battery Stowage Method



*Note: Methods A, B, and C are described in the following pages.

** Batteries mounted in their own containers with firmly attached lids are protected from accidental short circuiting; batteries in containers without lids should have their terminals capped or taped.

**METHOD A: PREPARE BATTERY
FOR STOWAGE
IN WHEELCHAIR**

IMPORTANT: Use this stowage method only when the wheelchair with *spillable* or *nonspillable* batteries will be loaded and stowed standing upright.

1. Make sure the battery is firmly secured to the wheelchair. If holder bracket appears to be loose, either (1) tighten holder bracket screws, bolts or belts or (2) strap the battery to the wheelchair frame with a strong tape such as duct or electrical tape.
2. Disconnect the power supply using one of the following methods:

First choice:

Disconnect the plug on the main power cable which runs from the battery case to the motor. Depending on the wheelchair brand, the cable will be labeled "power" or will be color-coded red.

Second choice:

- a) If there is no main power plug, disconnect the battery terminal cables from both the positive (+) and negative (-) poles.

CAUTION:

When performing this task, you must wear protective gloves and eyeglasses and use the proper size wrench and pliers. To avoid damage, the terminal connectors should not be "jerked" loose, but rather, loosened sufficiently to be detached without using excessive force.

You must not let metal tools touch the metal frame and the battery terminal pole at the same time or you could generate sparks or enough heat to pose a burn hazard.

3. If the battery is in its own container (bucket) equipped with a lid, no further preparation is needed (if the lid has been removed to disconnect the battery cables, put it back on). Proceed to step 4.
 - a) If the battery container does not have a lid, terminals must be capped or taped to protect the battery from accidental contact with metal objects during transit or reinstallation in the wheelchair; contact could cause sparks and high heat.
 - b) If the battery is not in a container which would serve to contain minor seepage of battery acid, the battery's regular vent caps (which are not "spill-resistant") should be replaced with "spill resistant" vent caps. Package the regular vent caps in a plastic bag and attach the bag to the wheelchair.

WARNING:

Regular vent caps must be replaced before reconnecting the battery to avoid dangerous pressure build-up in the battery during subsequent use.

4. Stow the wheelchair in the aircraft cargo compartment in a manner that assures it will remain standing upright, using cargo straps or netting.

END OF PROCEDURE

**METHOD B: REMOVE BATTERY FROM
WHEELCHAIR AND
PACKAGE IN APPROVED
CONTAINER**

IMPORTANT: Use this stowage method when the wheelchair with *spillable* batteries must be turned sideways to fit it through the cargo compartment door or if it will be stowed on its side. Both are conditions that could cause battery acid to spill or leak from the battery.

1. For batteries placed in separate containers/housings, remove the container from the wheelchair (if practical) and remove the battery from its container. You may have to perform the next step first, before removing the battery from the container.
2. Disconnect the power supply by disconnecting the battery terminal cables from both the positive (+) and negative (-) poles.

CAUTION:

When performing this task, you must wear protective gloves and eyeglasses and use the proper size wrench and pliers. To avoid damage, the terminal connectors should not be “jerked“ loose, but rather, loosened sufficiently to be detached without using excessive force.

You must not let metal tools touch the metal frame and the battery terminal pole at the same time or you could generate sparks or enough heat to pose a burn hazard.

3. Cap or tape the battery terminals/poles to prevent contact with metal objects during transit or removal/installation.

In order to perform the next task properly, an approved battery container including the following items is needed:

- 1 roll electrical tape
- 1 roll 2" masking tape
- 1 roll packing tape
- 1 roll putty
- 2 battery terminal/pole caps
- 6 "spill resistant" screw caps
- 6 "spill resistant" push caps
- 3 sheets absorbent material
- 1 large polyethylene bag to hold the battery & container
- 1 small polyethylene bag for regular battery caps
- 1 cardboard shipping box
- 1 special wheelchair shipping tag

(Note: These items are included in the Air Canada battery package list.)

- 4a. If the battery is "spillable" and is equipped with regular vent caps (which do not resist spills), replace these caps with the "spill resistant" battery vent caps. Package the regular caps in a plastic bag.
- 4b. If the battery is the "maintenance free" type, seal the vent slots with putty and hold the putty in place with the 2" masking tape.

WARNING:

Putty must be removed from vent holes before operating the chair.

5. Wrap the battery with three layers of absorbent material. Three layers will be enough to absorb the entire fluid contents of the largest wheelchair batteries.

6. If the battery container has been removed from the wheelchair, place the wrapped battery back in its original container, place the battery (and container) in the plastic bag, twist the top of the bag, and seal the plastic bag with tape.
7. Place both the plastic bag containing the battery and the smaller plastic bag containing the regular battery caps in the shipping box.
8. Seal the box with shipping tape.
9. Attach a wheelchair shipping tag to the box.
10. Stow the box in the aircraft according to the proper orientation as defined by the "THIS SIDE UP" instruction and arrows printed on the box. Stow the box near the wheelchair to avoid their separation.

END OF PROCEDURE

**METHOD C: REMOVE BATTERY FROM
WHEELCHAIR AND STOW**

IMPORTANT: Use this stowage method when a wheelchair with *non-spillable* batteries must be stowed on its side. Non-spillable batteries will not leak if the wheelchair must be tipped during loading or must be stowed on its side. However, the batteries should be removed to prevent shifting of the battery and potential damage to the wheelchair during transit.

1. Disconnect the main power plug (remove cables from the battery terminals only if necessary to remove the battery from the wheelchair).
2. For a battery in a separate container which can be easily removed from the wheelchair, remove the container with the battery left inside the container.
 - 3a. If the container has a lid which prevents the battery terminals from contacting other metal objects, make sure the lid is secure (put the lid back on the container if it was removed to detach the battery cables).
 - 3b. If the container does not have a lid, cap or tape battery terminals to prevent accidental contact with metal objects during transit or re-installation of the battery in the wheelchair.
4. Place the battery (and the battery container if provided) in a shipping box and seal the box with shipping tape.
5. Attach a wheelchair shipping tag to the box.
6. Stow the box and the wheelchair close together in the aircraft. Secure the box and wheelchair with cargo straps or netting.

END OF PROCEDURE

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