

United States

Battery Type	Proper Shipping Name	Hazard Class	ID number	Packing Group	Applicable Special Provisions	Packaging 173.**
Applicable to most consumer dry cell re-chargeable batteries including: Ni-Cad, NiMH, Zinc Carbon, Mercury, and Alkaline <b>F<sup>1</sup></b>	Waste Batteries, Dry, Sealed, NOS	n/a	n/a	n/a	<b>130</b>	
Industrial application dry alkaline batteries	Waste Batteries, Dry, containing Potassium Hydroxide Solid	8	UN3028	PG III	237	213 <b>F<sup>2</sup></b>
Flooded lead acid batteries including; industrial, automotive and stand by power batteries <b>F<sup>1</sup></b>	Waste Batteries, Wet Filled with Acid	8	UN2794	PG III	None	159
Alkaline wet cell batteries including: Ni-cad (industrial style), Ni-Iron, Zinc Carbonaire <b>F<sup>1</sup></b>	Waste Batteries, Wet Filled with Alkali	8	UN2795	PG III	None	159
Sealed acid batteries including: Gel cell and gates type <b>F<sup>1</sup></b>	Waste Batteries, Wet, Non-Spillable	8	UN2800	PG III	None	159, 159 (a)
Lithium batteries, lithium-ion and primary lithium chemistries <b>F<sup>1</sup></b>	Waste Lithium Batteries	9	UN3090	PG II	29, 188, 189, A54, A55, A100	185(d)
	Waste Lithium Batteries, Contained in Equipment		UN3091		29, 188, 189, A54, A55, A101, A104	
Damaged primary lithium batteries, shipped in schedule 40 PVC tubes <b>F<sup>1</sup></b>	Waste Lithium Batteries	9	UN3090	PG II	29, 188, 189, A54, A55, A100	185(d)
Drained Lead-acid Batteries	Waste Environmentally Hazardous Substance, Solid, NOS	9	UN3077	PG III	8, 146, 335, B54, IB8, IP3, N20, T1, TP33	213
Broken, burnt, drained or damaged batteries <b>F<sup>3</sup></b>	Hazardous Waste Solid NOS	9	NA3077	PG III	B54, IB8, IP2, T1, TP33	213

**F<sup>1</sup>** Batteries meeting the definition of a hazardous material per CFR 49. **F<sup>2</sup>** Bulk packagings are not authorized.

**F<sup>3</sup>** Batteries meeting the description of a hazardous waste per CFR 40.

Please note that 49 CFR part 172.101, Special Provision 190 is no longer applicable.

Example Format for Shipping Papers: UN3090, Waste Lithium Batteries, 9, PG II.

**Additional California Descriptions**

Non-RCRA Hazardous Waste Solid	May be used when shipping <i>Alkaline Batteries</i> in California; special provision 130 applies.
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**Universal Waste Battery Descriptions**

<i>Universal Waste Batteries</i> <i>Waste Batteries</i> <i>Used Batteries</i>	Applicable Labeling/Marking for <i>Universal Waste Batteries</i> when shipped in accordance with 40 CFR §273 (CCR Title 22 §66273).
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## 49 CFR §172.102 Special Provisions

**130** Dry batteries not specifically covered by another entry in the §172.101 Table must be described using this entry. Batteries described as “Batteries, dry, sealed, n.o.s.” are hermetically sealed and generally utilize metals (other than lead) and/or carbon as electrodes. These batteries are typically used for portable power applications. The rechargeable (and some non-rechargeable) types have gelled alkaline electrolytes (rather than acidic) making it difficult for them to generate hydrogen or oxygen when overcharged and therefore, differentiating them from non-spillable batteries. “Batteries, dry, sealed, n.o.s.” are not subject to any other requirements of this subchapter except for the following:

(1) Incident reporting requirements. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat ( *i.e.* , an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a dry battery. For all modes of transportation, a written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a dry battery or battery-powered device;

(2) Batteries and battery-powered device(s) containing batteries must be prepared and packaged for transport in a manner to prevent:

(i) A dangerous evolution of heat;

(ii) Short circuits, including but not limited to the following methods:

(a) Packaging each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material;

(b) Separating or packaging batteries in a manner to prevent contact with other batteries, devices or conductive materials ( *e.g.* , metal) in the packagings; or

(c) Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and

(iii) Damage to terminals. If not impact resistant, the outer packaging should not be used as the sole means of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits. Batteries contained in devices must be securely installed. Terminal protection methods include but are not limited to the following:

(a) Securely attaching covers of sufficient strength to protect the terminals;

(b) Packaging the battery in a rigid plastic packaging; or

(c) Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

(3) When transported by aircraft, for a battery whose voltage (electrical potential) exceeds 9 volts:

(i) When contained in a device, the device must be packaged in a manner that prevents unintentional activation or must have an independent means of preventing unintentional activation ( *e.g.* , packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, etc.); and

(ii) An indication of compliance with this special provision must be provided by marking each package with the words “not restricted” or by including the words “not restricted” on a transport document such as an air waybill accompanying the shipment.

29 For transportation by motor vehicle, rail car or vessel, production runs (exceptions for prototypes can be found in §173.185(e)) of not more than 100 lithium cells or batteries are excepted from the testing requirements of §173.185(a)(1) if—

a. For a lithium metal cell or battery, the lithium content is not more than 1.0 g per cell and the aggregate lithium content is not more than 2.0 g per battery, and, for a lithium-ion cell or battery, the equivalent lithium content is not more than 1.5 g per cell and the aggregate equivalent lithium content is not more than 8 g per battery;

b. The cells and batteries are transported in an outer packaging that is a metal, plastic or plywood drum or metal, plastic or wooden box that meets the criteria for Packing Group I packagings; and

c. Each cell and battery is individually packed in an inner packaging inside an outer packaging and is surrounded by cushioning material that is non-combustible, and non-conductive.

A54 Lithium batteries or lithium batteries contained or packed with equipment that exceed the maximum gross weight allowed by Column (9B) of the §172.101 Table may only be transported on cargo aircraft if approved by the Associate Administrator.

A55 Prototype lithium batteries and cells that are packed with not more than 24 cells or 12 batteries per packaging that have not completed the test requirements in Sub-section 38.3 of the UN Manual of Tests and Criteria (incorporated by reference; see §171.7 of this subchapter) may be transported by cargo aircraft if approved by the Associate Administrator and provided the following requirements are met:

a. The cells and batteries must be transported in rigid outer packagings that conform to the requirements of Part 178 of this subchapter at the Packing Group I performance level; and

b. Each cell and battery must be protected against short circuiting, must be surrounded by cushioning material that is non-combustible and non-conductive, and must be individually packed in an inner packaging that is placed inside an outer specification packaging.

188 *Small lithium cells and batteries.* Lithium cells or batteries, including cells or batteries packed with or contained in equipment, are not subject to any other requirements of this subchapter if they meet all of the following:

a. *Primary lithium batteries and cells.*

(1) Primary lithium batteries and cells are forbidden for transport aboard passenger-carrying aircraft. The outside of each package that contains primary (nonrechargeable) lithium batteries or cells must be marked “PRIMARY LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT” or “LITHIUM METAL BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT” on a background of contrasting color. The letters in the marking must be:

(i) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds); or

(ii) At least 6 mm (0.25 inch) on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary to fit package dimensions; and

(2) The provisions of paragraph (a)(1) do not apply to packages that contain 5 kg (11 pounds) net weight or less of primary lithium batteries or cells that are contained in or packed with equipment and the package contains no more than the number of lithium batteries or cells necessary to power the piece of equipment;

b. For a lithium metal or lithium alloy cell, the lithium content is not more than 1.0 g. For a lithium-ion cell, the equivalent lithium content is not more than 1.5 g;

c. For a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2.0 g. For a lithium-ion battery, the aggregate equivalent lithium content is not more than 8 g;

d. Effective October 1, 2009, the cell or battery must be of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter);

e. Cells or batteries are separated or packaged in a manner to prevent short circuits and are packed in a strong outer packaging or are contained in equipment;

f. Effective October 1, 2008, except when contained in equipment, each package containing more than 24 lithium cells or 12 lithium batteries must be:

(1) Marked to indicate that it contains lithium batteries, and special procedures should be followed if the package is damaged;

- (2) Accompanied by a document indicating that the package contains lithium batteries and special procedures should be followed if the package is damaged;
- (3) Capable of withstanding a 1.2 meter drop test in any orientation without damage to cells or batteries contained in the package, without shifting of the contents that would allow short circuiting and without release of package contents; and
- (4) Gross weight of the package may not exceed 30 kg (66 pounds). This requirement does not apply to lithium cells or batteries packed with equipment;

g. Electrical devices must conform to §173.21;

h. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat ( *i.e.* , an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a lithium battery. For all modes of transportation, a written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a lithium battery or battery-powered device; and

i. Lithium batteries or cells are not authorized aboard an aircraft in checked or carry-on luggage except as provided in §175.10.

189 *Medium lithium cells and batteries.* Effective October 1, 2008, when transported by motor vehicle or rail car, lithium cells or batteries, including cells or batteries packed with or contained in equipment, are not subject to any other requirements of this subchapter if they meet all of the following:

- a. The lithium content anode of each cell, when fully charged, is not more than 5 grams.
- b. The aggregate lithium content of the anode of each battery, when fully charged, is not more than 25 grams.
- c. The cells or batteries are of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). A cell or battery and equipment containing a cell or battery that was first transported prior to January 1, 2006 and is of a type proven to meet the criteria of Class 9 by testing in accordance with the tests in the UN Manual of Tests and Criteria, Third revised edition, 1999, need not be retested.
- d. Cells or batteries are separated or packaged in a manner to prevent short circuits and are packed in a strong outer packaging or are contained in equipment.
- e. The outside of each package must be marked “LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL” on a background of contrasting color, in letters:
  - (1) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds); or

(2) At least 6 mm (0.25 inch) on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary to fit package dimensions.

f. Except when contained in equipment, each package containing more than 24 lithium cells or 12 lithium batteries must be:

(1) Marked to indicate that it contains lithium batteries, and special procedures should be followed if the package is damaged;

(2) Accompanied by a document indicating that the package contains lithium batteries and special procedures should be followed if the package is damaged;

(3) Capable of withstanding a 1.2 meter drop test in any orientation without damage to cells or batteries contained in the package, without shifting of the contents that would allow short circuiting and without release of package contents; and

(4) Gross weight of the package may not exceed 30 kg (66 pounds). This requirement does not apply to lithium cells or batteries packed with equipment.

g. Electrical devices must conform to §173.21 of this subchapter; and

h. A written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat (*i.e.*, an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a lithium battery or battery-powered device.

190 Until the effective date of the standards set forth in Special Provision 189, medium lithium cells or batteries, including cells or batteries packed with or contained in equipment, are not subject to any other requirements of this subchapter if they meet all of the following:

a. *Primary lithium batteries and cells*. (1) Primary lithium batteries and cells are forbidden for transport aboard passenger-carrying aircraft. The outside of each package that contains primary (nonrechargeable) lithium batteries or cells must be marked “PRIMARY LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT” or “LITHIUM METAL BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT” on a background of contrasting color. The letters in the marking must be:

(i) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds); or

(ii) At least 6 mm (0.25 inch) on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary to fit package dimensions; and

(2) The provisions of paragraph (a)(1) do not apply to packages that contain 5 kg (11 pounds) net weight or less of primary lithium batteries or cells that are contained in or

packed with equipment and the package contains no more than the number of lithium batteries or cells necessary to power the piece of equipment.

- b. The lithium content of each cell, when fully charged, is not more than 5 grams.
- c. The aggregate lithium content of each battery, when fully charged, is not more than 25 grams.
- d. The cells or batteries are of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). A cell or battery and equipment containing a cell or battery that was first transported prior to January 1, 2006 and is of a type proven to meet the criteria of Class 9 by testing in accordance with the tests in the UN Manual of Tests and Criteria, Third Revised Edition, 1999, need not be retested.
- e. Cells or batteries are separated so as to prevent short circuits and are packed in a strong outer packaging or are contained in equipment.
- f. Electrical devices must conform to §173.21 of this subchapter.

A101 A primary lithium battery or cell packed with or contained in equipment is forbidden for transport aboard a passenger carrying aircraft unless the equipment and the battery conform to the following provisions and the package contains no more than the number of lithium batteries or cells necessary to power the intended piece of equipment:

- (1) The lithium content of each cell, when fully charged, is not more than 5 grams.
- (2) The aggregate lithium content of the anode of each battery, when fully charged, is not more than 25 grams.
- (3) The net weight of lithium batteries does not exceed 5 kg (11 pounds).

A103 Equipment is authorized aboard passenger carrying aircraft if the gross weight of the inner package of secondary lithium batteries or cells packed with the equipment does not exceed 5 kg (11 pounds).

A104 The net weight of secondary lithium batteries or cells contained in equipment may not exceed 5 kg (11 pounds) in packages that are authorized aboard passenger carrying aircraft.

237 “Batteries, dry, containing potassium hydroxide solid, *electric storage* ” must be prepared and packaged in accordance with the requirements of §173.159(a), (b), and (c). For transportation by aircraft, the provisions of §173.159(b)(2) are applicable.

#### 49 CFR §173.159 Batteries, wet.

(a) Electric storage batteries, containing electrolyte acid or alkaline corrosive battery fluid, must be completely protected so that short circuits will be prevented; they may not be packed with other materials except as provided in paragraphs (g) and (h) of this section and in §§ [173.220](#) and [173.222](#) . For transportation by aircraft, the packaging for wet cell batteries must incorporate an acid-or alkali-proof liner, or include a supplementary packaging with sufficient strength and adequately sealed to prevent leakage of electrolyte fluid in the event of spillage.

(b) The following specification packagings are authorized for batteries packed without other materials:

- (1) 4C1, 4C2, 4D, or 4F wooden boxes.
- (2) 4G fiberboard boxes.
- (3) 1D plywood drums.
- (4) 1G fiber drums.
- (5) 1H2 and 3H2 plastic drums and jerricans.
- (6) 4H2 plastic boxes.

(c) The following non-specification packagings are authorized for batteries packed without other materials:

- (1) Electric storage batteries protected against short circuits and firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation, are authorized for transportation by rail, highway, or water. The height of the completed unit must not exceed 1 1/2 times the width of the skid or pallet. The unit must be capable of withstanding, without damage, a superimposed weight equal to two times the weight of the unit or, if the weight of the unit exceeds 907 kg (2000 pounds), a superimposed weight of 1814 kg (4000 pounds). Battery terminals must not be relied upon to support any part of the superimposed weight.
- (2) Electric storage batteries weighing 225 kg (500 pounds) or more, consisting of carriers' equipment, may be shipped by rail when mounted on suitable skids and protected against short circuits. Such shipments may not be offered in interchange service.
- (3) One to three batteries not over 11.3 kg (25 pounds) each, packed in outer boxes. The maximum authorized gross weight is 34 kg (75 pounds).
- (4) Not more than four batteries not over 7 kg (15 pounds) each, packed in strong outer fiberboard or wooden boxes. Batteries must be securely cushioned and packed to prevent short circuits. The maximum authorized gross weight is 30 kg (65 pounds).
- (5) Not more than five batteries not over 4.5 kg (10 pounds) each, packed in strong outer fiberboard or wooden boxes. Batteries must be securely cushioned and packed to prevent short circuits. The maximum authorized gross weight is 30 kg (65 pounds).

(6) Single batteries not exceeding 34 kg (75 pounds) each, packed in 5-sided slipcovers or in completely closed fiberboard boxes. Slipcovers and boxes must be of solid or double-faced corrugated fiberboard of at least 91 kg (200 pounds) Mullen test strength. The slip cover or fiberboard box must fit snugly and provide inside top clearance of at least 1.3 cm (0.5 inch) above battery terminals and filler caps with reinforcement in place. Assembled for shipment, the bottom edges of the slipcover must come to within 2.5 cm (1 inch) of the bottom of the battery. The completed package (battery and box or slip cover) must be capable of withstanding a top-to-bottom compression test of at least 225 kg (500 pounds) without damage to battery terminals, cell covers or filler caps.

(7) Single batteries exceeding 34 kg (75 pounds) each may be packed in completely closed fiberboard boxes. Boxes must be of double-wall corrugated fiberboard of at least 181 kg (400 pounds) test, or solid fiberboard testing at least 181 kg (400 pounds); a box may have hand holes in its ends provided that the handholes will not materially weaken the box. Sides and ends of the box must have cushioning between the battery and walls of the box; combined thickness of cushioning material and walls of the box must not be less than 1.3 cm (0.5 inch); and cushioning must be excelsior pads, corrugated fiberboard, or other suitable cushioning material. The bottom of the battery must be protected by a minimum of one excelsior or double-wall corrugated fiberboard pad. The top of the battery must be protected by a wood frame, corrugated trays or scored sheets of corrugated fiberboard having minimum test of 91 kg (200 pounds), or other equally effective cushioning material. Top protection must bear evenly on connectors and/or edges of the battery cover to facilitate stacking of batteries. No more than one battery may be placed in one box. The maximum authorized gross weight is 91 kg (200 pounds).

(d) A nonspillable wet electric storage battery is excepted from all other requirements of this subchapter under the following conditions:

(1) The battery must be protected against short circuits and securely packaged;

(2) For batteries manufactured after September 30, 1995, the battery and the outer packaging must be plainly and durably marked "NONSPILLABLE" or "NONSPILLABLE BATTERY"; and

(3) The battery must be capable of withstanding the following two tests, without leakage of battery fluid from the battery:

(i) Vibration test. The battery must be rigidly clamped to the platform of a vibration machine, and a simple harmonic motion having amplitude of 0.8 mm (0.03 inches), with a 1.6 mm (0.063 inches) maximum total excursion must be applied. The frequency must be varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return must be traversed in 95±5 minutes for each mounting position (direction of vibrator) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

(ii) Pressure differential test. Following the vibration test, the battery must be stored for six hours at 24 °C±4 °C (75 °F±7 °F) while subjected to a pressure differential of at least 88 kPa (13 psig). The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

(4) At a temperature of 55° C (131° F), the battery must not contain any unabsorbed free-flowing liquid, and must be designed so that electrolyte will not flow from a ruptured or cracked case.

(e) Electric storage batteries containing electrolyte or corrosive battery fluid are not subject to the requirements of this subchapter for transportation by highway or rail if all of the following requirements are met:

- (1) No other hazardous materials may be transported in the same vehicle;
- (2) The batteries must be loaded or braced so as to prevent damage and short circuits in transit;
- (3) Any other material loaded in the same vehicle must be blocked, braced, or otherwise secured to prevent contact with or damage to the batteries; and
- (4) The transport vehicle may not carry material shipped by any person other than the shipper of the batteries.

(f) Electric storage batteries, containing electrolyte or corrosive battery fluid in a coil from which it is injected into the battery cells by a gas generator and initiator assembled with the battery, and which are nonspillable under the criteria of paragraph (d) of this section, are excepted from other requirements of this subchapter when examined by the Bureau of Explosives and approved by the Associate Administrator.

(g) Electrolyte, acid, or alkaline corrosive battery fluid, packed with storage batteries wet or dry, must be packed in one of the following specification packagings:

(1) In 4C1, 4C2, 4D, or 4F wooden boxes with inner receptacles of glass, not over 4.0 L (1 gallon) each with not over 8.0 L (2 gallons) total in each outside container. Inside containers must be well-cushioned and separated from batteries by a strong solid wooden partition. The completed package must conform to Packing Group III requirements.

(2) Electrolyte, acid, or alkaline corrosive battery fluid included with storage batteries and filling kits may be packed in strong rigid outer packagings when shipments are made by, for, or to the Departments of the Army, Navy, or Air Force of the United States. Packagings must conform to military specifications. The electrolyte, acid, or alkaline corrosive battery fluid must be packed in polyethylene bottles of not over 1.0 L (0.3 gallon) capacity each. Not more than 24 bottles, securely separated from storage batteries and kits, may be offered for transportation or transported in each package.

(3) In 4G fiberboard boxes with not more than 12 inside packagings of polyethylene or other material resistant to the lading, each not over 2.0 L (0.5 gallon) capacity each. Completed packages must conform to Packing Group III requirements. Inner packagings must be adequately separated from the storage battery. The maximum authorized gross weight is 29 kg (64 pounds). These packages are not authorized for transportation by aircraft.

(h) Dry storage batteries or battery charger devices may be packaged in 4G fiberboard boxes with inner receptacles containing battery fluid. Completed packagings must conform to Packing Group III requirements. Not more than 12 inner receptacles may be packed in one outer box. The maximum authorized gross weight is 34 kg (75 pounds).

#### **49 CFR § 173.185 Lithium cells and batteries.**

(a) *Cells and batteries.* A lithium cell or battery, including a lithium polymer cell or battery and a lithium-ion cell or battery, must conform to all of the following requirements:

(1) Be of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). A cell or battery and equipment containing a cell or battery that was first transported prior to January 1, 2006 and is of a type proven to meet the criteria of Class 9 by testing in accordance with the tests in the UN Manual of Tests and Criteria, Third Revised Edition, 1999, need not be retested.

(2) Incorporate a safety venting device or otherwise be designed in a manner that will preclude a violent rupture under conditions normally incident to transportation.

(3) Be equipped with an effective means to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.) if a battery contains cells or series of cells that are connected in parallel.

(4) Be packaged in combination packagings conforming to the requirements of part 178, subparts L and M, of this subchapter at the Packing Group II performance level. The lithium battery or cell must be packed in inner packagings in such a manner as to prevent short circuits, including movement which could lead to short circuits. The inner packaging must be packed within one of the following outer packagings: metal boxes (4A or 4B); wooden boxes (4C1, 4C2, 4D, or 4F); fiberboard boxes (4G); solid plastic boxes (4H2); fiber drums (1G); metal drums (1A2 or 1B2); plywood drums (1D); plastic jerricans (3H2); or metal jerricans (3A2 or 3B2).

(5) Be equipped with an effective means of preventing external short circuits.

(6) Except as provided in paragraph (d) of this section, cells and batteries with a liquid cathode containing sulfur dioxide, sulfuryl chloride or thionyl chloride may not be offered for transportation or transported if any cell has been discharged to the extent that the open circuit voltage is less than two volts or is less than 2/3 of the voltage of the fully charged cell, whichever is less.

(b) *Lithium cells or batteries packed with equipment.* Lithium cells or batteries packed with equipment may be transported as Class 9 materials if the batteries and cells meet all the requirements of paragraph (a) of this section. The equipment and the packages of cells or batteries must be further packed in a strong outer packaging. The cells or batteries must be packed in such a manner as to prevent short circuits, including movement that could lead to short circuits.

(c) *Lithium cells or batteries contained in equipment.* Lithium cells or batteries contained in equipment may be transported as Class 9 materials if the cells and batteries meet all the requirements of paragraph (a) of this section, except paragraph (a)(4) of this section, and the equipment is packed in a strong outer packaging that is waterproof or is made waterproof through the use of a liner unless the equipment is made waterproof by nature of its construction. The equipment and cells or batteries must be secured within the outer packaging and be packed so as to prevent movement, short circuits, and accidental operation during transport.

(d) *Cells and batteries, for disposal or recycling.* A lithium cell or battery offered for transportation or transported by motor vehicle to a permitted storage facility, disposal site or for purposes of recycling is excepted from the specification packaging requirements of paragraph (a)(4) of this section and the requirements

of paragraphs (a)(1) and (a)(6) of this section when protected against short circuits and packed in a strong outer packaging conforming to the requirements of §173.24 and 173.24a.

(e) *Shipments for testing (prototypes)*. A lithium cell or battery is excepted from the requirements of (a)(1) of this section when transported by motor vehicle for purposes of testing. The cell or battery must be individually packed in an inner packaging, surrounded by cushioning material that is non-combustible and nonconductive. The cell or battery must be transported as a Class 9 material.

(f) A lithium cell or battery that does not comply with the provisions of this subchapter may be transported only under conditions approved by the Associate Administrator.

(g) Batteries employing a strong, impact-resistant outer casing and exceeding a gross weight of 12 kg (26.5 lbs.), and assemblies of such batteries, may be packed in strong outer packagings, in protective enclosures (for example, in fully enclosed wooden slatted crates) or on pallets. Batteries must be secured to prevent inadvertent movement, and the terminals may not support the weight of other superimposed elements. Batteries packaged in this manner are not permitted for transportation by passenger aircraft, and may be transported by cargo aircraft only if approved by the Associate Administrator prior to transportation.

[72 FR 44949, Aug. 9, 2007]

**F<sup>4</sup> Only Steel drums are authorized for shipments of lithium batteries into KBI.**

**§173.213 Non-bulk packagings for solid hazardous materials in Packing Group III.**

(a) When §[172.101](#) of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of subpart B of part [173](#), to the requirements of [part 178](#) of this subchapter at the Packing Group I, II or III performance level, and to the requirements of the special provisions of Column 7 of the §[172.101](#) Table.

(b) The following combination packagings are authorized: Outer packagings:

- Steel drum: 1A1 or 1A2
- Aluminum drum: 1B1 or 1B2
- Metal drum other than steel or aluminum: 1N1 or 1N2
- Plywood drum: 1D
- Fiber drum: 1G
- Plastic drum: 1H1 or 1H2
- Wooden barrel: 2C2
- Steel jerrican: 3A1 or 3A2
- Plastic jerrican: 3H1 or 3H2 Aluminum jerrican: 3B1 or 3B2
- Steel box: 4A
- Aluminum box: 4B
- Natural wood box: 4C1 or 4C2
- Plywood box: 4D
- Reconstituted wood box: 4F
- Fiberboard box: 4G
- Solid plastic box: 4H2
- Inner packagings :
  - Glass or earthenware receptacles
  - Plastic receptacles
  - Metal receptacles
  - Glass ampoules

(c) The following single packagings are authorized: Steel drum: 1A1 or 1A2

- Aluminum drum: 1B1 or 1B2
- Plywood drum: 1D
- Fiber drum: 1G
- Plastic drum: 1H1 or 1H2
- Metal drum other than steel or aluminum: 1N1 or 1N2
- Wooden barrel: 2C1 or 2C2
- Steel jerrican: 3A1 or 3A2
- Plastic jerrican: 3H1 or 3H2 Aluminum jerrican: 3B1 or 3B2
- Steel box with liner: 4A
- Steel box: 4A
- Aluminum box with liner: 4B
- Natural wood box: 4C1
- Natural wood box, sift proof: 4C2
- Plywood box: 4D

Reconstituted wood box: 4F  
Fiberboard box: 4G  
Expanded plastic box: 4H1  
Solid plastic box: 4H2  
Bag, woven plastic: 5H1, 5H2 or 5H3  
Bag, plastic film: 5H4  
Bag, textile: 5L1, 5L2 or 5L3  
Bag, paper, multiwall, water resistant: 5M2  
Plastic receptacle in steel, aluminum, plywood, fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1  
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1  
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2