used to prevent freezing. Each packaging must conform to the requirements of part 178 of this subchapter at the Packing Group I performance level.

§ 173.183 Nitrocellulose base film.

Films, nitrocellulose base, must be packaged in packagings conforming to the requirements of part 178 of this subchapter at the Packing Group III performance level, as follows:

(a) In steel drums (1A2), aluminum drums (1B2), other metal drums (4A2), steel jerricans (3A2), aluminum jerricans (3B2), steel, aluminum or other metal (4A, 4B, 4N) boxes, wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes or plywood drums (1D) with each reel in a tightly closed metal can, polypropylene canister, or strong cardboard or fiberboard inner packaging with cover held in place by adhesive tape or paper; or

(b) In fiberboard (4G) boxes or fiber drums (1G) with a single tightly closed metal can, polypropylene canister, or strong cardboard or fiberboard inner packaging with cover held in place by adhesive tape or paper; authorized only for not over 600 m (1969 feet) of film.

[Amdt. 173–224, 55 FR 52643 Dec. 21, 1990, as amended by Amdt. 173–255, 61 FR 50627, Sept. 26, 1996; 78 FR 1087, Jan. 7, 2013]

§ 173.184 Highway or rail fusee.

(a) A fusee is a device designed to burn at a controlled rate and to produce visual effects for signaling purposes. The composition of the fusee must be such that the fusee will not ignite spontaneously or undergo marked decomposition when subjected to a temperature of 75 °C (167 °F) for 48 consecutive hours.

(b) Fusees (highway and railway) must be packaged in steel (1A2), aluminum (1B2) or other metal (1N2) drums, steel (3A2) or aluminum (3B2) jerricans, steel (4A), aluminum (4B) or other metal (4N) boxes, wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes or in fiberboard boxes (4G), plywood (1D) or fiber (1G) drums. If the fusees are equipped with spikes packagings must have reinforced ends to prevent penetration of spikes through the outer packagings; packages must be capable of passing drop test requirements (§178.603 of this subchapter), including at least one drop with spike in a downward position, and other requirements of part 178 of this subchapter, at the Packing Group II performance level.

[Amdt. 173–224, 55 FR 52643, Dec. 21, 1990, as amended at 66 FR 45379; 78 FR 1088, Jan. 7, 2013]

§ 173.185 Lithium cells and batteries.

As used in this section, *lithium cell(s) or battery(ies)* includes both lithium metal and lithium ion chemistries. *Equipment* means the device or apparatus for which the lithium cells or batteries will provide electrical power for its operation.

(a) *Classification.* (1) Each lithium cell or battery must be of the type proven to meet the criteria in Part III, subsection 38.3 of the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). Lithium cells and batteries are subject to these tests regardless of whether the cells used to construct the battery are of a tested type.

(i) Cells and batteries manufactured according to a type meeting the requirements of sub-section 38.3 of the UN Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in this subchapter.

(ii) Cell and battery types only meeting the requirements of the UN Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before July 2003 may continue to be transported if all other applicable requirements are fulfilled.

(2) Each person who manufactures lithium cells or batteries must create a record of satisfactory completion of the testing required by this paragraph prior to offering the lithium cell or battery for transport and must:

(i) Maintain this record for as long as that design is offered for transportation and for one year thereafter; and

(ii) Make this record available to an authorized representative of the Federal, state or local government upon request.

(3) Except for cells or batteries meeting the requirements of paragraph (c)

of this section, each lithium cell or battery must:

(i) Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport;

(ii) Be equipped with effective means of preventing external short circuits; and

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

(b) *Packaging.* (1) Each package offered for transportation containing lithium cells or batteries, including lithium cells or batteries packed with, or contained in, equipment, must meet all applicable requirements of subpart B of this part.

(2) Lithium cells or batteries, including lithium cells or batteries packed with, or contained in, equipment, must be packaged in a manner to prevent:

(i) Short circuits;

(ii) Movement within the outer package; and

(iii) Accidental activation of the equipment.

(3) For packages containing lithium cells or batteries offered for transportation:

(i) The lithium cells or batteries must be placed in non-metallic inner packagings that completely enclose the cells or batteries, and separate the cells or batteries from contact with equipment, other devices, or conductive materials (e.g., metal) in the packaging.

(ii) The inner packagings containing lithium cells or batteries must be placed in one of the following packagings meeting the requirements of part 178, subparts L and M, of this subchapter at the Packing Group II level:

(A) Metal (4A, 4B, 4N), wooden (4C1, 4C2, 4D, 4F), fiberboard (4G), or solid plastic (4H1, 4H2) box;

(B) Metal (1A2, 1B2, 1N2), plywood (1D), fiber (1G), or plastic (1H2) drum;

(C) Metal (3A2, 3B2) or plastic (3H2) jerrican.

(iii) When packed with equipment lithium cells or batteries must:

(A) Be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section; or

(B) Be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements as specified in paragraph (b)(3)(ii) of this section.

(4) When lithium cells or batteries are contained in equipment:

(i) The outer packaging must be constructed of suitable material of adequate strength and design in relation to the capacity and intended use of the packaging, unless the lithium cells or batteries are afforded equivalent protection by the equipment in which they are contained;

(ii) Equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during transport; and

(iii) Any spare lithium ion cells or batteries packed with the equipment must be packaged in accordance with paragraph (b)(3) of this section.

(5) Lithium batteries that weigh 12 kg (26.5 pounds) or more and have a strong, impact-resistant outer casing and assemblies of such batteries, may be packed in strong outer packagings; in protective enclosures (for example, in fully enclosed or wooden slatted crates); or on pallets or other handling devices, instead of packages meeting the UN performance packaging requirements in paragraphs (b)(3)(ii) and (b)(4) of this section. Batteries or battery assemblies must be secured to prevent inadvertent movement, and the terminals may not support the weight of other superimposed elements. Batteries or battery assemblies packaged in accordance with this paragraph are not permitted for transportation by passenger-carrying aircraft, and may be transported by cargo aircraft only if approved by the Associate Administrator.

(6) Except for transportation by aircraft, the following rigid large packagings are authorized for a single battery, including for a battery contained in equipment, meeting provisions (b)(1)

and (2) of this section and the requirements of part 178, subparts P and Q, of this subchapter at the Packing Group II level:

(i) Metal (50A, 50B, 50N);

(ii) Rigid plastic (50H);

(iii) Wooden (50C, 50D, 50F);

(iv) Rigid fiberboard (50G).

(c) *Exceptions for smaller cells or batteries.* Other than as specifically stated below, a package containing lithium cells or batteries, or lithium cells or batteries packed with, or contained in, equipment, that meets the conditions of this paragraph, is excepted from the requirements in subparts C through H of part 172 of this subchapter and the UN performance packaging requirements in paragraphs (b)(3)(ii) and (b)(4) of this section under the following conditions and limitations.

(1) *Size limits:*

(i) The Watt-hour rating may not exceed 20 Wh for a lithium ion cell or 100 Wh for a lithium ion battery. After December 31, 2015, each lithium ion battery subject to this provision must be marked with the Watt-hour rating on the outside case.

(ii) The lithium content may not exceed 1 g for a lithium metal cell or 2 g for a lithium metal battery.

(iii) Except when lithium metal cells or batteries are packed with or contained in equipment in quantities not exceeding 5 kg net weight, the outer package that contains lithium metal cells or batteries must be marked: ''PRIMARY LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT'' or ''LITHIUM METAL BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT, or labeled with a CARGO AIRCRAFT ONLY'' label specified in §172.448 of this subchapter.

(iv) For transportation by highway or rail only, the lithium content of the cell and battery may be increased to 5 g for a lithium metal cell and 25 g for a lithium metal battery and 60 Wh for a lithium ion cell or 300 Wh for a lithium ion battery provided the outer package is marked: ''LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL.''

(v) The marking specified in paragraphs (c)(1)(ii) and (c)(1)(iii) of this section must have a background of contrasting color, and the letters in the marking must be:

(A) 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 when package dimensions so require.

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

(vi) Except when lithium cells or batteries are packed with, or contained in, equipment, each package must not exceed 30 kg (66 pounds) gross weight.

(2) *Packaging.* Except when lithium cells or batteries are contained in equipment, each package must be capable of withstanding a 1.2 meter drop test, in any orientation, without damage to the cells or batteries contained in the package, without shifting of the contents that would allow battery-to-battery (or cell-to-cell) contact, and without release of the contents of the package.

(3) *Hazard communication.* Except for a package containing button cell batteries installed in equipment (including circuit boards), or no more than four lithium cells or two lithium batteries installed in the equipment:

(i) The outer package must be marked with:

(A) An indication that the package contains ''lithium metal'' or ''lithium ion'' cells or batteries, as appropriate;

(B) An indication that the package is to be handled with care and that a flammable hazard exits if the package is damaged;

(C) An indication that special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary;

(D) A telephone number for additional information.

(ii) Each shipment of one or more packages marked in accordance with this paragraph must be accompanied by a document that includes the following:

(A) An indication that the package contains ''lithium metal'' or ''lithium ion'' cells or batteries, as appropriate;

(B) An indication that the package is to be handled with care and that a

flammable hazard exits if the package is damaged;

(C) An indication that special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and

(D) A telephone number for additional information.

(4) *Air transportation.* For transportation by aircraft, lithium cells and batteries may not exceed the limits in the following table. The limits on the maximum number of batteries and maximum net quantity of batteries in the following table may not be combined in the same package:

Contents	Lithium metal cells and/or batteries with a lithium content not more than 0.3 g	Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g	Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g	Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh	Lithium ion cells with a Watt-hour rating more than 2.7 Wh but not more than 20 Wh	Lithium ion batteries with a Watt-hour rating more than 2.7 Wh but not more than 100 Wh
Maximum number of cells/batteries per package.	No Limit	8 cells	2 batteries	No Limit	8 cells	2 batteries.
Maximum net quantity (mass) per package.	2.5 kg	n/a	n/a	2.5 kg	n/a	n/a.

(i) The outer package must be durably and legibly marked with the following handling marking, which is durable, legible and displayed on a background of contrasting color:

(A) The marking must be not less than 120 mm (4.7 inches) wide by 110 mm (4.3 inches) high except markings of 105 mm (4.1 inches) wide by 74 mm (2.9 inches) high may be used on a package containing lithium batteries when the package is too small for the larger marking;

(B) The symbols and letters must be black and the border must be red;

(C) The ''*'' must be replaced by ''lithium ion battery'' and/or ''Lithium metal battery'' as appropriate and the ''xxx-xxx-xxxx'' must be replaced by a telephone number for additional information; and

(D) When packages required to bear the handling marking are placed in an overpack, the handling marking must either be clearly visible through the overpack, or the handling marking must also be affixed on the outside of the overpack, and the overpack must be marked with the word ''Overpack''.

(ii) Each shipment with packages required to bear the handling marking must include an indication the shipment contains ''lithium ion batteries'' or ''lithium metal batteries,'' as appropriate, and when an air waybill is used, an indication on the air waybill of compliance with this paragraph (c)(4) (or the applicable ICAO Packing Instruction).

(iii) For lithium batteries packed with, or contained in, equipment, the number of batteries in each package is limited to the minimum number required to power the piece of equipment, plus two spares, and the total net quantity (mass) of the lithium cells or batteries in the completed package must not exceed 5 kg.

(iv) Each person who prepares a package for transport containing lithium cells or batteries, including cells or batteries packed with, or contained in, equipment in accordance with the conditions and limitations in this paragraph, must receive adequate instruction on these conditions and limitations, commensurate with their responsibilities.

(v) A package that exceeds the number or quantity (mass) limits in the table shown in (c)(4) is subject to all applicable requirements of this subchapter, except that a package containing no more than 2.5 kg lithium metal cells or batteries or 10 kg lithium ion cells or batteries is not subject to the UN performance packaging requirements in paragraphs (b)(3)(ii) of this section when the package displays both the lithium battery handling mark and the Class 9 label.

(d) *Lithium cells or batteries shipped for disposal or recycling.* A lithium cell or battery, including a lithium cell or battery contained in equipment, that is transported by motor vehicle to a permitted storage facility or disposal site, or for purposes of recycling, is excepted from the testing and record keeping requirements of paragraph (a) and the specification packaging requirements of paragraph (b)(3) of this section, when packed in a strong outer packaging conforming to the requirements of §§173.24 and 173.24a. A lithium cell or battery that meets the size, packaging, and hazard communication conditions in paragraph (c)(1)–(3) of this section is excepted from subparts C through H of part 172 of this subchapter.

(e) *Low production runs and prototypes.* Low production runs (i.e., annual production runs consisting of not more than 100 lithium cells or batteries), or prototype lithium cells or batteries transported for purposes of testing, are excepted from the testing and record keeping requirements of paragraph (a) of this section provided:

(1) Except as provided in paragraph (e)(3) of this section, each cell or battery is individually packed in a non-metallic inner packaging, inside an outer packaging, and is surrounded by cushioning material that is non-combustible and non-conductive;

(2) The inner packages containing lithium cells or batteries are packed in one of the following packagings that meet the requirements of part 178, Subparts L and M at Packing Group I level.

(i) Metal (4A, 4B, 4N), wooden (4C1, 4C2, 4D, 4F), or solid plastic (4H2) box;

(ii) Metal (1A2, 1B2, 1N2), plywood (1D), or plastic (1H2) drum.

(3) Lithium batteries that weigh 12 kg (26.5 pounds) or more and have a strong, impact-resistant outer casing or assemblies of such batteries, may be packed in strong outer packagings, in protective enclosures (for example, in fully enclosed or wooden slatted crates), or on pallets or other handling devices, instead of packages meeting the UN performance packaging requirements in paragraphs (b)(3)(ii) and (b)(4) of this section. The battery or battery assembly must be secured to prevent inadvertent movement, and the terminals may not support the weight of other superimposed elements;

(4) Irrespective of the limit specified in column (9B) of the §172.101 Hazardous Materials Table, the battery or battery assembly prepared for transport in accordance with this paragraph may have a mass exceeding 35 kg gross

weight when transported by cargo aircraft; and

(5) Batteries or battery assemblies packaged in accordance with this paragraph are not permitted for transportation by passenger-carrying aircraft, and may be transported by cargo aircraft only if approved by the Associate Administrator prior to transportation.

(f) *Damaged, defective, or recalled cells or batteries.* Lithium cells or batteries, that have been damaged or identified by the manufacturer as being defective for safety reasons, that have the potential of producing a dangerous evolution of heat, fire, or short circuit (e.g. those being returned to the manufacturer for safety reasons) may be transported by highway, rail or vessel only, and must be packaged as follows:

(1) Each cell or battery must be placed in individual, non-metallic inner packaging that completely encloses the cell or battery;

(2) The inner packaging must be surrounded by cushioning material that is non-combustible, non-conductive, and absorbent; and

(3) Each inner packaging must be individually placed in one of the following packagings meeting the applicable requirements of part 178, subparts L, M, P and Q of this subchapter at the Packing Group I level:

(i) Metal (4A, 4B, 4N), wooden (4C1, 4C2, 4D, 4F), or solid plastic (4H2) box;

(ii) Metal (1A2, 1B2, 1N2), plywood (1D), or plastic (1H2) drum; or

(iii) Except for transportation by aircraft, for a single large battery or for a single battery contained in equipment, the following rigid large packagings are authorized:

(A) Metal (50A, 50B, 50N);

(B) Rigid plastic (50H);

(C) Plywood (50D); and

(4) The outer package must be marked with an indication that the package contains a ''Damaged/defective lithium ion battery'' and/or ''Damaged/defective lithium metal battery'' as appropriate.

(g) *Approval.* A lithium cell or battery that does not conform to the provisions of this subchapter may be transported only under conditions approved by the Associate Administrator.

[79 FR 46036, Aug. 6, 2014, as amended at 80 FR 1160, Jan. 8, 2015]

§ 173.186 Matches.

(a) Matches must be of a type which will not ignite spontaneously or undergo marked decomposition when subjected for 8 consecutive hours to a temperature of 93 °C (200 °F).

(b) *Definitions.* (1) *Fusee matches* are matches the heads of which are prepared with a friction-sensitive igniter composition and a pyrotechnic composition which burns with little or no flame, but with intense heat.

(2) *Safety matches* are matches combined with or attached to the box, book or card that can be ignited by friction only on a prepared surface.

(3) *Strike anywhere* matches are matches that can be ignited by friction on a solid surface.

(4) *Wax ''Vesta''* matches are matches that can be ignited by friction either on a prepared surface or on a solid surface.

(c) Safety matches and wax ''Vesta'' matches must be tightly packed in securely closed inner packagings to prevent accidental ignition under conditions normally incident to transportation, and further packed in outer fiberboard, wooden, or other equivalent-type packagings. These matches in outer packagings not exceeding 23 kg (50 pounds) gross weight are not subject to any other requirement (except marking) of this subchapter. These matches may be packed in the same outer packaging with materials not subject to this subchapter.

(d) Strike-anywhere matches may not be packed in the same outer packaging with any material other than safety matches or wax ''Vesta'' matches, which must be packed in separate inner packagings.

(e) *Packagings.* Strike-anywhere matches must be tightly packed in securely closed chipboard, fiberboard, wooden, or metal inner packagings to prevent accidental ignition under conditions normally incident to transportation. Each inner packaging may contain no more than 700 strike-anywhere matches and must be packed in outer steel drums (1A1, 1A2), aluminum drums (1B1, 1B2), other metal drums (1N1, 1N2), steel jerricans (3A1, 3A2), aluminum jerricans (3B1, 3B2), steel (4A), aluminum (4N), other metal (4N) boxes, wooden (4C1, 4C2), plywood (4D),