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loaded so that no more than a minimum displacement of packages occurs when it is lifted.

(2) A cargo net must completely encompass the bottom and sides of the draft. The mesh of the cargo net must be of a size and strength that will prevent a package in the draft from passing through the net.

(3) When a tray is used in handling packages, no package may extend more than one-third its vertical dimension above the sideboard of the tray.

(i) A landing mat must be used when a draft of nonpalletized Division 1.1 or 1.2 (explosive) materials is deposited on deck. The landing mat must have dimensions of at least 1 m (3 feet) wide, 2 m (7 feet) long, and 10 cm (3.9 inches) thick, and be made of woven hemp, sisal, or similar fiber, or foam rubber, polyurethane or similar resilient material.

(j) In addition to the other requirements of this section, packages of Division 1.1 and 1.2 (explosive) materials must be handled in accordance with the following:

(1) Packages may not be loaded or unloaded through a hatch at the same time that other cargo is being handled in any hold served by that hatch.

(2) Packages may not be loaded or unloaded from the same hatch by using two pieces of cargo equipment unless the equipment is positioned at the forward and aft ends of the hatch.

(3) Packages may not be lifted over any hazardous materials.

(4) The height of any structure, equipment, or load on a deck over which packages must be lifted may not be higher than the hatch coaming or bulwark, or 1 m (3 feet), whichever is greater.

(k) Unpackaged explosive devices may not be handled by their lifting lugs or suspension lugs.

(l) A chute may not be used when loading or unloading Class 1 (explosive) materials in compatibility group A or B.

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended by Amdt. 176–40, 61 FR 27175, May 30, 1996; 65 FR 58630, Sept. 29, 2000; 66 FR 45384, 45385, Aug. 28, 2001]

### § 176.108 Supervision of Class 1 (explosive) materials during loading, unloading, handling and stowage.

(a) During the loading, unloading, handling and stowage of Class 1 (explosive) materials, a responsible person shall be in constant attendance during the entire operation to direct the loading, unloading, handling and stowage of Class 1 (explosive) materials, including the preparation of the holds. The responsible person must be aware of the hazards involved and the steps to be taken in an emergency, and must maintain sufficient contact with the master to ensure proper steps are taken in an emergency.

(b) Each person involved in the handling of Class 1 (explosive) materials on a vessel shall obey the orders of the responsible person.

(c) The responsible person must inspect all cargo-handling equipment to determine that it is in safe operating condition before it is used to handle Class 1 (explosive) materials.

## STOWAGE

### § 176.112 Applicability.

The provisions of §§176.116(e), 176,118, and 176.120 of this subpart do not apply to Division 1.4 (explosive) materials, compatibility group S. Such materials may be stowed together with all other Class 1 (explosive) materials except those of compatibility group A or L. They must be segregated from other hazardous materials in accordance with table 176.83(b) of this part.

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended at 66 FR 45384, Aug. 28, 2001]

### § 176.116 General stowage conditions for Class 1 (explosive) materials.

(a) *Heat and sources of ignition:* (1) Class 1 (explosive) materials must be stowed in a cool part of the ship and must be kept as cool as practicable while on board. Stowage must be well away from all sources of heat, including steam pipes, heating coils, sparks, and flame.

(2) Except where the consignment of Class 1 (explosive) materials consists only of explosive *articles*, the wearing of shoes or boots with unprotected metal nails, heels, or tips of any kind is prohibited.

(b) *Wetness:* (1) Spaces where Class 1 (explosive) materials are stowed below deck must be dry. In the event of the contents of packages being affected by water when on board immediate advice must be sought from the shippers; pending this advice handling of the packages must be avoided.

(2) Bilges and bilge sections must be examined and any residue of previous cargo removed before Class 1 materials (explosive) are loaded onto the vessel.

(c) *Security:* All compartments, magazines, and cargo transport units containing Class 1 (explosive) materials must be locked or suitably secured in order to prevent unauthorized access.

(d) *Secure stowage:* Class 1 (explosive) materials must be securely stowed to prevent shifting in transit; where necessary, precautions must be taken to prevent cargo sliding down between the frames at the ship's sides.

(e) *Separation from accommodation spaces and machinery spaces:* (1) Class 1 (explosive) materials must be stowed as far away as practicable from any accommodation spaces or any machinery space and may not be stowed directly above or below such a space. The requirements in paragraphs (e)(2) through (e)(4) of this section are minimum requirements in addition to the applicable requirements of 46 CFR chapter I. Where the requirements of this subpart are less stringent than those of 46 CFR chapter I, the 46 CFR chapter I requirements must be satisfied for ships to which they are applicable.

(2) There must be a permanent A Class steel bulkhead between any accommodation space and any compartment containing Class 1 (explosive) materials. Division 1.1, 1.2, 1.3, or 1.5 materials may not be stowed within 3 m (10 feet) of this bulkhead; in the decks immediately above or below an accommodation space they must be stowed at least 3 m (10 feet) from the line of this bulkhead projected vertically.

(3) There must be a permanent A Class steel bulkhead between a compartment containing Class 1 (explosive) materials and any machinery space. Class 1 (explosive) materials, except those in Division 1.4 (explosive), may not be stowed within 3 m (10 feet) of this bulkhead; and in the decks above or below the machinery space they must be stowed at least 3 m (10 feet) from the line of this bulkhead projected vertically. In addition to this separation, there must be insulation to Class A60 standard as defined in 46 CFR 72.05–10(a)(1) if the machinery space is one of Category 'A' unless the only Class 1 (explosive) materials carried are in Division 1.4S (explosive).

(4) Where Class 1 (explosive) materials are stowed away from bulkheads bounding any accommodation space or machinery space, the intervening space may be filled with cargo that is not readily combustible.

(f) *Under deck stowage of Class 1 (explosive) materials allocated stowage categories 09 and 10:*

(1) These Class 1 (explosive) materials must not be stowed in the same compartment or hold with other cargo that is readily combustible (such as items packaged in straw).

(2) The position of stowage of these Class 1 (explosive) materials must be such as to maintain direct access to the hatchway by not overstowing with other cargo except for other Class 1 (explosive) materials.

(3) In all cases, all cargo within the compartment or hold, including Class 1 (explosive) materials stowed in cargo transport units, must be secured so as to eliminate the possibility of significant movement. Where an entire deck is used as a magazine, the stowage must be so arranged that the Class 1 (explosive) materials stowed therein must be removed from the ship before working any cargo in any decks above or below the space in the same hold.

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended at 66 FR 45384, 45385, Aug. 28, 2001; 69 FR 76183, Dec. 20, 2004; 68 FR 61942, Oct. 30, 2003]

### § 176.118 Electrical requirement.

(a) Electrical equipment and cables installed in compartments in which Class 1 (explosive) materials are stowed which do not need to be energized during the voyage must be isolated from the supply so that no part of the circuit within the compartment is energized. The method of isolation may be by withdrawal of fuses, opening of

switches or circuit breakers, or disconnection from bus bars. The means, or access to the means, of disconnection/reconnection must be secured by a locked padlock under the control of a responsible person.

(b) Electrical equipment and cables in a cargo space in which Class 1 (explosive) materials are stowed which are energized during the voyage for the safe operation of the ship must meet the requirements of subchapter J of 46 CFR chapter I. Before Class 1 (explosive) materials are loaded aboard a vessel, all cables must be tested by a skilled person to ensure that they are safe and to determine satisfactory grounding, insulation resistance, and continuity of the cable cores, metal sheathing or armoring.

(c) All Class 1 (explosive) materials must be stowed in a safe position relative to electrical equipment and cables. Additional physical protection must be provided where necessary to minimize possible damage to the electrical equipment or cables, especially during loading and unloading.

(d) Cable joints in the compartments must be enclosed in metal-clad junction boxes.

(e) All lighting equipment and cables must be of the fixed type, and must meet the relevant inspection, test, and installation standards of 46 CFR chapter I, subchapter J.

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended by Amdt. 176–34, 58 FR 51533, Oct. 1, 1993]

### § 176.120 Lightning protection.

A lightning conductor grounded to the sea must be provided on any mast or similar structure on a vessel on which Class 1 (explosive) materials are stowed unless effective electrical bonding is provided between the sea and the mast or structure from its extremity and throughout to the main body of the hull structure. (Steel masts in ships of all welded construction comply with this requirement).

### §§ 176.122–176.124 [Reserved]

### § 176.128 Magazine stowage types "A", "C" and Special Stowage.

(a) The stowage arrangements of Class 1 (explosive) substances and certain articles are subject to varying levels of containment, (except for compatibility group S substances), when stowed below deck. The levels are dependent on the hazard presented and the nature of the particular explosives involved. Columns (10A) and (10B) of the Hazardous Materials Table specify the stowage applicable to each substance or article. The different levels of containment are defined below as ''A'', ''C'' and ''Special''.

(b) *Magazine stowage type ''A''.* Magazine stowage type A is required for those substances that must be kept clear of steelwork.

(c) *Magazine stowage type ''C''.* Magazine stowage type C is required for those substances in compatibility group A.

(d) *Special Stowage.* Special Stowage is required for Explosive substances, n.o.s. in compatibility groups G or L, and for articles in compatibility groups G, H, L and K, which are particularly hazardous.

[69 FR 76183, Dec. 20, 2004]

### § 176.130 Magazine stowage Type A.

(a) In addition to protecting the Class 1 (explosive) materials and preventing unauthorized access, magazine stowage type A guards against friction between any spilled contents of packages and the vessel's sides and bulkheads.

(b) Class 1 (explosive) materials requiring magazine stowage type A must be stowed in a magazine which is tightly sheathed with wood on its inner sides and floor.

(c) When utilized as part of the magazine structure, the vessel's sides and bulkheads must be clean, free from rust or scale, and protected by battening or sweatboards spaced not more than 150 mm (6 inches) apart. All stanchions and other unprotected structural members must be similarly clean and battened. The underside of the deck above the magazine must be clean and free of rust and scale, but need not be battened.

(d) The top of the stow within the magazine must be at least 30 cm (12 inches) from the underside of the deck above.

(e) A type A magazine constructed in the square of a cargo space may not be loaded from the top.

(f) When other Class 1 (explosive) materials are stowed with Class 1 (explosive) materials for which magazine stowage type A is required, they or their packagings may have no exposed external parts made of ferrous metal or aluminum alloy.

### § 176.132 [Reserved]

### § 176.133 Magazine stowage Type C.

The construction requirements for magazine stowage type C are the same as for a closed cargo transport unit in §176.63(e). In addition, the magazine must be located as near as practicable to the centerline of the vessel and must not be closer to the vessel's side than a distance equal to one-eighth of the vessel's beam or 2.4 m (8 feet), whichever is less.

[69 FR 76184, Dec. 20, 2004]

### § 176.134 Vehicles.

Closed vehicles may be used to transport Class 1 (explosive) materials requiring magazine stowage when carried by vessel if they meet the requirements of the appropriate magazine stowage type. See §176.168 of this subpart for additional requirements relating to the transport of Class 1 (explosive) materials in vehicles.

### § 176.136 Special stowage.

(a) Special stowage is required for certain articles presenting both explosive and chemical hazards, such as smoke or lachrymatory (compatibility group G or H), toxic (compatibility group K), or substances and articles which present a special risk (compatibility group L). Except as permitted in paragraph (c) of this section, Class 1 (explosive) materials requiring special stowage must be stowed on deck unless such stowage is impracticable and the COTP authorizes special stowage below deck. Where on deck stowage is recommended and an alternative stowage below deck is permitted by the COTP, the stowage must always be subject to special stowage.

(b) Class 1 (explosive) materials for which special stowage is required must be stowed as far away as practicable from living, accommodation, and working areas, and may not be overstowed. Closed cargo transport units in which such Class 1 (explosive) materials are stowed may not be located closer to the vessel's side than a distance equal to one-eighth of the vessel's beam or 2.4 m (8 feet), whichever is less.

(c) Class 1 (explosive) materials in compatibility groups G and H may be transported in steel magazines or in freight containers. If a freight container is used for this purpose, the floor of the freight container must be leakproof; for example, an all-metal container may be used and a fillet of cement or other material worked across the bottom of the door opening.

(d) Class 1 (explosive) materials stowed in one compartment may not be of more than one compatibility group, except the COTP may allow Class 1 (explosive) materials of compatibility groups G and H in separate steel magazines to be stowed in the same compartment, not less than 3 m (10 feet) apart.

(e) Class 1 (explosive) materials in compatibility groups K and L must be stowed in a steel magazine regardless of the stowage position in the vessel.

[69 FR 76184, Dec. 20, 2004]

### § 176.137 Portable magazine.

(a) Each portable magazine used for the stowage of Class 1 (explosive) materials on board vessels must meet the following requirements:

(1) It must be weather-tight, constructed of wood or metal lined with wood at least 2 cm (0.787 inch) thick, and with a capacity of no more than 3.1 cubic m (110 cubic feet).

(2) All inner surfaces must be smooth and free of any protruding nails, screws or other projections.

(3) If constructed of wood, a portable magazine must be framed of nominal 5 cm × 10 cm (2×4 inch) lumber, and sheathed with nominal 20 mm (0.787 inch) thick boards or plywood.

(4) When constructed of metal, the metal must be not less than 3.2 mm (0.126 inch) thick.

(5) Runners, bearers, or skids must be provided to elevate the magazine at least 10 cm (3.9 inches) from the deck. Padeyes, ring bolts, or other suitable means must be provided for securing.

(6) If the portable magazine has a door or hinged cover, the door or cover must have a strong hasp and padlock or equally effective means of securing.

(7) The portable magazine must be marked on its top and four sides, in letters at least 8 cm (3 inches) high, as follows:

EXPLOSIVES—HANDLE CAREFULLY—KEEP LIGHTS AND FIRE AWAY.

(b) A portable magazine which meets the requirements for a type 2 or type 3 magazine under 27 CFR part 555 subpart K may be used for the stowage of Class 1 (explosive) materials on board vessels.

(c) A portable magazine with a capacity exceeding 3.1 $m^3$ (110 cubic feet) may be used for the stowage of Class 1 (explosive) materials under such construction, handling, and stowage requirements as the COTP approves.

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended at 66 FR 45185, Aug. 28, 2001; 6 FR 56317, Sept. 13, 2011]

### § 176.138 Deck stowage.

(a) [Reserved]

(b) Class 1 (explosive) materials may not be stowed within a horizontal distance of 6 m (20 feet) from any fire, machinery exhaust, galley uptake, locker used for combustible stores, or other potential sources of ignition. They must be clear of walkways and cargo working areas, fire hydrants, steam pipes, and means of access; away from all other facilities necessary for the safe working of the vessel, and not less than a horizontal distance of 8 m (26 feet) from the bridge, accommodation areas, and lifesaving appliances.

(c) Where vessels are fitted with container fastening arrangements, freight containers containing Class 1 (explosive) materials may be overstowed by containers of compatible Class 1 (explosive) materials or non-hazardous cargo. Where vessels are not fitted with container fastening arrangements, freight containers loaded with Class 1 (explosive) materials may be stowed only on the bottom tier of the stowage.

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended at 69 FR 76184, Dec. 20, 2004]

## SEGREGATION

### § 176.140 Segregation from other classes of hazardous materials.

(a) Class 1 (explosive) materials must be segregated from other packaged hazardous materials in accordance with § 176.83.

(b) Class 1 (explosive) materials must be segregated from bulk solid dangerous cargoes in accordance with the IMDG Code (IBR, see § 171.7 of this subchapter). Notwithstanding § 176.83(b), ammonium nitrate and sodium nitrate may be stowed together with blasting explosives, except those containing chlorates, provided the mixed stowage is treated as blasting explosives (see § 176.410(e)).

[Amdt. 176–30, 55 FR 52696, Dec. 21, 1990, as amended at 68 FR 45041, July 31, 2003; 68 FR 75748, Dec. 31, 2003]

### § 176.142 Reserved]

### § 176.144 Segregation of Class 1 (explosive) materials.

(a) Except as provided in § 176.145 of this subchapter, stowage of Class 1 (explosive) materials within the same compartment, magazine, or cargo transport unit is subject to provisions contained in table 176.144(a).

TABLE 176.144(a)—AUTHORIZED MIXED STOWAGE FOR EXPLOSIVES

[An "X" indicates that explosives in the two different compatibility groups reflected by the location of the "X" may not be stowed in the same compartment, magazine, or cargo transport unit]

| Compatibility groups | A | B | C | D | E | F | G | H | J | K | L | N | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | X | X | X | X | X | X | X | X | X | X | X | X |
| B | X | | X | X | X | X | X | X | X | X | X | X | |
| C | X | X | | 6 | 6 | X | 1 | X | X | X | X | 4 | |
| D | X | X | 6 | | 6 | X | 1 | X | X | X | X | 4 | |
| E | X | X | 6 | 6 | | X | 1 | X | X | X | X | 4 | |
| F | X | X | X | X | X | | X | X | X | X | X | X | |
| G | X | X | 1 | 1 | 1 | X | | X | X | X | X | X | |
| H | X | X | X | X | X | X | X | | X | X | X | X | |
| J | X | X | X | X | X | X | X | X | | X | X | X | |
| K | X | X | X | X | X | X | X | X | X | | X | X | |
| L | X | X | X | X | X | X | X | X | X | X | 2 | X | X |