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## **NAVIGATION AND VESSEL INSPECTION CIRCULAR NO.2-96**

Subj: INSPECTION OF CARGO HANDLING GEAR PRIOR TO EXPLOSIVES HANDLING OPERATIONS

- Ref:
- (a) Title 49, Code of Federal Regulations, Part 176, Subpart G, Detailed Requirements for Class 1 (Explosive) Materials
  - (b) Title 33, Code of Federal Regulations, Part 126.17, Permits Required for Handling Designated Dangerous Cargo
  - (c) Title 46, Code of Federal Regulations, Part 91.37, Inspection of Cargo Gear
  - (d) Title 29, Code of Federal Regulations, Part 1917, Marine Terminals
  - (e) Title 29, Code of Federal Regulations, Part 1918, Safety and Health Requirements for Longshoring
  - (f) Title 29, Code of Federal Regulations, Part 1919, Gear Certification

1. PURPOSE. The purpose of this circular is to provide guidance to Coast Guard Marine Safety field units concerning the inspection of shipboard and shoreside cargo gear prior to its use in explosives handling operations. Safe and adequate cargo handling gear is required for any operation involving explosives. Therefore, it is important that the procedures set forth in this circular take place prior to issuance, and as a condition, of the required permits for handling explosives.

2. ACTION.

- a. COTPs will use enclosure (1) as guidance for conducting inspections of cargo handling gear prior to its use in explosives handling operations.
- b. COTPs may use the checklist provided as enclosures (2) and (3) while conducting inspections of cargo handling gear, or may develop one of their own using the guidance provided in enclosure (1).
- c. COTPs are encouraged to continue to develop close ties with the parties involved in explosive handling operations to ensure that vessel's do not arrive to load or unload without evidence that the cargo gear is satisfactory.

3. DIRECTIVES AFFECTED None.

4. AUTHORITY.

a. Under the regulations contained in 33 CFR, Part 6, the COTP has authority to direct and control the handling of explosives aboard most vessels, and at waterfront facilities not owned or operated by the Department of Defense (DOD). In conjunction with this, the COTP can establish security zones, control the movement or take possession of vessels, require identification credentials for access to waterfront facilities, provide for the security of waterfront facilities and vessels in port, and supervise and control the handling of explosives and other dangerous cargoes.

b. Basic authority to regulate the transportation of hazardous materials is contained in 49 U.S.C. Chapter 51. Detailed requirements for handling of Class 1 (Explosive) materials by vessel are contained in 49 CFR 176.100-176.194. Both foreign and domestic vessels are required to have permits under 49 CFR 176.100 and 49 CFR 176.415 to handle explosives, or packaged blasting agents, ammonium nitrates, and certain ammonium nitrate mixtures. 33 CFR 126.17 requires that these commodities shall be handled only at a designated waterfront facility and only if a permit has been issued by the COTP.

c. The vessel inspection requirements in 46 CFR generally apply to U.S. flag vessels. However, Subchapter I does apply to foreign vessels whose operation involves "potential unusual risks," and these vessels are subject to inspection to the extent necessary to safeguard life and property in U.S. ports.

## 5. BACKGROUND

a. Historically, the Coast Guard has played a large role in the supervision of all explosives handling operations, whether DOD or commercial. However, following our experiences with Desert Shield/Desert Storm and Operation Restore Hope, Explosive Handling Supervision (EHS) policy was revised and COTPs were given authority and flexibility to adjust limited resources to meet new mission priorities.

b. In addition, the EHS program was included in an overall review of "M" mission priorities in development of the G-M Business Plan. COTPs were charged with assessing and developing mission priorities based on risk analysis of local conditions. It is for this reason that a wide latitude of EHS inspection procedures has been developed based on local needs of the various units involved in handling explosives. However, the area of cargo handling gear inspection is one where additional guidance has been sought by field units as well as EHS instructors at Yorktown.

## 6. DISCUSSION

a. The COTP has the authority to permit or prohibit the transfer of explosives and the operation of designated waterfront facilities. In addition, the COTP may assign a "supervisory detail" to direct and control the handling of explosives aboard most vessels, and at waterfront facilities not owned or operated by the Department of Defense (DOD).

b. The supervisory detail is usually the Coast Guard party which completes a pre-operation inspection as a condition of the required permits. This inspection assesses the

suitability of the facility and vessel for handling explosives. One factor taken into consideration during this pre-operation inspection is the condition of cargo handling gear to be used, both on the vessel and shoreside.

c. Coast Guard authority in EHS operations is very broad. In the interest of safety, the Coast Guard maintains a conservative standard for cargo handling gear. The testing standards described in enclosure (1) are part of U.S. regulations and the preferred standard for waterfront facilities and vessels that wish to handle explosives.

Encl:           (1) U.S. Coast Guard's Cargo Gear Inspection Guide for Explosives  
                  Handling (EHS) Details  
                  (2) Vessel Cargo Handling Gear Inspection Checklist for Explosives  
                  Handling Operations  
                  (3) Shoreside Cargo Handling Gear Inspection Checklist for Explosives  
                  Handling Operations

**U. S. COAST GUARD'S**

**CARGO GEAR**

**INSPECTION**

**GUIDE**

**For Explosives Handling (EHS) Details**  
**Prepared by**  
**Commandant (G-MOC-3)**

## CHAPTER 1. GENERAL GUIDANCE

- A. Introduction. The following guidance was developed drawing from several source including Coast Guard, Department of Defense, and Occupational Safety and Health Administration (OSHA) Regulations. In addition to the regulations, Commandant (G-MOC-3) has looked to RTC Yorktown, field units, and cargo gear experts to supply input into the development of this guide. It has been designed to lead an EHS detail through an inspection of cargo handling gear from start to finish.
- B. Inspection Process. Cargo gear inspection is broken into three parts. They are a review of all certification and documentation, a visual inspection of the gear, and proof load testing of the gear.
1. Inspection/Review of Certification and other Records. Review all certificates to ensure that all required testing and examinations have been properly completed and that all certificates, registers and other required records are up to date. In addition, check other records or logs to ensure required inspections are being completed and determine the maintenance history of the gear. Chapter 2 of this guide provides information on the requirements for certification and record keeping.
  2. Visual Inspection of Cargo Handling Gear. Conduct a visual inspection of the cargo handling gear. This should be a cursory review or examination of standing and running rigging, blocks, booms, etc. to the extent necessary to convince the inspector of compliance with the applicable standards, without significant maneuvering. A cursory exam conducted by a qualified representative of a recognized organization may be accepted in place of a Coast Guard visual inspection. Chapter 3 provides guidance for conducting the visual inspection.
  3. Proof Load Testing. Proof load testing shall be conducted on all cargo handling gear to be used in handling explosives prior to issuance of the required permits for handling explosives. If performing this test on vessel gear, follow the procedures laid out in 46 CFR 91.37-40. If performing this test onshore gear, follow the procedures given in 29 CFR 1919. If any part of the gear fails or becomes defective during the test, such defective equipment shall be replaced or satisfactorily repaired and the gear retested. Chapter 4 provides the procedures for proof load testing.
- C. Cargo Gear Specialists. If any person in the EHS detail is in doubt as to the condition and suitability of the cargo handling gear, tests and examinations described in 46 CFR Part 91 or 29 CFR Part 1919 may be required. However, Coast Guard personnel should not participate in the performance of any of these tests, except for witnessing the proof load test with the view to determining whether or not the gear is satisfactory. Beyond this, Coast Guard personnel should only be involved in a cursory review of the general condition of gear to the extent necessary to determine if further inspection is needed. It is intended that a cargo gear specialist be called on scene by the vessel or facility owner, operator, or representative, when further expertise is required. A cargo gear specialist is a qualified representative from an organization or association recognized by the Coast Guard or OSHA, depending on which regulations apply. These include: any classification society

which is a member of the International Association of Classification Societies (IACS), International Cargo Gear Bureau (ICGB), or the National Cargo Bureau (NCB).

- D. Containerized Explosives Cargo. With containers quickly becoming the most prevalent method of shipment for explosives, shoreside gantry cranes and other cargo handling gear will be used with much more frequency than ever before. Due to the size of some gantry cranes, a complete and thorough inspection of all gear and components can be extremely difficult and dangerous. Therefore, a visual inspection should be completed to the extent that is determined to be safe and necessary by the EHS detail supervisor, taking into consideration safe work practices as outlined in the Marine Safety Manual, Volume 1, Chapter 10, COMDTINST M16000.6. A review of certificates, other documentation, and a proof load test shall also be conducted.
- E. Department of Defense Explosives Handling. 49 CFR 176.102(c) states that the Commanding Officer of a Department of Defense (DoD) facility may decline the Coast Guard EHS detail. However, some facilities may use them as a matter of policy or in certain situations. For inspections of gear on DoD facilities and vessels for explosives handling use the following references for guidance:
1. Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation and Shipping (NAVSEA OP 5, Volume 1, Sixth Revision) - Chapter 10 - provides safety provisions for ammunition lifting equipment.
  2. Loading and Stowage of Military Ammunition and Explosives Aboard Bulk Merchant Ships (NAVSEA OP 3221, Rev 2) - Appendix E provides guidance on vessel cargo handling gear inspection.

CHAPTER 2. GEAR CERTIFICATION AND RECORD KEEPING REQUIREMENTS

- A. General. Both the Coast Guard and the Occupational Safety and Health Administration (OSHA) have certification and record keeping requirements for cargo handling gear. All documentation should be reviewed to ensure that it is in the proper order, that all gear has been properly tested, and all required tests and examinations are up to date. In addition, a review of any inspection and maintenance records should also be completed. Review of these records and documents will be helpful in building a "picture" of the condition of the gear to be used and determining if it is adequate for explosives handling operations.
  
- B. Vessel Requirements.
  - 1. Applicability.
    - a. Coast Guard Requirements - 46 CFR 90.05-1 details which vessels must comply with Coast Guard certification and recordkeeping requirements.
    - b. OSHA Requirements - 29 CFR 1919.1 details which vessels must comply with OSHA certification and recordkeeping requirements.
    - c. Foreign Vessels.
      - (1) Certification and examination is done under the requirements of the Flag State, by persons acceptable for certification purposes by the Flag State, or by OSHA.
      - (2) Questions concerning gear certification for foreign vessels should be directed to Commandant (G-MOC-2), Vessel Compliance Division,(202) 267-1464.
  - 2. Coast Guard Requirements.
    - a. Cargo Gear Plans (46 CFR 91.37-15, 91.37-20, and 91.37-23) - One approved copy of each set of gear plans shall be retained on the vessel.
    - b. Loose Gear Certificate (46 CFR 91.37-30) - each vessel shall have a certificate which lists evidence of compliance with proof load test requirements for all chains, rings, hooks, links, shackles, swivels, blocks, and any other loose gear whether accessory to a machine or not, but which is used as ship's cargo gear.
    - c. Wire Rope Certificate (46 CFR 91.37-35) - all wire rope shall be identified and described in a wire rope certificate. It shall contain:
      - (1) The breaking test load of a sample of the wire rope.
      - (2) The name and address of the manufacturer.
      - (3) The diameter of the rope in inches and/or fractions thereof.
      - (4) The number of strands and the number of wires in each strand.
      - (5) The quality of the wire.

- (6) The date of the test.
- (7) The load at which the sample broke.
- d. Documentation of Ship's Officer's Inspection of Cargo Gear (46 CFR 91.37-70) - the master of a vessel is required to designate a ship's officer to visually inspect cargo gear at frequent intervals (at least once a month). The designated officer is required to record his inspections in the cargo gear register, if carried. In addition, the same entry shall be made in the Official Logbook, if required; or such information shall be kept with the log records of the vessel.
- e. Records of all tests and examinations conducted by or under the supervision of surveyors of the organizations or associations approved by the Commandant. These records are required to be maintained on the vessel. (see 46 CFR 91.37-75(c)).

### 3. OSHA Requirements.

- a. Cargo Gear Register (29 CFR 1919.12(a)) - should be valid, up-to-date, and contain information concerning the required examinations, testing, and heat treatments required 29 CFR 1919.15, 1919.16, 1919.17, and 1919.19.
- b. Certificates for Cargo Gear (29 CFR 1919.12(b)) - should be up-to-date and attached to the Cargo Gear Register. They should contain information concerning required examinations, testing, and heat treatment required by 29 CFR 1919.14, 1919.15, 1919.16, and 1919.19.
- c. Records Identifying Wire Rope or Articles of Loose Gear (29 CFR 1919.12(e)) - these records shall list wire rope and articles of loose gear obtained from time to time and required to be certificated.
- d. Signatures on Certificates and Entries in Cargo Gear Registers (29 CFR 1919.12(c)) - The following table sets forth which "competent persons" shall sign certificates or entries in registers:



Table (1-1)  
 Competent Persons  
 for  
 Testing, Examining, and Surveying  
 Functions

Functions	Competent Person
Any testing, examination, inspection, or heat treatment required in U.S. ports	Responsible individual, surveyor or other authorized agent of a person accredited by OSHA under 29 CFR 1919
Any testing, examination, inspection, or heat treatment required while the vessel is in other than U.S. ports	Responsible individual, surveyor or other authorized agent of persons recognized by the Commandant of the U.S. Coast Guard or by a foreign nation whose certification is accepted by OSHA as being in substantial accordance with 29 CFR 1918.12(a)
Testing, examination and inspection of loose gear or wire rope; heat treatment of loose gear	Employees or authorized agents of persons accredited by OSHA for this purpose under 29 CFR 1919, or the manufacturer of the gear concerned unless disapproved by the Assistant Secretary*

\* Assistant Secretary is the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or his authorized representative

C. Shoreside Requirements.

1. Applicability. The Coast Guard does not have any regulations concerning certification or record keeping requirements for shoreside cargo handling gear. OSHA requirements are applicable except where cargo gear certification is performed under standards established and enforced by the States where the devices are located, or by subdivisions delegated this responsibility by the States, provided such standards meet the requirements of 29 CFR 1918.13(b)(2). If this is the case, then the certification and documentation required by the States should be reviewed to ensure they meet all applicable state requirements.
2. OSHA Requirements (29 CFR 1919.90(d)) - owners of the cargo gear must maintain the following required documentation or acceptable copies thereof for inspection at or near the worksite of the equipment involved:
  - a. Where initial and periodic tests as well as annual examinations are required, documentation available for inspection shall include:
    - (1) The latest unit test certificate.
    - (2) Any subsequent annual examination certificates.
    - (3) Wire rope test certificates relating to any replacements since last unit test or annual examination.
  - b. Where only annual examination is required, documentation available for inspection shall include:
    - (1) The latest annual examination certificate.
    - (2) Wire rope test certificates relating to any wire replaced since last annual examination.
  - c. If heat treatment of any loose gear is recommended by the manufacturer, the latest heat treatment certificate, attesting to

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compliance with the manufacturers' specifications, shall be part  
of the available documentation.

- d. Required contents of quadrennial unit proof test and annual examination documentation can be found in 29 CFR 1919.90 (b)(1) and (b)(2).

D. Testing and Examination Frequency Requirements.

- 1. Coast Guard Requirements (46 CFR 91.37-1). The following are the frequency of required tests and examinations for cargo gear.
  - a. A thorough examination of assembled gear shall be made at least once in every year.
  - b. Proof load tests, followed by dismantling or disassembling of gear and thorough examination shall be made at least every 5 years.
- 2. OSHA Requirements (29 CFR Subparts D and H). The following are the requirements for the frequency of quadrennial and annual tests and examinations, annealing, and heat treatments for cargo gear under OSHA.
  - a. Cranes, Derricks, and other Hoisting Machines:
    - (1) Tested and thoroughly examined every 4 years.
    - (2) Visually examined/inspected every 12 months.
  - b. Chains, rings, hooks, shackles, and swivels made of wrought iron (does not include bridle chains attached to derricks or masts) shall be annealed at the following intervals:
    - (1) For " or smaller in general use - at least once every 6 months (unless gear is used on equipment worked solely by hand, then at least every 12 months).
    - (2) Larger than " in general use - at least once every 12 months (unless gear is used on equipment worked solely by hand, then at least every 2 years).
    - (3) Exemptions from heat treatment (annealing).
      - (a) Gear made of steel.
      - (b) Gear which contains equipment made of materials which cannot be subject to heat treatment.

## CHAPTER 3. CARGO GEAR INSPECTION

- A. Inspection Equipment. The following is a list of some recommended tools and equipment and their uses for cargo gear inspection. Units are encouraged to develop kits containing these and/or other gear to use during inspections.
1. Calipers - to measure diameter of wire rope, chains, etc.
  2. Gloves - and other personal protective gear required by unit SOP.
  3. Groove Gauge - to measure how much wear has occurred to the sheave grooves of a block.
  4. Magnifying Glass - to determine the amount of wear and corrosion on a piece of wire rope.
  5. Marlin Spike - to check between the strands and core of wire rope.
  6. No-Go Gauge - to measure diameter of chain links.
- B. Loose Gear and Gear Components. The following guidance has been developed from Coast Guard and OSHA standards. EHS details should inspect all loose gear and gear components using these standards to determine whether it is safe for use in explosives handling.
1. Identification Markings - All chains, rings, hooks, links, shackles, swivels, blocks, and any other loose gear whether accessory to a machine or not, but which is used or intended for use as ship's cargo gear, shall bear a mark or number by which each piece can be identified. The safe working load "SWL" shall be marked on all blocks.
  2. Blocks - should be repaired or replaced if:
    - a. cheeks have cracks, breaks, burrs;
    - b. sheaves do not turn freely;
    - c. sheaves have visible cracks, breaks, burrs or gouges;
    - d. shows signs of corrugation;
    - e. block is not of proper size (i.e. three times the circumference of the line).
  3. Booms - should be repaired or replaced if:
    - a. are bent or severely dented;
    - b. braces are bent or missing;
    - c. gooseneck is not free;
    - d. it is not topped up by ship;
    - e. positioned to highest angle for minimum stress, yet does not hamper cargo loading/offloading.
  4. Chains - should be repaired or replaced if:
    - a. there is excessive wear at any point (Minimum allowable chain link diameter table);
    - b. there is stretching of individual links;
    - c. there is distortion, cracks, or breaks in individual links;
    - d. there are broken, worn, or distorted fittings;
    - e. there is binding of individual links preventing them from rotating or slipping freely on adjoining links;
    - f. it has been shortened by bolting, wiring or knotting.
  5. Fiber Line - should be replaced if:
    - a. Natural Fiber (Manila) -
      - (1) it does not have a minimum circumference of 3.5 inches;
      - (2) has frayed areas;
      - (3) is not reeved without overlays;

- (4) eyes do not have thimbles, splices have less than three tucks or show evidence of parting;
  - (5) it is twisted or there is evidence of dry rotting or mildew
  - (6) it has short or long splices;
  - (7) there is evidence of chafing or deterioration due to contact with foreign materials like oil, fuel, solvents, caustic fluids, dirt, lye, etc.
- b. Synthetic -
- (1) there is hardness inside the line (indication that it may have been burned from shockloading);
  - (2) it has frayed areas;
  - (3) it has short or long splices.
6. Hooks (Plain Hook, SelfMousing Hook) - should be replaced or repaired if:
- a. it is bent or twisted more than 10 degrees;
  - b. it has an increased throat opening exceeding 15 percent of the original opening;
  - c. any wear exceeding 10% of the original dimension of the hook is evident;
  - d. the latch, on amoused hook, doesn't close the throat opening;
  - e. damage to the hook eye is evident (wear exceeding 10 percent, elongation).
7. Winches - should be repaired or replaced if:
- a. controls do not work freely or provide control at all speeds; levers are not secured to shafts;
  - b. surrounding area is not free of grease and oil;
  - c. moving parts that present hazards do not have installed guards;
  - d. apparent electrical hazards are visible;
  - e. ends of falls are not secured to winch drum by clamps, U-bolts, shackles or some other equally strong method (fiber rope fastenings shall not be used);
  - f. are not provided a means to stop and hold the proof load in any position;
    - (1) electrical winches - are not equipped so that a failure of electric power shall stop the motion and set the brake without any action by the operator.
8. Wire Rope - should be replaced if:
- a. there are indications of corrosion or pitting, no lubrication;
  - b. there are kinks, crushingbirdcaging, or any other physical damage which has resulted in distortion of the wire rope structure;
  - c. there are six or more broken wires in one rope lay length or three or more broken wires in one strand in one lay length;
  - d. there are one or more broken wires within one rope lay length of any end fitting;
  - e. there are one or more valley breaks;
  - f. there is evidence of abrasion; outer wire wear exceeds 1/3 of the original outer wire diameter (Void of lubrication, bright and flat appearance).
  - g. it has a reduced diameter as follows -
    - (1) 3/64 in. for rope of up to and including 3/4 in.
    - (2) 1/16 in. for rope diameters of 7/8 to 1 1/8 in.
    - (3) 3/32 in. for rope diameters of 1 to 1 in.
  - h. there are signs of heat damage (metal discoloration, burn marks, apparent loss of internal lubrication);
  - i. the core is protruding from an opening between the strands;
  - j. if there are any knots or splices (except eye splice);
  - k. eyes -

- (1) eye splices do not have at least 3 tucks with a whole strand of rope and two tucks with one-half of the wires cut out of each strand;
  - (2) eyes in the ends of wire rope cargo falls are formed by knots and, in single part falls, are formed by wire rope clips.
9. Miscellaneous Components - should be repaired or replaced if:
- a. Padeye -
    - (1) it is distorted, cracked, or broken.
  - b. Shackles -
    - (1) screw-pin shackles are not properly seized;
    - (2) are not the proper size;
    - (3) it is distorted, cracked, or broken.
  - c. Slings -
    - (1) it has cuts, holes, or tears;
    - (2) there is excessive wear, abrasions, or chafing;
    - (3) there is broken stitching;
    - (4) the sling angles less than 45 degrees when attached to load.
  - d. Sockets (Filled/Poured Socket, Open Socket, Closed Socket, Wedge Socket, Swaged Socket) -
    - (1) there are cracks, deformations, excessive wear, corrosion, or pitting;
    - (2) there are one or more broken wires within one rope lay length of any socket.
  - e. Thimbles -
    - (1) it is not the proper size to fit rope and eye;
    - (2) it is deformed, kinked, or cracked.
  - f. Wire Rope Clips (U-Bolt, Fist Grip) -
    - (1) all U-Bolt wire rope clips are not installed with "U" section on dead end of wire;
    - (2) there are not the proper number of clips and proper distance between clips on wire rope  
(D = diameter of wire rope);
      - (a) number of clips:  $3 \times D + 1$
      - (b) distance between clips:  $6 \times D$
    - (3) clips are not tight or are so tight they deform, kink, crush, or break the wire;
    - (4) are used to form eyes in the working ends of cargo falls.
- C. Vessel Rigging. The following are guidelines for inspecting vessel rigging. They should be used with the guidance given in Part B of this chapter to determine the condition of the vessels rigging. Explosive handling details should adapt these guidelines for rigging that differs from the examples given.
1. Topping Lifts -
    - a. wires should meet the requirements of section B.7 of this chapter;
    - b. bull chain secured to deck with shackle and shackle pin seized;
    - c. bull chain is in visibly good condition (see section B.3 of this chapter);
    - d. swaged sockets in visibly good condition (see section B.8.d of this chapter);
    - e. bull wire secured to cleat.
  2. Vang Guys -
    - a. secured to bulwark in such manner as to produce minimum stress on guy and prevent boom from jack-knifing;
    - b. all slack removed;
    - c. secured to bulwark by D-ring;

- d. shackle pins seized;
  - e. bitter end made up on cleat and excess line neatly made up.
  - f. Manila Line -
    - (1) in good condition (see section B.4.a of this chapter);
    - (2) adequate length for position of boom
  - g. Blocks -
    - (1) in good condition (see section B.1 of this chapter);
    - (2) attached to pendants with shackle and shackle pin seized.
  - h. Pendants -
    - (1) thimbles placed in eyes;
    - (2) splices or fittings forming eyes not wrapped, but open for constant inspection;
    - (3) free of kinks, broken wires, flat spots, or suspected weak spots (see section B.7 of this chapter);
    - (4) mechanical fittings in good visible condition.
3. Preventers -
- a. secured to head of boom so as not to chafe on head block shackles;
  - b. free of kinks, broken wires, flat spots, or suspected weak spots (see section B.7 of this chapter);
  - c. minimum diameter of 3/4 inch;
  - d. eye for securing to bulwark formed with minimum of four rope clips;
  - e. properly secured to bulwark, shackle seized;
  - f. slacked to allowvang guy to stretch, yet share load;
  - g. tails, fittings, or other means of making preventer fast on deck or bulwark are of strength equal to that of preventer itself.
4. Schooner/Midship Guy -
- a. all slack removed;
  - b. free of frayed or worn areas;
  - c. made up and secured to cleat;
  - d. line of sufficient length and minimum circumference of 3.5 inches.
5. Heel Block -
- a. running free;
  - b. secured so as not to fall when runner is slack;
  - c. runner will not chafe on cheeks;
  - d. attachments in visibly safe condition;
  - e. preventer installed on heel block.
6. Runners/Whips/Falls -
- a. free of kinks, broken wires, flat spots, or suspected weak spots (see section B.7 of this chapter);
  - b. secured to winch drum with clamps, "U" bolts, shackles, or some equally strong method;
  - c. all splices uncovered;
  - d. secured to safety cargo hook with two wire-rope clamps;
  - e. minimum of three turns remaining on drum when cargo hook is in lower hold and on the pier;
  - f. no chafing on any standing rigging or other parts that cause excessive wear;
  - g. reeved on drums so as to follow winch control levers;
  - h. reeved through blocks properly;

- i. minimum diameter of 3/4 inch.
- D. Shoreside Cranes, Derricks, and Hoisting Equipment. The following guidelines are given for carrying out inspection of shoreside cargo handling gear. Since the Coast Guard does not normally regulate shoreside gear, requirements were partly derived from OSHA standards concerning marine terminals, found in 29 CFR Part 1917, as well as Coast Guard standards.
1. Break Bulk Cargo Handling Gear.
    - a. All components of gear or equipment covered in this section (i.e. wire rope, booms, hooks, shackle, etc.) must pass inspection under the requirements given in section B of this chapter.
    - b. House falls.
      - (1) Span Beams shall be secured to prevent accidental slodgement.
      - (2) a safe means of access shall be provided for employees working with house fall blocks.
    - c. Cranes and Derricks.
      - (1) Those having ratings that vary with boom length, radius (outreach) or other variables shall have a durable rating chart visible to the operator, covering the complete range of the manufacturer's (or design) capacity ratings. It shall include:
        - (a) all operating radii for all permissible boom lengths and jib lengths, as applicable, with and without outriggers.
        - (b) alternative ratings for optional equipment affecting such ratings.
        - (c) Any precautions or warnings specified by the owner or manufacturer.
      - (2) When rated load varies with boom radius, a boom angle indicator or radius indicator visible to the operator shall be fitted.
      - (3) Unless exempted by the provisions in 29 CFR 1918.76(a)(9)(vii), every crane used to load or discharge cargo into or out of a vessel shall be fitted with a load indicating device or alternative device in proper working condition which shall meet the criteria found in 29 CFR 1918.76(a)(9).
      - (4) Whenever exposed moving parts such as gears, chains, and chain sprockets present a hazard to employees, those parts shall be securely guarded.
      - (5) Outriggers. If attached, shall be used according to the manufacturer's specifications or design data, which shall be available.
        - (a) Floats, when used, shall be securely attached to the outriggers.
        - (b) Wood blocks or other support shall be sufficient size to support the outrigger, free of defects that may affect safety and of sufficient width and length to prevent the crane from shifting or toppling under load.
      - (6) Rope on Drums. At least three full turns of rope shall remain on ungrooved drums, and two turns on grooved drums, under all operating conditions. Wire rope shall be secured to drums by clamps, U-bolts, shackles or equivalent means. Fiber rope fastenings are prohibited.
      - (7) Brakes.
        - (a) Each independent hoisting unit of a crane shall be equipped with at least one holding brake, applied directly to the motor shaft or gear train.
        - (b) Each independent hoisting unit, except worm geared hoists, the angle of whose worm is such as to prevent the load from accelerating in the lowering direction, shall, in addition to a holding brake, be

equipped with a controlled braking means to control lowering speeds.

(c) All brakes shall be in good working condition.

(d) All power control braking means shall be capable of maintaining safe lowering speeds of rated loads.

(8) Rail-mounted cranes.

(a) Rated load marking shall be marked on each side of the crane and in the cab.

(b) Properly working Wind indicating device shall be fitted.

(c) Stops or Bumpers shall be properly installed.

(d) Effective travel warning devices shall be installed and operating properly.

(e) Communications. Means of communications shall be provided between the operators cab and the base of the gantry of all rail-mounted cranes. This requirement may be met by telephone, radio, sound-signalling system or other effective methods, but not solely by handsignalling.

d. Winches.

(1) Moving parts which present caught-in hazards to employees shall be guarded.

(2) Shall have clearly identifiable and readily accessible stop controls.

(3) Attachment of rope to drum meets requirements of section D.1.c(6) of this chapter.

2. Containerized Cargo Handling Gear. In addition to the requirements in section D.1 of this chapter, the following additional requirements should be applied to gantry cranes used for containerized cargo.

a. Rated load marking - shall be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block and this marking shall be clearly legible from the ground or floor.

b. When hoisting containers it attaches and lifts containers by at least 4 fittings.



## APPENDIX A. GLOSSARY

**Abrasion** - frictional surface wear on the wires of a wire rope.

**Back Stay** - wire rope or strand guy used to support a boom or mast.

**Below-the-Hook Lifting Devices**- devices used to attach the load to the hoisting gear below the hook.

**Birdcage** - description of the appearance of a wire rope forced into compression. The outer strands form a cage and, at times, displace the core.

**Block** - a wood or metal case enclosing one or more sheaves provided with a hook, eye, and strap by which it is attached to an object. They are designed to provide mechanical assistance when moving large heavy objects. Blocks can be named by the number of sheaves, location, or function. Diamond Blocks are slow speed blocks (wire rope moves at 599 feet per second or less). Sheaves of this type of block are usually bushed with high grade bronze alloy. Oval Blocks, also known as Concord Blocks, are high speed blocks (wire rope moves at 600 feet per second or faster). Sheaves of this type of block are equipped with a roller bearing assembly.

**Block and Tackle**- the complete unit of two or more blocks rove up with an adequate amount of rope.

**Boom** - a spar or pole projecting from a mast for supporting or guiding the weights to be lifted.

**Bull Rope** - a wire rope or fiber line used to heave, haul, or lift a load without benefit of the multiplying power of tackle blocks.

**Cargo Gear**- includes masts, stays, booms, winches, cranes, standing and running gear, slings, pallets, spreaders and similar loose gear, as well as dunnage, preventers, and the tackle and structures forming part of the shipboard cargo gear used in connection with the loading and unloading of a vessel.

**Come-a-Long** - device for making a temporary grip on a wire rope.

**Core** - center component of a wire rope which the strands are laid around. It provides support for the outer strands.

**Corrosion**- chemical decomposition of metal wires in a rope, or rigging due to moisture, acids, alkalines or other destructive agents.

**Corrugated**- term used to describe the grooves of a sheave or drum after they have been worn down to a point where they show an impression of a wire rope.

**Cover Wire**- outer most layer of wires.

**Crane** - mechanical device intended for lifting or lowering a load and moving it horizontally, in which the hoisting mechanism is an integral part of the machine. A crane may be a fixed or mobile machine.

**Derrick** - a mechanical device intended for lifting, with or without a boom supported at its head by a topping lift from a mast, fixed A frame, or similar structure. The mast or equivalent member may or may not be supported by guys, or braces. The boom, where fitted, may or may not be controlled in the horizontal plane by guys (rigs).

**Dog-Leg** - permanent bend or kink in a wire rope, caused by improper use or handling.

**End Fitting** - the treatment at the end of wire rope, usually made by an eye or an attached fitting. Designed to be the permanent end on wire rope which connects to the load.

**Eyebolt** - a bolt having either a head looped to form a worked eye, or a solid head with a hole drilled through it forming a shackle eye.

**Fall** - part of the rope of a tackle to which power is applied.

**Fitting** - used to attach different components to each other and to the ship.

- Gantry Crane**- crane having a spanning framework, often set on tracks and used for loading/unloading containers.
- Gooseneck**- An iron swivel making up the fastening between a boom and a mast. It consists of a pintle and an eyebolt or clamp.
- Guy** - wire rope, fiber line, or chains that support booms, davits, etc. laterally.
- Guy Pendants**- pendants that connect the head of the boom with a guy tackle and serve to shorten the length of the guy tackle.
- Fiber** - smallest component of a Manila line.
- Filled Sockets (poured sockets)**- sockets that use molten metal (such as zinc) to secure them to the wire rope.
- Heel Block** - a block located at the foot of a boom and fastened to a mast doringpost. One of the blocks through which the main cargo fall is reeved.
- Hook** - comes in two classes: plain hook and selfhousing hook. The four basic parts of a hook are the eye, throat, mouth, and pea. A selfhousing hook also has a spring loaded lever attached to it that cover the mouth of the hook.
- House Falls**- spans and supporting members, winches, blocks, and standing and running rigging forming part of a marine terminal and used with a vessel's cargo gear to load or unload by means of married falls.
- Kink** - irreparable deformation in wire rope caused by a loop of rope being pulled down tight, greatly reducing the rope strength.
- Lay** - (a) "rope lay" signifies the direction of rotation of the wires and the strands in the rope.  
(b) "lay length" is the distance measured along the rope in which a strand makes one complete revolution around the rope axis.
- Line** - length of fiber or wire rope that transmit pulling forces.
- Loose Gear**- removable and replaceable components of equipment or devices which may be used with or as part of assembled material handling units for purposes such as making connections, changing line direction and multiplying mechanical advantage. Examples are shackles and snatch blocks.
- Mousing** - covering the mouth of a hook to prevent cargo from slipping off when the line holding it slacks.
- Outriggers**- extendable or fixed metal arms, attached to the mounting base of a crane, which rests on supports at the outer ends. Used to increase support by spreading the weight of the crane and load over a wider base.
- Padeye** - a fitting having an eye integral with a plate or base in order to distribute the strain over a greater area and to provide ample means of securing. The pad may have either a "worked" or a "shackle" eye, or more than one of either or both.
- Peening** - permanent distortion resulting from cold, plastic metal deformation of the outer wires of a wire rope.
- Pendant** - a hanging length of rope having a block or thimble secured to its free end.
- Ply** - component of synthetic line made of yarns twisted together. Plys are twisted together to form strands.
- Preventers (guys and stays)**- heavy wire rope used to supplement the regular guys and stays as a safety precaution when handling cargo.
- Reeve** - passing the bitter end of a rope or line through a block or series of blocks.
- Rigging** - generic term that is used to describe the ropes, lines, blocks, etc. that are used to support and move an object.
- Runner** - a tackle or part of a tackle consisting of a line rove through a single block and fixed at one end.

- Running Rigging**- rigging that is reeved through blocks or fairleads, used to move cargo gear or load.
- Safe Working Load (SWL)**- is the load the gear is approved to lift, excluding the weight of the gear itself.
- Schooner/Midship Guy** - the tackle that spans the ends of two booms.
- Sheave** - a grooved pulley for wire rope.
- Sling** - a rope, chain, net, etc. used in hoisting freight.
- Splice** - joining of two sections of rope or line by interweaving of the strands.
- Standing Rigging**- rigging remaining permanently in position.
- Strands**- for Manila line, made of yarns twisted together. Three strands are laid up or twisted to form a line (plain laid line). For synthetic line, made of plies twisted together. Strands are laid up or twisted to form the line. For wire rope, strands are formed by twisting wires together. Strands are then laid around a core to form the wire rope (most wire rope consists of 6 strands wrapped around a core).
- Swaged Fitting** - fitting which wire rope can be inserted and then permanently attached by cold pressing (swaging) the shank that enclosed the rope.
- Tackle**- any combination of ropes and blocks that multiplies power.
- Thimble** - grooved metal fitting to protect the eye, or fastening loop of a wire rope.
- Topping Lift**- tackle that support the head of a boom.
- Union Purchase**- an arrangement in which a pair of booms is used in combination, the booms being fixed and the cargo runners coupled.
- Valley Break - Break on the valley between strands on wire rope.**
- Whip** - a tackle consisting of a fall rove through a single standing block (single whip) or of a fall secured at one end and rove through a single running and a single standing block (double whip).
- Winch - a power driven spool for handling of loads by means of friction between fiber or wire rope and the spool.**
- Wires** - Basic or smallest component of wire rope. They are twisted together to form strands.
- Wire Rope Clip**- small device that are used to clamp together two wire ropes or parts of the same wire rope. Commonly used for making end terminations. Available in two basic designs: U-bolt and Fist Grip.
- Working Load of Assembled Gear** the load for which each complete assembly is approved to lift excluding the weight of the gear itself.
- Yarns** - for Manila line, made of fibers twisted together. Yarns are twisted together to form strands. For synthetic line, smallest component of the line, twisted together to form plies.



Enclosure (2) to NVIC

2. Visual Inspection of Cargo Handling Gear (contd.)										
Legend: S = satisfactory R = rejected & repaired U = unsat & nonrepairable										
	Hold 1	Hold 2		Hold 3		Hold 4		Hold 5	Hold 6	Hold 7
		FWD	AFT	FWD	AFT	FWD	AFT			
e. Schooner/Midship Guy										
- all slack removed										
- free of frayed or worn areas										
- made up and secure to cleat										
-line of sufficient length/ minimum circumference of 3.5 inches										
f. Heel Block										
- running free										
- secured so as not to fall when runner is slack										
- runner will not chafe on cheeks										
- attachments is visibly safe condition										
g. Runners/Whips/Falls										
- wire rope in good condition										
- secured to winch drum with clamps, "U" bolts shackles, or other equally strong method										
- all splices uncovered										
- secured to safety cargo hook with two wire-rope clamps										
- minimum of three turns remaining on drum when cargo hook is in lower hold and on the pier										
- no chafing on any standing rigging or other parts that cause excessive wear										
- reeved on drums so as to follow winch control levers										
- reeved through blocks properly										
- minimum diameter of 3/4 inch										
h. General Items/Loose Gear										
- identification markings - all loose gear used or intended to be used as ship's cargo gear bears a mark or number										
- blocks - free of cracks, breaks, and burrs/sheaves turn freely, so signs of corrugation/ block is proper size/marked with safe working load "SWL"										
- chains - has no excess wear/no stretched, distorted cracked, or broken links/ no broken, worn or distorted fittings/no binding of individual links/ not shortened by bolting, wiring or knotting										
- hooks - not bent or twisted more than 10 degrees no increased throat opening of 15 % or more of original opening/ no wear exceeding 10% of the original dimension/ latch or mouse closes properly no damage to eye										
- padeye - not distorted, cracked or broken										
- shackles - screw pins properly seized/ is proper size/ not distorted, cracked or broken										
- slings - no cuts, holes, or tears/ no excessive wear, abrasions, or chafing/ no broken stitching sling angle is not less than 45 degrees when attached to load										
- sockets - no cracks, deformations, excessive wear corrosion or pitting/ no broken wires within one rope lay length										
- thimbles - is proper size to fit rope and eye/ not deformed, kinked, or cracked										
- wire rope clips - all U-bolt clips are installed with "U" section on dead end of wire/ proper number of clips and proper distance between clips/ not loose or so tight as to deform, kink, or otherwise damage wire										
Remarks:										

## Enclosure (2) to NVIC

Unit:	VESSEL CARGO HANDLING GEAR INSPECTION CHECKLIST FOR EXPLOSIVES HANDLING OPERATIONS	Date:					
Facility Name:	FIN:	Vessel Name: VIN:					
Gear Description:							
1. Inspection/Review of Certification & Other Records							
Legend: S = satisfactory U = unsatisfactory N/A = not applicable							
		Remarks:					
a. Approved copy of cargo gear plans on board							
b. Loose gear certificate							
c. Wire rope Certificate							
d. Documentation of Ship's Officer's Inspection of Cargo Gear							
e. Cargo Gear Register							
f. Cargo Gear Certificates							
g. Records Identifying Wire Rope or Articles of Loose Gear							
2. Visual Inspection of Cargo Handling Gear							
Legend: S = satisfactory R = rejected & repaired U = unsat & nonrepairable							
	Hold 1	Hold 2	Hold 3	Hold 4	Hold 5	Hold 6	Hold 7
		FWD AFT	FWD AFT	FWD AFT			
a. Booms							
- not bent or severely dented							
- gooseneck free							
- topped up by ship							
- positioned to highest angle for minimum stress, yet not hamper cargo loading/offloading							
b. Topping Lifts							
- wires in good condition							
- bull chain secured to deck with shackle and shackle pin seized							
- bull chain in visibly good condition							
- swaged sockets in visibly good condition							
- bull wire secured to cleat							
c. Vang Guys							
- secured to bulwark in such manner as to produce minimum stress on guy and prevent boom from jack-knifing							
- all slack removed							
- secured to bulwark by D-ring							
- shackle pins seized							
- bitter end made up on cleat and excess line neatly made up							
- manila line in good condition/of adequate length							
- blocks in good condition/ attached to pendants with shackle/ shackle pin seized							
- pendants in good condition/ thimbles in eye splices fittings forming eyes not wrapped, but open for inspection							
d. Preventers							
- secured to head of boom so as not to chafe on head block shackles, shackles, etc.							
- wire rope in visibly good condition							
- minimum diameter of 3/4 inch							
- properly secured to bulwark/ shackle seized							
- eye for securing to bulwark formed with minimum of four rope clips							
- slacked to allow vang guy to stretch, yet share load							
- tails, fittings, or other means of making preventer fast on deck or bulwark are of strength equal to that of the preventer							

Enclosure (2) to NVIC

2. Visual Inspection of Cargo Handling Gear (contd.)

Legend: S = satisfactory R = rejected & repaired U = unsat & nonrepairable

	Hold 1	Hold 2	Hold 3	Hold 4	Hold 5	Hold 6	Hold 7
		FWD	AFT	FWD	AFT	FWD	AFT
e. Schooner/Midship Guy							
- all slack removed							
- free of frayed or worn areas							
- made up and secure to cleat							
-line of sufficient length/ minimum circumference of 3.5 inches							
f. Heel Block							
- running free							
- secured so as not to fall when runner is slack							
- runner will not chafe on cheeks							
- attachments is visibly safe condition							
g. Runners/Whips/Falls							
- wire rope in good condition							
- secured to winch drum with clamps, "U" bolts shackles, or other equally strong method							
- all splices uncovered							
- secured to safety cargo hook with two wire-rope clamps							
- minimum of three turns remaining on drum when cargo hook is in lower hold and on the pier							
- no chafing on any standing rigging or other parts that cause excessive wear							
- reeved on drums so as to follow winch control levers							
- reeved through blocks properly							
- minimum diameter of 3/4 inch							
h. General Items/Loose Gear							
- identification markings - all loose gear used or intended to be used as ship's cargo gear bears a mark or number							
- blocks - free of cracks, breaks, and burrs/sheaves turn freely, so signs of corrugation/ block is proper size/marked with safe working load "SWL"							
- chains - has no excess wear/no stretched, distorted cracked, or broken links/ no broken, worn or distorted fittings/no binding of individual links/ not shortened by bolting, wiring or knotting							
- hooks - not bent or twisted more than 10 degrees no increased throat opening of 15 % or more of original opening/ no wear exceeding 10% of the original dimension/ latch or mouse closes properly no damage to eye							
- padeye - not distorted, cracked or broken							
- shackles - screw pins properly seized/ is proper size/ not distorted, cracked or broken							
- slings - no cuts, holes, or tears/ no excessive wear, abrasions, or chafing/ no broken stitching sling angle is not less than 45 degrees when attached to load							
- sockets - no cracks, deformations, excessive wear corrosion or pitting/ no broken wires within one rope lay length							
- thimbles - is proper size to fit rope and eye/ not deformed, kinked, or cracked							
- wire rope clips - all U-bolt clips are installed with "U" section on dead end of wire/ proper number of clips and proper distance between clips/ not loose or so tight as to deform, kink, or otherwise damage wire							

Remarks:

3. Proof Load Test

	Safe Working Load (tons)	Proof Load (tons)	Boom Angle	Degrees Swung		Pass/Fail Test	Remarks:
				Left	Right		
Hold 1:							
Hold 2:	FWD	FWD	FWD	FWD	FWD	FWD	
	AFT	AFT	AFT	AFT	AFT	AFT	
Hold 3:	FWD	FWD	FWD	FWD	FWD	FWD	
	AFT	AFT	AFT	AFT	AFT	AFT	
Hold 4:	FWD	FWD	FWD	FWD	FWD	FWD	
	AFT	AFT	AFT	AFT	AFT	AFT	
Hold 5:							
Hold 6:							
Hold 7:							

4. The above inspection and proof load test was completed by the below signed personnel and to the best of their knowledge is as indicated above.

Signature of Ship's Rigger	Date:
Signature of Ship's Supervisor	Date:
Signature of Ship's Master	Date:
Signature of Coast Guard EHS Supervisor	Date:
Signature of Cargo Officer	Date:



3. Proof Load Test

	Safe Working Load (tons)	Proof Load (tons)	Boom Angle	Degrees Swung		Pass/Fail Test	Remarks:
				Left	Right		
Hold 1:							
Hold 2:	FWD	FWD	FWD	FWD	FWD	FWD	
	AFT	AFT	AFT	AFT	AFT	AFT	
Hold 3:	FWD	FWD	FWD	FWD	FWD	FWD	
	AFT	AFT	AFT	AFT	AFT	AFT	
Hold 4:	FWD	FWD	FWD	FWD	FWD	FWD	
	AFT	AFT	AFT	AFT	AFT	AFT	
Hold 5:							
Hold 6:							
Hold 7:							

4. The above inspection and proof load test was completed by the below signed personnel and to the best of their knowledge is as indicated above.

Signature of Ship's Rigger	Date:
Signature of Ship's Supervisor	Date:
Signature of Ship's Master	Date:
Signature of Coast Guard EHS Supervisor	Date:
Signature of Cargo Officer	Date:

