



Foreign Freight Vessel Examiner (FFVE) Tactics, Techniques, and Procedures (TTP)



U.S. Coast Guard
Force Readiness Command
(FORCECOM)

CGTTP 3-72.8
7 September 2018

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CGTTP 3-72.8

07 SEPTEMBER 2018

COAST GUARD TACTICS, TECHNIQUES, AND PROCEDURES, CGTTP 3-72.8

Subj: FOREIGN FREIGHT VESSEL EXAMINER (FFVE)

- Ref:
- (a) Development System and Standards Tactics, Techniques, and Procedures (TTP), CGTTP 1-01 (series)
 - (b) Navigation and Navigable Waters, 33 U.S.C.
 - (c) SOLAS: Consolidated Text of the International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988: Articles, Annexes and Certificates, International Maritime Organization (IMO), (series)
 - (d) IMSBC Code: International Maritime Solid Bulk Cargoes Code and Supplement, IMO, (series)
 - (e) IMDG Code: International Maritime Dangerous Goods Code, IMO, (series)
 - (f) International Grain Code: International Code for the Safe Carriage of Grain in Bulk, IMO, (series)
 - (g) United States Coast Guard Foreign Freight Vessel Examiner Job Aid, MPS-JA-TCY-FFVE (series)
 - (h) The United States Coast Guard Marine Safety Manual, Volume II: Materiel Inspection, COMDTINST 16000.7 (series)
 - (i) Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017
 - (j) U.S. Coast Guard Foreign Freight Vessel Examiner (FFVE) Port State Control Officer Performance and Qualification Standard, MPS-PQS-TCY-FFVE (series)
 - (k) United States Coast Guard Foreign Freight Vessel Examiner Competency Code (FFVE), MPS-TA-TCY-FFVE(2) (series)
 - (l) International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), Including 2010 Manila Amendments STCW Convention and STCW Code, 2011 Edition (series)
 - (m) Lists of Solid Bulk Cargoes for which a Fixed Gas Fire-extinguishing System may be Exempted or for which a Fixed Gas Fire-extinguishing System is Ineffective, IMO, MSC.1/Circ.1395, 12 June 2015
 - (n) Copyright Permission Request, IMO, Aug. 2, 2017

- (o) Marine Safety Manual Volume I, Administration and Management, COMDTINST 16000.6 (series)
- (p) U.S. Coast Guard Boat Operations and Training (BOAT) Manual Volume I, COMDTINST M16114.32 (series)
- (q) Rescue and Survival Systems Manual, COMDTINST M10470.10 (series)
- (r) Risk Management (RM), COMDTINST 3500.3 (series)
- (s) Shipping, 46 CFR
- (t) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 U.S.C. § 9601 et seq.
- (u) Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), Chemicals Supplement to the International Medical Guide for Ships (IMGS), IMO, 1994
- (v) International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78)
- (w) Waterfront Facility Safety, 33 CFR § 160.109
- (x) Code of Safety for Caribbean Cargo Ships (CCSS Code), IMO (series)
- (y) Transportation, 49 CFR
- (z) Adoption of the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (INF Code), IMO Resolution MSC.88(71), 27 May 1999
- (aa) International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013
- (bb) Carriage of Dangerous Goods, IMO MSC.1/Circ. 1266, 18 December 2008
- (cc) Code of Practice for the Safe Loading and Unloading of Bulk Carriers, IMO Resolution A.862(20), 27 November 1997
- (dd) Guidelines for Assessing the Longitudinal Strength of Bulk Carriers During Loading, Unloading and Ballast Water Exchange, IMO MSC.1-Circ.1108, 25 May 2004
- (ee) ESP Code: International Code on the Enhanced Programme Of Inspections During Surveys Of Bulk Carriers And Oil Tankers, IMO (series)
- (ff) Guidelines on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers, IMO Resolution A.744(18), 4 November 1993
- (gg) Revised Guidelines for the Preparation of the Cargo Securing Manual, IMO MSC.1/Circ.1353/Rev.1, 15 December 2014
- (hh) FSS Code: International Code for Fire Safety Systems, IMO Resolution MSC.98(73) (series)
- (ii) Explosive Atmospheres, Part 0: Equipment – General Requirements, International Electrotechnical Commission (IEC), IEC 60079 (series)
- (jj) Guidance for Checking the Structure of Bulk Carriers, IMO MSC/Circ.1117, 24, June 2004

- (kk) Load Lines, 1966/1988 - International Convention on Load Lines, 1966, as Amended by the Protocol of 1988, Lloyd's Register Rulefinder 2005 - Version 9.4
- (ll) Port State Control Guidelines for the Enforcement of Management for the Safe Operation of Ships (ISM Code), COMDTPUB P 16700.4, NVIC 04-05
- (mm) National Container Inspection Program, COMDTINST M16616.11 (series)
- (nn) National Container Inspection Program (NCIP) Tactics, Techniques, and Procedures (TTP), CGTTP 3-72.3 (series)
- (oo) CSS Code: Code of Safe Practice for Cargo Stowage and Securing, IMO, (series)
- (pp) Confined Spaces Entry Program Tactics, Techniques, and Procedures (TTP), CGTTP 4-11.8 (series)
- (qq) Memorandum of Agreement between the United States Coast Guard and National Cargo Bureau Governing the Delegation of Certain Survey and Certification Services, July 20, 2017
- (rr) Recommendations on the Safe Use of Pesticides in Ships, IMO MSC.1/Circ. 1358, 30 June 2010
- (ss) Safety and Environmental Health Manual, COMDINST M5100.47 (series)

1. PURPOSE. To provide personnel charged with conducting onboard examinations with Coast Guard tactics, techniques, and procedures (CGTTP) to verify that foreign-flagged vessels operating in United States (U.S.) waters comply with applicable international conventions as well as U.S. laws and regulations.
2. ACTION. This CGTTP publication applies to port state control officers (PSCOs) performing exams on foreign-flagged freight vessels calling on, or otherwise trading with, U.S. ports of call. Internet release authorized.
3. CGTTP AFFECTED. None.
4. DISCUSSION. Vessel examinations are a key activity in the port state control process, where the U.S. exercises its authority over foreign vessels in waters subject to its jurisdiction. When vessels that are not in substantial compliance with applicable laws or regulations are identified in an exam, the USCG imposes controls until the substandard conditions are rectified and the vessels are brought into compliance. This tactics, techniques, and procedures (TTP) publication was authored and validated by accomplished performers and subject matter experts in the field. TTP publications adhere to a life-cycle maintenance periodicity unless triggered by other revision requirements.
5. DISCLAIMER. This TTP publication is not a substitute for applicable legal requirements, nor is it itself a rule. It is intended to provide guidance for Coast Guard personnel and is not intended to, nor does it impose legally binding requirements on any party outside the Coast Guard.

6. DISTRIBUTION. U.S. Coast Guard Force Readiness Command (FORCECOM) Training Division (FC-T), TTP Section posts an electronic version of this TTP publication to the CGTTP Library on CGPortal. In CGPortal, navigate to the CGTTP Library by selecting **References**, then select the **TACTICS, TECHNIQUES, AND PROCEDURES LIBRARY** link. FC-T, TTP Section does not provide paper distribution of this publication.
7. USCG FORMS. The USCG electronic forms referenced in this publication are available on the [CGPortal](#) website.
8. REQUEST FOR CHANGES. Submit recommendations for TTP improvements or corrections through the TTP Request webpage on CGPortal. In CGPortal, navigate to the TTP Request webpage by selecting **References**, then selecting the **TTP Requests** link.

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Chapter 1: Introduction

Introduction

This chapter overviews the contents of this tactics, techniques, and procedures (TTP) publication. It also defines the use of notes, cautions, and warnings in this TTP publication. See [Appendix A: Acronyms](#) for an explanation of acronyms used in this TTP publication.

Per reference (a), Development System and Standards Tactics, Techniques, and Procedures (TTP), CGTTP 1-01 (series), **“CGTTP is NOT policy and is not used to replace or fix policy gaps.”**

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Introduction	1-2
B	Notes, Cautions, and Warnings	1-7

Section A: Introduction

A.1. Overview This TTP publication provides guidance to United States Coast Guard (USCG) personnel charged with conducting onboard examinations of foreign freight vessels (FFVs) within United States (U.S.) waters.

A.1.a. Background Port state control (PSC) is a process by which a nation exercises its authority over foreign vessels in waters subject to its jurisdiction. The authority comes from several sources, both domestic and international. Through the PSC Program, the USCG verifies that foreign-flagged vessels operating in U.S. waters comply with applicable international conventions as well as U.S. laws and regulations. When vessels that are not in substantial compliance with applicable laws or regulations are identified, the USCG imposes controls until the substandard conditions are rectified and the vessels are brought into compliance.

Port state control officers (PSCOs) determine the depth and scope of an examination based on their observations of:

- Ship condition.
- Operations of ship system(s).
- Crew competency.

NOTE:

The terms “vessel” and “ship” are used interchangeably throughout this TTP publication. The term “vessel” is a frequently used U.S. regulatory term, while international organizations use the term “ship” regulations.

A.1.b. Authority Foreign vessels operating in U.S. waters are subject to inspection per reference (b), Navigation and Navigable Waters, 33 U.S.C. Reciprocity is accorded to vessels of countries that are party to reference (c), SOLAS: Consolidated Text of the International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988: Articles, Annexes and Certificates, International Maritime Organization (IMO), (series).

The following references provide additional governing authority for this TTP publication:

- Reference (d), IMSBC Code: International Maritime Solid Bulk Cargoes Code and Supplement, IMO, (series).
- Reference (e), IMDG Code: International Maritime Dangerous Goods Code, IMO, (series).

- Reference (f), International Grain Code: International Code for the Safe Carriage of Grain in Bulk, IMO, (series).

A.1.c.
Performance
Objectives

The objective of this TTP publication is to enhance and improve performance by establishing standards to complete reference (g), United States Coast Guard Foreign Freight Vessel Examiner Job Aid, MPS-JA-TCY-FFVE (series).

Providing standardized guidance enhances on-the-job training, minimizes interpretation variation of FFV exam requirements, and promotes effective documentation of exam results in the Marine Information for Safety and Law Enforcement (MISLE) database.

A.2. Scope

The scope of this TTP publication covers:

- Cargo-specific examination procedures on FFVs including bulk carriers, general dry cargo ships, container ships, and roll-on/roll-off (RO/RO) ships.
- Examination procedures for the carriage of dangerous packaged goods as well as the carriage of grain.

**A.3. Target
Audience**

This TTP publication is intended for use by USCG PSCOs performing exams on foreign-flagged freight vessels calling on, or otherwise trading with, U.S. ports of call. This TTP publication is focused on cargo-specific tasks/steps performed by a PSCO who holds the FFV examiner (FFVE) competency or is working towards attainment of the FFVE competency. PSCOs follow guidance to conduct FFV exams per reference (h), The United States Coast Guard Marine Safety Manual, Volume II: Materiel Inspection, COMDTINST 16000.7 (series).

Additional tasks/steps performed by the PSCO are found in:

- Reference (g).
- Reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.

Use this TTP publication in conjunction with:

- Reference (j), U.S. Coast Guard Foreign Freight Vessel Examiner (FFVE) Port State Control Officer Performance and Qualification Standard, MPS-PQS-TCY-FFVE (series).
 - Reference (k), United States Coast Guard Foreign Freight Vessel Examiner Competency Code (FFVE), MPS-TA-TCY-FFVE(2) (series).
-

A.4. Disclaimer Statement

This TTP publication cannot cover every FFVE scenario that might arise. Such cases can result in the need to deviate from guidance in this publication. You can deviate from the TTP as necessary to complete the task with greater safety, effectiveness, or efficiency. Do not take such deviations lightly. Temper any decision to deviate with maturity and a complete understanding of the mission, members' capabilities, and equipment.

Whenever possible, consult your unit chain of command before deviation. Report TTP adjustment needs per the Request for Changes paragraph in the letter of promulgation.

NOTE:

Specific sections cited in the reference documents were current at the time this TTP publication was promulgated. Make an effort to obtain the current reference version.

A.5. Economy of References

The titles of the following references have been abbreviated in this TTP publication from this point forward:

- Reference (c), SOLAS: Consolidated Text of the International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988: Articles, Annexes and Certificates, International Maritime Organization (IMO), (series), is listed as:
 - Reference (c), SOLAS.
- Reference (d), IMSBC Code: International Maritime Solid Bulk Cargoes Code and Supplement, IMO, (series), is listed as:
 - Reference (d), IMSBC Code.
- Reference (e), IMDG Code: International Maritime Dangerous Goods Code, IMO, (series), is listed as:
 - Reference (e), IMDG Code.
- Reference (f), International Grain Code: International Code for the Safe Carriage of Grain in Bulk, IMO, (series), IMO is listed as:
 - Reference (f), Grain Code.
- Reference (h), The United States Coast Guard Marine Safety Manual, Volume II: Materiel Inspection, COMDTINST 16000.7 (series), is listed as:
 - Reference (h), MSM Volume II.

- Reference (l), International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), Including 2010 Manila Amendments, STCW Convention and STCW Code, 2011 Edition (series), is listed as:
 - Reference (l), STCW.
- Reference (m), Lists of Solid Bulk Cargoes for which a Fixed Gas Fire-extinguishing System may be Exempted or for which a Fixed Gas Fire-extinguishing System is Ineffective, IMO, MSC.1/Circ.1395, 12 June 2015, is listed as:
 - Reference (m), IMO MSC.1/Circ. 1395.

A.6. Copyright Notice

Per reference (n), Copyright Permission Request, IMO, Aug. 2, 2017:

“Material from the IMO publication” reference (c), SOLAS, “is reproduced with the permission of the International Maritime Organization. The quoted material may not be a complete and accurate version of the original publication and the original publication may have subsequently been amended.”

A.7. Use of Best Practice

The term “best practice” is defined throughout this TTP publication as an innovative or modified practice that results in an improved or more effective response.

A.8. How to Use This Document

[Chapter 2: Fundamental Principles](#) provides safety precautions and discusses how to apply relevant international regulations.

Consult the chapter relevant to the ship’s type as indicated in the ship’s certificates:

- [Chapter 3: Bulk Carrier Ships.](#)
- [Chapter 4: Container Ships.](#)
- [Chapter 5: Roll-on/Roll-off Ships.](#)

In addition:

- If you need to identify or verify packaged dangerous packaged goods, then consult [Chapter 6: Packaged Dangerous Goods.](#)
 - If the vessel is carrying grain, then consult [Chapter 7: Carriage of Grain.](#)
-

A.9. Expanded Exam and Use of Clear Grounds

Per reference (h), MSM Volume II, expanded exams focus on areas where clear grounds exist and “*should not include other areas or systems unless the general impression or observations of the PSCO support such examination.*”

For more information on circumstances that constitute clear grounds, see reference (i), U.S. Coast Guard Foreign Freight Vessel Examiner (FFVE) Port State Control Officer Performance and Qualification Standard, MPS-PQS-TCY-FFVE, (series), and reference (h).

A.10. Evaluating Deficiencies

When evaluating deficiencies to determine the appropriate action codes for U.S. Coast Guard Port State Control Report of Inspection – Form B, Form CG-5437B, or if captain of the port (COTP) control actions are necessary, it is important to review the vessel’s cargo certificates and consider:

- The cargo’s hazards.
- Whether the cargo is being loaded or discharged.

Evaluate each case based on the totality of the circumstances. In some cases, it might be safest to stop cargo loading operations pending compliance. For a vessel already discharging cargo, it might be best to continue discharging and require the non-compliance be resolved before departure or before the vessel’s next U.S. voyage. For more information, refer to:

- Port State Control, Section D of reference (h), MSM Vol. II.
- Reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.

NOTE:

Scenarios in this TTP publication to expand the exam are provided as examples and are not intended to be all-inclusive.

A.11. Resources for FFV Exams

The following resources contain information relevant to FFV exams:

- The [Marine Inspection and Investigation School](#) webpage on CGPortal.
 - The [Marine Inspector Resource](#) webpage on CGPortal.
 - The [Marine Inspector Training Officers](#) website on CGPortal.
-

Section B: Notes, Cautions, and Warnings

B.1. Overview The following definitions apply to notes, cautions, and warnings found in this TTP publication.

NOTE: **An emphasized statement, procedure, or technique.**

CAUTION: **A procedure, technique, or action that, if not followed, carries the risk of equipment damage.**

WARNING: *A procedure, technique, or action that, if not followed, carries the risk of personnel injury or death.*

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Chapter 2: Fundamental Principles

Introduction

This chapter provides safety precautions and discusses how to apply relevant international regulations.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Personnel Protective Equipment and Hazards Associated with FFVs	2-2
B	International Convention for the Safety of Life at Sea (SOLAS) Applicability	2-4
C	IMSBC Code Applicability	2-5
D	IMDG Code Applicability	2-9
E	Grain Code Applicability	2-16

Section A: Personnel Protective Equipment and Hazards Associated with FFVs

A.1. Personnel Protective Equipment

Per reference (o), Marine Safety Manual Volume I: Administration and Management, COMDTINST M16000.6 (series), verify the inspection team is outfitted with appropriate personal protective equipment (PPE) to include:

- Atmospheric monitors and alarms, for example, multi-gas meters. As a best practice, fully charge meters before boarding the vessel.
- Coveralls.
- Eye protection.
- Flashlight.
- Foul weather gear appropriate for current or anticipated conditions.
- Gloves.
- Hard hat.
- Hearing protection.
- Radiation pagers.
- Safety-toed boots.

NOTE:

Check the unit's safe work practices for hazard descriptions. Check for cargo-specific hazards using the International Maritime Solid Bulk Cargo (IMSBC) Code or the International Maritime Dangerous Goods (IMDG) Code, depending on the ship type.

NOTE:

When boarding a vessel that is underway, at anchor, or otherwise away from the pier, follow the personal floatation and PPE requirements per reference (p), U.S. Coast Guard Boat Operations and Training (BOAT) Manual Volume I, COMDTINST M16114.32 (series), and reference (q), Rescue and Survival Systems Manual, COMDTINST M10470.10 (series).

NOTE:

As a best practice, lead PSCOs brief the inspection team regarding the hazards associated with the vessel type, nature of operation, and cargo. Situational awareness and general safe practices are necessary to keep the team safe, particularly when trainees might be less familiar with shipboard operations. Complete a general assessment of risk before each inspection per reference (r), Risk Management (RM), COMDTINST 3500.3 (series).

A.2. Safety Evaluation Factors

Identify the vessel type before the exam and discuss common hazards associated with particular arrangements of ship design, cargo type, and age:

- Bulk.
- Container.
- General dry cargo.
- Heavy lift/oil, bulk ore.
- RO/RO.

If the exam takes place at a facility, then consider practical mitigation for potential hazards such as moving vehicles, machinery, or hazardous materials.

Section B: International Convention for the SOLAS Applicability

B.1. Overview

Reference (c), SOLAS:

- Applies to the carriage of cargo on freight vessels, including vessels of less than 500 gross tonnage (GT).
- Contains general requirements for documents and shipping information, as well as regulations for safety construction items related to the cargo, for example, fire detection and suppression equipment for holds.
- Includes the parent citations for the IMSBC Code, IMDG Code, and the Grain Code discussed in this chapter.

B.2. Vessel Safety Regulations

Table 2-1 details SOLAS regulations related to vessel safety.

SOLAS Chapter/Regulation	Description
Chapter II-2, Regulation 19	Fire safety requirements for cargo vessels, including detection, suppression, and protection.
Chapter II-2, Regulation 20	Special requirements for RO/ROs, where ventilation and transfer of hazards between holds is a greater concern.
Chapter II-2, Regulation 20-1	Requirements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo.

Table 2-1 SOLAS regulations related to vessel safety

B.3. SOLAS and Other Applicable IMO Codes

Table 2-2 details the relationship between SOLAS and other applicable IMO codes.

IMO Code	SOLAS Parent Citation: 74 SOLAS (14)
Grain Code	Chapter VI, Regulation 9: Requirements for cargo ships carrying grain.
IMDG Code	Chapter VII, Regulation 3: Requirements for the carriage of dangerous goods.
IMSBC Code	Chapter VI, Regulation 1-2: Requirements for the carriage of solid bulk cargo other than grain.

Table 2-2 SOLAS and applicable IMO codes

NOTE:

As a best practice, consult the SOLAS parent citation in addition to the regulation from the applicable IMO code. The IMO codes derive their authority from SOLAS.

Section C: IMSBC Code Applicability

C.1. Overview

Reference (d), IMSBC Code:

- Is a comprehensive set of requirements for the safe loading, unloading, and carriage of solid bulk cargo by vessel.
- Became mandatory under Chapters VI and VII of SOLAS on 01 January 2013.
- Contains provisions for all solid bulk cargo, hazardous, and non-hazardous alike, other than grain.

Solid bulk cargo consists of particles, granules, or larger pieces of material generally uniform in composition loaded directly into cargo spaces or the hold of a vessel without any intermediate form of containment. It is typically poured into the hold of a vessel using a chute or dropped into the hold using a grab bucket.

C.2. IMSBC Code Application

The IMSBC Code applies to all ships subject to SOLAS and to cargo ships less than 500 GT. Regardless of whether a vessel's Flag State is signatory to SOLAS, the following regulations apply to foreign vessels in the navigable waters of the U.S. that transport solid bulk cargo:

- Operations, Part 97 of reference (s), Shipping, 46 CFR.
- Carriage of Bulk Solid Materials That Require Special Handling, Part 148 of Reference (s).

C.3. Other Applicable Regulations

In addition to IMSBC Code requirements, the following regulations apply to vessels carrying dangerous solid bulk cargo per reference (c), SOLAS:

- Cargo ships of 500 GT and over constructed on or after 1 September 1984 and cargo ships of less than 500 GT constructed on or after 1 February 1992, subject to SOLAS Chapter II-2/19.4, must have a Document of Compliance (DOC) when carrying dangerous goods in solid form in bulk, except class 6.2 and class 7.
- Cargo ships carrying cargo classified as potentially dangerous material (PDM) or materials hazardous only in bulk (MHB) do not require a DOC.

For specific applicability, see Chapter II of reference (c).

C.4. Solid Bulk Cargo Groups and Categories

Solid bulk cargo is categorized into three distinct groups under the IMSBC Code as shown in Table 2-3. Each solid bulk cargo is assigned to Group A, B, C, or a combination thereof. Carriage requirements are assigned to solid bulk cargo based on the group assignment and the specific properties and characteristics of the solid bulk cargo.

Group	Description
Group A	Cargo that might liquefy.
Group B	Cargo that possess chemical hazards.
Group C	Non-hazardous cargo, that is, cargo that does not meet either Group A or Group B.

Table 2-3 Solid bulk cargo groups

There are two categories of Group B cargos as shown in Table 2-4.

Group B Cargo Category	Description
Dangerous goods	Cargowith a United Nations (UN) number assigned by the UN Sub-committee of Experts on the Transport of Dangerous Goods. Chapter VII of reference (c), SOLAS, and reference (e), IMDG Code provide classifications for dangerous goods.
MHB	A material that does not meet the definition of dangerous goods as defined above, but presents a significant danger when transported in bulk by vessel. MHB is an international standard equivalent to PDM per Definitions, § 148.3 of reference (s), Shipping, 46 CFR.

Table 2-4 Group B cargo categories

C.5. IMSBC Code Content and Terms

The IMSBC Code contains 13 sections and four appendices shown in Table 2-5. The majority of the provisions are mandatory.

IMSBC Term	Definition
"Shall"	Relevant provisions are mandatory.
"Should"	Relevant provisions are recommended.
"May"	Relevant provisions are optional.

Table 2-5 IMSBC Code terms and definitions

C.6. IMSBC Code Recommended Provisions

The IMSBC Code provisions shown in Table 2-6 are recommended.

Section/Appendix	Description
Section 11	Security provisions, except for subsection 11.1.1.
Section 12	Stowage factor conversion tables.
Section 13	References to related information and recommendations.
Appendix 1	Individual schedules of solid bulk cargo. Appendix 1 is mandatory except for informational text contained under the following sections of each individual shipping schedule: <ul style="list-style-type: none"> • Descriptions. • Characteristics. • Hazard. • Emergency response procedures.
Appendix 2	Laboratory test procedures, associated apparatus, and standards.
Appendix 3	Properties of solid bulk cargo.

Table 2-6 Recommended IMSBC Code provisions

C.7. Unlisted Cargo Authorizations

Per Section 1, Regulation 1.3. of reference (d), IMSBC Code, before carriage in U.S. waters, solid bulk cargo not listed in the IMSBC Code must be authorized for carriage as follows:

- Non-hazardous cargo: For loading in a U.S. port, cargo authorizations are issued by the [Coast Guard Hazardous Materials Division COMDT \(CG-ENG-5\)](#) when requested. Vessels arriving with unlisted cargo onboard must have received competent authority approval from the port state of loading. Written approval is usually available onboard the vessel.
- Hazardous cargo: Approval from the port state of loading, Flag State of the vessel, and the port state of discharge is required. COMDT (CG-ENG-5) reviews and approves such cargo before loading. Written documentation is usually available onboard the vessel.

C.8. Cargo Exemptions and Equivalent Measures Under IMSBC Code

A competent authority can grant an exception from or authorize equivalent measures to some or all of the carriage requirements for certain solid bulk cargo per Section 1, Regulation 1.5 of reference (d). Exemptions or equivalent measures granted by other competent authorities must be approved by COMDT (CG-ENG-5) before carriage in the U.S. per International Shipments § 148.55 of reference (s), Shipping, 46 CFR, and be in the form of a letter.

If a vessel is operating under the conditions of an exemption not approved in the U.S., then seek instructions from COMDT (CG-ENG-5). If the exemption was issued to the vessel in relation to Group C cargo (non-hazardous), then the foreign exemption can be accepted without instruction from COMDT (CG-ENG-5).

**C.9. IMSBC
Code and U.S.
Regulations**

The IMSBC Code does not contain provisions related to the protection of the marine environment. In U.S. waters, the Environmental Protection Agency classifies certain materials as hazardous substances under reference (t), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 U.S.C. § 9601 et seq. Hazardous substances are subject to all applicable laws and regulations, as well as specific documentation and release mitigation requirements during transport and reporting requirements if released into the environment.

If the solid bulk cargo to be carried is determined to be a hazardous substance, then adhere to the following requirements in addition to the IMSBC Code:

- Stowage and Segregation for Materials of Class 9 § 148.150 of reference (s), Shipping, 46 CFR.
- Hazardous Substances § 148.270 of reference (s).

Non-hazardous cargo is defined as cargo assigned to Group C of the IMSBC Code and is not subject to U.S. law and regulation per Carriage of Bulk Solid Materials that Require Special Handling § 148 of reference (s).

Section D: IMDG Code Applicability

D.1. Overview Per Chapter VII/3 of reference (c), SOLAS, the carriage of dangerous goods in packaged form shall comply with reference (e), IMDG Code.

The IMDG Code:

- Ensures that dangerous goods are shipped safely to prevent personnel injury, ship, and cargo damage.
- Regulates the carriage of marine pollutants to safeguard the marine environment.

The IMDG Code was developed over several decades since 1929 to harmonize the carriage of dangerous goods in packaged form across the international community. The IMDG Code became mandatory in 2003.

D.2. IMDG Code Contents

Table 2-7 details the contents of the IMDG Code.

Part/ Appendix	Volume	Contents/Description
Part 1	Volume 1	General provisions, definitions, and training.
Part 2	Volume 1	Classification.
Part 3	Volume 2	Dangerous goods list, special provisions, and exceptions.
Part 4	Volume 1	Packing and tank provisions.
Part 5	Volume 1	Consignment procedures.
Part 6	Volume 1	Constructions and testing of packaging, intermediate bulk containers, large packaging, portable marine tanks, multiple-element gas containers, and road tank vehicles.
Part 7	Volume 1	Provisions concerning transport operations.
Appendix A	Volume 2	List of generic and not otherwise specified proper shipping names.
Appendix B	Volume 2	Glossary of terms.
Index	Volume 2	Alphabetical list of dangerous goods.
Supplement	Not applicable	Response procedures for spills and fires involving dangerous goods. Reference (u), Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), Chemicals Supplement to the International Medical Guide for Ships, (IMGS) IMO, 1994.

Table 2-7 IMDG Code contents

Treated legally as a mandatory instrument per Chapter VII of reference (c), SOLAS, the parts of the IMDG Code shown in Table 2-8 are recommended, but not mandatory.

IMDG Code Section	Description/Notes
Paragraphs 1.3.1.4 to 1.3.1.7	Training.
Chapter 1.4	Security provisions, except 1.4.1.1, which is mandatory.
Section 2.1.0 of Chapter 2.1	Class 1 – Explosives, Introductory notes.
Section 2.3.3 of Chapter 2.3	Determination of flashpoint.
Columns (15) and (17) of the dangerous goods list in Chapter 3.2.	Same as the title.
Section 5.4.5 of Chapter 5.4	The provisions of these sections are mandatory, but the format and layout of the multimodal dangerous goods form is not.
Chapter 7.3	Special provisions in the event of an incident and fire precautions involving dangerous goods only.
Section 7.9.3	Contact information for the main designated national competent authorities.
Appendix A	Same as the title.

Table 2-8 Recommended IMDG Code sections

D.3. IMDG Code Information Resources

Table 2-9 provides resources for IMDG Code information.

Information Type	Information Resource
Specific cargo, hazardous properties, and general guidance regarding the IMSBC Code.	COMDT (CG-ENG-5)
Vessel stability.	Coast Guard Human Element & Ship Design Division COMDT (CG-ENG-1)
Fire safety and protection measures.	Coast Guard Life Saving & Fire Safety Division COMDT (CG-ENG-4) Coast Guard Port State Control Division COMDT (CG-CVC-2)

Table 2-9 IMDG Code information resources

NOTE:

As a best practice, seek assistance and support from qualified USCG personnel to address various issues. For example, consult facility inspectors and explosive handling supervisors when dealing with issues regarding dangerous cargo in packaged form and the IMDG Code onboard an FFV.

D.4. Hazard Classes

The IMDG Code categorizes packaged hazardous cargos. Table 2-10 aligns with [Figure 6-1 Hazardous materials table](#).

Class/Hazard	Subclasses and Divisions
Class 1: Explosives	Six hazard divisions: <ul style="list-style-type: none"> • 1.1: Mass explosion hazard. • 1.2: Projection hazard but not a mass explosion hazard. • 1.3: Fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard. • 1.4: Present only a small hazard in the event of ignition or initiation during transport. • 1.5: Very insensitive substances that have a mass explosion hazard. • 1.6: Extremely insensitive articles that do not have a mass explosion hazard.
Class 2: Gases	Subdivided according to primary hazard during transport: <ul style="list-style-type: none"> • 2.1: Flammable gases. • 2.2: Non-flammable gases. • 2.3: Toxic gases.
Class 3: Flammable liquids	Subdivided as follows: <ul style="list-style-type: none"> • Flammable liquids. • Liquid desensitized explosives.
Class 4: Flammable solid, Spontaneously combustible, Dangerous when wet	Type of substances: <ul style="list-style-type: none"> • Flammable solids. • Self-reactive substances. • Pyrophoric solids. • Pyrophoric liquids. • Self-heating substances. • Substances that emit flammable gases in contact with water.
Class 5: Oxidizers, Organic Peroxides	Two sub-classes: <ul style="list-style-type: none"> • 5.1: Oxidizing substances. • 5.2: Organic peroxides.
Class 6: Toxic and infectious substances	Two sub-classes: <ul style="list-style-type: none"> • 6.1: Toxic substances. • 6.2: Infectious substances.
Class 7: Radioactive material	Radioactive material assigned a UN number per reference (e), IMDG Code, depends on fissile or non-fissile properties of radionuclides, type of packaging, or special arrangements governing the transport.
Class 8: Corrosive materials	Three packing groups related to the degree of hazard in transport: <ul style="list-style-type: none"> • Group I: Very dangerous substances and preparations. • Group II: Substances and preparations presenting medium danger. • Group III: Substances and preparation presenting minor danger.
Class 9: Miscellaneous dangerous substances and articles and environmentally hazardous substances	Subdivided as follows: <ul style="list-style-type: none"> • Substances that, on inhalation as fine dust, can endanger health. • Substances evolving flammable vapor. • Lithium batteries. • Lifesaving appliances. • Substances and articles that, in the event of fire, can form dioxins. • Substances transported or offered for transport at elevated temperatures. • Environmentally hazardous substances. • Genetically modified microorganisms and genetically modified organisms.

Table 2-10 Packaged hazardous cargo classes

D.5. IMDG Code and MARPOL Annex III

Table 2-11 compares the IMDG Code and Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form, Annex III of reference (v), International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78).

IMDG Code	MARPOL Annex III
Comprehensive set of requirements for the safe international transportation of packaged hazardous materials.	Mandatory provisions for the prevention of pollution by harmful substances carried by sea in packaged form.
Prohibits certain marine pollutants from carriage aboard ship while others are restricted to being shipped in limited qualities.	Provisions for detaining a vessel where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of pollution by harmful substance.

Table 2-11 IMDG Code and MARPOL Annex III comparison

D.6. IMDG Code and SOLAS

Per Chapter VII of reference (c), SOLAS:

- The carriage of dangerous goods in packaged form applies to all ships including cargo ships of less than 500 GT.
- The carriage of dangerous goods in packaged form on these vessels must comply with relevant provisions of the IMDG Code.
- All ships, irrespective of type and size, carrying substances, materials, or articles identified as marine pollutants in the IMDG Code are subject to the provisions of the IMDG Code.

NOTE:

The IMDG Code does not apply to ships' stores or equipment. Per Purpose and Applicability § 147.1 of reference (s), Shipping, 46 CFR, the COTP can prohibit the unsafe use or storage of hazardous ship stores on foreign vessels per Chapter VII of reference (c), and reference (w), Waterfront Facility Safety § 160.109 of reference (b), Navigation and Navigable Waters, 33 U.S.C.

D.7. SOLAS Special Requirements

Table 2-12 denotes the applicability of SOLAS special requirements concerning firefighting, ventilation, bilge pumping, etc., for cargo spaces on ships carrying dangerous goods.

Vessel Construction Date	SOLAS Chapter II-2, Regulation 19			Reference (x), Code of Safety for Caribbean Cargo Ships (CCSS Code), IMO (series).
	Passenger Ships	Cargo Ships 500 GT and Over	Cargo Ships Less Than 500 GT	
On or after 1 Sep 1984, but before 1 Feb 1992.	X ¹	X ¹	N/A	¹ All vessels regardless of build date
On or after 1 Feb 1992.	X ¹	X ¹	X ¹	
On or after 1 Jan 2011.	X ^{1,2}	X ^{1,2}	X ^{1,2}	
<p>Notes: ¹ Except when carrying dangerous goods in limited quantities. See IMDG Code Chapter 3.4, Limited Quantities. ² Except when carrying dangerous goods in excepted quantities. See IMDG Code Chapter 3.5, Transport Schedules for class 7 (radioactive).</p>				

Table 2-12 Special requirements of ships carrying dangerous goods

NOTE:

CCSS Code vessels operate predominantly in District 7, but have operated in District 8 and as far north as Boston.

For related information, see Chapter 6: Packaged Dangerous Goods, Section G: [SOLAS Table 19.3: Application of the Requirements to Different Classes of Dangerous Goods Except Solid Dangerous Goods in Bulk.](#)

D.8. Conduct the Exam

Verify cargo stowage and segregation using the following:

- DOC with special requirements for ships carrying dangerous goods.
- IMDG Code Volume I:
 - Chapter 3, Dangerous Goods List.
 - Chapter 7.1, Stowage.
 - Chapter 7.2, Segregation
 - Chapter 7.4, Transport of cargo transport units onboard ships.
 - Chapter 7.5, Packing of cargo transport units.
 - Chapter 7.6, Transport of dangerous goods in shipborne barges on barge-carrying ships.

NOTE:

As a best practice, question the chief mate on how the vessel meets stowage and segregation requirements. For example, the loading computer on new vessels might have software incorporated to monitor compliance.

D.9. IMDG Code on RO/ROs Carrying Only Vehicles

Table 2-13 shows how the IMDG Code applies to RO/ROs carrying only vehicles. For related information, see [Chapter 5: Roll-on/Roll-off Ships](#).

UN Designation	IMDG Code Part 3 Special Provision	Condition of Carriage
3166	961	Vehicles and equipment are not subject to the provisions of the IMDG Code if: <ul style="list-style-type: none"> • They are stowed on a RO/RO or in another cargo space designated by the Administration, that is, flag state, as specifically designed and approved for the carriage of vehicles and equipment. • There are no signs of leakage from the battery, engine, fuel cell, compressed gas cylinder or accumulator, or fuel tank when applicable.
Shipping Name		Vehicle, flammable gas-powered. Vehicle, liquid-powered. Vehicle, fuel cell, flammable gas-powered. Vehicle, fuel cell, flammable liquid-powered.

Table 2-13 Applicability of IMDG Code to RO/ROs carrying only vehicles

D.10. IMDG Code and Department of Transportation Requirements

Hazardous materials, except for Class A and B explosives and radioactive materials, can be transported by a vessel when the material’s packaging, marking, labeling, classification, description, certification, and placarding complies with the IMDG Code. All hazardous materials must otherwise be stowed and carried per Hazardous Materials Regulations, Subchapter C of reference (y), Transportation, 49 CFR, subject to the following conditions:

- Differences in the stowage and segregation requirements of the Department of Transportation (DOT) and IMO regulations are generally minor. The COTP can authorize the use of an alternative stowage location or method of segregation, handling, or stowage subject to conditions that ensure an acceptable level of safety per Alternative Stowage Procedures § 176.65 of reference (y).
- The word “can” indicates the optional nature of such authorization. For example, if a hazardous material is packaged per DOT regulations but is described, labeled, etc., per the IMDG Code, then it is acceptable for marine shipment.

Table 2-14 shows conditions and limitations of General Information, Regulations, and Definitions § 176.171 of reference (y), Transportation 49 CFR.

49 CFR	Conditions and Limitations
§ 171.7	IMDG Code incorporating Amendment 38-16 (English Edition), 2016 Edition.
§ 171.22	Authorizations and conditions for the use of international standards and regulations.
§ 171.23	Requirements for specific materials and packaging transport under the IMDG Code.
§ 171.25	Additional requirements for the use of the IMDG Code.

Table 2-14 Conditions and limitations of 49 CFR § 171

D.11. IMDG Code Modifications

Table 2-15 shows modifications to the IMDG Code per reference (y).

49 CFR	IMDG Code Modification
§ 172.101l	Alternate spelling of proper shipping names as they appear in the IMDG code.
§ 172.202(f)	Description of hazardous material on shipping papers.
§ 172.203(j)	Additional Information description requirements: Shipping papers for transportation by water.
§ 172.401l	Prohibited labeling: Does not apply to packages labeled in conformance with the IMDG code.
§ 172.502(c)	Prohibited and permissive placarding: Does not apply to bulk packaging, freight container, unit load device, transport vehicle that is placarded per the IMDG code.
§ 172.519	General specification for placards: <ul style="list-style-type: none"> Does not apply when placarded in conformance with the IMDG code. A bulk packaging transport vehicle or freight container containing a material poisonous by inhalation must be placarded per Poisonous by Inhalation Materials § 171.23(c)(10) of reference (y).
§ 172.602(c)	Emergency response information: form of Information.
§ 176.5	Application to vessel: innocent passage.
§ 176.27	Certificate.
§ 176.30	Dangerous cargo manifest.
§ 176.83	Segregation.
§ 176.84	Other requirements for stowage and segregation for cargo vessels and passenger vessels.
§ 176.140(c)	Segregation for other class of hazardous materials: Class 1.
§ 176.720	Requirements for carriage of cargo in international transportation regulated by reference (z), Adoption of the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes onboard Ships (INF Code), IMO Resolution MSC.88(71), 27 May 1999.
§ 176.906	Stowage of engines and machinery.

Table 2-15 IMDG Code modifications per 49 CFR

Section E: Grain Code Applicability

E.1. Overview Per reference (f), Grain Code, “*The term “grain” covers wheat, maize, corn, oats, rye, barley, rice, pulses, seeds and processed forms thereof, whose behavior is similar to that of grain in its natural state.*” Reference (f), provides an international standard for the safe carriage of grain in bulk. The majority of the requirements were developed to prevent the loss of stability that the carriage of grain could pose to a ship. The regulations for reference (f) are contained in:

- Chapter VI, Regulation 9 of reference (c), SOLAS.
- Bulk Grain, Subpart B § 172 of reference (s), Shipping, 46 CFR.

E.2. Effects of Grain

Consider how cargo behaves similarly to grain in its natural state:

- Materials like grain have peculiar characteristics and loading requirements.
- The need to control vermin and dust requires special consideration.
- Dust becomes a serious hazard as the dust from most grains, particularly hard grains like red sorghum, when mixed with air in the right proportion becomes an extremely explosive mixture.
- Grains are liable to heat or sweat, especially if damp, when they might germinate or rot.
- Grains having angles of repose of less than the critical 35 degrees are prone to shifting at sea, thereby affecting the vessel’s stability.

For more information, see:

- [Chapter 7: Carriage of Grain](#).
- The USCG/National Cargo Bureau (NCB) presentations at the [Cargo and Facilities Division COMDT \(CG-FAC-2\)](#) website on CGPortal. Click the **National Cargo Bureau Training info** link.

E.3. SOLAS and Grain Code Applicability

SOLAS Chapter VI applies to the carriage of grain in bulk on all cargo vessels of 500 GT and above and cargo ships of less than 500 GT. This is due to the particular hazards to ships or persons onboard which require special precautions for safe carriage. See Chapter VI/1 of reference (c).

E.4. Grain Code Contents and Organization

Table 2-16 depicts the organization of reference (f), Grain Code, in two parts.

Grain Code Contents	Description
Part A	The specific requirements vessels have to comply with in order to carry grain in bulk. These are related to the documentation, stability information, the loading of cargo, and its proper securing for the safe carriage of this type of cargo.
Part B	The general assumptions adopted by the code for calculating adverse heeling moments after a grain shift. Since the shifting of grain can result from various dynamic factors that are difficult to anticipate, the code adopts certain assumptions that help the vessel crew and the Administration calculate the minimum level of acceptable stability.

Table 2-16 Grain Code contents

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Chapter 3: Bulk Carrier Ships

Introduction

This chapter provides practices to conduct FFV exams aboard bulk carrier ships, including dry cargo and special purpose ships. Consider the ship's type when determining whether a ship is a bulk carrier per reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017. The ship's certificates indicate the ship's type. For descriptive information regarding bulk carriers, see [Appendix B: Characteristics of Vessel Types, Section B.1.: Bulk Carriers](#) and [Section B.2.: Dry Cargo Ships](#).

In This Chapter

This chapter contains the following sections:

Section	Title	Page
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Section A: Determining IMSBC Code Applicability

A.1. Introduction

Before attending the vessel, determine applicability under individual schedules of solid bulk cargo per Appendix 1 of reference (d), IMSBC Code, that:

- Provides the description of solid bulk cargo, as well as any hazards and special requirements for those specific cargoes.
- Assists the PSCO in determining the scope of the exam to verify compliance with solid bulk cargo carriage requirements.

A.2. Conduct the Exam

Verify the cargo carried is authorized under the IMSBC Code and the specific requirements outlined in the relevant shipping schedule in IMSBC Code Appendix 1 are carried out per:

- Chapter VII 7-1 of reference (c), SOLAS.
- Section 1.2 of Reference (d).

If the cargo is not authorized under the IMSBC Code, then verify the vessel has a valid non-hazardous cargo authorization or a hazardous cargo approval onboard. For more information, see [Chapter 2: Fundamental Principles, Section C.2.: IMSBC Code Application](#).

A.3. Expand the Exam

Expand the exam:

If	Then
The cargo to be carried is not listed in the IMSBC Code and the vessel does not have the required authorizations for an unlisted cargo.	Investigate and determine if the cargo is non-hazardous or if the cargo is hazardous and poses significant safety risk to transportation per reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.

Section B: Document of Compliance for Dangerous Goods

B.1. Document of Compliance The DOC for dangerous goods attests to the ship’s construction and systems meeting the safety requirements for carriage of dangerous goods:

- Cargo ships of 500 GT and over constructed on or after 1 September 1984 and cargo ships of less than 500 GT constructed on or after 1 February 1992, subject to Chapter II-2/19.4 of reference (c), SOLAS, must have a DOC when carrying dangerous goods in solid form in bulk, except class 6.2 and class 7.
- Ships carrying dangerous goods must have a DOC, regardless of year built, per reference (x), Code of Safety for Caribbean Cargo Ships (CCSS Code), IMO (series).

Cargo ships carrying cargo classified as PDM or MHB do not require a DOC. For specific applicability, refer to:

- Chapter II-2/1 of reference (c).
- Reference (bb), Carriage of Dangerous Goods, IMO MSC.1/Circ.1266, 18 December 2008.

Annual surveys are not required after the initial verification. Surveys are carried out in conjunction with the SOLAS Cargo Ship Safety Construction Certificate.

B.2. Conduct the Exam If the vessel requires a DOC due to the bulk cargo carried, then verify the DOC is onboard and valid.

B.3. Expand the Exam Expand the exam:

If	Then
The DOC is not onboard or valid. The cargo is not authorized to be carried in the DOC.	Determine follow-up actions per Section D.2 of reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017. For cargo that requires special considerations, see reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.

Section C: Dangerous Cargo Manifest

C.1. Dangerous Cargo Manifest

Solid bulk cargo classified as dangerous goods must also be accompanied by dangerous cargo manifest (DCM) setting forth the location of the dangerous goods onboard per:

- Chapter VII, 7-2 of reference (c), SOLAS, or,
- Section 4.8 of reference (d), IMSBC Code.

A DCM is not required for MHB and PDM cargo per the preceding references.

For more information, see [Chapter 6: Packaged Dangerous Goods, Section A.3.: Dangerous Cargo Manifest](#).

Determine if information is required to accompany the shipment, depending on the specific provisions for the cargo per:

- Appendix 1 of reference (d).
- Carriage of Bulk Solid Materials that Require Special Handling § 148 of reference (s), Shipping, 46 CFR.

C.2. Conduct the Exam

Examine the following:

- Location.
 - Contents:
 - Proper shipping name for cargo.
 - Hazardous classes for each cargo.
 - Stowage plan.
 - Shipping papers containing:
 - Authorized shipping name for bulk cargo.
 - The cargo groups.
 - The hazard class, if applicable.
 - The total quantity of cargoes offered.
 - Hazardous materials (HAZMAT) information.
 - Master signature.
 - Copies retained.
-

C.3. Expand the Exam

Expand the exam:

If	Then
A vessel carrying dangerous goods does not have a DCM.	Determine follow-up actions per: <ul style="list-style-type: none"> • Section D.2 of Reference (h), MSM Volume II. • Reference (i), Procedures for Port State Control, 2017. IMO Resolution A.1119(30), 20 December 2017. • Reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.

Section D: Shipping Documentation

D.1. Shipping Papers

Per Section 4 of reference (d), ISMBC Code, the shipper or loading terminal must:

- Supply the vessel master or a representative of the master with information to ensure the cargo is properly stowed and can be safely carried.
- Provide the information sufficiently in advance of loading to take proper precautions.

For more information, see [Chapter 6: Packaged Dangerous Goods, Section A.2.: Shipping Papers](#).

D.2. Conduct the Exam

Verify the following:

- Shipping papers are onboard.
- Appropriate information for the cargo carried is available:
 - An authorized bulk cargo shipping name.
 - The cargo group(s).
 - Hazard class, if applicable.
 - UN number, if applicable.
 - Total quantity of cargoes offered.

D.2.a. Verify Additional Information

Determine if information is required to accompany the shipment, depending on the specific provisions for the cargo per:

- Appendix 1 of reference (d).
- Carriage of Bulk Solid Materials that Require Special Handling § 148 of reference (s), Shipping, 46 CFR.

Information accompanying the shipment is primarily used during the loading of the vessel, during carriage, and appears in Appendix 1 of reference (d). Use Appendix 1 of reference (d) to determine when vessels carrying solid bulk cargo in the U.S. must have this information onboard before departure.

Additional information includes:

- The stow factor.
- The need for trimming and trimming procedures.
- The likelihood of shifting and the angle of repose.
- The moisture content and the transportable moisture limit.
- The likelihood of the formation of a wet base.
- Toxic or flammable gases that might be generated
- Flammability, toxicity, corrosiveness, and oxygen depletion.
- Self-heating properties.
- The emission of flammable gas when in contact with water.
- Radioactive properties.

D.2.b. Verify
Required
Certificates

Per Carriage of Bulk Solid Materials that Require Special Handling § 148 of reference (s), Shipping, 46 CFR, additional certificates might be required to accompany solid bulk cargo as indicated in the individual shipping schedules in Appendix 1 of reference (d), IMSBC Code.

For example, a certificate stating the oil and moisture levels of the cargo must accompany a bulk shipment of seed cake. This requirement can be found in the shipping schedules for seed cake per:

- Appendix 1 of reference (d).
- Seed Cake § 148.310 of reference (s).

NOTE:

Use Appendix 1 of reference (d) to determine the need for certificates. These certificates can be in the form of a shipping paper or available to the master electronically.

D.3. Expand the
Exam

Expand the exam:

If	Then
<p>The vessel does not possess required documentation.</p> <p>Papers have errors or cargo is not per documents.</p>	<p>Determine follow-up actions per reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017 .</p> <p>For cargo that require special considerations, see reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.</p>

Section E: Loading Instrument and User Manual

E.1. Loading Instrument and User Manual

Per reference (cc), Code of Practice for the Safe Loading and Unloading of Bulk Carriers, IMO Resolution A.862(20), 27 November 1997, also known as the BLU Code:

- Bulk carriers 150 meters in length and upwards are fitted with a loading instrument.
- The loading instrument must be capable of providing information on hull girder shear forces and bending moments.
- Bulk carriers constructed before 01 July 1999 must comply with these requirements no later than the date of the first intermediate or periodical survey of the ship.

NOTE:

The loading instrument might be either an analog or a digital device.

E.2. Conduct the Exam

Verify the following:

- User manual:
 - Is written in a language familiar to the ship's officers responsible for cargo operations.
 - Is provided in English if written in another language.
 - Crew is familiar with procedures to operate the loading instrument per reference (dd), Guidelines for Assessing the Longitudinal Strength of Bulk Carriers During Loading, Unloading and Ballast Water Exchange, IMO MSC.1-Circ.1108, 25 May 2004.
 - The ship and terminal are using the same loading/unloading plan.
-

Section F: Bulk Cargo Loading, Unloading, and Stowage Booklet (Loading Manual)

F.1. Loading Manual

Per Chapter VI, Regulation 7-2 of reference (c), SOLAS:

- The ship must be provided with a booklet to enable the master to prevent excess stresses in the ship's structure.
- The booklet must be written in a language familiar to the ship's officers responsible for cargo operations.
- The required information can be contained in the intact stability booklet.

F.2. Conduct the Exam

Verify the following:

- Booklet contents, that is, stability data, and service conditions including loading, unloading, restrictions, and ballast conditions.
- Written in a language familiar to the ship's officers responsible for cargo operations. Provided in English if written in another language.
- The ship's loading or unloading plan with the terminal is not in accordance with the manual approved by the Administration.

F.3. Expand the Exam

Expand the exam:

If	Then
A ship does not conduct a loading pattern per its approved loading manuals.	Request confirmation by the ship, flag state, or responsible officer that the proposed loading plan is acceptable.

Section G: Loading Certificate

G.1. Loading Certificate

A loading certificate is a document issued after the vessel has been loaded and surveyed by an independent or third party surveyor. Although the loading certificate is not required by regulation, it is used by protection and indemnity (P&I) clubs.

In the U.S., the NCB is authorized to assist the USCG by issuing loading certificates at the request of the principals involved with the shipment. Per Assignment and Certification §148.12 of reference (s), Shipping, 46 CFR, certificates issued by the NCB can be accepted as evidence of compliance with:

- Reference (d), IMSBC Code.
- Carriage of Bulk Solid Materials That Require Special Handling § 148 of reference (s).

For more information regarding the NCB's responsibilities, see:

- [Chapter 7: Carriage of Grain, Section E: National Cargo Bureau Certificates.](#)
- The [National Cargo Bureau](#) website.

NOTE:

The scope of the cargo compliance portion of the PSC inspection might be reduced for vessels loaded with cargo before arriving in the U.S.

G.2. Conduct the Exam

Verify whether the vessel has a loading certificate issued by the NCB or other competent authority.

Section H: Enhanced Survey Program Documents

H.1. Enhanced Survey Program Documents

Chapter XI-2 of reference (c), SOLAS, is the parent citation for reference (ee), ESP Code: International Code on the Enhanced Programme Of Inspections During Surveys Of Bulk Carriers And Oil Tankers, IMO, (series), which makes bulk carriers subject to an enhanced program of inspection.

Chapter XII/3 of reference (c), provides the implementation schedule for reference (ee). Bulk carriers shall comply with the regulations of reference (ee), by the date of the first periodical survey after the ship reaches 15 years of age, but not later than the date the ship reaches 17 years of age.

The vessel's class society conducts the enhanced survey program during the surveys of structure, machinery and equipment of cargo ship per Chapter I, Regulation 10 or reference (c).

The ESP Code consists of two annexes, but only Annex A applies to bulk carriers, as shown in Table 3-1.

ESP Code Annex A	Description
Part A	Code on the enhanced program of inspections during surveys of bulk carriers having single-side skin construction.
Part B	Code on the enhanced program of inspections during surveys of bulk carriers having double-side skin construction.

Table 3-1 ESP Code Annex A contents

H.2. Conduct the Exam

Verify the following:

- Participation in the enhanced survey program.
 - Written language, including a translation into English.
 - Presence of supporting documents per reference (ee):
 - Survey Report File Section 6.2.
 - Supporting Documents Section 6.3.
 - Survey reports on file.
-

H.3. Expand the Exam

Expand the exam:

If	Then
The vessel has not implemented or failed to carry out its enhanced survey program per: <ul style="list-style-type: none">• Chapter XI of reference (c), SOLAS.• Reference (ff), Guidelines on the Enhanced Programme of the Inspections During Surveys of Bulk Carriers and Oil Tankers, IMO Resolution a.744 (18), 4 November 1993.	Detention is warranted per reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.

Section I: Cargo Securing Manual

I.1. Cargo Securing Manual

The cargo securing manual (CSM) details approved methods and required equipment to properly and safely secure cargo. Per Chapter VI/5.6 of reference (c), SOLAS, all cargo, other than solid and liquid bulk cargo, cargo units and cargo transport units, shall be loaded, stowed, and secured throughout the voyage per the CSM approved by the Administration.

The goal of this inspection is to verify CSM approval by the Administration. As a best practice, spot check the contents of the approved CSM. For more information, see:

- Chapter VI, Regulation 5 of reference (c).
- Reference (gg), Revised Guidelines for the Preparation of the Cargo Securing Manual, IMO MSC.1/Circ.1353/Rev.1, 15 December 2014.

I.2. Conduct the Exam

Verify the following:

- The current and approved CSM is onboard and in the working language of the crew with a translation into English, French, or Spanish.
- The CSM includes four chapters:
 - General.
 - Securing devices and arrangements.
 - Stowage and securing of non-standardized and semi-standardized cargo.
 - Stowage and securing of containers and other standardized cargo.

Determine the following:

- The master and responsible officers are familiar with the CSM.
 - The cargo is secured per the CSM.
 - Spot check lashings and fittings are consistent with the CSM and satisfactory for their intended use. Verify appropriate securing points and fittings for cargo securing.
 - There is sufficient quantity of cargo securing devices reserved onboard. Spot check the quantity of reserve cargo securing devices onboard per the CSM and verify they are in good working condition.
-

I.3. Expand the Exam

Expand the exam:

If	Then
The cargo vessel does not have an approved CSM.	Require vessel to provide a CSM before next U.S. voyage.
The vessel has dangerous goods/hazardous material cargo onboard	Evaluate vessel's securing arrangements in cases where cargo securing is found to be insufficient. Take appropriate corrective action based on circumstances before the vessel's departure.
Vessel returns to U.S. ports without CSM on subsequent voyages.	<p>Detention is warranted until the vessel's owner/operator formally establishes a reasonable timeline for submittal of a CSM to the vessel's Administration or authorized representative.</p> <p>Notify Administration or Recognized Organization that the vessel is in violation of Chapters VI/5 and VII/5 of reference (c), SOLAS.</p> <p>Prevent future cargo operations at all U.S. ports until the vessel's owner/operator provides proof that CSM requirements have been met per Chapter 4: Container Ships, Section A: Cargo Securing Manual.</p>
Cargo securing is determined insufficient based on the circumstances.	Require appropriate corrective action based on the circumstances before the vessel's departure.

Section J: Monitoring Equipment for Cargos

J.1. Monitoring Equipment for Cargos

Verify appropriate monitoring equipment is provided for the hazards associated with the carriage of dangerous goods liable to either emit a toxic or flammable gas or cause oxygen depletion per:

- Chapter VI of reference (c), SOLAS.
- Appendix I of reference (d), IMSBC Code.

J.2. Conduct the Exam

Verify the following:

- Oxygen detection equipment onboard.
- Monitoring equipment maintenance, calibration, and function.
- Proper span gas per manufacturer instructions.
- Crew properly logs equipment use and tests.
- Crew can provide detailed instruction for use of equipment.
- Crew is trained and familiar with use of monitoring equipment.

When applicable, spot check:

- Toxic and flammable gas detection equipment and log book.
- Temperature monitoring equipment and log book.

J.3. Expand the Exam

Expand the exam:

If	Then
Vessel does not have proper monitoring equipment onboard.	<p>Determine follow-up actions per Section D.2 of reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.</p> <p>For cargo that requires special considerations, see reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.</p>

Section K: Firefighting Systems

K.1. Fixed Gas Fire Extinguishing Systems

Per Chapter XI-2/10.7.2 of reference (c), SOLAS, a ship engaged in the carriage of dangerous goods in any cargo spaces shall be provided with either one of the following:

- A fixed carbon dioxide (CO₂) or inert gas fire extinguishing system in compliance with reference (hh), FSS Code: International Code for Fire Safety Systems, IMO Resolution MSC.98(73) (series).
- A fire extinguishing system, which, in the opinion of the Administration, gives equivalent protection for the cargo carried.

K.1.a. Equivalencies

Approved equivalencies must be reported by the Flag Administration to the IMO per Chapter I/5 of reference (c). Table 2 of reference (m), IMO MSC.1/Circ. 1395, lists solid bulk cargo for which a fixed gas fire extinguishing system might be ineffective. Vessels carrying these cargoes are likely to have a fire extinguishing system that provides an equivalent level of protection for the cargo spaces.

NOTE:

For PSC purposes, only a Cargo Ship Safety Equipment Certificate issued pursuant to Chapter I of reference (c), is required.

K.1.b. Exceptions

Per Chapter II-2/10.7.1.4 of reference (c), certain cargo vessels might be exempt from the fixed-gas fire extinguishing system requirements if they are constructed and solely intended for the carriage of ore, coal, grain, unseasoned timber, non-combustible cargo, or cargo that constitutes a low fire risk. Table 1 of reference (m), provides a list of low fire risk cargo. Other cargo might be deemed a low fire risk for an exemption per Chapter II-2/10.7.1.4 reference (c).

NOTE:

Typically, the Exemption Certificate is issued in conjunction with the SOLAS Safety Equipment Certificate.

COMDT (CG-ENG-5) reviews and approves all low fire risk determinations for cargo loaded in the U.S. not listed in Table 1 of reference (m).

Vessels authorized to carry low fire risk cargo without a fixed gas fire extinguishing system must have a SOLAS exemption certificate per Chapter I/12(b)(vii) of reference (c).

**K.2.
Conduct the
Exam**

Verify the following:

- Crew is familiar with operation of fire extinguishing system.
- Appropriate ventilation for the cargo carried, that is, natural or mechanical, per Chapter II-2/9.7 and 19.3.4 of reference (c), SOLAS.
- A fixed CO₂ or inert gas fire extinguishing system is installed for the cargo holds:
 - If a system is not installed, then verify a valid SOLAS exemption is onboard. If not, then see [Section K.3.: Expand the Exam](#) of this section.

If the vessel is carrying ore, grain, coal, or timber, then examine the exemption certificate to verify it meets requirements per:

- Chapter II-2/10.7 of reference (c).
- Non-combustible cargo of reference (m), IMO, MSC.1/Circ.1395, 12 June 2015.
- Cargo deemed as a low fire risk by the Administration.

K.2.a. SOLAS
Table 19.2:
Application of the
Requirements to
Different Classes
of Dangerous
Goods for Ships
and Cargo Spaces

Use [Table 3-2 SOLAS Table 19.2](#) when a vessel carries solid dangerous goods in bulk. This typically applies to bulk carriers, ore/bulk/oil or older tank ships converted to carry solid bulk:

- Use the top row to identify specific classes of dangerous goods, that is, 4.1, 4.2, 4.3, 5.1, etc..
- When a ship carries one of these classes, follow down that column to determine the regulations necessary to carry those specific cargo per Chapter II-2, Regulation 19 of reference (c).

NOTE:

[Table 3-2 SOLAS Table 19.2](#) mentions reference (ii), Explosive Atmospheres, Part 0: Equipment – General Requirements, International Electrotechnical Commission (IEC), IEC 60079 (series).

Class		4.1	4.2	4.3 ⁶	5.1	6.1	8	9
Regulation 19								
.3.1.1	Firemain Supply (Permanent Pressurization or remote start)	X	X	–	X	–	–	X
.3.1.2	4- fire nozzles coverage or equivalent means	X	X	–	X	–	–	X
.3.2	Electrical Equipment – Source Ignition	X	X ⁷	X	X ⁸	–	–	X ⁸
.3.4.1	Ventilation 6 air changes	–	X ⁷	X	–	–	–	–
.3.4.2	Ventilation Fan requirements	X ⁹	X ⁷	X	X ^{7,9}	–	–	– X ^{7,9}
.3.4.3	Natural Ventilation	X	X	X	X	X	X	X
.3.6	Personnel Protection meeting IMDG and IMSBC requirements for individual substances	X	X	X	X	X	X	X
.3.8	Insulation Machinery space boundaries	X	X	X	X ⁷	–	–	X ¹⁰

Notes:

⁶ The hazards of substances in this class which may be carried in bulk are such that special consideration shall be given by the Administration to the construction and equipment of the ship involved in addition to meeting the requirements enumerated in this table.

⁷ Only applicable to Seedcake containing solvent extractions, to Ammonium nitrate and to Ammonium nitrate fertilizers.

⁸ Only applicable to Ammonium nitrate and to Ammonium nitrate fertilizers. However, a degree of protection per standards contained in the International Electrotechnical Commission publication 60079, Electrical apparatus for explosive gas atmospheres, is sufficient.

⁹ Only suitable wire mesh guards are required.

¹⁰ The requirements of the IMSBC Code, as amended, are sufficient.

Table 3-2 SOLAS Table 19.2

K.3. Expand the Exam

Expand the exam:

If	Then
<p>The vessel has a SOLAS exemption for the cargo hold fixed firefighting system, but reference (m), IMO MSC.1/Circ. 1395 does not list the cargo.</p> <p>A SOLAS exemption certificate is not onboard as required.</p> <p>The COTP is unsure whether the cargo is noncombustible or constitutes a low fire risk.</p>	<p>Determine follow-up actions per Section D.2 of reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.</p> <p>For cargo that requires special considerations, see reference (z), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.</p>

Section L: PPE for Dangerous Goods

**L.1. Personnel
Protective
Equipment**

Verify the presence of PPE. Appropriate PPE for the hazards associated with the carriage of dangerous goods is required onboard per:

- Chapter II-2 of reference (c), SOLAS.
- Reference (hh), FSS Code: International Code for Fire Safety Systems, IMO Resolution MSC.98(73), (series).

**L.2. Conduct the
Exam**

Verify the following:

- Four sets of protective clothing resistant to chemical attack in addition to at least two fire fighter outfits.
- At least two additional self-contained breathing apparatuses (SCBAs) with two spare charges for each apparatus or the means for fully recharging the air cylinders.

**L.3. Expand the
Exam**

Expand the exam:

If	Then
Vessel does not have proper PPE onboard.	Determine follow-up actions per Section D.2 of reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017. For cargo that requires special considerations, see reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.

Section M: Emergency Response and Medical First Aid

M.1. Emergency Response and Medical First Aid

Ships carrying dangerous goods in solid form in bulk must have instructions on emergency response and medical first aid relevant to incidents involving dangerous goods in solid form in bulk per Chapter VII, Part A-1/7-1 of reference (c), SOLAS.

Advice for diagnosis and treatment of chemical poisoning within the limits of the facilities available onboard ship is available in reference (u), Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), Chemicals Supplement to the International Medical Guide for Ships (IMGS) IMO, 1994.

M.2. Conduct the Exam

Verify the presence of emergency response and medical first aid information for cargo per Chapter VII, Part A-1/7-1 of reference (c).

M.3. Expand the Exam

Expand the exam:

If	Then
<p>The crew has inadequate information regarding emergency response and medical first aid.</p>	<p>Review vessel Safety Management System (SMS) emergency preparedness procedures.</p> <p>Determine follow-up actions per Section D.2 of reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.</p> <p>For cargo that requires special considerations, see reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.</p>

Section N: Crew Training Documents for Dangerous Goods

N.1. Crew Training Documents

The goal of this exam is to verify that:

- Crewmembers responsible for supervising or handling dangerous cargo have received proper training to conduct their duties.
- Crew training is appropriate to the types of cargo the ship is authorized to carry.

Reference (1), STCW, applies to crewmembers with responsibilities for cargo handling and stowage. Table 3-2 identifies and describes Standards of Training, Certification and Watchkeeping (STCW) content relevant to FFV exams.

STCW Table/Name	Description/Notes
Table A-II/2: Specification of minimum standard of competence for masters and chief mates on ships of 500 gross tonnage or more	Lists specific competence requirements for cargo handling, stowage, and the carriage of dangerous goods, including the IMSBC Code and the IMDG Code.
Table A-II/3: Specification of minimum standard of competence for officers in charge of a navigational watch and for masters on ships of less than 500 gross tonnage engaged on near-coastal voyages	Part of a mariner's certification under STCW and might not include independent documentation. A license is proof that a mariner meets the STCW requirements for training related to the carriage of dangerous goods.
Table A-11/5: Specification of minimum standards of competence of ratings as able seafarer deck.	Basic knowledge of and precautions to observe in connection with particular types of cargo.

Table 3-3 STCW content relevant to FFV exams

In addition to STCW requirements, solid bulk cargo transfers must be supervised by a responsible person designated by the master of the ship per Supervision of Cargo Transfer § 48.80 of reference (s), Shipping, 46 CFR.

NOTE:

Except for transportation in bulk packagings, the bulk carriage of hazardous materials by water is governed by Chapter I, Coast Guard, Department of Homeland Security, subchapters D, I, N and O of reference (s).

N.2. Conduct the Exam

Examine training documentation including:

- STCW endorsements at the management or operational level, depending upon the crewmember’s role on the vessel.
- Documented assignment of officers responsible for cargo supervision.

N.3. Expand the Exam

Expand the exam:

If	Then
<p>STCW documentation is missing.</p>	<p>Verify sufficient number of trained officers and able-bodied seafarers to perform cargo supervision duties and their ability to stand watch per reference (I), STCW.</p> <p>Locate management and operational competencies for cargo handling and stowage in reference (I):</p> <ul style="list-style-type: none"> • Table A-II/2, Specification of Minimum Standard of Competence for Masters and Chief Mates on Ships of 500 Gross Tonnage or More. • Table A-II/3, Specification of Minimum Standard of Competence for Officers in Charge of a Navigational Watch and for Masters on Ships of Less Than 500 Gross Tonnage Engaged on Near-coastal Waters. • Table A-II/5, Specification of Minimum Standards of Competence of Ratings as Able Seafarer Deck. <p>Verify ship’s policy/procedures for dangerous goods training.</p>

Section O: Deck Walk

O.1. Deck Walk Examine a vessel to the extent necessary to determine whether it is in substantial compliance with applicable international conventions. For guidance and examples, see reference (jj), Guidance for Checking the Structure of Bulk Carriers, IMO MSC/Circ.1117, 24, June 2004.

NOTE:

Vessel type and service influence the conduct of a deck walk. For example, a major focus on a bulk carrier with numerous cargo holds might involve scanning hundreds of dogs/hatch securing devices to verify substantial compliance.

As a best practice, review:

- Vessel-type particulars and past MISLE data before attending the vessel.
- The ship's fire control plan before the deck walk to become familiar with the overall vessel layout.
- The survey report file required onboard after the vessel has completed the renewal surveys per reference (ee), ESP Code: International Code on the Enhanced Programme Of Inspections During Surveys Of Bulk Carriers And Oil Tankers, IMO, (series). The survey report file consists of:
 - Structural survey reports.
 - Condition evaluation report.
 - Thickness measurements reports per reference (ee).
- Any outstanding conditions of class for known damage.

O.2. Conduct the Exam

Examine the following:

- Hydraulic lines and rams.
- Gantry crane.
- Fire station accessibility.
- Gaskets and knife edges on cargo holds.
- Cargo hold dogs and securing devices.
- Watertight and weathertight closures.

- Guardrails.
- Deck plating.
- Scuppers and freeing ports.
- Containment.
- Condition of ladder ways, guardrails, fire mains, piping, hatch covers and watertight/weathertight closures.

NOTE:

For further reading, see Hatch Cover Maintenance and Operation: A Guide to Good Practice by David Byrne, North of England P&I Association Limited, 1998 and A Masters Guide to: Hatch Cover Maintenance by the Noord Nederlandsche P&I Club.

O.3. Expand the Exam

Expand the exam:

If	Then
A portion of deck guardrail is missing.	See Protection of the Crew, Regulation 25 of reference (kk), Load Lines, 1966/1988 - International Convention on Load Lines, 1966, as Amended by the Protocol of 1988, Lloyd's Register Rulefinder 2005 - Version 9.4.
An access opening or weathertight door is missing gaskets.	See Doors, Regulation 12 of reference (kk).
Equipment is absent, damaged, deteriorated, improperly installed, or inoperable. The structure is damaged or deteriorated.	Examine similar equipment. For example, if a hatch-securing device is absent/deteriorated, then examine all hatch-securing devices in the surrounding area and spot check in other locations. Check SMS procedures for shipboard operations and maintenance of ship and equipment. Determine follow-up actions per Section D.2 of reference (h), MSM Vol II, and reference (i) Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.
Hatch cover component and coaming, gasket, wastage, knife edge, or fracture identified.	Verify condition of additional hatch cover(s) and components, if possible. Expand into administrative documents per reference (II), Port State Control Guidelines for the Enforcement of Management for the Safe Operation of Ships (ISM Code), COMDTPUB P 16700.4, NVIC 04-05: <ul style="list-style-type: none"> • Requisitions. • Corrective/preventative action reports.

Section P: Structural Integrity

P.1. Structural Integrity

Examine vessel structural integrity and look for cracks and corrosion on deck and around the cargo holds per reference (jj), Guidance for Checking the Structure of Bulk Carriers, IMO MSC-Circ.1117, 24 June 2004.

Figure 3-1 provides examples of typical issues to examine. Also see [Figure 3-2 Typical cross section of bulk carrier through cargo hold](#) and [Figure 3-3 Structural integrity issues on a bulk carrier deck](#).

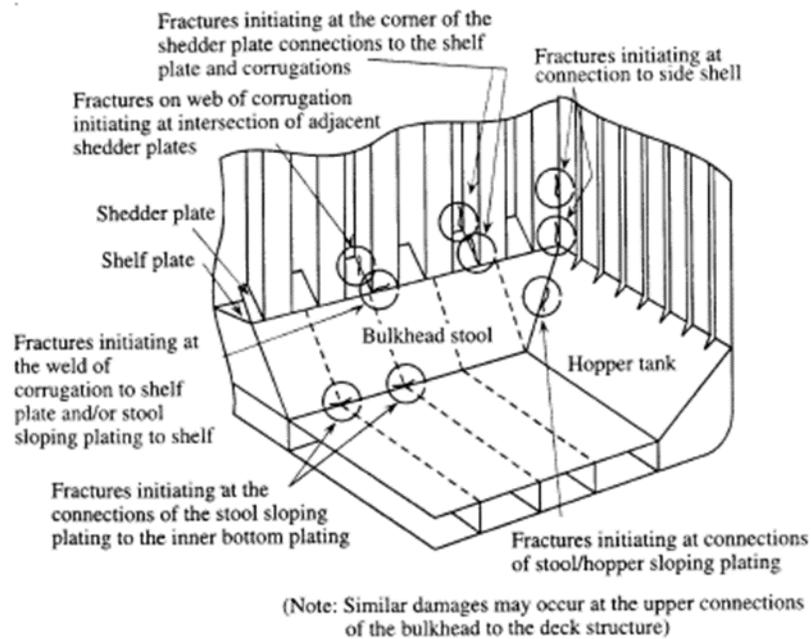
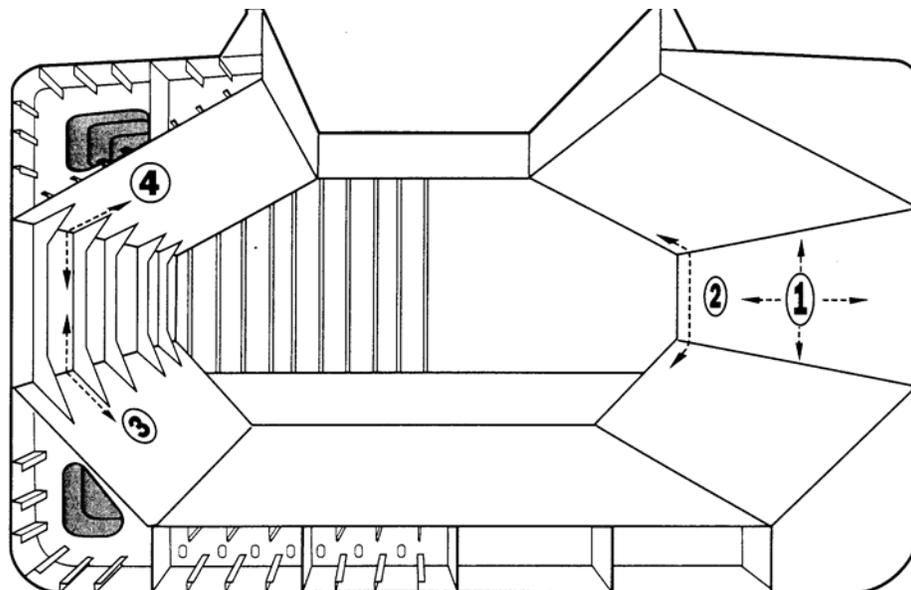


Figure 3-1 Typical fracturing at the connection of a transverse bulkhead structure



No.	Where to Look	What to Look for
1	Side shell plating.	Cracks in welds or plates. Leaks in welds or plates. Distortion of plating.
2	Connection of bulkhead plating to side shell.	Punctured plating. Buckled plating. Cracked plating. Heavily indented plating. Corrosion and wastage.
3	Connection of side shell frames and end brackets to the shell plating and hopper side tank plating by close-up inspection.	Cracks. Corrosion and wastage. Excessively deformed frames or brackets. Detached frames or brackets.
4	Connection of side shell frames and end brackets to the shell plating and topside tank plating.	Cracks. Corrosion and wastage. Excessively deformed frames or brackets. Detached frames or brackets.

Figure 3-2 Typical cross section of bulk carrier through cargo hold

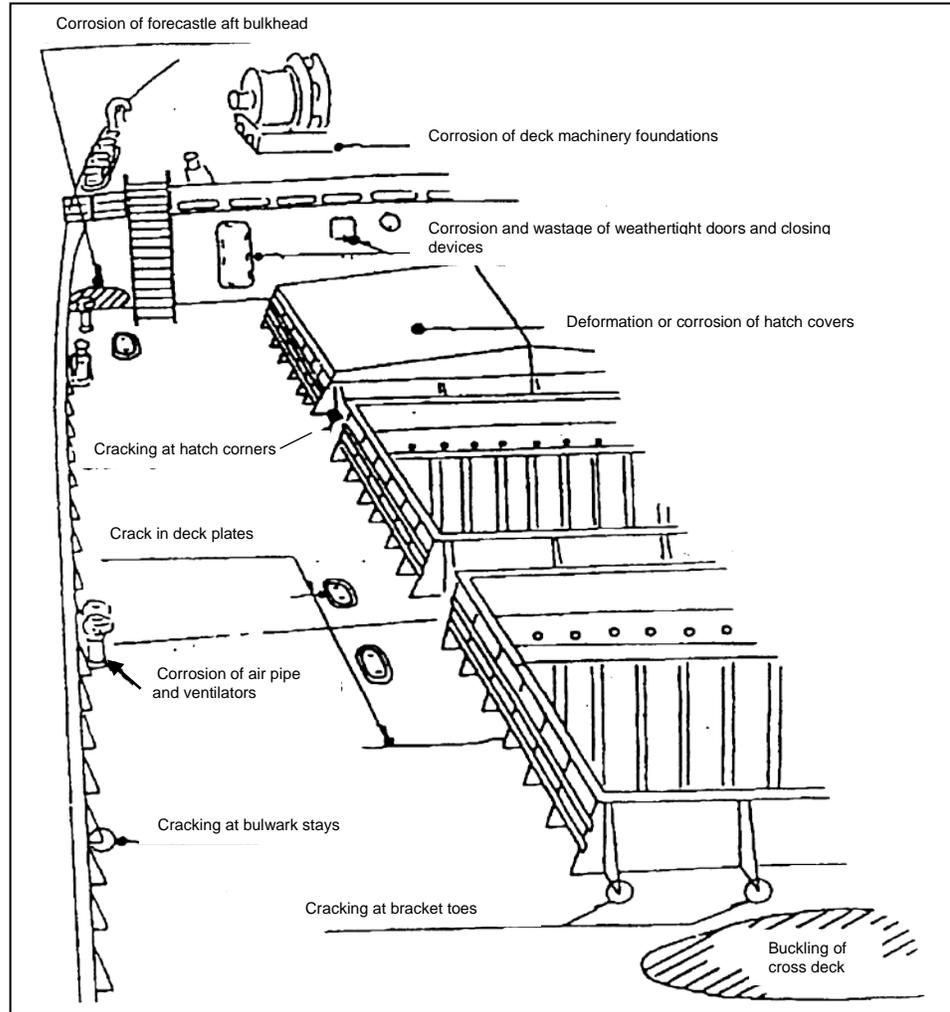


Figure 3-3 Structural integrity issues on a bulk carrier deck

P.2. Conduct the Exam

Examine the following:

- Hull maintenance and general condition on deck.
- Areas of high stress and bending moments.
- Areas where fracturing, cracks, distortion or excessive wastage commonly occur, including visible cargo hold internals.
- Hull strength and integrity.

P.3. Expand the Exam

Expand the exam:

If	Then
<p>There is a structural integrity issue, for example, mid-body and damage to cargo holds identified.</p>	<p>Verify compliance with the enhanced survey program. See Section H: Enhanced Survey Program Documents in this chapter.</p> <p>Check:</p> <ul style="list-style-type: none"> • SMS procedures for maintenance of shipping equipment. • The same area on the opposite of the space or vessel for transference damage. <p>Determine follow-up actions per reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.</p>

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Chapter 4: Container Ships

Introduction

This chapter provides practices to conduct FFV exams aboard container ships. For more information on container ships carrying packaged dangerous goods, see [Chapter 6: Packaged Dangerous Goods](#). For descriptive information, see [Appendix B: Characteristics of Vessel Types, Section B.3.: Container Ships](#).

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Cargo Securing Manual	4-2
B	Loading Instrument and Loading Instrument Manual	4-4
C	Cargo Systems – Intermodal Containers	4-6
D	Firefighting Systems	4-8
E	Deck Walk	4-9
F	Structural Integrity Examination	4-11

Section A: Cargo Securing Manual

A.1. Cargo Securing Manual

The CSM provides information about equipment available to adequately stow and secure cargo as well as its proper use. Per Chapter VI/5.6 of reference (c), SOLAS, all cargo, other than solid and liquid bulk cargo, cargo units and cargo transport units, shall be loaded, stowed, and secured throughout the voyage per the CSM approved by the Administration.

The goal of this exam is to verify CSM approval by the Administration. As a best practice, spot check the contents of the approved CSM. For more information, see:

- Chapter VI, Regulation 5 of reference (c).
- Reference (gg), Revised Guidelines for the Preparation of the Cargo Securing Manual, IMO MSC.1/Circ.1353/Rev.1, 15 December 2014.

A.2. Conduct the Exam

Examine the following:

- CSM approved by the Administration.
- Format per reference (gg).
- Working languages.
- Securing procedures for current cargo:
 - Manual identifies securing mechanism, lashing gear, and tier height arrangements.
 - Deck, cargo hatch covers and their gaskets, and cell guides in holds.
 - Securing arrangements for vessels with dangerous goods/hazardous materials cargos onboard. For more information, see [Chapter 6: Packaged Dangerous Goods](#).

NOTE:

As a best practice, seek assistance and support from qualified USCG personnel to address various issues. For example, consult facility inspectors and explosive handling supervisors when dealing with issues regarding dangerous cargo in packaged form and the IMDG Code onboard a freight ship.

A.3. Expand the Exam

Expand the exam:

If	Then
Containers not secured per the CSM.	Verify CSM procedures approved by the Administration. Spot check additional containers.
HAZMAT container is leaking or damaged.	Evacuate area of all personnel. Verify: <ul style="list-style-type: none"> • The DCM. • Safety data sheet. • CSM procedures. Contact sector command, incident command division, or other applicable personnel to address the leaking/damaged container. Consult relevant stakeholders, for example, the NCB.
Non-placard container is leaking or damaged. HAZMAT is found.	Assume container contains HAZMAT: <ul style="list-style-type: none"> • If leaking, evacuate area of all personnel. • Verify contents via shipping papers. • Verify safety data sheet. Contact sector command, incident command division, or other applicable personnel to address the leaking/damaged container. Consult relevant stakeholders, for example, the NCB.

Section B: Loading Instrument and Loading Instrument Manual

B.1. Loading Instrument and Loading Instrument Manual

Vessels employ a loading instrument to obtain information on hull girder shear forces and bending moments. On container vessels, the loading instrument must account for the stowage requirements for dangerous goods per:

- Reference (e), IMDG Code.
- Reference (n), Shipping, 46 CFR.

The goal of this exam is to:

- Observe and assess vessel operation and crewmembers' competency.
- Check the stowage of dangerous goods using the loading instrument and comparing to the stowage on deck.

NOTE:

The loading instrument might be either an analog or a digital device.

B.2. Conduct the Exam

Examine the following:

- Loading instrument manual contents.
- Written language.
- Loading or unloading plan agreement with terminal.
- Vessel's stowage plan.
- Operation to evaluate crew competence, not the operational aspects of the system.

Verify gross mass of units being loaded are entered into the loading computer per the shipping document and Chapter VI of reference (c), SOLAS.

B.3. Expand the Exam

Expand the exam:

If	Then
<p>The loading manual is unapproved, the wrong version, or not ship-specific.</p> <p>The loading instrument computer is inoperable.</p>	<p>Determine the approved method of loading per Section B.1.: Loading Instrument and Loading Instrument Manual in this Chapter.</p> <p>Verify how practice differs from the approved method.</p> <p>Review SMS procedures for key shipboard operations and corrective actions taken.</p>
<p>The loading instrument computer either documents data incorrectly or miscalculates data.</p>	<p>Issue a Code 17 deficiency on U.S. Coast Guard Port State Control Report of Inspection – Form B, Form CG-5437B. This code documents a deficiency for the vessel to rectify before departure.</p> <p>Consider restricting cargo operations until the crew enters correct gross mass data into the computer.</p> <p>Review SMS procedures for key shipboard operations.</p>

Section C: Cargo Systems – Intermodal Containers

C.1. Cargo Systems Intermodal Containers

Container ships pose a particular hazard due to the amount and type of cargo being transported. As the vessels grow in size, some carry more than 10,000 20-foot equivalent units. The 20-foot equivalent unit is an inexact unit used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long or 6.1 meter intermodal container. The common heights for intermodal containers are:

- 8 feet, 6 inches, or 2.6 meters.
- 9 feet, 6 inches, or 2.9 meters.

For more information, see [Figure B-11 Container ship diagram](#).

NOTE:

Pay attention to the types of containers onboard ships as well as the condition and proper stowage. The extreme weight, coupled with vessel movement, requires the structural integrity of the containers onboard to be sound. See Figure 4-1.



Figure 4-1 Vessels before and after structural integrity collapse

C.2. Preparing for the Exam

Before examining the containers' structural integrity:

- Examine the DOC, DCM, and stowage plan for information regarding the location and proper stowage of dangerous cargo onboard. As a best practice, use the loading instrument to locate specific containers.
- Compare the stowage plan and DOC for dangerous goods to ensure the chosen containers are stored in the correct locations above and below deck.
- Compare the stowage plan to the actual location of chosen containers.

- Ensure crewmembers escorting USCG members about the deck area have made the proper notifications..
- Ensure the vessel's PPE is in working condition and properly operational.

C.3. Conduct the Exam

Conduct a visual inspection of random containers per:

- Reference (mm), National Container Inspection Program, COMDTINST M16616.11 (series)..
- Reference (nn), National Container Inspection Program (NCIP) Tactics, Techniques, and Procedures (TTP), CGTTP 3-72.3 (series).
- Reference (oo), CSS Code: Code of Safe Practice for Cargo Stowage and Securing, IMO, (series).

NOTE:

Pay attention to the main framework and cargo securing equipment and ensure placards for containers carrying dangerous goods are placed correctly. Figure 4-2 shows a typical example.

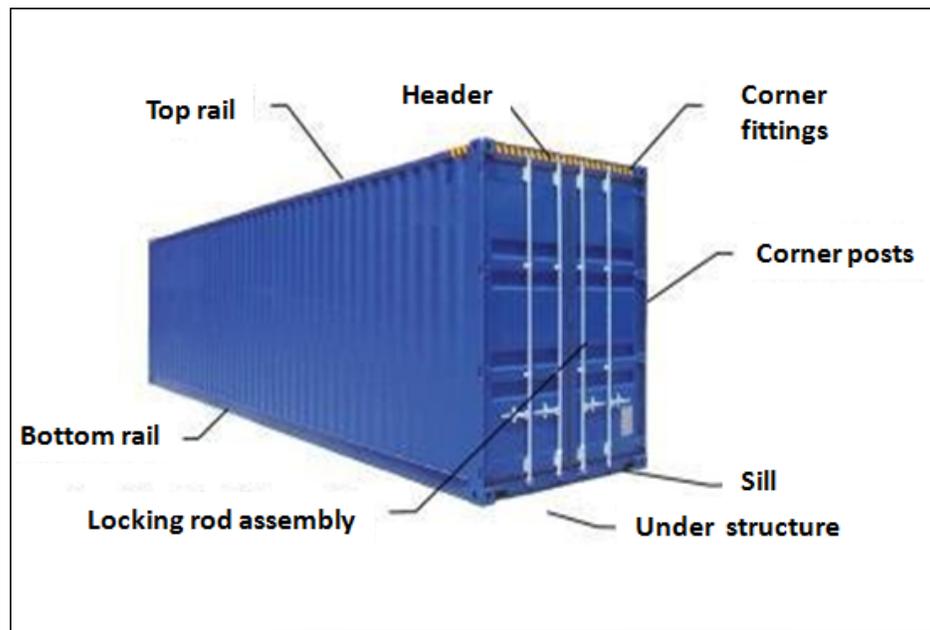


Figure 4-2 Typical cargo securing equipment

Section D: Firefighting Systems

D.1. Container Vessel Firefighting Systems

Ensure container ships moving dangerous goods comply with firefighting requirements per reference (c), SOLAS:

- Firefighting for ships constructed on or after 1 January 2016 designed to carry containers on or above the weather deck, Regulation 10.7.3 of Chapter II-2.
- Carriage of Dangerous Goods, Regulation 19 of Chapter II-2.

For more information, see [Chapter 6: Packaged Dangerous Goods](#), [Section G: Fire Safety Requirements for Cargo Spaces](#).

NOTE:

Container ships not carrying dangerous goods are subject to applicable firefighting requirements in Chapter II-2 of reference (c).

Section E: Deck Walk

E.1. Deck Walk Conduct a deck walk to evaluate various aspects of a vessel's structure. Observe safety precautions per:

- Reference (h), MSM Volume II.
- Reference (o), Marine Safety Manual Volume I, Administration and Management, COMDTINST 16000.6 (series).

NOTE:

Be aware of safety hazards associated with containerized cargo and the vessel's design while conducting the deck walk.

E.2. Conduct the Exam Examine the material condition including vulnerabilities of the following:

- Watertight/weathertight doors.
 - Fire control plan.
 - Deck structure.
 - Rails and bulwarks.
 - Pilot ladder.
 - Anchor and windlass.
 - Fire main and fire hose stations.
 - Ring buoys/lights.
 - Life rafts.
 - Paint locker.
 - Shipboard oil pollution emergency plan locker.
 - Pollution prevention equipment.
 - Container lashings.
 - Hazardous cargo markings.
 - Hatch covers onboard the vessel and on the dock.
 - Cell guide damage.
 - Underdeck passages as applicable.
-

E.3. Expand the Exam

Expand the exam:

If	Then
Equipment is absent, damaged, deteriorated, improperly installed, or inoperable.	Examine similar equipment. For example, if a hatch-securing device is absent/deteriorated, then examine all hatch-securing devices in the surrounding area and spot check in other locations.
The structure is damaged or deteriorated.	Check SMS procedures for shipboard operations and maintenance of ship and equipment. Determine follow-up actions per Section D.2 of reference (h), MSM Vol II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.

Section F: Structural Integrity Examination

F.1. Structural Integrity Examination

Multiple forces act upon a ship transiting through the water. Figure 4-3 shows a worst case scenario. Factors that influence a vessel's structural integrity include:

- The weight of the empty ship, for example, light ship weight.
- Weight/volume distribution of cargo, fuel, and ballast.
- The movement of the ship in a sea state.
- Vibrations from propellers and engines.
- Forces caused by docking, towing, and collisions.
- Dry-docking loads.
- The flexing forces of hogging and sagging, for example, vessel torsion and bowing in severe weather.

As a best practice, become familiar with [International Association of Classification Societies](#) standards regarding critical structure areas and definitions.



Figure 4-3 Vessel before and after structural failure

F.1.a. Effects of Ship Flex

All ships flex differently and have varied flex threshold limits. Figure 4-4 shows how torsion loads can cause considerably high stress levels on the hull, shown in the red circle. Permanent deformation can result when a ship surpasses its structural limits.

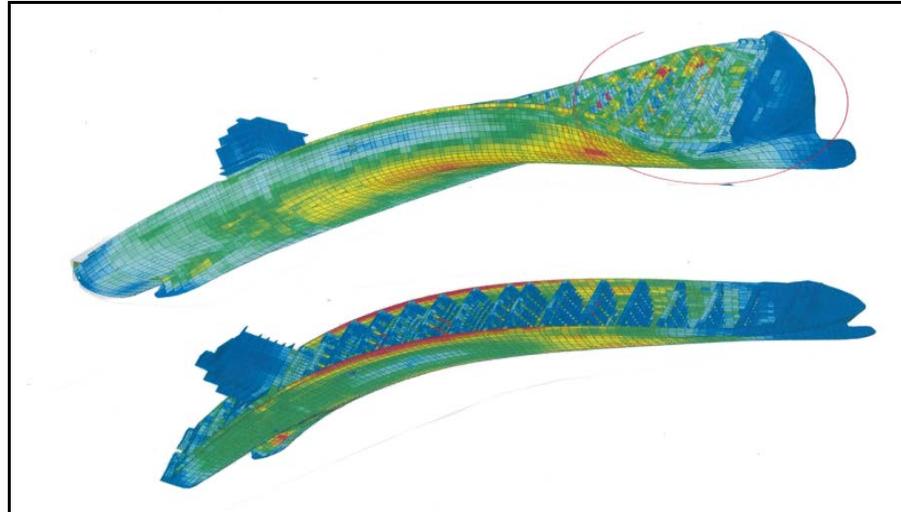


Figure 4-4 Torsion and flex effects on a container vessel

F.1.b. Mid-ship, Half Length Stress

The mid-ship region can be adversely affected by a variety of forces/stresses, for example, sheer, torsion, and loading. The mid-ship, half-length shown in Figure 4-5 is the area of a vessel, reflecting the mid-range portion of the vessel, and transgressing outward, that is, forward/aft, a one-quarter length in each direction. Pay attention to this region for signs of structural failure when conducting a deck walk.



Figure 4-5 Mid-ship, half length

**F.2.
Conduct the
Exam**

Examine the following for possible deficiencies:

- Survey reports on file.
- Hull maintenance and general state on deck.
- Areas of high stress and bending moments.
- Areas where fracturing, cracks, distortion or excessive wastage commonly occur including visible cargo hold internals.
- Condition of ladder ways, guardrails, fire mains, piping, hatch covers, and watertight/weathertight closures.
- Hull strength and integrity.

**F.3. Expand the
Exam**

Expand the exam:

If	Then
A portion of the deck guard rail is missing.	See Protection of the Crew, Regulation 25 of reference (kk), Load Lines, 1966/1988 - International Convention on Load Lines, 1966, as Amended by the Protocol of 1988, Lloyd's Register Rulefinder 2005 - Version 9.4.
An access opening or weathertight door is missing gaskets.	See Doors, Regulation 12 of reference (kk).
Equipment is absent, damaged, deteriorated, improperly installed, or inoperable.	Examine similar equipment. For example, if a hatch-securing device is absent/deteriorated, then examine all hatch-securing devices in the surrounding area and spot check in other locations.
The structure is damaged or deteriorated.	Check SMS procedures for shipboard operations and maintenance of ship and equipment. Determine follow-up actions per Section D.2 of reference (h), MSM Vol II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.

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Chapter 5: Roll-on/Roll-off Ships

Introduction

This chapter provides practices to conduct FFV exams aboard RO/RO ships. For more information on RO/RO vessels carrying packaged dangerous goods, see [Chapter 6: Packaged Dangerous Goods](#). See [Appendix B: Characteristics of Vessel Types, Section B.4.: Roll-on/Roll-off \(RO/RO\) Ships](#) for descriptive information.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Cargo Securing Manual	5-2
B	Firefighting Systems	5-4
C	Cargo Ventilation System	5-8
D	RO/RO Vessel Deck Walk	5-9

Section A: Cargo Securing Manual

A.1. Cargo Securing Manual

The CSM provides information about equipment available to adequately stow and secure cargo as well as its proper use. Per Chapter VI/5.6 of reference (c), SOLAS, all cargo, other than solid and liquid bulk cargo, cargo units and cargo transport units, shall be loaded, stowed, and secured throughout the voyage per the CSM approved by the Administration.

The goal of this exam is to verify CSM approval by the Administration. As a best practice, spot check the contents of the approved CSM. For more information, see:

- Chapter VI, Regulation 5 of reference (c).
- Reference (gg), Revised Guidelines for the Preparation of the Cargo Securing Manual, IMO MSC.1/Circ.1353/Rev.1, 15 December 2014.

A.2. Conduct the Exam

Verify the following:

- The current and approved CSM is onboard and in the working language of the crew plus a translation into English, French, or Spanish.
- The CSM contents include the following four chapters:
 - General.
 - Securing devices and arrangements.
 - Stowage and securing of non-standardized and semi-standardized cargo.
 - Stowage and securing of containers and other standardized cargo.

Determine the following:

- The master and the responsible officers are familiar with the CSM and the cargo is secured per the CSM.
 - Spot check lashings and fittings are consistent with the CSM and satisfactory for their intended use. Appropriate securing points and fittings are used for cargo securing.
 - There is sufficient quantity of cargo securing devices reserved onboard. Spot check the quantity of reserve cargo securing devices onboard per the CSM and verify they are in good working condition.
-

A.3. Expand the Exam

Expand the exam:

If	Then
RO/RO vessel does not have an approved CSM.	Require vessel to provide a CSM before next U.S. voyage after sailing foreign.
RO/RO vessel returns to U.S. ports without CSM on subsequent voyages.	<p>Detention is warranted until the vessel's owner or operator formally establishes a reasonable timeline for submittal of a CSM to the vessel's Administration or authorized representative.</p> <p>Notify Administration or Recognized Organization that the vessel is in violation of Chapters VI/5 and VII/5 of reference (c), SOLAS.</p> <p>Prevent future cargo operations at all U.S. ports until the vessel owner/operator provides proof of CSM requirement.</p>
Cargo securing is insufficient.	Require appropriate corrective action based on the circumstances before the vessel's departure.

Section B: Firefighting Systems

B.1. Introduction Examine firefighting systems to verify if they are suitable for the intended space per:

- Chapter II-2 of reference (c), SOLAS.
- Reference (hh), FSS Code: International Code for Fire Safety Systems, IMO Resolution MSC.98(73) (series).

The following sections provide procedures to inspect different firefighting systems.

B.2. Fixed Fire Detection and Fire Alarm Systems

Verify randomly selected smoke detectors in high-risk areas to ensure they are operational:

- Fire panel indicator light at the control station, e.g. bridge, engine room control.
- Fire control panel is properly labeled and operational, e.g. alarms are not in a fault status.

NOTE:

RO/RO space fire detectors might be disconnected during on- and off-loading. When detectors are disconnected, ensure the spaces are manned or provided with a fire patrol per references (c) and (hh).

B.3. Space Sealing Capabilities

Verify the following:

- System is approved by Administration.
 - Servicing reports are available and up to date.
 - Manufacturer instructions are available and the crew understands them.
 - System piping is intact and there is no corrosion around piping system.
 - Tank holding agent is not leaking or showing signs of possible leakage.
 - Ventilation is operational.
-

**B.4.
Low-pressure,
CO₂ Fixed
Firefighting
System**

Verify the following:

- Servicing reports and maintenance logs are up to date.
- Manufacturer operation instructions are available and understood by the crew.
- Level of CO₂ in the tank.
- Refrigeration is operational and at proper temperature. Compressor is operational, e.g. not locked out or tagged out.
- Ventilation within the space is functioning.

WARNING:

Spaces containing low-pressure CO₂ systems present potential hazards including compromised atmosphere, CO₂ refrigerant leaks, and frostbite. Ensure spaces containing low-pressure CO₂ are well ventilated prior to entry.

**B.5. Portable Fire
Extinguishers**

Examine the following:

- During walkthrough, spot check location of fire extinguishers per the vessel's fire control plan.
- Condition of extinguishers, e.g. corrosion, hose condition, charge gauge indicator, horn not cracked.
- Extinguishers are secured and not laying on the deck.
- Servicing report and maintenance logs are up to date.

NOTE:

In addition to the portable fire extinguishers, verify at least three water fog applicators and one portable foam applicator are provided in spaces intended for the carriage of motor vehicles with fuel in their tanks.

**B.6. Fixed-foam
Extinguishing
Systems**

Examine the following:

- Piping and components for physical damage and corrosion.
- Foam analysis report, if provided, for foam's suitability for continued use.

Verify the following:

- Tank foam level complies with the manufacturer's operating manual.
 - Operating instructions are posted and legible.
-

**B.7.
Fixed-pressure,
Water-spraying
Fire
Extinguishing
Systems**

Verify the following:

- Fixed-pressure, water-spraying fire extinguishing systems comply with reference (hh), FSS Code: International Code for Fire Safety Systems, IMO Resolution MSC.98(73), (series).
 - Fixed-pressure, water-spraying and water mist fire extinguishing systems for machinery spaces are approved by the Administration, based on the guidelines developed by the Organization.
 - Fixed water-based firefighting systems for RO/RO spaces, vehicle spaces, and special category spaces are approved by the Administration, based on the guidelines developed by the Organization.
-

B.8. Expand the Exam

Expand the exam:

If	Then
Low-pressure CO ₂ is not serviced.	Identify servicing and inspection intervals for: <ul style="list-style-type: none"> • SMS maintenance. • Administration servicing and inspection intervals.
Low-pressure CO ₂ not operating within system parameters.	Verify: <ul style="list-style-type: none"> • Servicing records. • Certificates of last inspection. • Manufacturer or regulatory parameters. • Other firefighting systems.
There are deluge system issues, for example, damaged pipe line/ nozzle, or inadequate drainage.	Verify: <ul style="list-style-type: none"> • Additional deck zones for similar issues. • Servicing records. • Testing. • Last inspection. • Certificates.
Cargo deck power ventilation is inoperable.	Verify required air changes per the ventilation plan.
Fire dampers do not open and close properly.	Verify condition of fire dampers. Test additional dampers.
The crew does not understand instructions for the fixed system.	Check: <ul style="list-style-type: none"> • Vessel maintenance and inspection procedures per Chapter II-2, 14.2.2 of reference (c), SOLAS. • System performance expectations per reference (hh), FSS Code: International Code for Fire Safety Systems, IMO Resolution MSC.98(73), (series). • The vessel's SMS for emergency preparedness and training.
The firefighting systems were not serviced per Administration standards. The fixed foam system's analysis was not performed per reference (hh).	Review the vessel's SMS for maintenance of the ship and equipment. Engage with vessel's classification society and consider appropriate control actions for non-compliance.
The water-based fire extinguishing system displays signs of leakage.	Consult system technical manual. Verify Administration standards. Verify situation poses a risk to firefighting capabilities. Engage with vessel's classification society and consider appropriate control actions for non-compliance.

Section C: Cargo Ventilation System

C.1. Cargo Ventilation System

Per Chapter V, Regulation 19 of reference (c), SOLAS:

- Examine the proper evacuation of accumulated fumes and vapors aboard a RO/RO vessel.
- Verify adequate power ventilation in enclosed spaces.

C.2. Conduct the Exam

Verify the following:

- Ventilation is separated from other systems/ducts and can be sealed. Separation of ventilation system/ducts is conducted during new construction and verified by class society.
 - Ventilation is on and operating while cargo is onboard and or being transported throughout the cargo decks.
 - System controls are located outside the space. Ventilation shutdowns are normally located on or near the bridge/engine room control stations.
 - Means for rapid shutdown and effective closure of the ventilation system from outside of the space in case of fire, taking into account the weather and sea conditions.
 - Presence of one or more portable combustible gas detecting instruments onboard.
 - Loss of operation indicator.
 - Indication light panel showing any loss of the required ventilating capacity on the navigation bridge.
-

Section D: RO/RO Vessel Deck Walk

D.1. RO/RO Vessel Deck Walk RO/RO vessels pose a unique situation where examiners routinely enter cargo hold spaces.

NOTE: **Pay attention to moving vehicles on deck, particularly during cargo operations.**

D.2. Conduct the Exam Examine the top weather deck and spot check the tween decks. Examine the following:

- Watertight and weather tight closures.
- Ramp doors.
- Gaskets and knife edges on cargo holds.
- Portable and fixed firefighting.
- Drains on tween decks.
- Ventilation ducts and closures.
- Cargo securing.

D.3. Expand the Exam Expand the exam:

If	Then
Vehicle tie-down straps are not adequately secure.	Check CSM for recommended strap placement and location.
Equipment is absent, damaged, deteriorated, improperly installed, or inoperable. Structure is damaged, deteriorated, or improperly installed.	Examine similar equipment, for example, if a ramp-securing device is absent/deteriorated, then examine all ramp securing devices in the surrounding area and spot check in other locations. Check SMS procedures for shipboard operations and maintenance of ship and equipment. Determine follow-up actions per Section D.2 of reference (h), MSM Vol II, and reference (i) Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.

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Chapter 6: Packaged Dangerous Goods

Introduction

This chapter provides best practices when conducting FFV exams on vessels carrying packaged dangerous goods.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Special Requirements for the Carriage of Dangerous Goods	6-2
B	Crew Training Required	6-11
C	Emergency Response and Medical First Aid	6-12
D	Cargo Segregation	6-13
E	Cargo Spaces	6-15
F	Ventilation Arrangement	6-17
G	Fire Safety Requirements for Cargo Spaces	6-18

Section A: Special Requirements for the Carriage of Dangerous Goods

A.1. Introduction Dangerous goods can range from explosives, flammable liquids, oxidizing substances to infectious substances. Dangerous goods are present in both the packaged and bulk form of shipments.

Figure 6-1 shows how Federal regulations itemize and characterize hazardous materials. The symbols in this figure align with the data in [Table 2-10 Packaged hazardous cargo classes](#).



Figure 6-1 Hazardous materials

Conduct the exams in this section to verify compliance with applicable stowage and segregation requirements per reference (e), IMDG Code.

A.2. Shipping Papers

Verify the vessel master or a representative has information from the shipper or loading terminal sufficiently to ensure that the cargo is properly stowed and can be safely carried. Verify the information is provided sufficiently in advance of loading to enable precautions to be carried out.

A.2.a. Verify Content

Verify the following in regard to the content of shipping papers:

- Legible and printed in English.
- Description of hazardous materials to include:
 - Proper shipping name.
 - Identifiable number, for example, UN number.
 - Hazard class.
 - Flash point packing group.
 - Total quantity indicated by mass or volume and associated unit of measure, for example, gross weight, kilogram/liter, etc.
 - The number and type of packages.
- Technical and chemical group names can be entered in parenthesis between the proper shipping name and hazard class. For example, a chemical group name could be a specific brand of chlorine bleach.
- Hazardous materials not subject to hazardous shipping requirements are identified and contrasted by color or highlighting.
- An “X” is placed in columns titled “HM” next to proper shipping name.
- Emergency response telephone number. This number refers to a specialist that can provide incident mitigation information in the event of a HAZMAT release/leak. Verify this number is:
 - Monitored at all times.
 - Listed immediately following the hazardous material description or readily identifiable and a clearly visible manner.
 - Includes “+” sign if shipment is from overseas.
- Retention and record keeping of physical/digital shipping papers:
 - Vessel retains papers for a period of two years for hazardous materials and three years for hazardous wastes.

- Show the date the initial carrier accepted the shipment.
- Copy is provided upon request for inspection.

A.2.b. Verify
Additional
Considerations

Verify the following considerations:

- Special permits: A marking designating DOT shipping papers, that is, “DOT-SP”, is marked on shipping papers for any material requiring special permit.
 - Limited quantities: Either “limited quantity” or “Ltd qty” are marked on shipping papers for material shipped as limited quantity.
 - With exception to Class 7 (radioactive) materials, all hazardous substances are identified in parenthesis in association with “proper shipping name” if it is not readily identified. Letters representing reportable quantity are marked on shipping paper before or after basic description of hazardous substance offered for transportation. See Table of Hazardous Materials and Special Provisions, Part 172, Subpart B of reference (y), Transportation, 49 CFR, for a list of substances for which reportable quantities apply.
 - Class 7 (radioactive) materials include additional entries to include the name of radionuclide, a written description of physical and chemical form of the material and activity contained in each package.
 - For empty packagings (containers) being shipped, the words “*RESIDUE: Last Contained ****” are included with the basic description per Additional Description Requirements, § 172.203 of reference (y).
 - Materials identified in the list of marine pollutants per Part 172, Subpart B of reference (y), are marked as “MARINE POLLUTANT” included with basic description.
 - For poisonous materials the words “POISON INHALATION HAZARD” or “TOXIC INHALATION HAZARD” immediately follow the hazard description.
-

A.3. Dangerous Cargo Manifest

Shipments of dangerous cargos must be accounted for by arrangement of an onboard DCM per reference (e), IMDG Code, and Additional Description Requirements § 172.203 of reference (y), Transportation, 49 CFR. These policies use slightly different terminology for the same situation. For example, the dangerous goods list and DCM are similar in function, but differ slightly with respect to application of enforcement options as well as slight differences in special provisions. Figure 6-2 shows a DCM example.

1.1 Name of ship			1.2 IMO number				1.3 Call sign					
1.4 Voyage number			2. Flag State of ship			3. Port of loading			4. Port of discharge			
5. Booking/ Reference Number	6. Marks & Numbers Container Id. No(s), Vehicle Reg. No(s)	7. Number and kind of packages	8. Proper Shipping Name	9. Class	10. UNNo.	11. Packing Group	12. Subsidiary Risk(s)	13. Flashpoint (in °C, °F)	14. Marine Pollutant	15. Mass (kg) Gross/Net	16. EmS	17. Stowage position on board
Additional information												
18.1 Name of master						19.1 Shipping Agent						
18.2 Place and date						19.2 Place and date						
Signature of master						Signature of Agent						

Figure 6-2 Dangerous cargo manifest example

NOTE: Spot check DCM stowage either during the deck walk or while inspecting the loading computer in the cargo control room.

A.3.a. Verify Basic Requirements

Verify the following:

- Name of ship, official number, and flag.
- Shipping name and identification number.
- Number and description of packages with gross weight.
- Hazard class associated with the specific cargo and secondary hazards.
- General cargo/non-hazardous materials are not included.
- Stowage location onboard the vessel, that is, bay, row, or tier.
- The identification and status of limited quantities, hazardous substance generic names with proper shipping names, and marine pollutants, etc. per Additional Description Requirements § 172.203 of reference (y).

A.3.b. Additional
Requirements

Verify the following:

- The hazardous material information provided on the DCM is identical to the shipping papers. This includes “proper shipping name” as indicated in parentheses.
- Regulations allow for subtle spelling differences between the dangerous goods list in reference (e), IMDG Code, and Purpose and use of Hazardous Materials Table § 172.101 of reference (y), Transportation, 49 CFR. Exception: The terms “flammable” and “inflammable” cannot be used interchangeably within U.S. jurisdictions per reference (y). See [Figure 6-3 General segregation requirements for hazardous materials](#).
- The designated licensed deck/cargo officer attests to the accuracy of the DCM with his or her signature. If the exam team determines the DCM is inaccurate, then review with the deck officer or chief officer to determine clear grounds and expand the exam with physical stowage spot checks.
- Copies of the DCM are kept onboard for no less than one year and the document is kept available for inspection. The DCM is usually stored digitally and can be accessed on the ship’s computer in the cargo control room or on the bridge.

Segregation shall also take account of a single subsidiary risk label.

CLASS	1.1 1.2 1.5	1.3 1.6	1.4	2.1	2.2	2.3	3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	7	8	9
Explosives 1.1, 1.2, 1.5	*	*	*	4	2	2	4	4	4	4	4	4	2	4	2	4	X
Explosives 1.3, 1.6	*	*	*	4	2	2	4	3	3	4	4	4	2	4	2	2	X
Explosives 1.4	*	*	*	2	1	1	2	2	2	2	2	2	X	4	2	2	X
Flammable gases 2.1	4	4	2	X	X	X	2	1	2	X	2	2	X	4	2	1	X
Non-toxic, non-flammable gases 2.2	2	2	1	X	X	X	1	X	1	X	X	1	X	2	1	X	X
Toxic gases 2.3	2	2	1	X	X	X	2	X	2	X	X	2	X	2	1	X	X
Flammable liquids 3	4	4	2	2	1	2	X	X	2	1	2	2	X	3	2	X	X
Flammable solids (including self-reactive substances and solid desensitized explosives) 4.1	4	3	2	1	X	X	X	X	1	X	1	2	X	3	2	1	X
Substances liable to spontaneous combustion 4.2	4	3	2	2	1	2	2	1	X	1	2	2	1	3	2	1	X
Substances which, in contact with water, emit flammable gases 4.3	4	4	2	X	X	X	1	X	1	X	2	2	X	2	2	1	X
Oxidizing substances (agents) 5.1	4	4	2	2	X	X	2	1	2	2	X	2	1	3	1	2	X
Organic peroxides 5.2	4	4	2	2	1	2	2	2	2	2	2	X	1	3	2	2	X
Toxic substances 6.1	2	2	X	X	X	X	X	X	1	X	1	1	X	1	X	X	X
Infectious substances 6.2	4	4	4	4	2	2	3	3	3	2	3	3	1	X	3	3	X
Radioactive material 7	2	2	2	2	1	1	2	2	2	2	1	2	X	3	X	2	X
Corrosive substances 8	4	2	2	1	X	X	X	1	1	1	2	2	X	3	2	X	X
Miscellaneous dangerous substances and articles 9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The numbers and symbols in the table have the following meanings:

- 1 – “Away from”;
- 2 – “Separated from”;
- 3 – “Separated by a complete compartment or hold from”;
- 4 – “Separated longitudinally by an intervening complete compartment or hold from”.
- X – The Dangerous Goods List has to be consulted to verify whether there are specific segregation provisions.

Figure 6-3 General segregation requirements for hazardous materials

A.3.c. Stowage and Segregation Check

Conduct a stowage and segregation check:

- As part of the documentation review, check the DCM and stowage plan to compare dangerous goods (hazardous materials), for example, the proximity of dangerous goods to other hazardous materials.
- Check the cargo per General Segregation Requirements for Hazardous Materials, Table 176.83(c) of reference (y), Transportation, 49 CFR. The symbol “X” indicates compatibility unless otherwise specified per Purpose and use of Hazardous Materials Table § 172.101 of reference (y).

A.4. Document of Compliance

The DOC for the carriage of dangerous goods certifies compliance with additional safety measures to address Chapter XI-2 of reference (c), SOLAS. The appendix to the DOC in [Figure 6-4 Packaged goods in underdeck spaces from the DOC](#) identifies the classes of dangerous goods authorized to be carried and the locations where they can be stowed.

NOTE:

Certain vessel locations where dangerous goods can be carried might include footnotes with additional special requirements.

A.4.a. Conduct the Exam

During the documentation portion of the exam or before attending the vessel, randomly select cargos in the DCM to ensure there is substantial compliance with the carriage of dangerous goods.

Verify the following on board the vessel:

- Classes of dangerous goods are allowed to be carried.
- Verified cargos are carried in the spaces authorized by the certificate.
- Dangerous goods are stowed as indicated in the DCM and loading plan, e.g. for container vessels and RO/ROs.

Verify the following on the certificate:

- Additional fire protection systems pertaining to dangerous goods including structural, preventative and suppression equipment.
- Cargo stowage and segregation from ignition sources.
- Additional PPE provided for hazards associated with the carriage of dangerous goods.

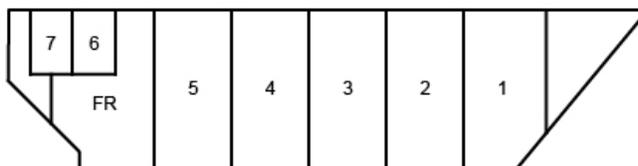
Verify the following additional contents and certificate features:

- Ship name/distinctive number and letters, for example, IMO number and call sign.
- Port of registry and Flag Administration.
- Period of validity not exceeding five years, or beyond the expiration of the valid Cargo Ship Safety Construction Certificate.
- Certificate includes a statement to the effect that the construction and equipment of the ship are in compliance with Chapter II-2/19 or Chapter II-2/54 of reference (c), if the ship's keel was laid prior to 01 Jul 2002.

APPENDIX PACKAGED GOODS IN UNDERDECK SPACES

Cargo spaces indicated in the plan are corresponding with the table below

- P - Indicates
PACKAGED GOODS
PERMITTED
- C - Indicates
IN CLOSED FREIGHT
CONTAINERS PERMITTED
- X - Indicates
NOT PERMITTED



Class	Underdeck space(s)					
	1	2, 3	4	5	6	7
1.1 to 1.6	P	X	X	X	X	X
1.4S	P	P	P	P	P	P
2.1 hydrogen and hydrogen mixtures exclusively	C	C	X	X	X	X
2.1 other than hydrogen and hydrogen mixtures	C	C	X	X	X	X
2.2	P	P	P	P	X	X
2.3 flammable	X	X	X	X	X	X
2.3 non-flammable	X	X	X	X	X	X
3 FP < 23°C	C	C	X	X	X	X
3 FP < 23°C ≤ FP ≤ 60°C	P	P	P	P	X	X
4.1	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	X	X
4.2	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	X	X
4.3 liquids	C ²⁾	C ²⁾	C ²⁾	C ²⁾	X	X
4.3 solids	C	C	C	C	X	X
5.1	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	P ^{1) 3)}	P ^{1) 3)}
5.2	X	X	X	X	X	X
6.1 liquids FP < 23°C	C	C	X	X	X	X
6.1 liquids 23°C ≤ FP ≤ 60°C	C	C	C	C	X	X
6.1 liquids FP > 60°C	P	P	P	P	X	X
6.1 solids	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾
8 liquids FP < 23°C	C	C	X	X	X	X
8 liquids 23°C ≤ FP ≤ 60°C	C	C	C	C	X	X
8 liquids FP < 60°C	P	P	P	P	P ⁴⁾	P ⁴⁾
8 solids	P	P	P	P	P	P
9 goods evolving flammable vapour exclusively	C	C	X	X	X	X
9 other than goods evolving flammable vapour	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾	P ¹⁾

- 1) If stowage in a "mechanically ventilated space" is stipulated by the IMDG Code, in closed freight containers.
- 2) Except goods having a flashpoint less than 23°C listed in the IMDG Code.
- 3) Except goods for which stowage "protected from sources of heat" is stipulated by the IMDG Code.
- 4) Except goods having a subsidiary risk class 6.1.

Figure 6-4 Packaged goods in underdeck spaces from the DOC

Verify illustration of under deck spaces and on deck spaces:

- Corresponding tables in [Figure 6-4 packaged goods in underdeck spaces from the DOC](#) highlight permitted/non-permitted stowage, depending on hazard class, under or on-deck location, and availability of mechanical ventilation.
 - Consider using the appendix in [Figure 6-4](#) when expanding the exam as a tool to verify the stowage of dangerous goods.
-

Section B: Crew Training Required

B.1. Crew Training Documentation

Examine crew training documentation relating to hazardous materials and dangerous goods. Crewmembers who need training are those required by the ship's safe manning certificate to hold certificates of competency for Chapters II/1, II/2, II-3, and II/5 of reference (c), SOLAS and reference (1), STCW.

STCW tables A-II/1, A-II/2, A-II/3, and A-II/5 outline the mandatory minimum training requirement. These tables are part of a mariner's certification under STCW and might not include independent documentation. An STCW certificate of competency is proof that the vessel meets requirements for training related to the carriage of dangerous goods. For details, see [Table 3-3 STCW content relevant to FFV exams](#).

If necessary, consider HAZMAT training requirements per Responsibility for Compliance and Training § 176.13 of reference (y), Transportation, 49 CFR. This regulation requires that deck cargo officers obtain HAZMAT cargo supervision and refresher within 90 days of employment per Training Requirements §172.704 reference (y).

B.2. Conduct the Exam

Verify the following:

- Training documentation is present.
- Recurrent training is conducted.

B.3. Expand the Exam

Expand the exam:

If	Then
HAZMAT training is missing or expired.	Verify: <ul style="list-style-type: none"> • Enough officers with HAZMAT training are available to properly stand watch. • A policy that covers HAZMAT training exists in the vessel's SMS.
Found no documentation of crewmembers with recurrent training required per Responsibility for Compliance and Training, § 176.13 of reference (y).	Restrict cargo operations until acceptable training has been completed per Responsibility for Compliance and Training § 176.13 of reference (y), that is, when all crewmembers required by the safe manning certificate have STCW endorsements greater than three years from date of issue. Issue deficiency to the vessel to provide training before next U.S. port call.

Section C: Emergency Response and Medical First Aid

C.1. Emergency Response and Medical First Aid

Verify a copy of the instructions on emergency response and medical first aid relevant to incidents involving dangerous goods is onboard.

Advice for diagnosis and treatment of chemical poisoning within the limits of the facilities available onboard ship is available in reference (u), Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), Chemicals Supplement to the International Medical Guide for Ships (IMGS), IMO, 1994.

C.2. Conduct the Exam

Verify the presence of emergency response and medical first aid information for cargo.

C.3. Expand the Exam

Expand the exam:

If	Then
The crew has inadequate information regarding emergency response and medical first aid.	Review SMS emergency preparedness procedures. Determine follow-up actions per Section D.2 of reference (h), MSM Volume II, and reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30). For cargo that require special considerations, see reference (aa), International Maritime Solid Bulk Cargoes Code - Port State Control Guidance, CG-CVC Policy Letter 13-03, May 12, 2013.

Section D: Cargo Segregation

D.1. Cargo Segregation

The term “segregation” refers to a separation of cargo by distance or barriers. The goal of this exam is to identify and verify requirements for the segregation of hazardous materials transported by vessel.

WARNING:

Dangerous goods that are incompatible with each other and can react dangerously when they come in contact due to leakage, spillage, or other accidents. Dangerous goods can increase the intensity of fire or cause explosions if they burn together.

NOTE:

Some vessels have cargo segregation programs as a component of the loading computer. Ask the vessel’s chief officer how segregation requirements are verified.

D.2. Conduct the Exam

Identify and verify segregation between dangerous goods in packaged form per the following:

- Reference (y), Transportation, 49 CFR.
 - Table of Hazardous Materials and Special Provisions, Subpart B.
 - General Segregation Requirements for Hazardous Materials, Table 176.83(b).
 - General Handling and Stowage, Subpart C.
 - General Handling and Stowage, Subpart D.
- Stowage of Cargo Transport Units in Cargo Spaces other than RO/RO Cargo Spaces, Section 7.4.4 of reference (e), IMDG Code:
 - Freight containers with a fuel tank containing flammable liquid or gas are to be stowed on deck only.
 - Freight containers equipped with heating or refrigeration equipment are not operated in cargo holds where flammable liquid or gas is stowed.
 - Freight containers with electric power, designed to operate in an environment containing flammable vapors, can be operated below deck in a cargo hold containing a flammable liquid or gas.

- Exemptions to segregation and special segregation requirements as determined by inspection.

NOTE:

Application of segregation terms vary by storage method of packaged hazmat onboard the ship: e.g. storage inside cargo transport units, storage as breakbulk cargo, or storage as cargo transport units on board container ships. See specific definition found in Section 176.83 of reference (y), Transportation, 49 CFR, or Section 7.2.2 of reference (e), IMDG Code.

D.3. Expand the Exam

Expand the exam:

If	Then
<p>Dangerous cargo do not comply with stowage and segregation requirements.</p>	<p>Verify:</p> <ul style="list-style-type: none"> • DCM applicability. • Class segregation against the DOC for validity and relevant appendix page. • SMS has established procedures/instructions to ensure compliance with storage and segregation requirements. <p>Require cargo to meet stowage and segregation requirements before departure.</p> <p>Notify appropriate stakeholders as warranted.</p>

Section E: Cargo Spaces

E.1. Cargo Spaces

The goal of this exam is to ensure that cargo spaces are constructed and equipped per the arrangements noted in the ship's Safety Construction Certificate and the DOC, Dangerous Goods.

E.2. Conduct the Exam

Verify the following:

- Installation of electrical components.
 - Ventilation requirements including power and natural ventilations per Chapter II-2, Tables 19.1, 19.2 and 19.3 of reference (c), SOLAS, and reference (e), IMDG Code:
 - Spaces capable of being sealed are fitted with an approved firefighting system.
 - Spaces not capable of being sealed are fitted with a fixed-pressure, water-spraying system.
-

E.3. Expand the Exam

Expand the exam:

If	Then
<p>Dangerous cargos do not comply with stowage and segregation requirements.</p>	<p>Question the cargo officers to verify they are aware of documented procedures to follow.</p>
<p>Mechanical ventilation in the cargo hold where no natural ventilation exists is inoperable.</p>	<p>Review authority and responsibilities of the master, technical systems operations, and shipboard operations pertaining to preventative maintenance.</p> <p>Determine mechanical ventilation requirements per Chapter II-2 and Tables 19.1, 19.2., 19.3 of reference (c), SOLAS, and reference (e), IMDG Code.</p> <p>Spot check additional mechanical ventilation. If there is more than one mechanical ventilation fan installed, then ensure remaining mechanical ventilation meets the required number of air changes per Chapter II-2, Regulations 19 & 20 of reference (c).</p> <p>Per reference (h), MSM Vol. II, consider restricting cargo operations or requiring the vessel to move cargo to an above deck location to meet stowage and segregation requirements before departure.</p>
<p>Electrical equipment does not meet source of ignition equipment requirements per Chapter II-2 and Tables 19.1 and 19.2 of reference (c).</p>	<p>Consider requiring the vessel to secure electrical power in affected cargo space or moving cargo to above deck location per Provisions Concerning Transport Operations, Part 7 of reference (e).</p> <p>Review the SMS to ensure the vessel’s operating company has established procedures to maintain the ship in conformity with provisions of relevant rules and regulations. Ensure the vessel takes appropriate corrective action based on circumstances and maintains records.</p>

Section F: Ventilation Arrangement

F.1. Introduction

Vessels ventilate cargo to:

- Prevent the formation of cargo sweat or ship's sweat which could damage the cargo.
- Reduce the harmful heating of a cargo.
- Remove hazardous gases from the cargo spaces.

F.2. Conduct the Exam

Verify the following:

- Power/mechanical ventilation:
 - Provides six air changes per hour, achieved in an empty hold per hour.
 - Fan motors are intrinsically safe.
 - Suitable wire mesh guards are fitted over the inlet and outlet openings.
 - Natural ventilation is employed when there are no provisions for mechanical ventilation.
-

Section G: Fire Safety Requirements for Cargo Spaces

G.1. Firefighting Objectives

Chapter II-2, Regulation 19 of reference (c), SOLAS, addresses fire safety objectives for the carriage of dangerous goods. Use the tables presented in the following subsections to determine what requirements to apply to a particular vessel and cargo. For bulk carrier requirements, see [Chapter 3: Bulk Carriers, Section K: Fixed Gas Fire Extinguishing Systems. Table 3-2 SOLAS Table 19.2](#) assists the examiner in applying regulations addressing water supplies, ventilation, sources of ignition, fire detection, PPE and other requirements.

G.1.a. SOLAS Table 19.1: Application of the Requirements to Different Modes of Carriage of Dangerous Goods in Ships and Cargo Spaces

Use [Table 6-1 SOLAS Table 19.1](#) from reference (c), for every vessel that carries dangerous goods, except whenever the dangerous goods are carried within a cargo hold in its bulk state:

1. Use the top row to determine different modes of carriage, that is, open or closed RO/RO spaces, container cargo spaces, etc.
2. Determine the column that applies to your situation.
3. Follow that column down to see what specific rows apply. Compile the results with instances where there is an X, for example:
 - Water supplies.
 - Fixed fire detection system.
 - Ventilation arrangements.

Regulation 19.2.2 Regulation 19		Weather decks (.1 to .5 inclusive)	.1 Not specifically designed	.2 Container cargo spaces	.3		.4 Solid dangerous goods in bulk	.5 Shipborne barges
					Closed ro-ro Spaces ⁵	Open ro-ro spaces		
.3.1.1	Firemain Supply (Permanent Pressurization or remote start)	X	X	X	X	X	For application of requirements of regulation 19 to different classes of dangerous goods, see table 19.2	X
.3.1.2	4- fire nozzles coverage or equivalent means	X	X	X	X	X		-
.3.1.3	Cooling under deck cargo space	-	X	X	X	X		X
.3.1.4	Flood with specified media in lieu of .3.1.3	-	X	X	X	X		X
.3.2	Electrical Equipment – Source Ignition	-	X	X	X	X		X ⁴
.3.3	Fixed fire detection system	-	X	X	X	-		X ⁴
.3.4.1	Ventilation 6 air changes	-	X	X ¹	X	-		X ⁴
.3.4.2	Ventilation Fan requirements	-	X	X ¹	X	-		X ⁴
.3.5	Bilge pumping requirements	-	X	X	X	-		-
.3.6.1	4-chemical suits in addition to fireman's outfits	X	X	X	X	X		-
.3.6.2	2-additional SCBAs	X	X	X	X	X		-
.3.7	Portable fire extinguishers	X	X	-	-	-		-
.3.8	Insulation Machinery space boundaries	X	X	X ²	X	X		-
.3.9	Water-spray system	-	-	-	X ³	X		-
.3.10.1	Separation closed and adjacent open spaces	-	-	-	X	-		-
.3.10.2	Separation closed and adjacent weather deck	-	-	-	X	-	-	

Notes:

- 1 For classes 4 and 5.1 solids not applicable to closed freight containers. For classes 2, 3, 6.1 and 8 when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For classes 4 and 5.1 liquids when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For the purpose of this requirement, a portable tank is a closed freight container.
- 2 Applicable to decks only.
- 3 Applies only to closed RO/RO spaces, not capable of being sealed.
- 4 In the special case where the barges are capable of containing flammable vapors or alternatively if they are capable of discharging flammable vapors to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived to the satisfaction of the Administration.
- 5 Special category spaces shall be treated as closed RO/RO spaces when dangerous goods are carried.

Table 6-1 SOLAS Table 19.1

G.1.b. SOLAS
Table 19.3:
Application of the
Requirements to
Different Classes
of Dangerous
Goods Except
Solid Dangerous
Goods in Bulk

Use [Table 6-2 SOLAS Table 19-3](#) when a vessel carries packaged dangerous goods:

1. Use the top row to identify specific classes of dangerous goods, e.g. 1.1, 5.1, 9, etc.
2. When a ship carries one of these specific classes, follow that column down to determine the regulations necessary to carry specific cargo per Chapter II-2 Regulation 19 of reference (c), SOLAS.

NOTE:

The requirements in [Table 6-2 SOLAS Table 19-3](#) are in addition to those listed in [Table 6-1 SOLAS Table 19-1](#).

Class	Regulation 19																						
	1.1 to 1.6	1.4S	2.1	2.2	2.3 flammable ²⁰	2.3 non-flammable	3 FP ¹⁵ liquids <23°C	3 FP ¹⁵ liquids ≥23°C to ≤60°C	4.1	4.2	4.3 liquids ²¹	4.3 solids	5.1	5.2 ¹⁶	6.1 liquids FP ¹⁵ < 23°C	6.1 liquids FP ¹⁵ ≥ 23°C to ≤ 60°C	6.1 liquids	6.1 solids	8 liquids FP ¹⁵ < 23°C	8 liquids FP ¹⁵ ≥ 23°C to ≤ 60°C	8 liquids	8 solids	9
3.1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.1.3	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.1.4	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.2	X	-	X	-	X	-	X	-	-	-	X ¹⁸	-	-	-	X	-	-	-	X	-	-	-	X ¹⁷
3.3	X	X	X	X	-	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X
3.4.1	-	-	X	-	-	X	X	-	X ¹¹	X ¹¹	X	X	X ¹¹	-	X	X	-	X ¹¹	X	X	-	-	X ¹¹
3.4.2	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	X ¹⁷
3.5	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	X	X	-	X	X ¹⁹	X ¹⁹	-	-
3.6	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X ¹⁴
3.7	-	-	-	-	-	-	X	X	X	X	X	X	X	-	X	X	-	-	X	X	-	-	-
3.8	X ¹²	-	X	X	X	X	X	X	X	X	X	X	X ¹³	X	X	X	-	-	X	X	-	-	-
3.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.10.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.10.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes

- 11 When "mechanically-ventilated spaces" are required by the International Maritime Dangerous Goods Code.
- 12 Stow 3 m horizontally away from the machinery space boundaries in all cases.
- 13 Refer to the International Maritime Dangerous Goods Code.
- 14 As appropriate to the goods to be carried.
- 15 Refers to flashpoint.
- 16 Under the provisions of the IMDG Code, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.
- 17 Only applicable to dangerous goods evolving flammable vapour listed in the IMDG Code.
- 18 Only applicable to dangerous goods having a flashpoint less than 23°C listed in the IMDG Code.
- 19 Only applicable to dangerous goods having a subsidiary risk class 6.1.
- 20 Under the provisions of the IMDG Code, stowage of class 2.3 having subsidiary risk class 2.1 under deck or in enclosed ro-ro spaces is prohibited.
- 21 Under the provisions of the IMDG Code, stowage of class 4.3 liquids having a flashpoint less than 23°C under deck or in enclosed ro-ro spaces is prohibited.

Table 6-2 SOLAS Table 19.3

G.2. Water Supply

Ensure the vessel is able to deliver firefighting water from four nozzles to all parts of the cargo spaces. If there is a doubt, have the crew demonstrate effective operation in the cargo space. For more information, see the [COMDT \(CG-ENG-4\)](#) website on CGPortal.

G.3. Sources of Ignition

Verify the following:

- Dangerous goods are adequately separated from ignition sources.
- Test explosion-proof or intrinsically safe equipment and lighting is installed in the cargo areas.

As a best practice, look for exposed electrical wires, loose connections, damaged fixtures, and approved fittings.

For more information, see the electrical installation in ship series 60092 publications at the [International Electrotechnical Commission](#) website.

G.4. Fire Detection Systems

Verify bridge alarm panel indicators for faulted zones:

- Smoke detectors in RO/RO cargo spaces.
 - Have the crew test for all other vessel types, if feasible.
-

G.5. Personnel Protective Equipment

Verify vessels carrying dangerous goods provide adequate PPE per Chapter II-2, 19.3.1 of reference (c), SOLAS:

- Chemical suits: Four sets of full protective clothing, resistant to chemical attack. Typical failure points of the suits include cracking in bends of the armpits and crotch. Ensure that no part of the body is unprotected.
- Two SCBAs, each with two spare charges in addition to those required for the firefighting ensemble. If vessel has the means to refill the air bottles, then only one spare charge is required. Verify the integrity of the seal around the facemask.

NOTE:

Ensure continuous positive pressure air flow to the facemask.

G.6. Additional Fire Extinguishers

Verify the presence of portable fire extinguishers with at least 12 kilograms/26 pounds of dry powder total capacity in addition to other required extinguishers per Chapter II-2, 19.3.7 of reference (c), SOLAS.

**G.7. Fire
Boundaries**

Verify the following:

- Bulkheads forming boundaries between cargo spaces and machinery spaces are insulated to deck assemblies A-60 Class standard unless the dangerous goods are stowed at least three meters horizontally away from such bulkheads. For more information on “A” Class standards, see Chapters II-2/9 and II-2/19 of reference (c).
- The condition of bulkhead, penetrations, and attached insulation.
- For more information, see Type, Location, and Construction of Fire Control Bulkheads and Decks § 72.05-10 of reference (s), Shipping, 46 CFR.

G.8. Break Bulk

Verify tonnage for hazardous cargo such as Class 5.1 per Supervision of Handling and Stowage § 176.57 of reference (y), Transportation, 49 CFR.

**G.9. Fixed Gas
Fire
Extinguishing
Systems**

Verify the following:

- The presence of a fixed CO₂, an inert gas fire extinguishing system, or with a fire extinguishing system that provides equivalent protection approved by the vessel’s Administration. For more information, see reference (m), IMO, MSC.1/Circ. 1395.
 - Vessels carrying these cargo have a fire extinguishing system that provides an equivalent level of protection for the cargo spaces.
 - Required documentation in the safety equipment certificate for equivalencies.
-

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Chapter 7: Carriage of Grain

Introduction

This chapter discusses the documents, manuals, loading, and stowage requirements necessary for the safe carriage of grain products onboard FFVs.

For more information, see the USCG/National Cargo Bureau (NCB) presentations at the [Cargo and Facilities Division COMDT \(CG-FAC-2\)](#) website on CGPortal. In the Safety Branch section, click the **National Cargo Bureau Training info** link.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Grain Hazards	7-2
B	Document of Authorization	7-5
C	Grain Loading Booklet	7-6
D	Grain Stowage	7-7
E	National Cargo Bureau Certificates	7-9
F	Fumigation	7-11

Section A: Grain Hazards

A.1. Vessel Stability

Vessel stability is the most serious hazard associated with carriage of grain. Grain loaded into the cargo hold generally takes a conical shape. The maximum slope angle of non-cohesive, that is, free-flowing material is called the angle of repose shown in Figure 7-1.

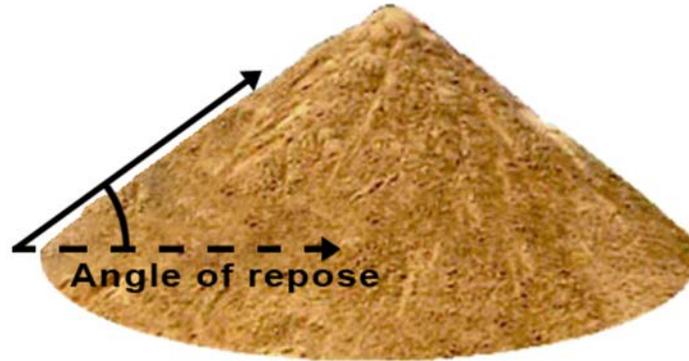


Figure 7-1 Angle of repose

Bulk cargo trimming is leveling off cargo in the ship's holds. This practice is called trimming, but is not to be confused with trimming in connection with the ship's draft.

WARNING:

If the cargo is not leveled or trimmed and the vessel is allowed to proceed to sea, then it could shift and change the center of gravity of both the grain and the vessel.

A.1.a. Conduct the Exam

Verify cargo is trimmed or leveled per reference (f), Grain code. Table 7-1 shows bulk cargo trimming levels.

Grain	Angle of Repose
Barley	30 degrees
Corn	23 degrees
Soybeans	25 degrees
Wheat	25 degrees

Table 7-1 Bulk cargo trimming levels

A.1.b. Expand the Exam

Expand the exam:

If	Then
Vessel is listing.	Verify: <ul style="list-style-type: none"> • Grain type, loading booklet, and how cargo was loaded at previous port. • How cargo was trimmed and secured. Review departure sailing stability calculations.
A crew-member is alone in the cargo hold.	Verify SMS procedure for trimming and cargo hold entry procedures: <ul style="list-style-type: none"> • Determine if the situation requires posting a lookout or safety observer. • Determine if cargo hold entry/exit requires the use of a lifeline.

A.2. Spontaneous Combustion

Spontaneous combustion or spontaneous ignition occurs by self-heating, followed by thermal runaway, followed by auto-ignition.

WARNING:

Grain dust is combustible. Dust concentration in the atmosphere can provide a source of ignition and cause explosions to occur, resulting in injury or death.

A.2.a. Conduct the Exam

Verify the vessel meets requirements per:

- Reference (c), SOLAS.
- Reference (f), Grain Code.

A.3. Entrapment and Engulfment

Grain entrapment or engulfment occurs when a person becomes submerged in grain and cannot get out without assistance.

WARNING:

Shifting grain provides an engulfment hazard in the cargo hold where personnel can suffocate or be crushed by the weight of the grain.

NOTE:

Do not enter a cargo hold unless the space is empty of bulk cargo, and certified safe for entry by a marine chemist. For guidance regarding personnel designated to authorize a space for entry, see reference (pp), Confined Spaces Entry Program Tactics, Techniques, and Procedures (TTP), CGTTP 4-11.8 (series).

A.3.a. Conduct the Exam

Verify objective evidence that personnel inside the cargo hold spaces follow SMS procedures for entry:

- Have a watch outside of the space to monitor safety.
- Crewmembers wear a body harness with a lifeline.
- Crewmembers have training on the specific hazards associated with cargo hold entry and entrapment/engulfment.

A.4. Health Risks

Be aware of potential health risks associated with conducting the exam. As a best practice, consult risk management strategy per reference (o), Marine Safety Manual Volume I, Administration and Management, COMDTINST 16000.6 (series).

WARNING:

Grain dust particles in the atmosphere during cargo operations can cause health problems days after conducting an exam; particularly for personnel conducting a deck walk.

A.4.a. Conduct the Exam

Periodically reassess conditions while the vessel conducts cargo operations:

- If there are health concerns, then postpone the deck walk until after cargo operations are complete.
 - If the conditions are hazardous, then document why the deck walk cannot be completed in the activity's MISLE narrative. Perform follow-up actions as deemed necessary per the circumstances.
-

Section B: Document of Authorization

- B.1. Document of Authorization** Each vessel that loads grain in bulk must have a Document of Authorization (DOA) per reference (c), SOLAS.
- Reference (f), Grain Code, identifies instances where a vessel can carry grain in bulk without the required DOA and associated data. In those instances, the vessel's master must provide proof of compliance per reference (f).
-
- B.2. Conduct the Exam** Verify the following:
- The DOA is ship-specific and approved by the Administration or a Recognized Organization on its behalf.
 - The DOA is in the official language of the Administration. If not in English or French, then a translation into one of these languages is required per reference (c).
 - Incorporation of the DOA into the grain loading booklet. Approval of the DOA serves as evidence that the vessel can safely carry grain in bulk as cargo and that the grain loading booklet was revised to be in compliance with reference (f). For more information, see [Section C: Grain Loading Booklet](#) of this chapter.
-

Section C: Grain Loading Booklet

C.1. Grain Loading Booklet

Verify a vessel intending to load grain in bulk has an approved grain loading booklet aboard per reference (c), SOLAS. If the booklet is not in English or French, then a translation into one of these languages is required.

C.2. Conduct the Exam

Verify the following:

- The booklet:
 - Is approved by the Administration.
 - Contains the information listed in reference (f), Grain Code.
 - Is in printed form and the vessel maintains a copy.
- The master is proficient in the contents and stability requirements contained in the booklet.

NOTE:

When the vessel undergoes a change in registry, the new Administration reviews and approves the grain loading booklet and issues a new DOA per Chapter VI of reference (c).

Section D: Grain Stowage

D.1. Grain Stowage

Improper grain stowage can lead to hazards associated with vessel stability as discussed in [Section A.1.: Vessel Stability](#) of this chapter. For details concerning the NCB's responsibilities regarding grain stowage, see [Section E: National Cargo Bureau Certifications](#) of this chapter.

D.2. Conduct the Exam

While loading, ask the chief officer to detail procedures to trim the grain in the hold.

Verify the following:

- NCB surveyors issued a Certificate of Readiness.
- The vessel presented a stability calculation with the master's signature to the NCB surveyors.
- The vessel prepared a stability calculation using the grain loading booklet.
- There are no structural defects on the boundaries of cargo compartments.
- Before loading grain in a vessel:
 - Cargo hold is clean.
 - Compartments are dry.
 - No signs of rodent or insect infestation.
 - Cargo holds are structurally sound.

NOTE:

Verify the grain is loaded and trimmed to minimize the free surface effect that results from shifting in transit.

- The condition of the cargo hatches and its associated gaskets:
 - No sources of ignition present during the active loading of grain.

WARNING:

Faulty electrical circuits can produce a fire or explosion.

- The vessel does not have a list of more than one degree.
- Condition of the cargo hatches, gaskets and dogs. Verify the vessel prevents leakage into the holds.

NOTE:

The use of additional sealing is a recognized best practice in industry. It is common for vessel crews to seal cargo hold hatches with tape or with foam.

- The stability calculation for loading does not exceed the freeboard limits imposed by the International Load Line certificate. Ensure the vessel's seasonal load line mark complies with the parameters reflected on the approved load line certificate. For more information, see reference (kk), Load Lines, 1966/1988 - International Convention on Load Lines, 1966, as Amended by the Protocol of 1988.
 - Partially filled compartments are properly trimmed per the vessel's grain loading booklet.
-

Section E: National Cargo Bureau Certificates

E.1. Introduction The NCB assists the USCG with carrying out the provisions of reference (c), SOLAS. The NCB:

- Issues grain certificates of loading and certificates of readiness.
- Conducts stability reviews.
- Issues certificates of cargo hold cleanliness.

For more information, see:

- Reference (qq), Memorandum of Agreement between the United States Coast Guard and the National Cargo Bureau Governing the Delegation of Certain Survey and Certification Services, July 20, 2017. This document is available at the USCG's [Specialized Organization Authorizations](#) website.
- The [National Cargo Bureau](#) website.

E.2. Exam Best Practices

NCB activities do not address non-cargo vessel requirements. Best practices include:

- Focus on areas not addressed by the NCB report to ascertain the vessel's compliance per reference (h), MSM Volume II.
- Contact the closest NCB office if you encounter an issue beyond your knowledge.

E.3. Certificate of Loading

The NCB issues a certificate of loading following successful completion of loading. This certificate is recognized as evidence the vessel was loaded per Bulk Grain § 172 Subpart B of reference (s), Shipping, 46 CFR.

If, at the completion of loading, the vessel does not comply with the regulations and refuses to make the necessary changes, then the NCB supervisor does not issue the certificate of loading and notifies the COTP.

E.3.a. Conduct the Exam

Verify valid DOA issued.

E.3.b. Expand the Exam

Expand the exam:

If	Then
Vessel is loading grain without a DOA.	Verify: <ul style="list-style-type: none">• Cargo type.• Cargo loaded per reference (f), Grain Code. Contact the NCB to seek guidance.

E.4. Certificate of Readiness

The NCB supervisor issues a certificate of readiness when the pertinent documents and stability calculations are in order and the holds pass inspection. The certificate confirms that the vessel is ready in all respects to load a cargo of bulk grain.

E.4.a. Conduct the Exam

Verify the following:

- The vessel's fitness to load bulk grain.
 - Hold cleanliness, bilge readiness, structural integrity, protection against heat, and electrical hazards.
 - Proper installation of moveable bulkheads, if applicable.
 - Compliance with grain stability requirements as demonstrated by proper completion of the NCB grain stability calculation form available at the [National Cargo Bureau](#) website.
-

Section F: Fumigation

F.1. Overview Vessels often have cargo holds that need to be fumigated at the completion of loading bulk grain cargo. Reference (rr), Recommendations on the Safe Use of Pesticides in Ships, IMO MSC.1/Circ. 1358, 30 June 2010, governs the fumigation standards for most FFVs. Exceptions include fumigation rules that apply to vessels carrying hazardous materials per Interim Regulations for Shipboard Fumigation § 147A of reference (s), Shipping, 46 CFR.

F.1.a. Fumigation Notice Per Notice to Captain of the Port § 147A.10 of reference (s):

- Vessels being fumigated provide the COTP with a 24-hour advanced notice of fumigation.
- PSC teams scheduled to perform exams on a fumigated ship discuss this requirement at the pre-exam meeting.

As a best practice, review the unit's safe work practices and specific fumigant/pesticide hazards to determine:

- The type of chemical/pesticide employed.
- Locations of the affected space(s).
- Present hazards. When appropriate, determine when it is safe to conduct the exam and the safety practices to be followed.

F.1.b. Safety Concerns It is imperative that PSCOs conducting exams be aware of their surroundings, as it is critical for the health and safety of themselves, the crew, and any other person who is onboard a vessel during fumigation.

WARNING:

Displacement of oxygen and the toxicity of the fumigant can cause serious injury or death.

NOTE:

In case of exposure to pesticides and subsequent illness, seek medical care immediately and document through the Occupational Medical Surveillance and Evaluation Program (OMSEP) per reference (ss), Safety and Environmental Health Manual, COMDTINST M5100.47 (series). To access the OMSEP Evaluation Tool, visit the [U.S. Coast Guard Academy](#) website on CGPortal. Once there, navigate to the Libraries section and click CGA Forms.

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Appendix A: Acronyms

BLU Code	Code of Practice for the Safe Loading and Unloading of Bulk Carriers.
BOAT	Boat Operations and Training.
CCSS	Code of Safety for Caribbean Cargo Ships.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act.
CFR	Code of Federal Regulations.
CG-CVC	Office of Commercial Vessel Compliance.
CG-CVC-2	Port State Control Division.
CG-ENG-1	Human Element & Ship Design Division.
CG-ENG-4	Life Saving & Fire Safety Division.
CG-ENG-5	Hazardous Materials Division.
CG-FAC-2	Cargo and Facilities Division.
CGTTP	Coast Guard tactics, techniques, and procedures.
Circ.	IMO Circular.
CO₂	Carbon dioxide.
COMDINST	Commandant instruction.
COMDTPUB	Commandant publication.
COTP	Captain of the port.

CSM	Cargo securing manual.
DCM	Dangerous cargo manifest.
DOA	Document of Authorization.
DOC	Document of Compliance.
DOT	Department of Transportation.
DOT-SP	Department of Transportation shipping papers.
DWT	Deadweight tonnage.
ESP Code	International Code on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers.
FC-T	FORCECOM Training Division.
FFV	Foreign freight vessel.
FFVE	Foreign freight vessel examiner.
FORCECOM	U.S. Coast Guard Force Readiness Command.
FSS Code	International Fire Safety Systems Code.
GT	Gross tonnage.
HAZMAT	Hazardous material.
IEC	International Electrotechnical Commission.
IMDG Code	International Maritime Dangerous Goods Code.
IMO	International Maritime Organization.
IMSBC Code	International Maritime Solid Bulk Cargoes Code.

INF Code	International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships.
ISM Code	International Safety Management Code.
Ltd qty	Limited quantity.
MARPOL	International Convention for the Prevention of Pollution from Ships.
MFAG	Medical first aid guide.
MHB	Materials hazardous only in bulk.
MISLE	Marine Information for Safety and Law Enforcement.
MSC	IMO Maritime Safety Committee.
NCB	National Cargo Bureau.
NCIP	National Container Inspection Program.
OMSEP	Occupational Medical Surveillance and Evaluation Program.
P&I	Protection and indemnity.
PDM	Potentially dangerous material.
PPE	Personnel protective equipment.
PSC	Port state control.
PCSO	Port state control officer.
RO/RO	Roll-on/Roll-off.
RM	Risk Management
SCBA	Self-contained breathing apparatus.

SMS	Safety Management System.
SOLAS	International Convention for the Safety of Life at Sea.
STCW	International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers.
TTP	Tactics, techniques, and procedures.
U.S.	United States.
U.S.C.	United States Code.
UN	United Nations.
USCG	United States Coast Guard.

Appendix B: Characteristics of Vessel Types

B.1. Bulk Carriers

A bulk carrier is designed to carry product in bulk, such as grains, coal, and rock. These vessels are generally constructed with single deck, top-side tanks and hopper side tanks in cargo spaces and have separate holds to separate the cargo. Each hold has a hatch that opens where the crew loads and unloads cargo. Deep tanks are located below the cargo holds and contain ballast, fuel, or void spaces.

Consider the ship's type indicated in the ship's certificates when determining whether a ship is a bulk carrier per reference (i), Procedures for Port State Control, 2017, IMO Resolution A.1119(30), 20 December 2017.



Figure B-1 Bulk Carrier

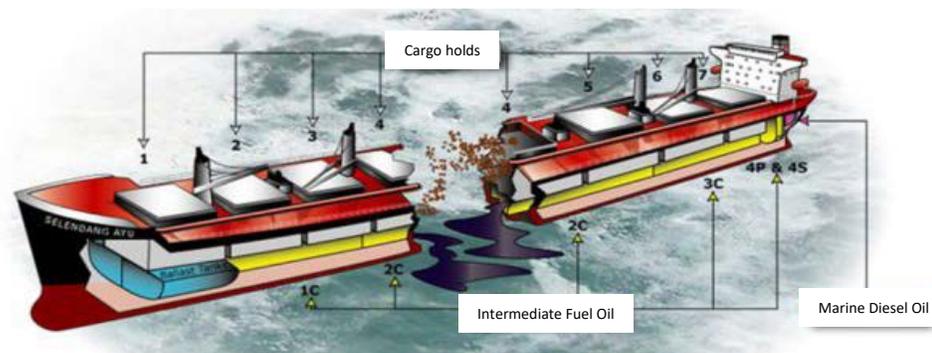


Figure B-2 Bulk carrier diagram

Bulk/break bulk cargo vessels are perceived to have more risk than other vessel types. For example, a bulk freighter that comes into a port ballasted has substantially more freeboard, adding to the risk for personnel transfer to and from the vessel. Port state control officers (PSCOs) and boarding officers tailor risk management strategies for the vessel types on which they are used. What might be an acceptable control strategy for a container vessel might be less than adequate for a bulk cargo vessel.

The following sections discuss different bulk carrier types based on their size and type of cargo.

B.1.a.
Double-bottom,
Single-hull Bulk
Carrier

Double-bottom, single-hull bulk carriers have a single hull, but are provided with a double bottom or a tank top throughout its length, from aft of the forward collision bulkhead to the aft peak bulkhead. The double-bottom spaces are used for storage of ballast and duct keel for passage of pipelines. Figure B-3 shows the midship section of a typical single hull double bottom bulk carrier, that is, port side only.

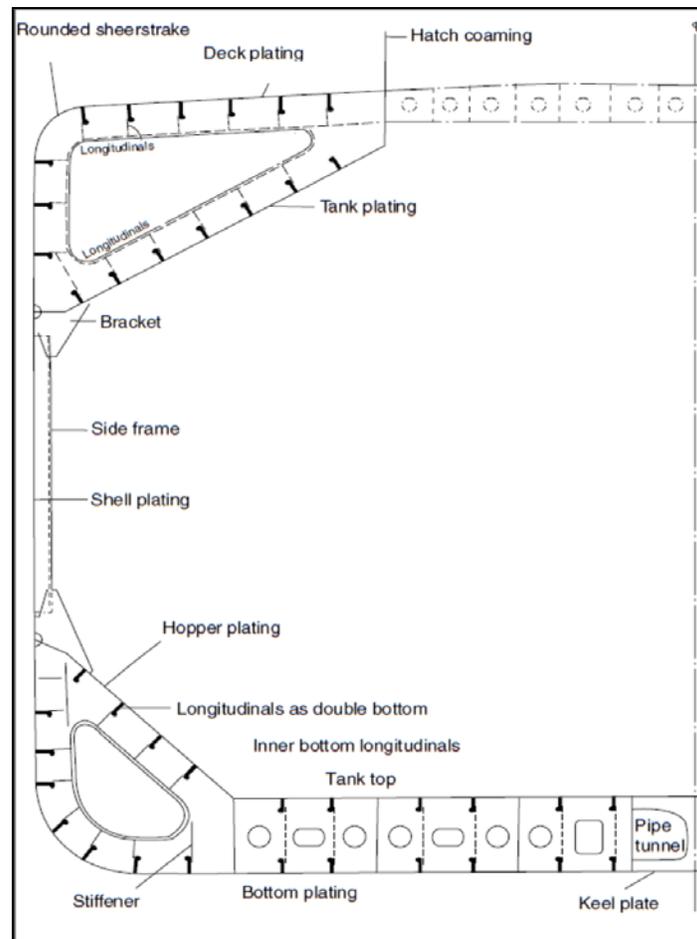


Figure B-3 Single-hull, double-bottom bulk carrier midship section

NOTE: Item nomenclature might vary in different geographic regions.

B.1.b.
Double-hull Bulk
Carrier

The use of double hull in bulk carrier designs has increased in recent years. The wing tanks at the sides provide marginal ballast, and control on the stability of the ship.

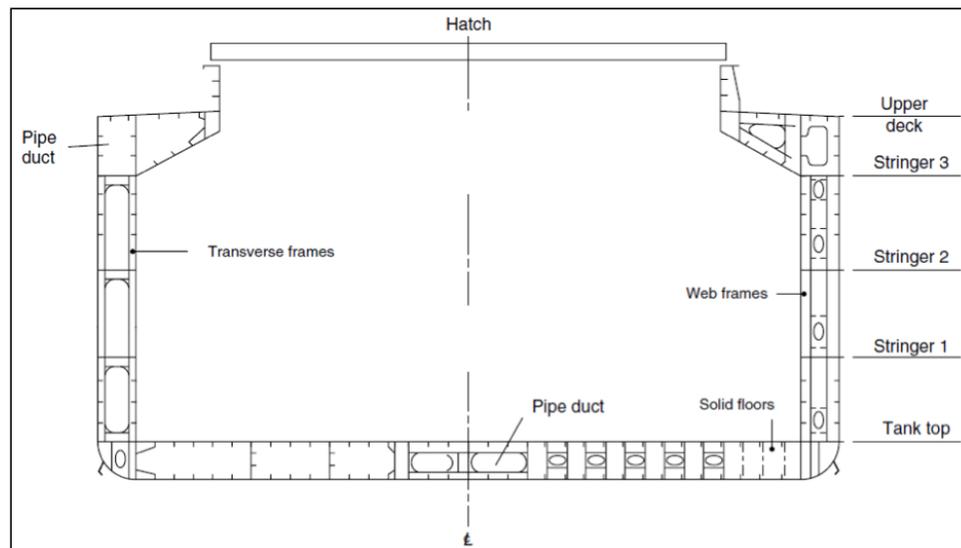


Figure B-4 Midship section of a double-hull bulk carrier

B.1.c. Carrier
Bulk Size

Handysize and handymax size bulk carriers comprise about 70 percent of the total dry bulker fleet. Ships of this size are able to access most ports and canals, which increases their scope of trade-making abilities.

Table B-1 compares bulk carrier types by deadweight tonnage (DWT).

Bulk Carrier Type	Weight
Handysize	10,000 DWT to 30,000 DWT.
Handymax	35,000 DWT to 60,000 DWT.
Panamax	60,000 DWT to 80,000 DWT.
Capesize	80,000 DWT and over.

Table B-1 Bulk carrier types by weight

B.1.d. General
Arrangement

A common dry bulk carrier has a clear main deck with the machinery room and superstructure. Hatches with unrestricted access to holds are designed on the main deck with steel hatch covers to facilitate easy loading and discharge of cargo.

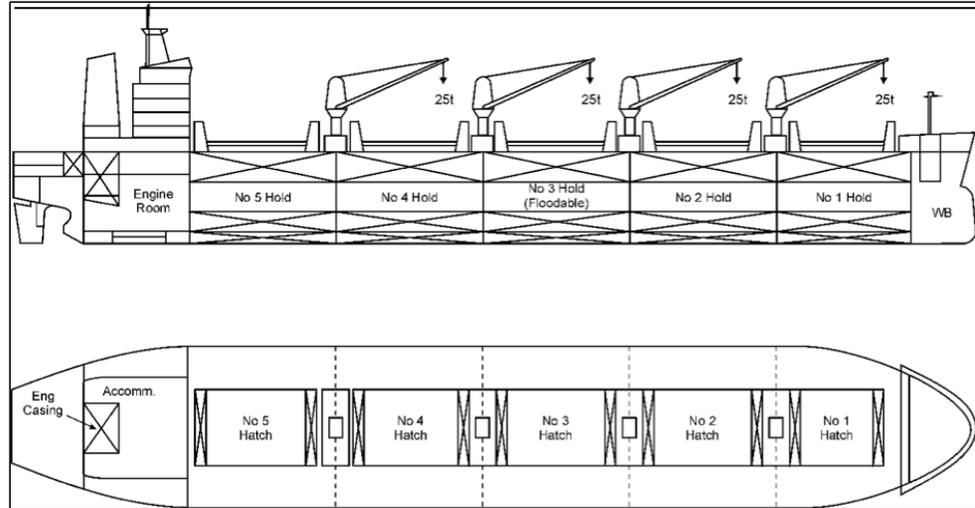


Figure B-5 Bulk carrier profile view

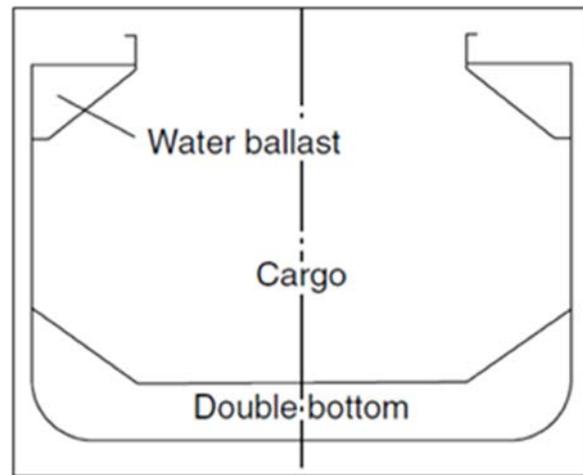


Figure B-6 General arrangement plan of a typical bulk carrier

Geared bulk ships have deck mounted cranes with 360-degree access and can load and discharge cargo from the holds immediately forward and aft. The space just forward of the forward collision bulkhead is used for chain locker. The fore peak tank in the bulbous bow is used to control and maintain the trim of the vessel and to ensure complete propeller immersion.

B.1.e. Topside
Tanks

Topside tanks are tanks of triangular configuration fitted at both shoulders/wings of the cargo holds and are meant to carry ballast water. Topside tanks consist of a “transverse ring” made from frames in the transverse direction.

Each transverse ring consists of:

- A deck transverse: The part of the frame under the deck supporting the deck plating.
- A side transverse: The part of the frame supporting the side shell plating. This is in line with the side shell frames within the cargo holds in single skin bulk carriers.
- A bottom transverse: The part of the frame supporting the bottom part of the topside tank.

The topside tanks are connected to the main ballast system of the ship. When discharging topside tanks during the loading/discharging of cargo, the discharge rate must remain constant and the weight of ballast water should be harmonized with the weight of the cargo per reference (cc), Code of Practice for the Safe Loading and Unloading of Bulk Carriers, IMO Resolution A.862(20) of 27 November 1997, also known as the BLU Code.

B.1.f. Wing
Tanks

Wing tanks provide additional space for ballast and the sloping margins of the tanktop to collect the cargo in the central part of the hold.

The fuel tank plating forms a sloping boundary that carries static and dynamic load due to cargo and ballast. The transverse frames in the wing tanks are divided into three types: side transverse, bottom transverse and bilge transverse, according to the structure to which they are attached.

In addition to carrying ballast, the upper and lower wing tanks have the following advantages:

- The space where an untrimmed cargo would otherwise shift into is occupied by the upper wing tanks and void space, that is upper stool, meaning cargo such as grain can sometimes be carried without being trimmed.
- The lower wing tank, combined with the lower void space, shapes the lower part of the cargo hold enabling cargo to be easily accessed in the central part of the hold when discharged with grabs.

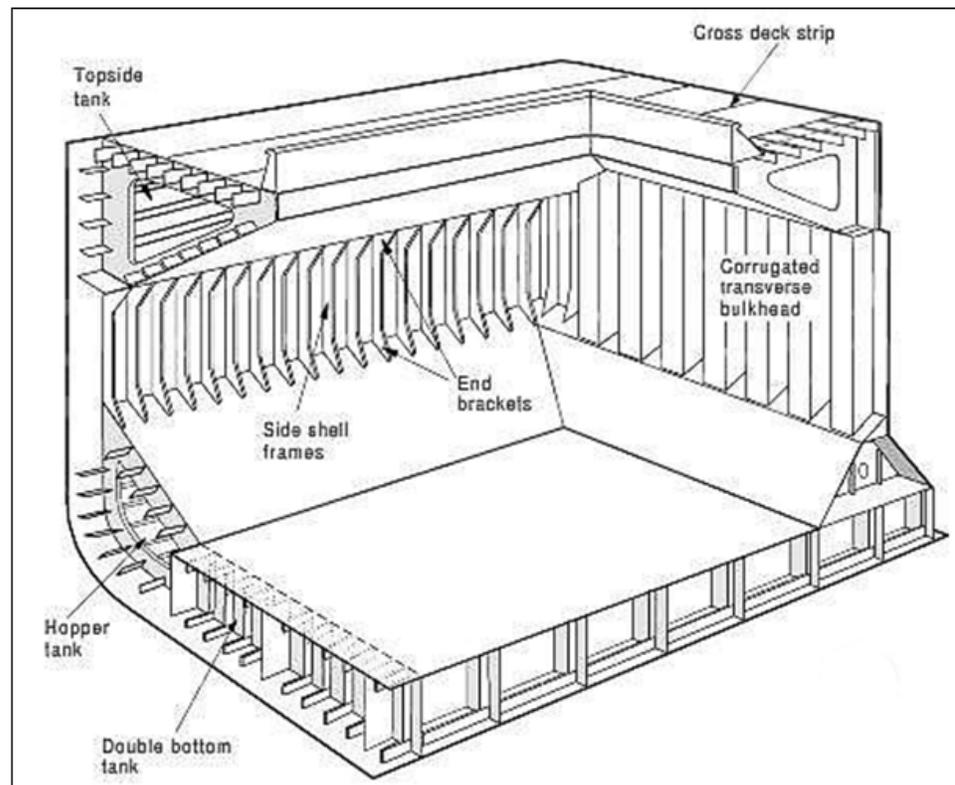


Figure B-7 Tanks configuration of a typical bulk carrier

NOTE:

For information on hatch cover design principals, design, maintenance, and safety, see *Hatch Cover Maintenance and Operation: A Guide to Good Practice* by David Byrne, North of England P&I Association Limited, 1998 and *A Masters Guide to: Hatch Cover Maintenance* by the Noord Nederlandsche P&I Club.

B.2. Dry Cargo Ships

Dry cargo ships carry solid dry goods that have a higher tolerance to heat and cold, such as metal ores, coal, steel products, forest products, and grains. These vessels are equipped with on-deck cranes and other mechanisms for loading and unloading of goods.



Figure B-8 Dry cargo ship

B.3. Container Ships

Container ships are ocean vessels that carry goods in large containers, a technique called containerization. Container ships are primarily used for the transportation of non-bulk cargo, generally manufactured goods in truck-size intermodal containers.



Figure B-9 Container ship

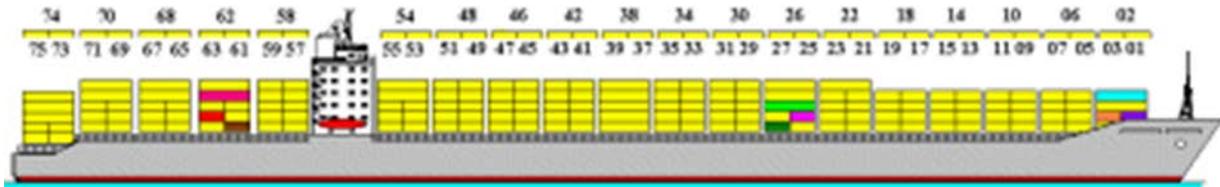


Figure B-10 Container ship diagram

B.3.a. Container
Vessel
Arrangement

[Figure B-11 Container ship diagram](#) shows a typical container vessel arrangement. Containers carried on container vessels are arranged in a stowage numbering system:

- Bay, that is, length:
 - Odd-numbered are 20 feet.
 - Even-numbered are 40 feet.
- Row, that is, width:
 - Middle row is designated as 00.
 - Odd numbers progressing starboard.
 - Even numbers progressing to port.
- Tier, that is, height: Numbers are all even with 02 at bottom level and progressing up.

Bays

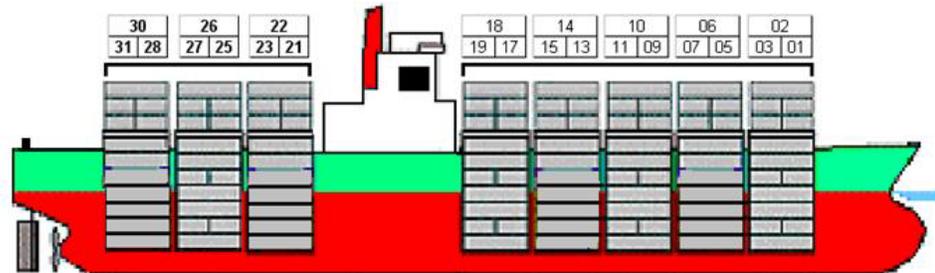
Even numbers are 40' container

02	
03	01

Odd numbers are 20' Container

Note that every other even number is omitted (DO NOT count these when doing stowage)

12 08 04 28 24 16



Rows and Tiers

View from Bow

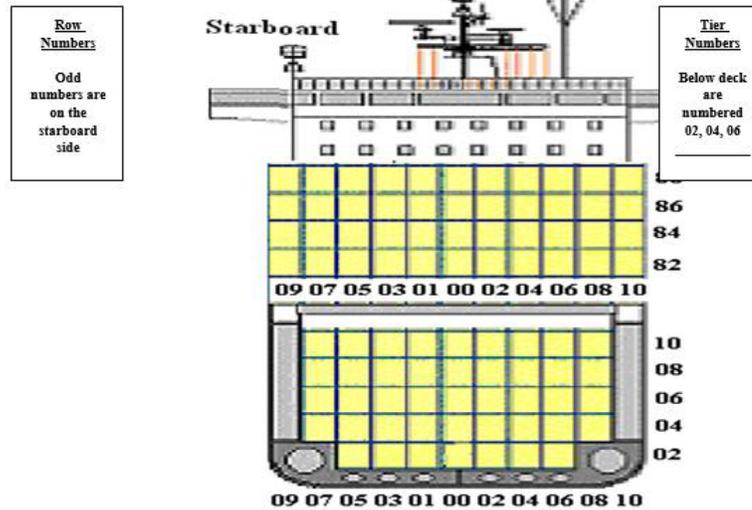


Figure B-11 Container ship diagram

B.4. Roll-on/ Roll-off (RO/RO) Ships

Roll-on/Roll-off (RO/RO) ships are used to transport vehicles. Also known as car carriers, these ships are designed to carry wheeled cargo, such as cars, trucks, semi-trailer trucks, trailers, and railroad cars. RO/ROs use a platform vehicle, such as a self-propelled module transporter to drive cars and other vehicle cargo on and off the vessel on their own wheels. RO/ROs have special inclines, that is, ramps constructed to make the loading and the unloading of vehicles and cargo easier and more convenient. The inclines of a RO/RO ship are connected to the entrance either in the bow or aft of the vessel or both.



Figure B-12 RO/RO ship

B.5. Heavy Lift Vessels

Heavy lift vessels are specialized ships capable of transporting non-standardized heavy cargo. They can be subdivided into four main categories:

- Project cargo ships.
- Open deck cargo ships.
- Dock ships
- Semi-submersible ships.

For more information, see the heavy lift vessel entry on the [Wärtsilä Encyclopedia of Marine Technology](#) website.

**B.6.
Self-unloading
Systems**

Self-unloading systems are horizontal and vertical conveyor systems used to discharge bulk cargo. Originally developed to allow ships to handle cargo at ports not equipped with their own gear, they are also used to reduce handling costs by minimizing the need for stevedores. Categories include:

- Bulklift systems.
- Cargo scooper systems.
- Consilium systems.

For more information, see self-unloading systems entry on the [Wärtsilä Encyclopedia of Marine Technology](#) website.

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