Basic qualifications in cargo handling, which everyone in logistics must know.
Introduction

WELCOME TO THE IMSBC CODE TRAINING MODULE FOR TERMINAL PERSONELL

Learning objectives in general:
To provide terminal representatives with training commensurate with their responsibilities as following manner:

1. Understanding and managing the ship/shore interface in relations to the operations and limitations of the terminal, its cargo handling equipment and procedures, the planning, control and monitoring of cargoes, relevant properties of the cargoes being handled, berthing/mooring operations and emergency procedures.

2. Thorough understanding of the underlying principles related to the loading and/or unloading of bulk carriers in accordance with BLU Code;
CHAPTER I

The IMSBC Code and Supplement

CONTENTS --- IMSBC Code

Section 1 General provisions;
Section 2 General loading, carriage and unloading precautions;
Section 3 Safety of personnel and ship;
Section 4 Assessment of acceptability of consignments for the shipment;
Section 5 Trimming procedures;
Section 6 Methods of determining the angle of repose;
Section 7 Cargoes that may liquefy;
Section 8 Test procedures for cargoes that may liquefy;
Section 9 Materials possessing chemical hazards;
Section 10 Carriage of solid wastes in bulk;
Section 11 Security provisions;
Section 12 Stowage factor conversion tables;
Section 13 References to related information and recommendations;
Section 14 Prevention of pollution by cargo residues from ships;
Appendix 1  Individual schedules of solid bulk cargoes;
Appendix 2  Laboratory test procedures, associated apparatus and standards;
Appendix 3  Properties of solid bulk cargoes;
Appendix 4  Index;
Appendix 5  Bulk cargo shipping names in three languages
CONTENTS --- SUPPLEMENT

Section 1  BLU Code;

Section 2  BLU Manual;

Section 3  Uniform method of measurement of the density of bulk cargo;

Section 4  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;

Section 5  Revised recommendations for entering enclosed spaces aboard ships;

Section 6  Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds;

Section 7  Guidelines for the submission of information and completion of the format for the properties of cargoes not listed in the IMSBC Code and their conditions of carriage;

Section 8  Guidelines for developing and approving procedures for sampling, testing and controlling the moisture content for solid bulk cargoes which may liquefy;

Section 9  Contact names and addresses of designated national competent authorities responsible for the safe carriage of grain and solid bulk cargoes.
CONTENTS --- BLU Code

Section 1  Definitions;
Section 2  Suitability of ships and terminals;
Section 3  Procedures between ship and shore prior to the ship’s arrival;
Section 4  Procedures between ship and the terminal prior to cargo handling;
Section 5  Cargo loading and handling of ballast;
Section 6  Unloading cargo and handling of ballast;
Appendix 1  Recommended contents of port and terminal information books;
Appendix 2  Loading or unloading plan;
Appendix 3  Ship/Shore safety checklist for loading or unloading dry bulk cargo carriers;
Appendix 4  Guidelines for completing the ship/shore safety checklist;
Appendix 5  Form for cargo information for solid bulk cargoes.
CHAPTER II

Cargoes listed in IMSBC Code

Where a solid bulk cargo is listed in appendix 1 to IMSBC Code (individual schedules for solid bulk cargoes) it shall be transported in accordance with the provisions in its Schedule in addition to the provisions in sections 1 to 10 and 11.1.1 (security provisions). The master should consider to consult the authorities at the ports of loading and discharge, as necessary, concerning the requirements which may be in force and applicable for the carriage.

Cargoes not listed in IMSBC Code.

If a solid cargo which is not listed in appendix 1 to IMSBC Code proposed for carriage in bulk, the shipper shall prior to loading, provide the competent authority of the port of loading with the characteristics and properties of the cargo in accordance with section 4 of IMSBC Code. Based on the information received, the competent authority will assess the acceptability of the cargo for safe shipment.

When it is assessed that the solid bulk cargo proposed for carriage may present hazards as those defined by group A or B of the IMSBC Code as defined in 1.7, advice is to be sought from the competent authorities of the port of loading, port unloading and of the flag State. The three competent authorities will set the preliminary suitable conditions for the carriage of this cargo.

When it is assessed that the solid bulk cargo proposed for carriage presents no specific hazards for transportation, the carriage of this cargo shall be authorized. The competent authorities of the port of unloading and of the flag State shall be advised of that authorization.

The competent authority of the port of loading shall provide to the master a certificate stating the characteristics of the cargo and the required conditions for carriage and handling of this shipment. The competent authority of the port of loading shall also submit an application to the IMO (International Maritime Organization) within one year from the issue of the certificate, to incorporate this solid bulk cargo into IMSBC Code appendix I (individual schedules of solid bulk cargoes).
Format for the properties of cargoes not listed in IMSBC Code and conditions of the carriage.

Tentative Bulk cargo Shipping Name (in capital letters)
Description (Describe the cargo)
Characteristics

<table>
<thead>
<tr>
<th>Angle of repose</th>
<th>Bulk density (kg/m³)</th>
<th>Stowage factor (m³/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Class</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hazard (Clarify the hazard of carriage of the cargo)
Stowage and segregation
Hold cleanliness
Weather precautions
Loading
Precautions
Ventilation
Carriage
Clean-up

Emergency procedures

<table>
<thead>
<tr>
<th>Special emergency equipment to be carried</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency procedures</td>
</tr>
<tr>
<td>Emergency action in the event of fire</td>
</tr>
<tr>
<td>Medical First Aid</td>
</tr>
</tbody>
</table>
Definitions

**Solid bulk cargo** means any cargo, other than a liquid or gas, consisting of a combination of particles, granules or any larger pieces of material generally uniform in composition which is loaded directly into the cargo spaces on a ship without any intermediate form of containment.

**Angle of repose** means the max. slope angle of non-cohesive granular material. It is measured between horizontal plane and the cone slope of such material.

**Non-cohesive material** means dry material that readily shift due to sliding during transport.

**Bulk cargo shipping name (BCSN)** identifies a bulk cargo during transport by sea.

**Competent authority** means any national regulatory body or authority designated or otherwise as such for any purpose in connection with IMSBC Code. The competent authority shall operate independently from shipper.

**Stowage factor** means the figure which expresses the number of cubic metres which one tonne of cargo will occupy.

**High-density** solid bulk cargo means a solid bulk cargo with a stowage factor of 0.56 m³/t or less.

**Materials hazardous only in bulk (MHB)** means materials which may possess chemical hazards when carried in bulk other than materials classified as dangerous goods in the IMDG Code.

**Group A** consist of cargoes which may liquefy if shipped at a moisture content in excess of their transportable moisture limit.

**Group B** consist of cargoes which possess a chemical hazard which could rise to a dangerous situation on a ship.

**Pour** means the quantity of cargo poured through one hatch opening as one step.
CHAPTER III

General requirements
Prior to and during loading, carriage and discharge of a solid bulk cargo, all necessary safety precautions shall be observed. Due considerations shall be also given to fire prevention and the effective operation of fire detection systems, containment and suppression under all anticipated operating conditions and cargoes.

Poisoning, corrosive and asphyxiation hazards.
Some solid bulk cargo are susceptible to oxidation, which may result in oxygen depletion, emission of toxic gases or fumes and self-heating. Some cargoes are not liable to oxidize but may emit toxic gases, particularly when wet. There are also cargoes which, when wetted, are corrosive to skin, eyes and mucous membranes or to terminal’s loading equipment and to the ship’s structure. When these cargoes are carried, particular attention shall be paid to protection of personnel and the need for special precautions to be taken prior to loading and after loading. Appropriate attention shall be paid that cargo spaces and adjacent spaces may be depleted in oxygen or may contain toxic or asphyxiating gases, and that an empty cargo space or tank which has remained closed for some time may have insufficient oxygen to support life. Prior to entry into enclosed space on terminal or aboard a ship, appropriate procedures shall be followed, taking into account the recommendations developed by IMO. Emergency entry into cargo space shall be undertaken only by trained personnel wearing self-containing breathing apparatus and protective clothing and always under supervision of a response officer (responsible terminal’s representative).

Health hazards due to dust.
To minimize the chronic and acute risks associated with exposure to the dust of some solid bulk cargoes precautions, including the use appropriate breathing protection, protective clothing, protective skin creams, adequate personal washing and laundering of outer clothing, shall be taken as necessary.
**Flammable atmosphere**
Dust of some solid bulk cargoes may constitute an explosion hazard, especially whilst loading, unloading and cleaning. This risk can be minimized by ventilating to prevent the formation of a dust-laden atmosphere or by hosing-down rather than sweeping. Some cargoes also may emit flammable gases in sufficient quantities to constitute fire or explosion hazard. Where this is indicated in the cargo schedule the cargo spaces shall be effectively ventilated as necessary. The atmosphere in the cargo spaces shall be monitored by means of an appropriate gas detector.

**Ventilation**
When cargoes which may emit toxic gases are carried, the cargo spaces shall be provided with mechanical or natural ventilation, and, when cargoes which may emit flammable gases are carried, the cargo spaces shall be provided with mechanical ventilation. When continuous ventilation is required by the schedule for the cargo in the IMSBC Code or by the cargo information provided by the shipper, ventilation shall be maintained while the cargo is in warehouse. Ventilation shall be such that any escaping hazardous gases, vapours or dust cannot enter the accommodation or other interior spaces in hazardous concentrations. Due consideration shall be given to prevent escaping hazardous gases, vapours or dust from reaching enclosed work areas. Adequate precautions shall be taken to protect the personnel in these work areas.
CHAPTER IV

Provision of information

The shipper shall provide the terminal’s authorities (master) with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect. The cargo information shall include:

1. The Bulk cargo shipping name (BCSN);
2. The cargo group (A and B, A, B or C);
3. The IMO class of the cargo;
4. The UN number, preceded by letters “UN” for the cargo, if applicable;
5. The total quantity of the cargo offered;
6. The stowage factor;
7. The need for trimming and the trimming procedures, as necessary;
8. The likelihood of shifting, including angle of repose, if applicable;
9. Additional information in the form of a certificate on the moisture content of the cargo and its transportable moisture limit in the case of a concentrate or other cargo which may liquefy;
10. Toxic or flammable gases which may be generated by cargo, if any;
11. Flammability, toxicity, corrosiveness and propensity to oxygen depletion of the cargo;
12. Self-heating properties of the cargo, and the need for trimming;
13. Properties on emission of flammable gases in contact with water;
14. Radioactives properties.
Table 1. Form for cargo information for solid bulk cargo.

<table>
<thead>
<tr>
<th>BCSN (bulk cargo shipping name)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipper</strong></td>
<td><strong>Transport document</strong></td>
</tr>
<tr>
<td><strong>Consignee</strong></td>
<td><strong>Carrier</strong></td>
</tr>
<tr>
<td><strong>Name/means of transport</strong></td>
<td><strong>Instructions or other matters</strong></td>
</tr>
<tr>
<td><strong>Port/place of departure</strong></td>
<td><strong>Port/place of destinations</strong></td>
</tr>
<tr>
<td><strong>General description of the cargo</strong></td>
<td><strong>Gross mass (kg/tonnes)</strong></td>
</tr>
<tr>
<td>(Type of material/particles size)</td>
<td></td>
</tr>
<tr>
<td>Specifications of bulk cargo, if applicable:</td>
<td></td>
</tr>
<tr>
<td>Stowage factor:</td>
<td></td>
</tr>
<tr>
<td>Angle of repose, if applicable</td>
<td></td>
</tr>
<tr>
<td>Trimming procedures:</td>
<td></td>
</tr>
<tr>
<td>Chemical properties if potential hazard</td>
<td></td>
</tr>
<tr>
<td>(Class and UN No. or “MHB”)</td>
<td></td>
</tr>
</tbody>
</table>

- Group A and B
- Group A
- Group B
- Group C

Classification relating to Marpol Annex V
- Harmful to the marine environment
- Not Harmful to the marine environment

Relevant special properties of the cargo (e.g. highly soluble in water)

<table>
<thead>
<tr>
<th><strong>Transportable moisture limit</strong></th>
<th><strong>Moisture content at shipment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Additional certificates</strong></td>
<td></td>
</tr>
<tr>
<td>• Certificate of moisture content and transportable moisture limit</td>
<td></td>
</tr>
<tr>
<td>• Weathering certificate</td>
<td></td>
</tr>
<tr>
<td>• Exemption certificate</td>
<td></td>
</tr>
<tr>
<td>• Other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DECLARATION</strong></th>
<th><strong>Name/status, company/organization of signatory</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>I hereby declare that the consignment is fully and accurately described and that the given test results and other specifications are correct to the best of my knowledge and belief and can be considered as representative to the cargo to be loaded.</td>
<td></td>
</tr>
<tr>
<td><strong>Place and date</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Signature on behalf of shipper</strong></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER V

Cargoes that may liquefy

Conditions as hazards

Group A cargoes contain a certain proportion of small particles and certain amount of moisture. These cargoes may liquefy during voyage in case when average moisture content exceeds the transportable moisture limit (TML) and when stimulus of compaction and vibration occurs during a voyage. Some cargoes which may liquefy may also heat spontaneously. Some cargoes are susceptible to moisture migration and may develop a dangerous wet base even if the average moisture content is less than the TML. Although the cargo surface may appear dry undetected liquefaction may take place, resulting in shifting of the cargo. Cargoes with high moisture content are prone to sliding, particularly when the cargo is shallow and subject to large heel angles. In the resulting viscous fluid state cargo may flow to one side of the ship with a roll but not completely return with a roll the other way. Consequently the ship may progressively reach a dangerous heel and capsize quite suddenly.
CHAPTER VI

Classification of dangerous goods

The classification of materials possessing chemical hazards and intended to be shipped in bulk under requirements of IMSBC Code shall be in accordance with these classification. SOLAS regulation VII/7 defines dangerous goods in solid form in bulk. For the purpose of the IMSBC Code, dangerous goods shall be classified in accordance with part 2 of the IMDG Code.

Class 4.1: Flammable solids
The materials in this class are readily combustible and solids which may cause fire through friction.

Class 4.2: Substances liable to spontaneous combustion
The materials in this class are materials, other than pyrophoric materials, which, in contact with air without energy supply, are liable to self-heating.

Class 4.3: Substances which, in contact with water, emit flammable gases
The materials in this class are solids which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

Class 5.1: Oxidizing substances
The materials in this class are materials that, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

Class 6.1: Toxic substances
The materials in this class are materials liable either to cause death or serious injury or to harm human health if swallowed or inhaled, or by skin contact.

Class 7: Radioactive material
The materials in this class are materials containing radionuclides.

Class 8: Corrosive substances
The materials in this class are solids which, by chemical action, will cause severe damage when in contact with living tissue or will materially damage, or even destroy other goods or the means of transport.

**Class 9: Miscellaneous dangerous substances and articles**

The materials in this class are materials and articles which, during transport, present a danger not covered by other classes.

**Materials hazardous only in bulk (MHB)**

These are materials which possess chemical hazards when transported in bulk other than materials classified as packaged dangerous goods in the IMDG. These materials present a significant risk when carried in bulk and require special precautions. A notational reference shall accompany the MHB designation in the „Class” cell of the characteristics table for each individual Schedule for cargoes classified as MHB.

### Notational table

<table>
<thead>
<tr>
<th>Chemical hazard</th>
<th>Notational reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Combustible solids</strong></td>
<td>CB</td>
</tr>
<tr>
<td>These are materials which are readily combustible or easily ignitable when transported in bulk and do not meet the established criteria for inclusion in class 4.1;</td>
<td></td>
</tr>
<tr>
<td><strong>Self-heating solids</strong></td>
<td>SH</td>
</tr>
<tr>
<td>These are materials that self-heat when transported in bulk and do not meet the established criteria for inclusion in class 4.2;</td>
<td></td>
</tr>
<tr>
<td><strong>Solids that evolve flammable gas when wet</strong></td>
<td>WF</td>
</tr>
<tr>
<td>These are materials that emit flammable gases when in contact with water when transported in bulk and do not meet the established criteria for inclusion in class 4.3;</td>
<td></td>
</tr>
<tr>
<td><strong>Solids that evolve toxic gas when wet</strong></td>
<td>WT</td>
</tr>
<tr>
<td>These are materials that emit toxic gases when in contact with water when transported in bulk;</td>
<td></td>
</tr>
<tr>
<td><strong>Toxic solids</strong></td>
<td>TX</td>
</tr>
<tr>
<td>These are materials that have toxic hazards to humans if inhaled or with contact with skin when loaded, unloaded, or transported in bulk and do not meet the established criteria for inclusion in class 6.1;</td>
<td></td>
</tr>
<tr>
<td><strong>Corrosive solids</strong></td>
<td>CR</td>
</tr>
</tbody>
</table>
These are materials that are corrosive to skin, eye or to metal or are respiratory sentizers and do not meet the established criteria for inclusion in class 8;

Other hazards

<table>
<thead>
<tr>
<th>Solid bulk material</th>
<th>4.1</th>
<th>4.2</th>
<th>4.3</th>
<th>5.1</th>
<th>6.1</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable solids</td>
<td>4.1</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substances liable to spontaneous combustion</td>
<td>4.2</td>
<td>2</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substances which, in contact with water, emit flammable gases</td>
<td>4.3</td>
<td>3</td>
<td>3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidizing substances</td>
<td>5.1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxic substances</td>
<td>6.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>2</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radioactive materials</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Corrosive substances</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>X</td>
<td>2</td>
<td>X</td>
</tr>
<tr>
<td>Miscellaneous dangerous substances and articles</td>
<td>9</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>2</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Materials hazardous only in bulk (MHB)</td>
<td>MHB</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

2 – „Separated from”  
   In different holds (different warehouse storage spaces);
3 – „Separated by a complete compartment or hold from”
X – Segregation not necessary

Unless otherwise required in the in the individual schedules, segregation between solid bulk cargoes of group B and dangerous goods in packaged form shall be in accordance with the following table:
### Dangerous goods in packaged form

| Bulk cargo classified as dangerous goods | Class/Division | 1.1 | 1.2 | 1.3 | 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 |
|------------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|----|---|---|
| **Flammable solids**                     |                | 4.1 | 4   | 3   | 2   | 2   | 2   | 2   | X  | 1   | X   | 1   | 2   | X   | 3   | 2 | 1 | X |
| **Substances liable to spontaneous combustion** |                | 4.2 | 4   | 3   | 2   | 2   | 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   | 1   | X   | 2   | X  | 1   | X   | 2   | 2   | X   | 2   | 1 | X |
| **Oxidizing substances**                 |                | 5.1 | 4   | 4   | 2   | 2   | X   | 2   | 1  | 2   | 2   | X   | 2   | 1   | 3   | 1 | 2 | X |
| **Toxic substances**                     |                | 6.1 | 2   | 2   | X   | X   | X   | X   | X  | 1   | X   | 1   | 1   | X   | 1   | X | X | X |
| **Radioactive materials**                |                | 7   | 2   | 2   | 2   | 2   | 2   | 2   | 1  | 2   | X   | 3   | X   | 2   | X | X | X |
| **Corrosive substances**                 |                | 8   | 4   | 2   | 2   | 1   | X   | 1   | 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 |
| **Materials hazardous only in bulk (MHB)** | MHB            | X   | X   | X   | X   | X   | X   | X   | X  | X   | X   | X   | X   | X   | X   | X | X | X |

1 – „Away from”
Effectively segregated so that incompatible materials cannot interact dangerously in the event of an accident;

2 – „Separated from”
In different holds (different warehouse storage spaces);

3 – „Separated by a complete compartment or hold from”
Means either a vertical or a horizontal separation;

4 - „Separated longitudinally by an intervening complete compartment or hold from”
**Special requirements**

**Materials of classes 4.1, 4.2, 4.3**

Materials of these classes shall be kept as cool and dry as reasonably practicable and, unless expressly provided otherwise in IMSBC Code, shall be stowed „away from” all sources of heat or ignition.

Cargoes liable to give off vapours or gases which can form an explosive mixture with air shall be stowed in a mechanically ventilated space.

Prohibition of smoking in dangerous areas shall be enforced, and clearly legible “NO Smoking” signs shall be displayed.

**Materials of classes 5.1**

Materials of these classes shall be kept as cool and dry as reasonably practicable and, unless expressly provided otherwise in IMSBC Code, shall be stowed „away from” all sources of heat or ignition. They shall also be stowed „separated from” other combustible materials.

Before loading cargoes of this class, particular attention shall be paid to the cleaning of the cargo spaces into which they will be loaded. As far as reasonably practicable, non-combustible securing and protecting materials shall be used and only a minimum of dry wooden dunnage shall be used.

Precautions shall be taken to avoid the penetration of oxidizing materials into other cargo spaces which may contain a combustible material.

**Materials of class 8 or materials having similar properties**

These cargoes shall be kept as dry as reasonably practicable. Prior to loading these cargoes, attention shall be paid to the cleaning of the cargo spaces into which they will be loaded, particularly to ensure that these spaces are dry.
CHAPTER VII

Wood pellets containing additives and/or binders

Description
These wood pellets are light blond to dark brown in colour, very hard and cannot be easily squashed. The raw material (sawdust, planer shavings and other wood waste) for such pellets is fragmented, dried and extruded into pellet form using appropriate additives and/or binders. The raw material is compressed approximately 3.5 times and the finished wood pellets typically have a moisture content of 4% to 8%. Wood pellets are used as a fuel in district heating and electrical power generation as well as a fuel for small space heaters such as stoves and fireplaces.

Characteristics

<table>
<thead>
<tr>
<th>Angle of repose</th>
<th>Bulk density (kg/m³)</th>
<th>Stowage factor (m³/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximately 30°</td>
<td>600 to 750</td>
<td>1.33 to 1.67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Class</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylindrical with diameter: 3 mm to 12 mm Length: 10 to 20 mm</td>
<td>MHB (WF)</td>
<td>B</td>
</tr>
</tbody>
</table>

Hazard
These wood pellets are subject to oxidation leading to depletion of oxygen and increase of carbon monoxide and carbon dioxide in cargo and communicating spaces. Swelling if exposed to moisture. Wood pellets may ferment over time if moisture content is over 15%, leading to generation of asphyxiating and flammable gases which may cause spontaneous combustion. Handling of wood pellets may cause dust to develop. Risk of explosion at high dust concentration.
Stowage and segregation
Segregate as for class 4.1 materials.

Hold (warehouse storage space) cleanless
Clean and dry as relevant to the hazards of the cargo.

Weather precautions
This cargo shall be kept as dry as practicable. This cargo shall not be handled during precipitation. During handling of this cargo, all non-working hatches of the cargo spaces into which this cargo is loaded or to be loaded shall be closed. There is a high risk of renewed oxygen depletion and carbon monoxide formation in previously ventilated adjacent spaces after closure of the hatch covers.

Precautions
Entry of personnel into cargo and adjacent confined spaces shall not be permitted until tests have been carried out it has been established that the oxygen content and carbon monoxide levels have been to the following levels: oxygen 21% and carbon monoxide < 100 ppm. If these conditions are not met, additional ventilation shall be applied to the cargo hold or adjacent confined spaces and re-measuring shall be conducted after a suitable interval.

<table>
<thead>
<tr>
<th>Emergency procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special emergency equipment to be carried</strong></td>
</tr>
<tr>
<td>Self-containing breathing apparatus and combined or individual oxygen and carbon monoxide meters should be available.</td>
</tr>
<tr>
<td><strong>Emergency action in the event of fire</strong></td>
</tr>
<tr>
<td>Batten down; use ship’s fixed fire-fighting installation, if fitted.</td>
</tr>
<tr>
<td>Exclusion of air may be sufficient to control fire.</td>
</tr>
<tr>
<td>Extinguish fire with carbon dioxide, foam or water</td>
</tr>
</tbody>
</table>

**Ferrosilicon UN 1408 with 30% or more but less than 90% silicon**

**Description**
Ferrosilicon is an extremely heavy cargo.

**Characteristics**

<table>
<thead>
<tr>
<th>Angle of repose</th>
<th>Bulk density (kg/m³)</th>
<th>Stowage factor (m³/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td>1.389 to 2.083</td>
<td>0.48 to 0.72</td>
</tr>
<tr>
<td></td>
<td>(1.111 to 1.538 for briquettes)</td>
<td>(0.65 to 0.90 for briquettes)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Class</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 300 mm</td>
<td>4.3</td>
<td>6.1</td>
</tr>
</tbody>
</table>
Hazard
In contact with moisture or water it may evolve hydrogen, a flammable gas which may form explosives mixtures with air and may, under similar circumstances, produce phosphine and arsine, which are highly toxic gases. This cargo is non-combustible or has a low fire-risk.

Stowage and segregation
Clean and dry as relevant to the hazards of the cargo.

Weather precautions
This cargo shall be kept as dry as practicable before loading, during loading and during voyage. This cargo shall not be loaded during precipitation. During loading of this cargo, all non-working hatches of the cargo spaces to which this cargo is loaded shall be loaded.

Precautions
The manufacturer or the shipper shall provide the terminal authority and master with a certificate stating that, after manufacture, the cargo was stored under cover, but exposed to dry weather for not less than three days prior shipment.

Ventilation
Continuous mechanical ventilation shall be conducted during the voyage for the cargo spaces carrying this cargo. If maintaining ventilation endangers the ship or the cargo, it may be interrupted unless there is a risk of explosion or other danger due to interruption of the ventilation. In any case, mechanical ventilation shall be maintained for a reasonable period prior to discharge.

Carriage
For quantitative measurements of hydrogen, phosphine and arsine, suitable detectors for each gas or combination of gases shall be on board while this cargo is carried. The detectors shall be of certified safe type for use in explosive atmosphere. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during voyage, and the results of the measurements shall be recorded and kept on board.

Clean-up
After discharge of this cargo, the cargo spaces shall be swept clean twice. Water shall not be used for cleaning of the cargo space which has contained this cargo, because of danger of gas.

<table>
<thead>
<tr>
<th>Emergency procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special emergency equipment to be carried</strong></td>
</tr>
<tr>
<td>Self-containing breathing apparatus</td>
</tr>
<tr>
<td><strong>Emergency action in the event of fire</strong></td>
</tr>
<tr>
<td>Wear self-containing breathing apparatus</td>
</tr>
<tr>
<td><strong>Emergency action in the event of fire</strong></td>
</tr>
<tr>
<td>Batten down and use CO₂ if available. <strong>Do not use water</strong></td>
</tr>
</tbody>
</table>
**Bulk carrier**

Bulk carrier means a ship which is constructed generally with single deck, top side and hopper side tanks in cargo spaces, and intended primarily to carry dry cargo in bulk, and includes also such types as ore carriers and combination carriers.

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. Most bulk carriers have deck mounted cranes that have 360 degree access and can load and discharge cargo from the holds immediately forward and aft.
Dry bulk carriers are categorised on different aspects like size, type of cargo, and structural properties.

According to Size:

- **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.

Handysize and Handymax size bulkers comprise of around 70 percent of the total dry bulker fleet. This size of bulk carriers are seeing the maximum growth rate in today’s market, as shipping companies prefer smaller sizes due to many restrictions put on ships of larger size. Ships of these size are also able to access most of the ports and canals, which increases their scope of trade-making abilities.

According to Structural Properties:

- **Single Bottom Bulk Carrier**: These type of bulk carrier ships do not have a double bottom, and the only barrier between the sea and the cargo is the outer bottom plate. Bulk carriers under 120 m length do not require a double bottom as per structural requirements, but today, ship designers still prefer to avoid single bottoms in order to prevent contact of cargo with sea water in case of structural damages.

- **Double Bottom-Single Hull Bulk Carrier**: These ships 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.

- **Double Hull Bulk Carrier**: The use of double hull in bulk carrier designs have increased rapidly over the last ten years. The wing tanks at the sides are an added advantage, and provide more marginal ballast, and better control on the stability of the ship.
General Arrangement Plan of a typical bulk carrier
Midship Section of a Typical Single hull Double bottom Bulk Carrier (Port Side only)
Midship Section of a double hull bulk carrier.
Suitability of ships and terminals

All ships nominated for loading should hold the appropriate valid statutory certification including, if required, the document of compliance for ships carrying solid dangerous goods in bulk. It is recommended that the period of validity of the ship’s certificates be sufficient to remain valid during loading, voyage and unloading times, plus reserve to allow for delays in berthing, inclement (bad) weather or both.

The charterer and shipper when accepting a ship for a particular cargo or service should ensure that the ship:

1. Is suitable for access to the planned loading or unloading facilities;
2. Does not have cargo handling equipment which would inhibit the safety of the loading and unloading operations

Terminal operator should ensure that they only accept ships that can safely berth alongside their installation, taking into consideration issues such as:

1. Water depth at the berth;
2. Maximum size of the ship;
3. Mooring arrangements;
4. Fendering;
5. Safe access;
6. Obstructions to loading/unloading operations.

Terminal equipment should be properly certificated and maintained in accordance with the relevant national regulations and/or standards, and only operated by duly qualified and, if appropriate, certificated personnel. Terminal personnel should be trained in all aspects of safe loading and unloading and carriage of bulk cargoes, commensurate with their responsibilities. The training should be designed to provide familiarity with the general hazards of loading, unloading and carriage of bulk cargoes and the adverse effect improper cargo handling operations may have on the safety of the ship.
Procedures between the terminal and the ship prior to the ship’s arrival.

On receipt of the ship’s initial notification of its ETA (estimated time of arrival), the terminal should give the ship the following information as soon as possible:

3. The name of the berth at which loading will take and the estimated times for berthing and completion of loading or unloading;
4. Characteristics of the loading or unloading equipment, including the terminal’s nominal loading or unloading rate and the number of loading or unloading heads to be used;
5. Features of the berth or jetty the master may need to be aware of, including the position of fixed and mobile obstructions, fenders, bollards and mooring arrangements;
6. Minimum depth of water alongside the berth and in approach or departure channels;
7. Water density at the berth;
8. The maximum distance between the waterline and the top of cargo hatch covers or coamings, whichever is relevant to the loading operations, and maximum air draught;
9. Arrangements for gangways and access;
10. Which side of the ship is to be alongside the berth;
11. Maximum allowable speed of approach to the jetty and availability of tugs, their type and bollard pull;
12. The loading sequence for different parcels of cargo, and any other restrictions of it is not possible to take the cargo in any order or any hold to suit the ship;
13. Any properties of the cargo to be loaded which may present a hazard when placed in contact with cargo or residues on board;
14. Advance information on the proposed cargo handling operations or changes of existing plans for cargo handling;
15. If the terminal’s loadings or unloading equipment is fixed, or has any limits to its movement;
16. Mooring lines required;
17. Warning of unusual mooring arrangements;
18. Any restrictions on deballastings;
19. Maximum sailing draught permitted by the port authority; and
20. Any other items related to the terminal requested by the master.
21. Information on estimated times for berthing and departure and on minimum water depth at the berth should progressively updated and passed to the master on receipt of successive ETA advices.
Procedures between the terminal and the ship prior to cargo handling

The terminal representative is responsible for loading or unloading cargo in accordance with the hatch sequence and tonnages stated on the ship’s loading or unloading plan. Before loading or unloading is commenced, the terminal representative should:

1. Complete the ship/shore safety checklist jointly with the master Tab.2
2. Agree loading or unloading plan Tab.3
3. To submit ship’s master cargo information for solid bulk cargo Tab.1
4. To submit ship’s master and discussed emergency procedures (content)
5. Not deviate from the loading or unloading plan unless by prior consultation and agreement with the master;
6. Trim the cargo, when loading or unloading, to the master’s requirements;
7. Maintain a record of the weight and disposition of the cargo loaded or unloaded and ensure that the weight in the hold do not deviate from the plan;
8. Provide the master with the names and procedures for contacting the terminal personnel or shipper’s agent who will have responsibility for the loading or unloading operation and with whom the master will have contact;
9. Avoid damage to the ship by the loading or unloading equipment and inform the master, if damage occurs;
10. Ensure that no hot work is carried out on board or in the vicinity of the ship while the ship is alongside the berth expect with the permission of the master and in accordance with any requirements of the port administration;
11. Ensure that there is agreement between the master and the terminal representative at all stages and in relation to all aspects of the loading or unloading operation.

Cargo loading/unloading and handling of ballast in general

When the cargo loading plan is agreed, the master and terminal representative should confirm the method of cargo operations so as to ensure no excessive stresses on the hull, tank top and associated structures, and exchange information to avoid any structural damage to the ship by cargo handling equipment. The terminal representative should alert the master, when the cargo is heavy, or when the individual grab loads are large, that there may be high, localized impact loads on the ship’s structure until the tank top is completely covered by cargo, especially when high free-fall drops are permitted. As such impacts have the potential for causing structural damage, special care should be taken at the start of the loading operation in
each cargo hold. The terminal representative should advise the master on any change to the agreed loading rate and, at the completion of each pour, the terminal representative should advise the master of the weight loaded and that cargo loading continues in accordance with the agreed cargo plan. When ballasting one or more holds, master and terminal operator should take account of the possibility of the discharge of flammable vapours from the hold. Suitable precautions should be taken before any hot work is permitted adjacent to or above that space.

**Ship/shore communications arrangements**

Ship/shore communications arrangements should be confirmed when completing the ship/shore safety checklist, giving also all necessary details and contact details for both ship and terminal including:

a) Language and terminology to be used.

b) Location of telephones and terminal offices, normal communications procedures and telephone numbers.

c) Emergency communications procedures and telephone numbers.

d) Designated port VHF Channels.

Clarify procedures for providing the duty officer with the tonnage loaded and the loading rate as required. Clarify arrangements for stops to carry out draught checks. Clarify arrangements for reporting ship damage by stevedores. The ship should provide the terminal with its proposed loading/unloading plan in advance of the ship's arrival. The terminal representative should co-ordinate with the master and agree upon a plan before operations begin. Agreeing the unloading plan prior to arrival simplifies matters for all concerned when the ship does arrive, as there usually is little time for the master to re-calculate the loading plan after the ship has arrived and is ready to commence loading. Master should ensure that the terminal representative is provided with accurate information in good time so as the loader/unloader operator can be notified of the ship's requirements.
Tab.2
Ship/shore safety checklist for loading or unloading

Date…………………………..Terminal………………………………………………..Port…………………………Minimum air draught……………………………………..Available depth of water in berth………………………………………………..Ship’s name…………………………………………………………………………Arrival drought (read/calculated)………………………………….Air draught……………Calculated departure draught…………………………………Air draught……………

The master and terminal, or their representatives, should complete the checklist jointly. Advice on points to be considered is given in the accompanying guidelines. The safety of operations requires that all questions should be answered affirmatively and the boxes ticked. If this is not possible, the reason should be given, and agreement reached upon precautions to be taken between ship and terminal. If a question is considered to be not applicable write “N/A”, explaining why if appropriate.

1. Is the depth of water at the berth, and the air draught, adequate for the cargo operations to be completed? The depth of water should be determined over the entire area the ship will occupy, and the terminal should be aware of the ship’s maximum air draught and water draught requirements during cargo operations. Where the loaded drought means a small underkeel clearance, the master should consult and confirm that the proposed departure drought is safe and suitable.

2. Are mooring arrangements adequate for all local effects of tide, current, weather, traffic and craft alongside? Due regard should be given to the need for adequate fendering arrangements. Ships should remain well secured in their moorings. Alongside piers or quays, ranging of the ship should be prevented by keeping mooring ropes taut, attention should be given to the movement of the ship caused by tides, currents or passing ships and by the operations in progress. Wire ropes and fibre ropes should not be used together in the same direction because of differences in their elastic properties.

3. In emergency, is the ship able to leave the berth at any time? The ship should normally be able to move under its own power at short notice, unless agreement to immobilize the ship has been reached with the terminal representative, and the port authority where applicable. The method to be used for any emergency unberthing operation should be agreed, taking into account the possible risks involved. If emergency
towing-off wires are required, agreement should be reached on their positions and methods of securing.

4. Is there safety access between the ship and the wharf?
   The means access between the ship and the wharf must be safe and legal, and may be provided by either ship or terminal. It should consist of an appropriate gangway or accommodation ladder with a properly fastened safety net underneath it. Access equipment must be tended, since it can be damaged as a result of changing heights and draughts; persons responsible for tending it must be agreed between the ship and terminal, and recorded in the checklist. The gangway should be positioned so that it is underneath the pass of cargo being loaded or unloaded. It should be well illuminated during darkness. A lifebuoy with a heaving line should be available on board the ship near the gangway or accommodation ladder.

5. Is the agreed ship/terminal communications systems operative?
   Communication should be maintained in the most efficient way between the responsible officer on duty on the ship and the responsible person ashore. The selected system of communication and the language to be used, together with the necessary telephone numbers and/or radio.

6. Are the liaison contact persons during operations positively identified?
   The controlling personnel on ship and terminal must maintain an effective communication with each other and their respective supervisors. Their names, and if appropriate where they can contacted, should be recorded in the checklist.

7. Are adequate crew on board, and adequate staff in terminal, for emergency?
   It is not possible or desirable to specify all conditions, but it is important that a sufficient number of personnel should be on board the ship, and in the terminal throughout the ships stay, to deal with an emergency. The signals to be used in the event of an emergency arising ashore or on board should be clearly understood by all personnel involved in cargo operations.

8. Have any bunkering operations been advised and agreed?
   The person on board in charge of bunkering must be identified, together with time, method of delivery (hose from shore, bunker barge, etc.) and the location of the bunker point on board. Loading of bunkers should be coordinated with the cargo operations. The terminal should confirm agreement to the procedure.
9. Have any intended repairs to wharf or ship whilst alongside been advised and agreed?

*Hot work, involving welding, burning or use naked flame, whether on the ship or the wharf may require a hot work permit. Work on deck which could interfere with cargo work will need to be coordinated.*

10. Has a procedure for reporting and recording damage from cargo operations been agreed?

*Operational damage can be expected in a harsh trade. To avoid conflict, a procedure must be agreed, before cargo operations commence, to record such damage. An accumulation of small items of damage to steel work can cause significant loss of strength for the ship, so it is essential that damage is noted, to allow prompt repair.*

11. Has the ship been provided with copies of port and terminal regulations, including safety and pollution requirements and details of emergency services?

*Although much information will normally be provided by ship’s agent, a fact sheet containing this information should be passed to the ship on arrival, and should include any local regulations controlling the discharge of ballast and hold washings.*

12. Has the shipper provided the master with the properties of the cargo in accordance with the requirements of chapter VI of SOLAS?

*The shipper should pass to the master, for example, the grade of cargo, particle size, quantity to be loaded, stowage factor, and cargo moisture content. The IMSBC Code gives guidance on this. The ship should be advised of any material which may contaminate or react with the planned cargo, and the ship should ensure that the holds are free of such material.*

13. Is the atmosphere safe in holds and enclosed spaces to which access may be required, have fumigated cargoes been identified, and has the need for monitoring of atmosphere been agreed by ship and terminal?

*Rusting of steelwork or the characteristic of a cargo may cause a hazardous atmosphere to develop. Considerations should be given to: oxygen depletion in holds; the effect to fumigation either of cargo to be discharged, or of cargo in a silo before loading from where gas can be swept on board along with the cargo with no warning to the ship; and leakage of gases, whether poisonous or explosive, from adjacent holds or other spaces.*

14. Have the cargo handling capacity and any limits of travel for each loader/unloader been passed to the ship/terminal?

*The number of loaders or unloaders to be used should be agreed, and their capabilities understood by both parties. The agreed maximum transfer rate for each loader/unloader should be recorded in the checklist. Limits of travel of loading or unloading equipment should be indicated. This is essential information when planning cargo operations in berths.*
where a ship must be shifted from one position to another due to loading. Gear should always be checked for faults and that it is clear of contaminates from previous cargoes. The accuracy of weighing devices should be ascertained frequently.

15. Has a cargo loading and unloading plan been calculated for all stages of loading/deballasting or unloading/ballasting?

Where possible the ship should prepare the plan before arrival. To permit her to do so the terminal provide whatever information to ship requests for planning purposes. The plan should be agreed with the terminal and copy passed over for use by terminal staff. All watch officers on board and terminal supervisors should have access to a copy. No deviation from the plan should be allowed without agreement of the master.

16. Have the holds to be worked been clearly identified in the loading or unloading plan, showing the sequence of work, and the grade and tonnage of cargo to be transferred each time the hold is worked?

The necessary information should be provided in the loading/unloading plan.

17. Has the need for trimming of cargo in the holds been discussed, and have the method and extent been agreed?

The extent of trimming will depend upon the nature of the cargo, and must be in accordance with the IMSBC Code, or the International Grain Code, as appropriate.

18. Do both ship and terminal understand and accept that if the ballast programme becomes out of step with the cargo operations, it will be necessary to suspend cargo operations until the ballast operations has caught up?

All parties will prefer to load or discharge the cargo without stops if possible. However, if the cargo or ballast programmes are out of step a stop to cargo handling must be ordered by the master and accepted by the terminal to avoid the possibility of inadvertently overstressing the ship’s structure.

19. Have the intended procedures for removing cargo residues lodged in the holds while unloading been explained to the ship and accepted?

The use bulldozers, front-end loaders or pneumatic/hydraulic hammers to shake material loose should be undertaken with care, as wrong procedures can damage or distort ship’s steelwork. Prior agreement ton the need and method intended, together with adequate supervision of operators, will avoid subsequent claims or weakening of the ship’s structure.

20. Have the procedures to adjust the final trim of the loading ship been decided and agreed?
Any tonnages proposed at the commencement of loading for adjusting the trim of the ship can only be provisional, and too much importance should not be attached to them. The significance lies in ensuring that the requirement is not overlooked or ignored. The actual quantities and positions to be used to achieve final ship’s trim will depend upon the draft readings taken immediately beforehand. The ship should be informed of the tonnage on the conveyor system since that quantity may be large and must still be loaded when the order “stop loading” is given. This figure should be recorded in the checklist.

21. Has the terminal been advised of the time required for the ship to prepare for sea, on completion of cargo work?

The procedure of securing for sea remains as important as it ever was, and should not be skimped. Hatches should be progressively secured on completion so that only one or two remain to be closed after cargo work is finished. Early advice must be given to the terminal if any extension of time is necessary.
The general hazards of loading and/or unloading Bulk Carriers are:

1. Structural damage due to improper distribution of cargo.
2. Loss or reduction of stability during voyage (shift in heavy weather or cargo liquefying).
3. Chemical reactions (gases, spontaneous combustion, corrosion)

Loading/unloading plan

A cargo loading/unloading plan should be laid out in such a way that for each step of the cargo operations there is a clear indication of:

1. The quantity of cargo and the corresponding hold number (s) to be loaded/unloaded;
2. The amount of water ballast and the corresponding tank number’s to be discharged/loaded;
3. The ships draft and trim at the completion of each step in the cargo operation;
4. The calculated value of the still water shear forces and bending moments at the completion of each step and the cargo operations;
5. Estimated time for completion of each step in the cargo operation;
6. Assumed rate’s of loading/unloading operation;
7. Assumed ballasting rate’s.

The loading/unloading plan should indicate any allowances for cargo stoppage (which may be necessary to allow the ship to deballast when the loading rate is high), shifting ship, bunkering, draught checks and cargo trimming. The loading/unloading plan should be changed when a revised plan has been prepared, accepted and signed by both parties (ship and shore). Loading plans should be kept by the ship and terminal for a period of six months.

For each step of the loading operation the loading plan should also show the amount of ballast and the tanks to be deballasted, the ship's draught and trim, and the calculated shear stress and bending moments. Exceeding the permissible limits specified in the ship's approved loading manual will lead to over-stressing of the ship's structure and may result in catastrophic failure of the hull structure.

It is imperative to carry out draft checks at regular intervals during the loading, and particularly when between about 75-90% of the cargo is loaded. The tonnage loaded should be compared with the terminal's weight figure, and adjustments to the final trimming figures determined and agreed accordingly.

Any changes to the loading plan required by either terminal or ship should be made known as soon as possible and agreed by the master and terminal representative. Stresses resulting from any changes must remain within the ship's hull stress limitations.
High impact cargo drops and exceeding maximum load limits on tanks tops should be avoided.

To avoid over-stressing the ship:

a) Cargo should be distributed evenly within each hold and trimmed to the boundaries of the cargo space to minimize the risk of it shifting at sea. The quantity of cargo to be trimmed into the fore and aft holds should be delivered exactly as required to ensure the ship finishes with the required fore and aft draughts and trim. This will ensure it will be able to depart from the load port and proceed to and arrive at its unloading port safely and with the required under keel clearance.

b) Cargo should not be loaded high against one hold bulkhead or one side, and low against the other.

c) Each hold should be loaded using at least two separate pours per hold.

d) The terminal should maintain an accurate record of the tonnages loaded in each pour into each hold.

e) Sudden increases in the loading rates causing significant overloading should be avoided.
### Tab. 3 Loading/unloading plan

<table>
<thead>
<tr>
<th>Loading/unload plan</th>
<th>Date: 20.02.18</th>
<th>Vessel</th>
<th>Voyage No 013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version: No I</td>
<td></td>
<td>m/v „Grande Dinero”</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load/unload Port: Riga</th>
<th>Cargo(es)</th>
<th>Assumed stowage factor: 1.17 m³/t</th>
<th>Ballast pumping rate: 400 t/hr</th>
<th>Dock water density: 1.015</th>
<th>Max draught available: 7.59</th>
<th>Max air draught: 30.73</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>To/from Port: Louisina</th>
<th>No of loaders/dischargers</th>
<th>Load/discharge rate: 1800 t/hr</th>
<th>Min.draught available: 5.80</th>
<th>Max sailing/arrival draught: 5.91</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last cargo Clinker</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hold No</th>
<th>Cargo</th>
<th>Balast operations</th>
<th>Time required (hours)</th>
<th>Calculated values</th>
<th>Calculated values</th>
<th>Observed values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Tonn es</td>
<td></td>
<td>Drought</td>
<td>Maximum</td>
<td>Drought</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fwd</td>
<td>Aft</td>
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<td>1</td>
<td>3</td>
<td>4050</td>
<td>4050</td>
<td>3.56</td>
<td>5.971</td>
<td>84</td>
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<tr>
<td>2</td>
<td>1</td>
<td>1800</td>
<td>1800</td>
<td>1.3</td>
<td>5.21</td>
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<td>4.5</td>
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<td>4</td>
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<td>1000</td>
<td>1000</td>
<td>2.5</td>
<td>5.01</td>
<td>46</td>
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<td>5</td>
<td>2</td>
<td>500</td>
<td>500</td>
<td>1.3</td>
<td>6.40</td>
<td>55</td>
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<tr>
<td>6</td>
<td>4</td>
<td>500</td>
<td>500</td>
<td>1.3</td>
<td>6.65</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1300</td>
<td>1300</td>
<td>3.3</td>
<td>6.55</td>
<td>48</td>
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<td>8</td>
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<td>800</td>
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<tr>
<td>9</td>
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<td>350</td>
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<td>48</td>
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</tbody>
</table>
Intercargo guide for safe loading of Nickel Ore

I. Shipper’s Declaration provided?
   - Yes
   - No

II. Correct BCSN used?
   - Yes
   - No

III. TML Stated?
   - Yes
   - No

IV. Moisture Content Certified?
   - Yes
   - No

V. MC < TML
   - Yes
   - No

VI. Visual Inspection OK?
   - Yes
   - No

VII. LOAD
   - Yes

VIII. Visual monitoring OK
   - Yes
   - No

Stop Loading
Continue loading
I. **Shipper’s Declaration**: It is a legal requirement under provisions of IMSBC Code Section 4.2 for the shipper to provide accurate information to the Master.

II. **Correct BCSN**: All dry bulk cargoes should be shipped under their correct Bulk Cargo Shipping Name (BCSN).

III. **TML Stated**: As a Cargo prone to liquefaction, it is essential that Nickel Ore is classified as „Group A” and the accurate Flow Moisture Point (FMP) must be determined in accordance with the IMSBC Code and the Transportable Moisture Limit (TML) stated in the cargo declaration.

IV. **Moisture Content (MC)**: The actual moisture content of the cargo to be loaded must be provided by the shipper in accordance with the IMSBC Code from samples taken no more than seven days prior to loading. If the moisture content of the cargo is likely to have changed since the samples were taken, e.g. due to monsoon rain, further samples should be taken and the moisture content re-certified.

V. **MC < TML**: The actual moisture content should be below the Transportable Moisture Limit. If not the cargo must not be loaded.

VI. **Visual Inspection**: As far as practicable, the owner’s representative or ship’s crew should visually inspect the cargo stockpiles prior to loading. If such inspections raise doubt on the accuracy of the cargo declaration, then the cargo must not be loaded and further advise sought.

VII. **Load**: The cargo should be loaded in accordance with the provisions of the BLU Code and the IMSBC Code.

VIII. **Visual monitoring**: should be carried out during loading and if indications of high moisture content are observed, such a free water or cargo splatter, loading must stop, and further advise sought.
Emergency procedures

Every terminal should always have written procedures for dealing with emergency situations. These should be summarized in the terminal’s information and regulation booklet, and should be discussed by the terminal representative and the master for each ship on arrival.

Emergency situations that could occur should be assessed for each terminal, but typically at least should include:
   a. Fire on board ship;
   b. Fire on the terminal;
   c. Oil spillage and pollution;
   d. Injuries.

The emergency plans should include:

1. Alarm signal for terminal and for ship;
2. Notifying the emergency services, including necessary contact points and list of contact numbers;
3. Location of Muster points;
4. Evacuation procedures;
5. First aid procedures;

Actions to be taken by both terminal and by ship in the event of:

1. Fire or explosion on own ship, on another ship or terminal;
2. Oil spillage;
4. The necessity to rescue persons from holds, cranes or other plant;
5. Other emergency
Recommended content of port information book

1. Location of the port and the terminal;
2. Details of port administration;
3. Radiocommunication procedures and frequencies;
4. Arrival information requirements;
5. Port health, immigration, quarantine and customs regulations and procedures;
6. Relevant charts and nautical publications;
7. Pilotage requirements;
8. Towage and tug assistance;
9. Berthing and anchorage facilities;
10. Port emergency procedures;
11. Significant weather features;
12. Availability of fresh water, provisions, bunkers and lubricants;
13. The maximum size of ship the port can accept;
14. Maximum permissible draught and minimum of depth of water in navigational channels;
15. Water density at the port;
16. Maximum permissible air draught;
17. Requirements for ship’s draught and trim for navigation in the waterways;
18. Tidal and currents information, as it affects ship movements;
19. Restrictions on the discharge of ballast water;
20. Statutory requirements regarding loading and cargo declaration;
21. Information on waste reception facilities in the port;
Recommended content of terminal information book

1. Details of terminal contact personnel;
2. Technical data on the berth and loading or unloading equipment;
3. Depth of water at the berth;
4. Water density at the berth;
5. The minimum and maximum size of ship which the terminal’s facilities are designed to accept, included the minimum clearance between deck obstructions;
6. Mooring arrangements and attendance of mooring lines;
7. Loading or unloading rates and equipment clearances;
8. Loading or unloading procedures and communications;
9. Cargo weight determinations by weighmer and draught survey;
10. Conditions for acceptance of combination carriers;
11. Access to and from ships and berth or jeties;
12. Terminal emergency procedures;
13. Damage and indemnity arrangements;
14. Landing location of accommodation ladder;
15. Information on waste reception facilities at the terminal.