Maritime regulations regarding shipping of concentrates

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Maritime Safety Division

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International Maritime Organization

IMO is an intergovernmental body that deals with matters on sea transport, which are referred to it by its Member Governments.

IMO is mainly involved in development of international regulations, on the basis of proposals by Member Governments.

The practical design and application of the regulations is the responsibility of the national maritime Administrations concerned.
Structure of IMO

General Assembly
174 Member States

Council
40 Member States

5 Committees

Facilitation Committee
Technical Co-operation Committee
Legal Committee
Maritime Safety Committee
Marine Environment Protection Committee

7 Sub-Committees

- Ship Design and Construction (SDC)
- Ship Systems and Equipment (SSE)
- Human Element, Training and Watchkeeping (HTW)
- Navigation, Communications and Search and Rescue (NCSR)
- Implementation of IMO Instruments (III)
- Carriage of Cargoes and Containers (CCC)
- Pollution Prevention and Response (PPR)

COUNCIL

IMO

IMDG?, IMSBC?, Codes?

what?

SOLAS?

how?

who said?

when?

why?

where?

MARPOL?
Regulatory framework

INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA
SOLAS

Chapter VI
Carriage of cargoes and oil fuels
Part A-1, Carriage of dangerous goods in solid form in bulk
IMSGBC Code

Chapter VII
Carriage of dangerous goods
Part A, Carriage of dangerous goods in packaged form
IMDG Code

Regulatory framework

INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS
MARPOL

Annex V
Prevention of Pollution by Garbage from Ships

➢ prohibition of discharge of residues from solid bulk cargoes classified as harmful to the marine environment (HME)

➢ requirement for shippers of solid bulk cargoes, other than grain, to declare whether or not the cargo is classified as HME in accordance with the specified criteria
Regulatory framework

International Maritime
Solid Bulk Cargoes Code

Provisions facilitate the safe stowage and shipment of solid bulk cargoes.

Updated every two years.

E&T Group and the CCC Sub-Committee of IMO deal with amendments* to the IMSBC Code.

*Based on proposals by Member States for new provisions or amendments to existing ones.

IMSBC – contents

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IMSBC – definitions

1) **Bulk Cargo Shipping Name (BCSN)** identifies a bulk cargo during transport by sea. When a cargo is listed in the IMSBC Code, the Bulk Cargo Shipping Name of the cargo is identified by capital letters in the individual schedules or in the index.

2) **Bulk density** means the weight of solids, air and water per unit volume. Bulk density is expressed in kilograms per cubic metre (kg/m³).

3) **Stowage factor** means the figure which expresses the number of cubic metres which one tonne of cargo will occupy (m³/t).

4) **Concentrates** means materials obtained from a natural ore by a process of enrichment or beneficiation by physical or chemical separation and removal of unwanted constituents.

5) **Cohesive material** means materials other than non-cohesive materials.

6) **Non-cohesive material** means dry materials that readily shift due to sliding during transport, as listed in appendix 3, paragraph 1, Properties of dry bulk cargoes.

7) **Angle of repose** means the maximum slope angle of non-cohesive (i.e. free-flowing) granular material. It is measured as the angle between a horizontal plane and the cone slope of such material.

8) **Trimming** means any levelling of a cargo within a cargo space, either partial or total.

9) **Transportable moisture limit (TML)** of a cargo which may liquefy means the maximum moisture content of the cargo which is considered safe for carriage in ships not complying with the special provisions of 7.3.2 of the Code.

10) **Cargoes which may liquefy** means cargoes which contain a certain proportion of fine particles and a certain amount of moisture. They may liquefy if shipped with a moisture content in excess of their transportable moisture limit.

IMSBC – classification

**Group A**: consists of cargoes which may liquefy if shipped at a moisture content in excess of their TML.

**Group B**: consists of cargoes which possess a chemical hazard

- Class 4.1 Flammable solids
- Class 4.2 Substances liable to spontaneous combustion
- Class 4.3 Substances which, in contact with water, emit flammable gases
- Class 5.1 Oxidizing substances
- Class 6.1 Toxic substances
- Class 7 Radioactive material
- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances and articles

**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 C**: consists of cargoes which are neither liable to liquefy (group A) nor to possess chemical hazards (group B).
Mineral concentrates
(see Bulk Cargo Shipping Names below)

<table>
<thead>
<tr>
<th>Mineral concentrate</th>
<th>Physical properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEMENT COPPER</td>
<td>LEAD ORE RESIDUE</td>
</tr>
<tr>
<td>COPPER CONCENTRATE</td>
<td>LEAD SILVER</td>
</tr>
<tr>
<td>IRON CONCENTRATE</td>
<td>MANGANESE</td>
</tr>
<tr>
<td>IRON CONCENTRATE (pellet feed)</td>
<td>CONCENTRATE</td>
</tr>
<tr>
<td>IRON CONCENTRATE (sinter feed)</td>
<td>NEFELINE SVENITE</td>
</tr>
<tr>
<td>LEAD AND ZINC CALCINES (mixed)</td>
<td>PENTAHYDRATE CRUDE</td>
</tr>
<tr>
<td>LEAD AND ZINC MIDDLES</td>
<td>PYREXITE</td>
</tr>
<tr>
<td>LEAD CONCENTRATE</td>
<td>PYRITE ASHES (iron)</td>
</tr>
</tbody>
</table>

See also the entries for metal sulphide concentrates.

Description
Mineral concentrates are refined ones in which valuable components have been enriched by eliminating the bulk of waste materials.

Characteristics

<table>
<thead>
<tr>
<th>Physical properties</th>
<th>Size</th>
<th>Angle of repose</th>
<th>Bulk density (g/cm³)</th>
<th>Stowage factor (g/m³)</th>
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</thead>
<tbody>
<tr>
<td>Various</td>
<td>Not applicable</td>
<td>1.75 to 3.030</td>
<td>0.33 to 0.67</td>
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</tbody>
</table>

Hazard classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Subsidiary hazard(s)</th>
<th>MHS</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>A</td>
</tr>
</tbody>
</table>

Hazard
The above materials may liquefy if shipped at a moisture content in excess of their transportable moisture limit (TML). See sections 7 & 8 of this Code.

Stowage and segregation
No special requirements.

Hold cleanliness
No special requirements.

Mineral concentrates

Weather precautions
When a cargo is carried in a ship other than a ship complying with the requirements in 7.3.2 of this Code, the following provisions shall be complied with:

1. the moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;
2. unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
3. unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatch covers of the cargo spaces into which the cargo is loaded, or to be loaded, shall be closed;
4. the cargo may be handled during precipitation under the conditions stated in the procedures required in 4.3.3 of this Code; and
5. the cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

Loading
This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship’s breadth and that the cargo slopes uniformly from the hatch boundaries to the bulwarks to avoid steep surfaces of cargo that could collapse during voyage.

When the stowage factor of this cargo is equal to or less than 0.56 m³/t, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.
Mineral concentrates

Precautions
Barge wells shall be clean, dry and covered as appropriate, to prevent ingress of the cargo. The barge system of a cargo space to which this cargo is to be loaded shall be tested to ensure it is working.

Ventilation
The cargo spaces carrying this cargo shall not be ventilated during voyage.

Carriage
The appearance of the surface of this cargo shall be checked regularly during the voyage. If free water above the cargo or fluid state of the cargo is observed during the voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsize of the ship, and give consideration to seeking emergency entry into a place of refuge.

Discharge
No special requirements.

Clean-up
No special requirements.

METAL SULPHIDE CONCENTRATES
(see also Mineral concentrates schedule)

Description
Mineral concentrates are refined ores in which the valuable components have been enriched by eliminating the bulk of waste materials. Generally the particle size is small although agglomerates sometimes exist in concentrates which have not been freshly produced.

The most common concentrates in this category are zinc concentrates, lead concentrates, copper concentrates and low-grade middling concentrates.

Characteristics

<table>
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<tbody>
<tr>
<td>Size</td>
<td>Angle of repose</td>
</tr>
<tr>
<td>Various</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Hazard classification</td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Subsidiary hazard(s)</td>
</tr>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Hazard
Some metal sulphide concentrates may have acute and long-term health effects. This cargo may liquify if shipped at a moisture content in excess of its transportable moisture limit (TML). See sections 7 and 8 of this Code.

Some sulphide concentrates are liable to oxidation and may have a tendency to self-heat, with associated oxygen depletion and emission of toxic fumes. Some materials may present corrosion problems.

Stowage and segregation
Unless determined by the competent authority, segregation as required for class 4.2 materials. "Separated from" foodstuffs and all class 8 materials.

Hold cleanliness
Clean and dry as relevant to the hazards of the cargo.
METAL SULPHIDE CONCENTRATES

Weather precautions
When a cargo is carried in a ship other than a ship complying with the requirements in 7.3.2 of this Code, the following provisions shall be complied with:

1. The moisture content of the cargo shall be kept less than its TML during loading operations and the voyage;
2. Unless expressly provided otherwise in this individual schedule, the cargo shall not be handled during precipitation;
3. Unless expressly provided otherwise in this individual schedule, during handling of the cargo, all non-working hatchways of the cargo spaces into which the cargo is loaded, or to be loaded, shall be closed;
4. The cargo may be handled during precipitation under the conditions stated in the procedures required in 4.3.3 of this Code, and
5. The cargo in a cargo space may be discharged during precipitation provided that the total amount of the cargo in the cargo space is to be discharged in the port.

Loading
This cargo shall be trimmed to ensure that the height difference between peaks and troughs does not exceed 5% of the ship’s breadth and that the cargo slopes uniformly from the hatch boundaries to the bulkheads to avoid steep surfaces of cargo that could collapse during voyage.

As the density of the cargo is extremely high, the tank top may be overstressed unless the cargo is evenly spread across the tank top to equalize the weight distribution. Due consideration shall be given to ensure that the tank top is not overstressed during the voyage and during loading by a pile of the cargo.

Precautions
Entry into the cargo space for this cargo shall not be permitted until the cargo space has been ventilated and the atmosphere tested for concentration of oxygen. Appropriate precautions shall be taken to protect machinery and accommodation spaces from the dust of the cargo. Bilge wells of the cargo spaces shall be protected from ingress of the cargo. Due consideration shall be given to protect equipment from the dust of the cargo. Persons who may be exposed to the dust of the cargo shall wear goggles or other equivalent dust eye-protection and dust filter masks. Those persons shall wear protective clothing, as necessary.

When a Metal Sulphide Concentrate is considered as presenting a low fire risk, the carriage of such cargo on a ship not fitted with a fixed gas fire-extinguishing system shall be subject to the Administration’s authorization as provided by SOLAS Regulation II-2/10.7.1.4.

Ventilation
The cargo spaces carrying this cargo shall not be ventilated during voyage.

Carriage
The appearance of the surface of this cargo shall be checked regularly during the voyage. If free water above the cargo or fluid state of the cargo is observed during the voyage, the master shall take appropriate actions to prevent cargo shifting and potential capsizing of the ship, and give consideration to seeking emergency entry into a place of refuge. For quantitative measurements of oxygen and toxic fumes liable to be evolved by the cargo, suitable detectors for each gas and flame or combination of these shall be on board while this cargo is carried.

The detectors shall be suitable for use in an atmosphere without oxygen. The concentrations of these gases in the cargo spaces carrying this cargo shall be measured regularly, during the voyage, and the results of the measurements shall be recorded and kept on board.

Discharge
No special requirements.

Clean-up
No special requirements.
M mitigation

ternal Sulfide Concentrates

Emergency procedures

- Special emergency equipment to be carried
- Self-contained breathing apparatus.
- Emergency procedures
- Wear self-contained breathing apparatus.
- Emergency action in the event of fire
- Batten down, use ship's fixed fire-fighting installation.
- Exclusion of air may be sufficient to control the fire. Do not use water.
- Medical first aid
- Refer to the Medical First Aid Guide (MFAG), as amended.

Remarks

Fire may be indicated by the smell of sulphur dioxide.

METAL SULPHIDE CONCENTRATES, CORROSIVE UN 1759
(see also Mineral concentrates schedule)

This schedule shall only apply to cargoes that would fall under Packing Group (PG) III as specified in the IMDG Code if they were carried in a packaged form.

Description

Mineral concentrates are refined ores in which the valuable components have been enriched by eliminating the bulk of waste materials. Generally, the particle size is small, although agglomerates sometimes exist in concentrates which have not been freshly produced.

The most common concentrates in this category are: zinc concentrates, lead concentrates, copper concentrates and low-grade middling concentrates.

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<td>Various</td>
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<td>1,700 to 3,230</td>
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Hazard classification

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<td>8</td>
<td>Not applicable</td>
<td>SH and/or WT</td>
<td>A and B</td>
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METAL SULPHIDE CONCENTRATES, SELF-HEATING UN 3190
(see also Mineral concentrates schedule)

This schedule shall only apply to cargoes that would fall under Packing Group (PG) III as specified in the IMDG Code if they were carried in a packaged form. This includes cargoes in PG III that may be exempted in packages of less than 450 L or 3 m³.

Description
Mineral concentrates are refined ores in which the valuable components have been enriched by eliminating the bulk of waste materials. Generally, the particle size is small, although agglomerates sometimes exist in concentrates which have not been freshly produced.

The most common concentrates in this category are: zinc concentrates, lead concentrates, copper concentrates and low grade middling concentrates.

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Section 1

General provisions

1.2 Cargoes listed in this Code

1.2.1 Typical cargoes currently shipped in bulk, together with advice on their properties and methods of handling, are given in the schedules for individual cargoes. However, these schedules are not exhaustive and the properties attributed to the cargoes are given only for guidance. Consequently, before loading, it is essential to obtain current valid information from the shipper on the physical and chemical properties of the cargoes presented for shipment. The shipper shall provide appropriate information about the cargo to be shipped (see 4.2).

1.2.2 Where a solid bulk cargo is specifically listed in appendix 1 to this 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 of this Code. The master shall consider whether 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.
Thank you