

BIMCO steel turnings clause

Turnings

Turnings clause from BIMCO.

1998 code of safe practice for solid bulk cargoes (bc code) appendix b list of bulk materials possessing chemical hazards ferrous metal, borings, shavings, turnings or cuttings in a form liable to self-heating * iron swarf * steel swarf* for comprehensive information on transport of any material, refer to sections 1-10 of this code.

Un No	Imo Class	Mfag table no.	App. stw factor	Ems no.
2793	4.2	none **		b13

* refer to paragraph 6.1.1 (asphyxia) of the mfag.

Properties

These materials are liable to self-heating and to ignite spontaneously, particularly when in a finely divided form, wet or contaminated with such materials as unsaturated cutting oil, oily rags and other combustible matter. self-heating or inadequate ventilation may cause dangerous depletion of oxygen in the cargo spaces.

Observations

Excessive amounts of cast iron borings or organic materials may encourage heating. The material should be protected from moisture prior to and after loading. If, during loading, the weather is inclement, hatches should be closed or otherwise protected to keep the material dry.

The provisions of this appendix should not apply to consignments of materials which are accompanied by a declaration submitted prior to loading by the shipper and stating that they have no self-heating properties when transported in bulk.

Segregation and stowage requirements

"Separated from" foodstuffs.

Special requirements

1. Prior to loading, temperature of the material should not exceed 55 degrees c. wooden sweat battens, dunnage and debris should be removed from the cargo space before the material is loaded.
2. The surface temperature of the material should be taken prior to, during and after loading and daily during the voyage.

Temperature readings during the voyage should be taken in such a way as not to require entry into the cargo space or, alternatively, if entry is required for this purpose, sufficient breathing apparatus, additional to that required by the safety equipment regulations, should be provided.

If the surface temperature exceeds 90 degrees c during loading, further loading should cease and should not recommence until the temperature has fallen below 85 degrees c. the ship should not depart unless the temperature is below 65 degrees c and has shown a steady or downward trend in temperature for at least eight hours. During loading and transport, the bilge of each cargo space in which the material is stowed should be as dry as practicable. during loading, the material should be compacted in the cargo space as frequently as practicable with a bulldozer or other means. After loading, the material should be trimmed to eliminate peaks and should be compacted.

3. whilst at sea, any rise in surface temperature of the material indicates a self-heating reaction problem. If the temperature should rise to 80 degrees c, a potential fire situation is developing and the ship should make for the nearest port.

Water should not be used at sea. early application of an inert gas to a smouldering situation may be effective. In port, copious quantities of water may be used but due consideration should be given to stability.

4 entry into cargo spaces containing this material should be made only with the main hatches open and after adequate ventilation and when using breathing apparatus.



SOLAS Chapter VII, Part A-1, Regulation 7-3

Regulation 7-2

Documents

- 1 In all documents relating to the carriage of dangerous goods in solid form in bulk by sea, the bulk cargo shipping name of the goods shall be used (trade names alone shall not be used).
- 2 Each ship carrying dangerous goods in solid form in bulk shall have a special list or manifest setting forth the dangerous goods on board and the location thereof. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods on board, may be used in place of such a special list or manifest. A copy of one of these documents shall be made available before departure to the person or organization designated by the port State authority.

Regulation 7-3

Stowage and segregation requirements

- 1 Dangerous goods in solid form in bulk shall be loaded and stowed safely and appropriately in accordance with the nature of the goods. Incompatible goods shall be segregated from one another.
- 2 Dangerous goods in solid form in bulk, which are liable to spontaneous heating or combustion, shall not be carried unless adequate precautions have been taken to minimize the likelihood of the outbreak of fire.
- 3 Dangerous goods in solid form in bulk, which give off dangerous vapours, shall be stowed in a well ventilated cargo space.

Regulation 7-4

Reporting of incidents involving dangerous goods

- 1 When an incident takes place involving the loss or likely loss overboard of dangerous goods in solid form in bulk into the sea, the master, or other person having charge of the ship, shall report the particulars of such an incident without delay and to the fullest extent possible to the nearest coastal State. The report shall be drawn up based on general principles and guidelines developed by the Organization.*
- 2 In the event of the ship referred to in paragraph 1 being abandoned, or in the event of a report from such a ship being incomplete or unobtainable, the company, as defined in regulation IX/1.2, shall, to the fullest extent possible, assume the obligations placed upon the master by this regulation.

Extract from the IMDG Code

Part 3 – Dangerous Goods List and limited quantities exceptions

UN No.	Proper Shipping Name (PSN)	Class or division	Subsidiary risk(s)	Packing group	Special provisions	Limited quantities	Packing		IBC	
							Instructions	Provisions	Instructions	Provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1	PP	I	61 274	None	P002	–	IBC07	B1
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1	PP	II	61 274	500 g	P002	–	IBC08	B2 B4
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1	PP	III	61 223 274	500 g	P002 LP02	–	IBC08	B3
2787	ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC flashpoint less than 23°C	3	6.1 PP	I	274	None	P001	–	–	–
2787	ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC flashpoint less than 23°C	3	6.1 PP	II	274	500 ml	P001	–	IBC02	–
2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1	PP	I	43 274	None	P001	–	–	–
2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1	PP	II	43 274	100 ml	P001	–	IBC02	–
2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1	PP	III	43 223 274	500 ml	P001 LP01	–	IBC03	–
2789	ACETIC ACID, GLACIAL or ACETIC ACID SOLUTION, more than 80% acid, by mass	8	3	II	–	1 l	P001	–	IBC02	–
2790	ACETIC ACID SOLUTION more than 10% and less than 50% acid, by mass	8	–	III	–	5 l	P001 LP01	–	IBC03	–
2790	ACETIC ACID SOLUTION not less than 50% but not more than 80% acid, by mass	8	–	II	–	1 l	P001	–	IBC02	–
2793	FERROUS METAL BORINGS, SHAVINGS, TURNINGS, or CUTTINGS in a form liable to self-heating	4.2	–	III	223 931	None	P003 LP02	PP20	IBC08	B3 B6
2794	BATTERIES, WET, FILLED WITH ACID electric storage	8	–	–	295	1 l	P801	–	–	–

Portable tanks and bulk containers			EmS	Stowage and segregation	Properties and observations	UN No.
IMO tank instructions	UN tank instructions	Provisions	(15)	(16)	(17)	(18)
–	T6	TP33	F-A, S-A	Category A. Clear of living quarters.	Solid pesticides present a very wide range of toxic hazard. Toxic if swallowed, by skin contact or by inhalation.	2786
–	T3	TP33	F-A, S-A	Category A. Clear of living quarters.	See entry above.	2786
–	T1	TP33	F-A, S-A	Category A. Clear of living quarters.	See entry above.	2786
–	T14	TP2 TP9 TP13 TP27	F-E, S-D	Category B. Clear of living quarters.	Pesticides frequently contain petroleum or coal tar distillates, or other flammable liquids. Miscibility with water depends upon the composition. Toxic if swallowed, by skin contact or by inhalation.	2787
–	T11	TP2 TP13 TP27	F-E, S-D	Category B. Clear of living quarters.	See entry above.	2787
T7	T14	TP2 TP9 TP13 TP27	F-A, S-A	Category A. Clear of living quarters.	A wide variety of toxic liquids. Toxic if swallowed, by skin contact or by inhalation.	2788
–	T11	TP2 TP13 TP27	F-A, S-A	Category A. Clear of living quarters.	See entry above.	2788
–	T7	TP2 TP28	F-A, S-A	Category A. Clear of living quarters.	See entry above.	2788
T4	T7	TP2	F-E, S-C	Category A.	Colourless flammable liquid with a pungent odour. When pure, crystallizes below 16°C. Flashpoint: 40°C c.c. (pure product) 81°C c.c. (80% solution). Explosive limits: 4% to 17%. Miscible with water. Corrosive to lead and most other metals. Corrosive to skin, eyes and mucous membranes.	2789
–	T4	TP1	F-A, S-B	Category A.	Colourless liquid with a pungent odour. Miscible with water. Corrosive to lead and most other metals. Corrosive to skin, eyes and mucous membranes.	2790
T4	T7	TP2	F-A, S-B	Category A.	See entry above.	2790
–	BK2	–	F-G, S-J	Category A.	These cargoes are liable to self-heating and to ignite spontaneously, particularly when in a finely divided form, wet or contaminated with such materials as unsaturated cutting oil, oily rags and other combustible matter. Self-heating or inadequate ventilation may cause dangerous depletion of oxygen in the stowage spaces. Excessive amounts of cast iron borings or organic materials may encourage heating. The swarf should be protected from moisture prior to and after loading. If, during loading, the weather is inclement, hatches should be closed or otherwise protected to keep the material dry.	2793
–	–	–	F-A, S-B	Category A. For unit loads in open cargo transport units, category B.	Metal plates immersed in acid electrolyte in a glass, hard rubber or plastics receptacle. When electrically charged, may cause fire through short-circuiting of terminals. Acid electrolyte is corrosive to most metals. Cause burns to skin, eyes and mucous membranes. Used batteries being transported for disposal or reclamation should be carefully checked prior to shipment to ensure the integrity of each battery and its suitability for transport.	2794

Extract from the BC Code

FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS UN 2793
in a form liable to self-heating

Description

Metal drillings, usually wet or contaminated with such materials as unsaturated cutting oil, oily rags and other combustible material.

This schedule should **not** apply to consignments of materials which are accompanied by a declaration submitted prior to loading by the shipper and stating that they have no self-heating properties when transported in bulk.

Characteristics

Angle of repose	Bulk density (kg/m ³)	Stowage factor (m ³ /t)
Not applicable	Various	Various
Size	Class	Group
Not applicable	4.2	B

Hazard

These materials are liable to self-heat and ignite spontaneously, particularly when in a finely divided form, wet or contaminated with such materials as unsaturated cutting oil, oily rags and other combustible matter.

Excessive amounts of cast-iron borings or organic materials may encourage heating. Self-heating or inadequate ventilation may cause dangerous depletion of oxygen in cargo spaces.

Stowage & segregation

"Separated from" foodstuffs.

Hold cleanliness

Clean and dry without any residue of previous cargoes.

Weather precautions

Do not handle cargo during precipitation, keep dry and close hatches that are not being worked.

Loading

During loading, the material should be compacted in the cargo space as frequently as practicable with a bulldozer or other means. Keep the bilge of each cargo space in which the cargo is stowed as dry as practicable. After loading, the cargo should be trimmed to eliminate peaks and compacted.

Wooden sweat battens and dunnage should be removed from the cargo space before the cargo is loaded.

Precautions

Prior to loading, the temperature should not exceed 55°C. The temperature of the material should be taken prior to and during loading. The temperature should be obtained from between 200 mm and 350 mm into the pile. If the temperature exceeds 90°C during loading, further loading should cease and not recommence until the temperature has fallen below 85°C.

The ship should not depart unless the temperature is below 65°C and has shown a steady or downward trend in temperature for at least eight hours.

Ventilation

Do not ventilate.

FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS UN 2793 (continued)**Carriage**

Monitor and record the surface temperature of the cargo daily during the voyage. Temperature readings should be taken in such a way as not to require entry into the cargo space or, alternatively if entry is required for this purpose, at least two sets of self-contained breathing apparatus, additional to those required by SOLAS regulation II-2/10.10, should be provided.

Discharge

Entry into cargo spaces containing this material should be made only with the main hatches open and after adequate ventilation and when using breathing apparatus.

Clean up

Make sure that oil spillages, if any, are cleaned from tank tops and bilge wells before hosing out.

Emergency procedures

<p align="center">Special emergency equipment to be carried</p> <p align="center">Self-contained breathing apparatus</p>
<p align="center">Emergency procedures</p> <p align="center">Nil</p>
<p align="center">Emergency action in the event of fire</p> <p>Whilst at sea, any rise in surface temperature of the material indicates a self-heating reaction problem. If the temperature should rise to 80°C a potential fire situation is developing and the ship should make for the nearest suitable port. Batten down. Water should not be used at sea. Early application of an inert gas to a smouldering situation may be effective.</p>
<p align="center">Medical First Aid</p> <p align="center">Refer to the <i>Medical First Aid Guide (MFAG)</i>, as amended.</p>

Remarks

In port, copious quantities of water may be used, but due consideration should be given to factors affecting the stability of the ship.

Appendix 7 from the BC Code

Appendix 7

Recommendations for entering enclosed spaces aboard ships

Preamble

The object of these recommendations is to encourage the adoption of safety procedures aimed at preventing casualties to ships' personnel entering enclosed spaces where there may be an oxygen-deficient, flammable and/or toxic atmosphere.

Investigations into the circumstances of casualties that have occurred have shown that accidents on board ships are in most cases caused by an insufficient knowledge of, or disregard for, the need to take precautions rather than a lack of guidance.

The following practical recommendations apply to all types of ships and provide guidance to seafarers. It should be noted that on ships where entry into enclosed spaces may be infrequent, for example, on certain passenger ships or small general cargo ships, the dangers may be less apparent, and accordingly there may be a need for increased vigilance.

The recommendations are intended to complement national laws or regulations, accepted standards or particular procedures which may exist for specific trades, ships or types of shipping operations.

It may be impracticable to apply some recommendations to particular situations. In such cases, every endeavour should be made to observe the intent of the recommendations, and attention should be paid to the risks that may be involved.

1 Introduction

The atmosphere in any enclosed space may be deficient in oxygen and/or contain flammable and/or toxic gases or vapours. Such an unsafe atmosphere could also subsequently occur in a space previously found to be safe. Unsafe atmosphere may also be present in spaces adjacent to those spaces where a hazard is known to be present.

2 Definitions

2.1 *Enclosed space* means a space which has any of the following characteristics:

- .1 limited openings for entry and exit;
- .2 unfavourable natural ventilation; and
- .3 is not designed for continuous worker occupancy,

and includes, but is not limited to, cargo spaces, double bottoms, fuel tanks, ballast tanks, pump-rooms, compressor rooms, cofferdams, void spaces, duct keels, inter-barrier spaces, engine crankcases and sewage tanks.

2.2 *Competent person* means a person with sufficient theoretical knowledge and practical experience to make an informed assessment of the likelihood of a dangerous atmosphere being present or subsequently arising in the space.

2.3 *Responsible person* means a person authorized to permit entry into an enclosed space and having sufficient knowledge of the procedures to be followed.

3 Assessment of risk

- 3.1** In order to ensure safety, a competent person should always make a preliminary assessment of any potential hazards in the space to be entered, taking into account previous cargo carried, ventilation of the space, coating of the space and other relevant factors. The competent person's preliminary assessment should determine the potential for the presence of an oxygen-deficient, flammable or toxic atmosphere.
- 3.2** The procedures to be followed for testing the atmosphere in the space and for entry should be decided on the basis of the preliminary assessment. These will depend on whether the preliminary assessment shows that:
- .1 there is minimal risk to the health or life of personnel entering the space;
 - .2 there is no immediate risk to health or life but a risk could arise during the course of work in the space; and
 - .3 a risk to health or life is identified.
- 3.3** Where the preliminary assessment indicates minimal risk to health or life or potential for a risk to arise during the course of work in the space, the precautions described in 4, 5, 6 and 7 should be followed as appropriate.
- 3.4** Where the preliminary assessment identifies risk to life or health, if entry is to be made, the additional precautions specified in section 8 should also be followed.

4 Authorization of entry

- 4.1** No person should open or enter an enclosed space unless authorized by the master or nominated responsible person and unless the appropriate safety procedures laid down for the particular ship have been followed.
- 4.2** Entry into enclosed spaces should be planned and the use of an entry permit system, which may include the use of a checklist, is recommended. An Enclosed Space Entry Permit should be issued by the master or nominated responsible person, and completed by a person who enters the space prior to entry. An example of the Enclosed Space Entry Permit is provided in the appendix.

5 General precautions

- 5.1** The master or responsible person should determine that it is safe to enter an enclosed space by ensuring:
- .1 that potential hazards have been identified in the assessment and as far as possible isolated or made safe;
 - .2 that the space has been thoroughly ventilated by natural or mechanical means to remove any toxic or flammable gases, and to ensure an adequate level of oxygen throughout the space;
 - .3 that the atmosphere of the space has been tested as appropriate with properly calibrated instruments to ascertain acceptable levels of oxygen and acceptable levels of flammable or toxic vapours;
 - .4 that the space has been secured for entry and properly illuminated;
 - .5 that a suitable system of communication between all parties for use during entry has been agreed and tested;
 - .6 that an attendant has been instructed to remain at the entrance to the space whilst it is occupied;
 - .7 that rescue and resuscitation equipment has been positioned ready for use at the entrance to the space, and that rescue arrangements have been agreed;
 - .8 that personnel are properly clothed and equipped for the entry and subsequent tasks; and
 - .9 that a permit has been issued authorizing entry.
- The precautions in .6 and .7 may not apply to every situation described in this section. The person authorizing entry should determine whether an attendant and the positioning of rescue equipment at the entrance to the space is necessary.

5.2 Only trained personnel should be assigned the duties of entering, functioning as attendants, or functioning as members of rescue teams. Ships' crews should be drilled periodically in rescue and first aid.

5.3 All equipment used in connection with entry should be in good working condition and inspected prior to use.

6 Testing the atmosphere

6.1 Appropriate testing of the atmosphere of a space should be carried out with properly calibrated equipment by persons trained in the use of the equipment. The manufacturers' instructions should be strictly followed. Testing should be carried out before any person enters the space, and at regular intervals thereafter until all work is completed. Where appropriate, the testing of the space should be carried out at as many different levels as is necessary to obtain a representative sample of the atmosphere in the space.

6.2 For entry purposes, steady readings of the following should be obtained:

- .1 21% oxygen by volume by oxygen content meter; and
- .2 not more than 1% of lower flammable limit (LFL) on a suitably sensitive combustible-gas indicator, where the preliminary assessment has determined that there is potential for flammable gases or vapours.

If these conditions cannot be met, additional ventilation should be applied to the space and re-testing should be conducted after a suitable interval. Any gas testing should be carried out with ventilation to the enclosed space stopped, in order to obtain accurate readings.

6.3 Where the preliminary assessment has determined that there is potential for the presence of toxic gases and vapours, appropriate testing should be carried out, using fixed or portable gas- or vapour-detection equipment. The readings obtained by this equipment should be below the occupational exposure limits for the toxic gases or vapours given in accepted national or international standards. It should be noted that testing for flammability does not provide a suitable means of measuring for toxicity, nor vice versa.

6.4 It should be emphasized that pockets of gas or oxygen-deficient areas can exist, and should always be suspected, even when an enclosed space has been satisfactorily tested as being suitable for entry.

7 Precautions during entry

7.1 The atmosphere should be tested frequently whilst the space is occupied, and persons should be instructed to leave the space should there be deterioration in the conditions.

7.2 Ventilation should continue during the period that the space is occupied and during temporary breaks. Before re-entry after a break, the atmosphere should be re-tested. In the event of failure of the ventilation system, any persons in the space should leave immediately.

7.3 In the event of an emergency, under no circumstances should the attending crew member enter the space before help has arrived and the situation has been evaluated to ensure the safety of those entering the space to undertake rescue operations.

8 Additional precautions for entry into a space where the atmosphere is known or suspected to be unsafe

8.1 If the atmosphere in an enclosed space is suspected or known to be unsafe, the space should only be entered when no practical alternative exists. Entry should only be made for further testing, essential operation, and safety of life or safety of a ship. The number of persons entering the space should be the minimum compatible with the work to be performed.

8.2 Suitable breathing apparatus, e.g., air-line or self-contained type, should always be worn, and only personnel trained in its use should be allowed to enter the space. Air-purifying respirators should not be used, as they do not provide a supply of clean air from a source independent of the atmosphere within the space.

- 8.3 The precautions specified in 5 should also be followed, as appropriate.
- 8.4 Rescue harnesses should be worn and, unless impractical, lifelines should be used.
- 8.5 Appropriate protective clothing should be worn, particularly where there is any risk of toxic substances or chemicals coming into contact with the skin or eyes of those entering the space.
- 8.6 The advice in 7.3 concerning emergency rescue operations is particularly relevant in this context.

9 Hazards related to specific types of cargo

9.1 Dangerous goods in packaged form

- 9.1.1 The atmosphere of any space containing dangerous goods may put at risk the health or life of any person entering it. Dangers may include flammable, toxic or corrosive gases or vapours that displace oxygen, residues on packages and spilled material. The same hazards may be present in spaces adjacent to the cargo spaces. Information on the hazards of specific substances is contained in the IMDG Code, the Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide) and Materials Safety Data Sheets (MSDS). If there is evidence or suspicion that leakage of dangerous substances has occurred, the precautions specified in 8 should be followed.
- 9.1.2 Personnel required to deal with spillages or to remove defective or damaged packages should be appropriately trained and wear suitable breathing apparatus and appropriate protective clothing.

9.2 Bulk liquid

- 9.2.1 The tanker industry has produced extensive advice to operators and crews of ships engaged in the bulk carriage of oil, chemicals and liquefied gases, in the form of specialist international safety guides. Information in the guides on enclosed space entry amplifies these recommendations and should be used as the basis for preparing entry plans.

9.3 Solid bulk

- 9.3.1 On ships carrying solid bulk cargoes, dangerous atmospheres may develop in cargo spaces and adjacent spaces. The dangers may include flammability, toxicity, oxygen depletion or self-heating, which should be identified in shipping documentation. For additional information, reference should be made to the Code of Safe Practice for Solid Bulk Cargoes.

9.4 Oxygen-depleting cargoes and materials

- 9.4.1 A prominent risk with such cargoes is oxygen depletion due to the inherent form of the cargo; for example, self-heating, oxidation of metals and ores or decomposition of vegetable oils, animal fats, grain and other organic materials or their residues.
- 9.4.2 The materials listed below are known to be capable of causing oxygen depletion. However, the list is not exhaustive. Oxygen depletion may also be caused by other materials of vegetable or animal origin, by flammable or spontaneously combustible materials, and by materials with a high metal content:
 - .1 grain, grain products and residues from grain processing (such as bran, crushed grain, crushed malt or meal), hops, malt husks and spent malt;
 - .2 oilseeds as well as products and residues from oilseeds (such as seed expellers, seed cake, oil cake and meal);
 - .3 copra;
 - .4 wood in such forms as packaged timber, roundwood, logs, pulpwood, props (pit props and other propwood), woodchips, woodshavings, woodpulp pellets and sawdust;
 - .5 jute, hemp, flax, sisal, kapok, cotton and other vegetable fibres (such as esparto grass/Spanish grass, hay, straw, bhusa), empty bags, cotton waste, animal fibres, animal and vegetable fabric, wool waste and rags;

- .6 fishmeal and fishscrap;
- .7 guano;
- .8 sulphidic ores and ore concentrates;
- .9 charcoal, coal and coal products;
- .10 direct reduced iron (DRI);
- .11 dry ice;
- .12 metal wastes and chips, iron swarf, steel and other turnings, borings, drillings, shavings, filings and cuttings; and
- .13 scrap metal.

9.5 Fumigation

- 9.5.1** When a ship is fumigated, the Recommendations on the safe use of pesticides in ships, reproduced in appendix 8, should be followed. Spaces adjacent to fumigated spaces should be treated as if fumigated.

10 Conclusion

- 10.1** Failure to observe simple procedures can lead to people being unexpectedly overcome when entering enclosed spaces. Observance of the principles outlined above will form a reliable basis for assessing risks in such spaces and for taking necessary precautions.

Appendix

Example of an Enclosed Space Entry Permit

This permit relates to entry into any enclosed space and should be completed by the master or responsible officer and by the person entering the space or authorized team leader.

General

Location/name of enclosed space.....

Reason for entry.....

This permit is valid from: hrs Date

to: hrs Date
(See note 1)

Section 1 – Pre-entry preparation

(To be checked by the master or nominated responsible person)

	Yes	No
• Has the space been thoroughly ventilated?	<input type="checkbox"/>	<input type="checkbox"/>
• Has the space been segregated by blanking off or isolating all connecting pipelines or valves and electrical power/equipment?	<input type="checkbox"/>	<input type="checkbox"/>
• Has the space been cleaned where necessary?	<input type="checkbox"/>	<input type="checkbox"/>
• Has the space been tested and found safe for entry? (See note 2)	<input type="checkbox"/>	<input type="checkbox"/>

	Yes	No
<ul style="list-style-type: none"> • Pre-entry atmosphere test readings: <ul style="list-style-type: none"> - oxygen % vol (21%) By: - hydrocarbon % LFL (less than 1%) Time: - toxic gases ppm (specific gas and PEL) (See note 3) 		
• Have arrangements been made for frequent atmosphere checks to be made while the space is occupied and after work breaks?	<input type="checkbox"/>	<input type="checkbox"/>
• Have arrangements been made for the space to be continuously ventilated throughout the period of occupation and during work breaks?	<input type="checkbox"/>	<input type="checkbox"/>
• Are access and illumination adequate?	<input type="checkbox"/>	<input type="checkbox"/>
• Is rescue and resuscitation equipment available for immediate use by the entrance to the space?	<input type="checkbox"/>	<input type="checkbox"/>
• Has a responsible person been designated to be in constant attendance at the entrance to the space?	<input type="checkbox"/>	<input type="checkbox"/>
• Has the officer of the watch (bridge, engine-room, cargo control room) been advised of the planned entry?	<input type="checkbox"/>	<input type="checkbox"/>
• Has a system of communication between all parties been tested and emergency signals agreed?	<input type="checkbox"/>	<input type="checkbox"/>
• Are emergency and evacuation procedures established and understood by all personnel involved with the enclosed space entry?	<input type="checkbox"/>	<input type="checkbox"/>
• Is all equipment used in good working condition and inspected prior to entry?	<input type="checkbox"/>	<input type="checkbox"/>
• Are personnel properly clothed and equipped?	<input type="checkbox"/>	<input type="checkbox"/>

Section 2 – Pre-entry checks

(To be checked by the person entering the space or authorized team leader)

	Yes	No
• I have received instructions or permission from the master or nominated responsible person to enter the enclosed space	<input type="checkbox"/>	<input type="checkbox"/>
• Section 1 of this permit has been satisfactorily completed by the master or nominated responsible person	<input type="checkbox"/>	<input type="checkbox"/>
• I have agreed and understand the communication procedures	<input type="checkbox"/>	<input type="checkbox"/>
• I have agreed upon a reporting interval of minutes	<input type="checkbox"/>	<input type="checkbox"/>
• Emergency and evacuation procedures have been agreed and are understood	<input type="checkbox"/>	<input type="checkbox"/>
• I am aware that the space must be vacated immediately in the event of ventilation failure or if atmosphere tests show a change from agreed safe criteria	<input type="checkbox"/>	<input type="checkbox"/>

Section 3 – Breathing apparatus and other equipment

(To be checked jointly by the master or nominated responsible person and the person who is to enter the space)

	Yes	No
• Those entering the space are familiar with the breathing apparatus to be used	<input type="checkbox"/>	<input type="checkbox"/>
• The breathing apparatus has been tested as follows:		
– gauge and capacity of air supply	
– low pressure audible alarm	
– face mask – under positive pressure and not leaking	
• The means of communication has been tested and emergency signals agreed	<input type="checkbox"/>	<input type="checkbox"/>
• All personnel entering the space have been provided with rescue harnesses and, where practicable, lifelines	<input type="checkbox"/>	<input type="checkbox"/>

Signed upon completion of sections 1, 2 and 3 by:

Master or nominated responsible person Date Time.....

Responsible person supervising entry Date Time.....

Person entering the space or
authorized team leader Date Time.....

Section 4 – Personnel entry

(To be completed by the responsible person supervising entry)

Names	Time in	Time out
.....
.....
.....
.....

Section 5 – Completion of job

(To be completed by the responsible person supervising entry)

- Job completed Date Time
- Space secured against entry Date Time
- The officer of the watch has been
duly informed Date Time

Signed upon completion of sections 4 and 5 by:

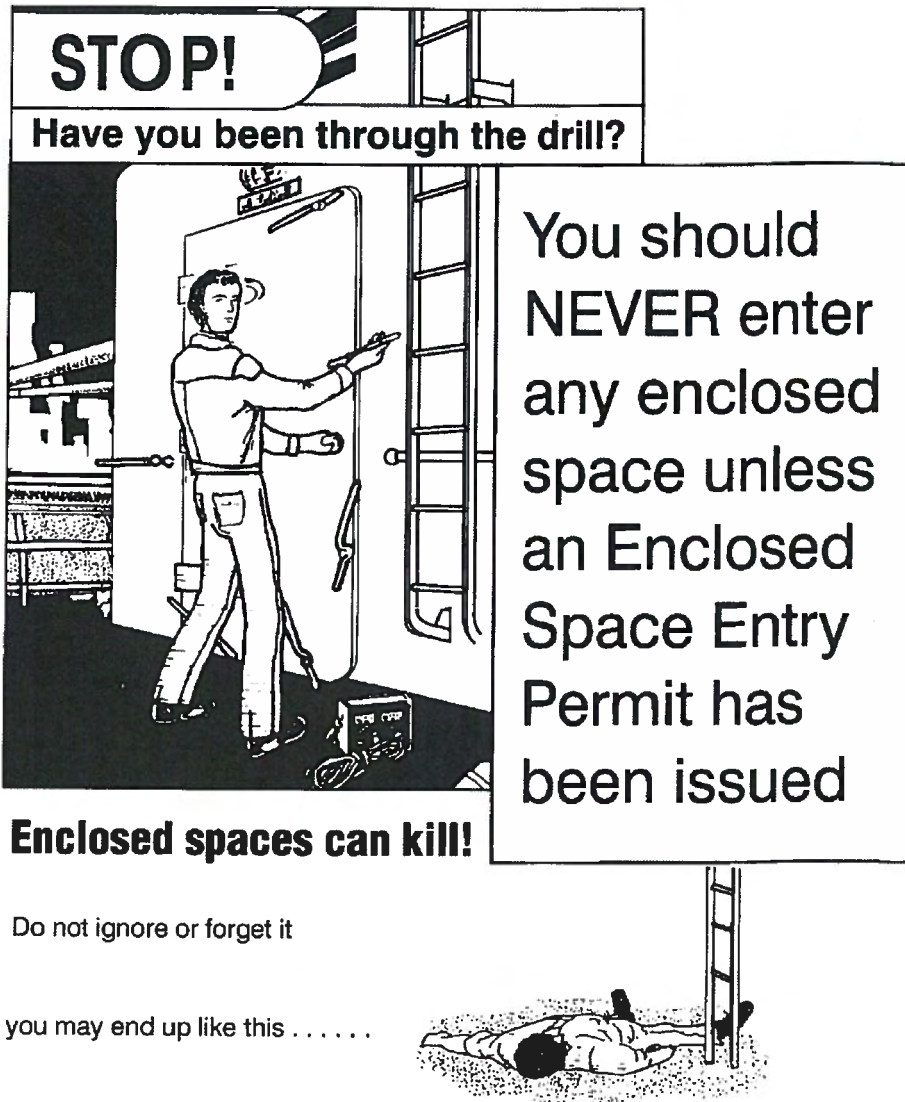
Responsible person supervising entry Date Time

THIS PERMIT IS RENDERED INVALID SHOULD VENTILATION OF THE SPACE STOP OR IF ANY
OF THE CONDITIONS NOTED IN THE CHECKLIST CHANGE

Notes:

- 1 The permit should contain a clear indication as to its maximum period of validity.
- 2 In order to obtain a representative cross-section of the space's atmosphere, samples should be taken from several levels and through as many openings as possible. Ventilation should be stopped for about 10 minutes before the pre-entry atmosphere tests are taken.
- 3 Tests for specific toxic contaminants, such as benzene or hydrogen sulphide, should be undertaken depending on the nature of the previous contents of the space.

RECOMMENDED POSTER FOR DISPLAY ON BOARD SHIPS
IN ACCOMMODATION OR OTHER PLACES, AS APPROPRIATE
(reduced format)



MAIB Safety Bulletin

MAIB SAFETY BULLETIN 2/2008

Fatalities in enclosed spaces

MAIB SAFETY BULLETIN 2/2008

This document, containing urgent safety recommendations, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

This Safety Bulletin is issued to raise awareness of the unnecessary and avoidable loss of life of seafarers working in enclosed spaces and, through industry bodies and organisations, seeks to establish control measures that can be utilised to prevent such accidents in the future.

A handwritten signature in black ink, appearing to read 'Stephen Meyer', with a stylized flourish at the end.

Stephen Meyer
Chief Inspector of Marine Accidents

This bulletin is also available on our website: <http://www.maib.gov.uk>

Press Enquiries: 020 7944 6433/3387; out of hours: 020 7944 4292

Public Enquiries: 020 7944 3000

BACKGROUND

Since September 2007 the MAIB has started three investigations into accidents in which a total of six seafarers have died in enclosed/confined spaces:

- On 23 September 2007, three experienced seamen died inside the chain locker on board the emergency response and rescue vessel *Viking Islay*. The first two were overcome while tying off an anchor chain to prevent it from rattling in the spurling pipe. The third to die was the first rescuer who entered the chain locker wearing an Emergency Escape Breathing Device (EEBD). He was soon constrained by the device and removed its hood. All three men died as a result of the lack of oxygen inside the chain locker caused by the on-going corrosion of its steel structure and anchor chain.
- On 18 January 2008, two seamen collapsed in a store on board the general cargo ship *Sava Lake*. The chief officer entered the store to try and rescue the men but was soon forced to leave when he became short of breath and his vision narrowed. The two seamen had been asphyxiated. The store was adjacent to the vessel's forward cargo hold containing 'steel turnings'. To allow for the drainage of sea water and the removal of cargo residue, the bellows pieces on the cargo vent trunk either side of the cargo ventilation fan motor, located in the store, had been cut. This allowed a path for the air from the self-heating cargo, to enter the store. When tested, the air in the cargo hold contained only 6% oxygen.
- On 11 June 2008, an experienced seaman died on board the passenger cruise ship *Saga Rose* after he entered an almost empty ballast tank. The tank's manhole cover, which was inside a small cofferdam accessed from within the engine room, had been removed and the seaman had been instructed to confirm the tank's contents. As it was not intended for the seaman to enter the tank, no permit to work was issued. When the seaman was found to be missing, an experienced motorman was sent into the cofferdam to check on his wellbeing. He found the seaman lying at the bottom of the empty tank and raised the alarm. The motorman then entered the tank but collapsed when trying to recover the seaman. After the ship's emergency response team provided air to the stricken crew via in-line breathing apparatus, the motorman recovered and was able to leave the tank. However, the seaman never regained consciousness. He had been asphyxiated in the oxygen depleted atmosphere of the tank, which had not been inspected for several years and was heavily corroded. It is not certain why the seaman entered the tank but it is likely it was to determine whether a small amount of water in the tank bottom was salt or fresh water.

The MAIB report of its investigation of the fatalities on board *Viking Islay* was published on 9 July 2008. The MAIB will publish reports on the fatalities on board *Saga Rose* and *Sava Lake* on completion of its investigations.

Co-incident with the MAIB investigations, the Marine Accident Investigators International Forum (MAIIF) identified the large number of fatalities in the shipping industry worldwide which were related to work in confined or enclosed spaces and considered that the occurrence of such accidents was increasing. Accordingly, in October 2007, MAIIF tasked its representative from Vanuatu to research the incidence of this type of accident with a view to the submission of a paper to the International Maritime Organization (IMO). To date, responses from 18 administrations identify 120 fatalities and 123 injuries resulting from entry into confined spaces since 1991. These statistics do not include the fatalities from *Sava Lake* or *Saga Rose*.

SAFETY LESSONS

There can be few aspects of personal safety on board ships that have received more attention than the importance of following the correct procedures before entering a dangerous enclosed/confined space. Tragically, it is clear that the measures which have been put into place have failed to prevent the death of many seafarers. Indeed, the data collected on behalf of MAIIF indicates that accidents in enclosed/confined spaces continues to be one of the most common causes of work-related fatalities on board ships today. This is due to:

- Complacency leading to lapses in procedure;
- Lack of knowledge;
- Potentially dangerous spaces not being identified; and,
- Would-be rescuers acting on instinct and emotion rather than knowledge and training.

It is essential that the IMO recognises the unacceptably large fatality rate in this area and takes the lead in identifying initiatives to improve this very poor safety record. It is also vital that all shipping industry bodies raise the awareness of the continuing and increasing number of deaths in enclosed spaces to show that no-one is immune to the physical effects of the lack of oxygen or harmful gases. While the holding of breath might seem a logical step to a person entering a tank 'for a few seconds' or to a would-be rescuer, it is all too frequently the last life sustaining breath he or she ever takes.

RECOMMENDATIONS

Ship owners and managers, and industry bodies and organisations are recommended to:

2008/145

- Identify and implement measures aimed at improving the identification of all dangerous and potentially dangerous spaces and increasing compliance with the safe working practices required when working in such compartments.
- Individually and collectively raise the awareness of the continuing high incidence of fatalities of seafarers working in enclosed spaces.

The Maritime and Coastguard Agency is recommended to:

2008/146

Co-sponsor with the Maritime Administration of Vanuatu and other concerned administrations a submission to the IMO aimed at raising the awareness of the number of fatalities on ships which have occurred in enclosed spaces, and highlighting the need for measures to be identified which will reduce this unnecessary loss of life, such as the identification and marking of all potentially dangerous spaces.

Adolph Andersens Succr new procedures

Phone	Adolph Andersens Succr., Randers. / Fax
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Concerning chartering and transport of steel turnings for account Stena Jern & Metal A/S in Denmark Adolph Andersens Succr. has this date agreed to following

Procedure


- 1) Chartering of tonnage
- 2) Information to agents in concerned harbours
- 3) Information to masters on board

Steel turnings are classified as : Un No : 2793 – Imo Class : 4.2

- 1) Adolph Andersens Succr. search the market for available tonnage, with the right position and size for the concerned shipment. When the right candidate has been found, Adolph Andersens Succr. will secure, with written confirmation of the ship owners, that the vessel is approved to load and transport the specific cargo. The shipowners will be advised that the master will receive and sign for a print of the "BC Code" prior commencement of loading.
- 2) The agent in the specific loading port will be informed in writing by Adolph Andersens Succr., about the specific cargo. The agent will receive a print of the "BC Code". Further the agent will be instructed to print the "BC Code" and deliver this to the master against receipt prior commencement of loading. The receipt will be forwarded to Stena Jern & Metal A/S along with the other original cargo documents.
- 3) The agent delivers the above mentioned material to the master. Should the master refuse to receive the material or sign the receipt, loading is not allowed to commence. Should this occasion arise the agent must inform Stena Jern & Metal and Adolph Andersens Succr. for solving the problem in cooperation with the shipowners.

Composed by :
Date : May 28th 2008

Stena Jern & Metal A/S new procedures

Instruction	Iron- and metal turnings	
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Purpose:

- o Secure that iron and metal turnings are correctly handled during receive, storage and load.
- o Secure that the ship in question is sanctioned for transport of turnings
- o Secure that the captain is correctly instructed and that he is aware of precautions when it comes to transport of turnings.

Responsibility:

Sales Responsible

- o Secure that the chartering broker prepares a written procedure for cargo shipping.

Branch Manager

- o Secure that iron and metal turnings are handled correctly.


Environmental Manager

- o Secure that this instruction is always kept up-to-date.

Procedure:

1. The Sales Responsible must secure that the chartering broker makes a written procedure for cargo shipping. This written procedure must secure and document that the ship in question is sanctioned for transport of turnings. The procedure must also secure, that the captain is instructed in precautions due to transport of turnings, according to Code of Safe Practice for Solid Bulk Cargo – "BC Code - IMO Class 4.2".
2. The Sales Responsible and the branches, occupied with disembarkment of turnings, keeps a copy of this procedure.
3. The Branch Managers must secure to the largest extent that the turnings are kept in a dry place and that the cutting oil is collected and handled correctly.
4. When turnings are loaded the branch is responsible of monitoring the temperature:
 - The day before an expected load, the temperature of the turnings must be monitored. The temperature must be measured 20-35 cm into the pile.
 - If the temperature is more than 55°C the sales responsible (and if necessary the chartering broker) shall be contacted.
 - When loading, the temperature must be monitored. The temperature mustn't exceed 90°C.
 - If the temperature exceeds 90°C the captain of the ship in question estimates whether loading should continue or not. The temperature mustn't be more than 85°C before loading can continue.
 - The ship mustn't leave the harbour in case the temperature exceeds 65°C.
5. During rain- or snowfall the loading must be stopped on captains demand. When heavy rain- or snowfall the captain must be contacted in every case, and the captain must judge whether to continue loading or not.
6. During loading, the material should be compacted in the cargo space as frequently as practicable with an ironblock. After loading, the cargo should be trimmed to eliminate peaks. The cargo should also be compacted.
7. The Branch Manager keeps the loading journal that includes measurements and notes/marks.

Prepared by:	Date: 28-05-2008	No. -
Approved by:	Revision: 1	Page 1 of 2

Instruction	Iron- and metal turnings	
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LOAD JOURNAL

BRANCHE	BRANCHE MANAGER	SHIP
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DATE	MEASSUREMENTS AND NOTES/MARKS	INITIALS

Prepared by:	Date: 28-05-2008	No. -
Approved by:	Revision: 1	Page 2 of 2

MAIB Safety Flyer

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

FLYER TO THE SHIPPING INDUSTRY

Fatal accident to two crew members while transporting ferrous metal turnings



"Steel turnings"



Cut ventilation duct

Two able seamen on board a 75m general cargo vessel were found dead in the forward store, adjacent to the forward hold, during a voyage from northern to southern Europe. The cargo, as stated on the Bill of Lading, was "steel turnings".

The terminal managers in both loading ports did not consider the cargo to be hazardous, and the wet cargo was loaded in rain without trimming or measuring the cargo temperature. The correct Bulk Cargo Shipping Name (BCSN) for the IMDG Class 4.2 cargo was "ferrous metal borings, shavings, turnings, or cuttings in a form liable to self heating (UN No. 2793)". A cargo that the ship's Document of Compliance – Special Requirements for Ships Carrying Dangerous Goods, did not permit to be carried.

Prior to arrival at the first loading port, the cargo had been identified to the master by the ship broker as an "IMO 4.2" material, without further guidance. The management company was aware of the possible carriage of the cargo, but relied on the master to confirm that the cargo was suitable for carriage.

Despite his concerns, the master accepted the cargo in both loading ports, placated by the assurances of terminal personnel and cargo agents. The ship sailed without the ability to remotely monitor the hold temperature and oxygen level.

During the voyage the ship encountered heavy weather and pitched heavily into head seas. On the morning of the accident, the master directed the two able seamen to carry out rounds of the deck due to the heavy weather. The two men reported back to the master that all was correct, and continued with their tasks inside the accommodation; they were last seen at around 1100 that morning.

At 1930, the master noticed that the two men were missing and ordered that a search be carried out. The chief officer discovered the two men collapsed at the bottom of the stairway in the forward store, and immediately entered the store to rescue the men; he narrowly escaped from the store as he became short of breath and his vision narrowed.

The two seamen had been asphyxiated; almost certainly by the oxygen depleted air, measured at 6% following the accident, caused by the self heating cargo.

To allow for the drainage of sea water and the removal of cargo residue the crew had cut the cargo vent trunking bellows pieces either side of the cargo ventilation fan motor, located within the forward store. This action had provided an air path for the cargo hold atmosphere to enter the forward store, conceivably assisted by the panting of the fore part of the ship as she pitched.

Safety Lessons

1. **Owners / Managers / Masters** should ensure:

- Crew are made aware of the location and dangers of Enclosed Spaces, including spaces adjacent to a known hazard, including the posting of appropriate signage at the entrance to these spaces.
- Crew are fully familiarised with the ship's Enclosed Space entry procedures, including the correct emergency response when persons are found collapsed in such spaces.

2. **Owners / Charterers / Managers** of vessels which may carry "Ferrous Metal, Borings, Shavings, Turnings or Cuttings in a form liable to self heating" should ensure:

- Prospective cargoes are checked against the vessel's Document of Compliance – Special Requirements for Ships Carrying Dangerous Goods (DoC).

3. **Shipbrokers / Cargo brokers** that fix cargoes of "Ferrous Metal, Borings, Shavings, Turnings or Cuttings in a form liable to self heating" should ensure:

- Cargo documentation uses the correct BCSN, IMDG Class and UN number.

4. **Shippers** of "Ferrous Metal, Borings, Shavings, Turnings or Cuttings in a form liable to self heating" should ensure:

- Cargo documentation states the correct BCSN, IMDG Class and UN number.

5. **Terminal operators** that export "Ferrous Metal, Borings, Shavings, Turnings or Cuttings in a form liable to self heating" should ensure:

- Personnel are aware of the dangers of this cargo and that it is stored and loaded in accordance with the BC Code, and that master's receive the required documentation.

6. **Masters** of vessels which have been fixed to load cargoes of "Ferrous Metal, Borings, Shavings, Turnings or Cuttings in a form liable to self heating" should ensure:

- Potential cargo is compatible with the vessel's DoC.
- Cargo is loaded in accordance with the BC Code, they receive the correct documentation; and, that all necessary precautions are taken on board prior to loading, including the briefing of the crew.
- If necessary, they should refuse to load the cargo pending further advice from their vessel's owner / manager.

This flyer and the MAIB's investigation report are posted on its website:

www.maib.gov.uk

Alternatively, a copy of the flyer and/or report will be sent on request, free of charge.

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