
RECOMMENDATIONS ON THE SAFE USE OF PESTICIDES IN SHIPS

1996 Edition



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INTERNATIONAL MARITIME ORGANIZATION

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FOREWORD

The *Recommendations on the Safe Use of Pesticides in Ships* are intended as a guide to competent authorities, mariners, fumigators, fumigant and pesticide manufacturers, and others concerned. They were first circulated in September 1971 and revised by the Maritime Safety Committee in 1984, 1993, 1995 and 1996.

RECOMMENDATIONS

The *Recommendations on the Safe Use of Pesticides in Ships* are recommended to governments in pursuance of their obligations under chapter VI of the 1974 SOLAS Convention as amended.

CONTENTS

	<i>Page</i>
1 Introduction	1
2 Prevention of infestation	
2.1 Maintenance and sanitation	2
2.2 Main sites of infestation	2
3 Chemical control of insect infestation	
3.1 Methods of chemical disinfection	4
3.1.1 Types of pesticides and methods of insect control	4
3.1.2 Contact insecticides.	4
3.1.3 Fumigants	6
3.2 Disinfection of empty cargo spaces.	6
3.3 Disinfection of food stores, galleys and crew and passenger accommodation	7
3.4 Disinfection of cargoes and surrounds	7
3.4.1 Fumigation of cargo spaces and cargoes	7
3.4.2 Fumigation with aeration (ventilation) in port	7
3.4.3 Fumigation continued in transit	8
3.5 Carriage of fumigated freight containers, barges and other cargo transport units on a ship	13
3.5.1 Loaded without ventilation after fumigation	13
3.5.2 Fumigated freight containers, barges or other cargo transport units ventilated before loading	15
3.5.3 Fumigation after loading on board a ship	15

Previous page

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	<i>Page</i>
4 Control of rodent pests	
4.1 General	15
4.2 Fumigation and baiting	15
4.3 Rodent baits (chronic poisons permitted for use by ship's personnel)	16
5 Regulations for the use of pesticides	
5.1 National and international controls on pesticide usage . . .	16
6 Safety precautions – General	
6.1 Pesticide materials	17
6.2 Space and surface spraying	17
6.3 Fumigation	18
6.4 Contact insecticides in the cargo space, admixture with raw grain	18
6.5 Exposure to pesticides resulting in illness	18
Annex 1 – Pesticides suitable for shipboard use	19
Annex 2 – Threshold limit values (TLV) for vapours in air	23
Annex 3 – Fumigation warning sign	24
Annex 4 – IMDG Code Class 9 schedule for cargo transport unit under fumigation.	25
Annex 5 – Model checklist for in-transit fumigation with phosphine . .	26

1 INTRODUCTION

1.1 These Recommendations have been compiled by the Sub-Committee on the Carriage of Dangerous Goods and the Sub-Committee on Containers and Cargoes, both of which have been amalgamated into the Sub-Committee on Dangerous Goods, Solid Cargoes and Containers since 1995, under the direction of the Maritime Safety Committee of the International Maritime Organization (IMO).

1.2 Insects and rodents on ships are objectionable for various reasons. In addition to aesthetic and nuisance aspects, pests may damage equipment and spread disease and infection, contaminate food in galleys and food stores, and cause damage to cargoes that will result in commercial or other losses. Very few pesticides are suitable for use against all kinds of pests that may occur aboard or in different parts of ships. It is therefore necessary to consider the main categories of pesticides individually.

1.2.1 *Insects in cargo spaces and cargoes*

1.2.1.1 Insect and mite pests of plant and animal products may be carried into the cargo spaces with goods (*introduced infestation*); they may move from one kind of product to another (*cross-infestation*) and may remain to attack subsequent cargoes (*residual infestation*). Their control may be required to comply with phytosanitary requirements to prevent spread of pests and for commercial reasons to prevent infestation and contamination of, or damage to, cargoes of human and animal food.* In severe cases of infestation of bulk cargoes such as cereals, excessive heating may occur.

1.2.2 *Rodents*

1.2.2.1 Rodents should be controlled not only because of the damage they may do to cargo or the ship's equipment, but also, as required by the International Health Regulations, to prevent the spread of disease.

1.3 The following sections provide guidance to shipmasters in the use of pesticides[†] with a view to safety of personnel and to avoidance of excessive residues of toxic agents in human and animal food. They cover pesticides used for the control of insect[‡] and rodent pests in empty and loaded cargo spaces, in

* References to human and animal food include both raw and processed materials.

[†] The word *pesticide* as used throughout the text means insecticides, fumigants and rodenticides. Examples of some commonly used pesticides are listed in annex 1.

[‡] The word *insect* as used throughout the text includes mites.

crew and passenger accommodation and in food stores. Account has been taken of existing recommendations of the World Health Organization (WHO), the International Labour Office (ILO), and the Food and Agriculture Organization of the United Nations (FAO) in regard to pesticide residues and occupational safety.

2 PREVENTION OF INFESTATION

2.1 Maintenance and sanitation

2.1.1 Ship cargo spaces, tank top ceilings and other parts of the ship should be kept in a good state of repair to avoid infestation. Many ports of the world have rules and by-laws dealing specifically with the maintenance of ships intended to carry grain cargoes; for example, boards and ceilings should be completely grain-tight.

2.1.2 Cleanliness, or good housekeeping, is as important a means of controlling pests on a ship as it is in a home, warehouse, mill or factory. Since insect pests on ships become established and multiply in debris, much can be done to prevent their increase by simple, thorough cleaning. Box beams and stiffeners, for example, become filled with debris during discharge of cargo and unless kept clean can become a source of heavy infestation. It is important to remove *thoroughly* all cargo residue from deckhead frames and longitudinal deck girders at the time of discharge, preferably when the cargo level is suitable for convenient cleaning. Where available, industrial vacuum cleaners are of value for the cleaning of cargo spaces and fittings.

2.1.3 The material collected during cleaning should be disposed of, or treated, immediately so that the insects cannot escape and spread to other parts of the ship or elsewhere. In port it may be burnt or treated with a pesticide, but in many countries such material may only be landed under phytosanitary supervision. Where destruction ashore is not practicable, the sweepings should be jettisoned well out to sea. If any part of the ship is being fumigated the material may be left exposed to the gas.

2.2 Main sites of infestation

2.2.1 *Tank top ceiling:* If, as often happens, cracks appear between the ceiling boards, food material may be forced down into the underlying space and serve as a focus of infestation for an indefinite period. Insects bred in this space can readily move out to attack food cargoes and establish their progeny in them.

2.2.2 *'Tween-deck centre lines, wooden feeders and bins* are often left in place for several voyages and because of their construction are a frequent source of infestation. After unloading a grain cargo, burlap and battens covering the narrow spaces between the planks should be removed and discarded before the holds are cleaned or washed down. These coverings should be replaced by new material in preparation for the next cargo.

2.2.3 *Transverse beams and longitudinal deck girders* which support the decks and hatch openings may have an L-shaped angle-bar construction. Such girders provide ledges where grain may lodge when bulk cargoes are unloaded. The ledges are often in inaccessible places overlooked during cleaning operations.

2.2.4 *Insulated bulkheads near engine-rooms:* When the hold side of an engine-room bulkhead is insulated with a wooden sheathing, the airspace and the cracks between the boards often become filled with grain and other material. Sometimes the airspace is filled with insulating material which may become heavily infested and serves as a place for insect breeding. Temporary wooden bulkheads also provide an ideal place for insect breeding, especially under moist conditions, such as when green lumber is used.

2.2.5 *Cargo battens:* The crevices at the sparring cleats are ideal places for material to lodge and for insects to hide.

2.2.6 *Bilges:* Insects in accumulations of food material are often found in these spaces.

2.2.7 *Electrical conduit casings:* Sometimes the sheet-metal covering is damaged by general cargo and when bulk grain is loaded later, the casings may become completely filled. This residual grain has often been found to be heavily infested. Casings that are damaged should be repaired immediately or, where possible, they should be replaced with steel strapping, which can be cleaned more easily.

2.2.8 Other places where material accumulates and where insects breed and hide include:

The area underneath burlap, which is used to cover limber boards and sometimes to cover tank top ceilings.

Boxing around pipes, especially if it is broken.

Corners, where old cereal material is often found.

Crevices at plate landings, frames and chocks.

Wooden coverings of manholes or wells leading to double-bottom tanks or other places.

Cracks in the wooden ceiling protecting the propeller shaft tunnel.

Beneath rusty scale and old paint on the inside of hull plates.

Shifting boards.

Dunnage material, empty bags and used separation cloths.

Inside lockers.

3 CHEMICAL CONTROL OF INSECT INFESTATION

3.1 Methods of chemical disinfestation

3.1.1 *Types of pesticides and methods of insect control*

3.1.1.1 To avoid insect populations becoming firmly established in cargo spaces and other parts of a ship, it is necessary to use some form of chemical toxicant for control. The materials available may be divided conveniently into two classes: contact insecticides and fumigants. The choice of agent and method of application depend on the type of commodity, the extent and location of the infestation, the importance and habits of the insects found, and the climatic and other conditions. Recommended treatments are altered or modified from time to time in accordance with new developments.

3.1.1.2 The success of chemical treatments does not lie wholly in the pesticidal activity of the agents used. In addition, an appreciation of the requirements and limitations of the different available methods is required. Crew members can carry out small-scale or "spot" treatments if they adhere to the manufacturer's instructions and take care to cover the whole area of infestation. However, extensive or hazardous treatments including fumigation and spraying near human and animal food should be placed in the hands of professional operators, who should inform the master of the identity of the active ingredients used, the hazards involved and the precautions to be taken.

3.1.2 *Contact insecticides*

3.1.2.1 *Space treatments:* Insecticides may be discharged into the air as fine particles of liquid or solid. There are a number of types of equipment for producing and distributing such particles. This method of treatment kills flying insects and deals with superficial infestation where exposed insects come into contact with the particles, whilst there may be a limited residual pesticidal effect on surfaces on which the particles settle.

3.1.2.2 For use in cargo spaces, space sprays and fogs can be produced in several different ways. These include fog generators in which an insecticide in the form of a liquid or coarse spray is vaporized. Such vaporized insecticides may condense into fine particles on reaching cool air. Alternatively, fine particles may be produced mechanically from suitable formulations by dispersing nozzles, venturi systems or centrifugal force. Insecticidal smokes are evolved from generators simply by igniting the material and such generators are a convenient form of application for use by ships' personnel.

3.1.2.3 Tests have shown that these insecticidal smokes and sprays can be very effective against insects moving freely in the open, in spaces such as holds. However, no appreciable penetration or control of insects can be obtained in deep crevices, or between or under deck boards, tank top ceilings and limber boards, places where infestation commonly occurs. Where insects are deep-seated, it is usually necessary to use a fumigant.

3.1.2.4 *Surface sprays:* Spraying with a suitable insecticide can also be used to control residual infestation. Within the limitations of the technique this is a convenient way to control insects as it does not require evacuation of spaces not being treated. Various formulations are available:

- .1 emulsifiable concentrates and water-dispersible powder concentrates for dilution with water; and
- .2 oil concentrates for dilution with a suitable carrier oil and; for small-scale use, ready-to-use formulations, usually in a light oil.

3.1.2.5 Hand-operated or mechanically operated sprayers may be used according to the size of the job to be done. To reach the heights of some ships' holds, power equipment is required which will develop enough pressure to get the spray material where it is needed. Hand sprayers are rarely adequate: "knapsack" sprayers which develop enough pressure to reach infested areas may be used. Such surface sprays produce a deposit toxic to insects present at the time and also to those that subsequently crawl over or settle on treated surfaces.

3.1.2.6¹ As with fogging, a disadvantage of spraying is that the insecticide does not kill insects hidden in inaccessible parts of cargo spaces. Insecticidal sprays applied in oil solutions or water emulsions take some time to dry and may be hazardous to persons moving about the ship. No cargo should be loaded until spray deposits have dried.

3.1.2.7 In addition to the methods described above, insecticidal lacquers may be painted on to boundary junctures in accommodation and galley areas in accordance with the manufacturers' instructions, to provide control of pests. Hand sprayers and hand-held aerosols may also be effective in these areas.