



Guide for the Storage on board of Ships of Dangerous Substances for use, selling and similar purposes

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GENERAL CONDITIONS

Definitions:

"Administration" means the Government of the State whose flag the Ship is entitled to fly or under whose authority the Ship is authorised to operate in the specific case.

"IACS" means the International Association of Classification Societies.

"Interested Party" means the party, other than the Society, having an interest in or responsibility for the Ship, product, plant or system subject to classification or certification (such as the owner of the Ship and his representatives, the ship builder, the engine builder or the supplier of parts to be tested) who requests the Services or on whose behalf the Services are requested.

"Owner" means the registered owner, the ship owner, the manager or any other party with the responsibility, legally or contractually, to keep the ship seaworthy or in service, having particular regard to the provisions relating to the maintenance of class laid down in Part A, Chapter 2 of the Rules for the Classification of Ships or in the corresponding rules indicated in the specific Rules.

"Rules" in these General Conditions means the documents below issued by the Society:

- (i) Rules for the Classification of Ships or other special units;
- (ii) Complementary Rules containing the requirements for product, plant, system and other certification or containing the requirements for the assignment of additional class notations;
- (iii) Rules for the application of statutory rules, containing the rules to perform the duties delegated by Administrations;
- (iv) Guides to carry out particular activities connected with Services;
- (v) Any other technical document, as for example rule variations or interpretations.

"Services" means the activities described in Article 1 below, rendered by the Society upon request made by or on behalf of the Interested Party.

"Ship" means ships, boats, craft and other special units, as for example offshore structures, floating units and underwater craft.

"Society" or "TASNEEF" means Tasneef and/or all the companies in the Tasneef Group which provide the Services.

"Surveyor" means technical staff acting on behalf of the Society in performing the Services.

Article 1

1.1. The purpose of the Society is, among others, the classification and certification of ships and the certification of their parts and components. In particular, the Society:

- (i) sets forth and develops Rules;
- (ii) publishes the Register of Ships;
- (iii) issues certificates, statements and reports based on its survey activities.

1.2. The Society also takes part in the implementation of national and international rules and standards as delegated by various Governments.

1.3. The Society carries out technical assistance activities on request and provides special services outside the scope of classification, which are regulated by these general conditions, unless expressly excluded in the particular contract.

Article 2

2.1. The Rules developed by the Society reflect the level of its technical knowledge at the time they are published. Therefore, the Society, although committed also through its research and development services to continuous updating of the Rules, does not guarantee the Rules meet state-of-the-art science and technology at the time of publication or that they meet the Society's or others' subsequent technical developments.

2.2. The Interested Party is required to know the Rules on the basis of which the Services are provided. With particular reference to Classification Services, special attention is to be given to the Rules concerning class suspension, withdrawal and reinstatement. In case of doubt or inaccuracy, the Interested Party is to promptly contact the Society for clarification.

The Rules for Classification of Ships are published on the Society's website: www.tasneef.ae.

2.3. The Society exercises due care and skill:

- (i) in the selection of its Surveyors
- (ii) in the performance of its Services, taking into account the level of its technical knowledge at the time the Services are performed.

2.4. Surveys conducted by the Society include, but are not limited to, visual inspection and non-destructive testing. Unless otherwise required, surveys are conducted through sampling techniques and do not consist of comprehensive verification or monitoring of the Ship or of the items subject to certification. The surveys and checks made by the Society on board ship do not necessarily require the constant and continuous presence of the Surveyor. The Society may also commission laboratory testing, underwater inspection and other checks carried out by and under the responsibility of qualified service suppliers. Survey practices and procedures are selected by the Society based on its experience and knowledge and according to generally accepted technical standards in the sector.

Article 3

3.1. The class assigned to a Ship, like the reports, statements, certificates or any other document or information issued by the Society, reflects the opinion of the Society concerning compliance, at the time the Service is provided, of the Ship or product subject to certification, with the applicable Rules (given the intended use and within the relevant time frame).

The Society is under no obligation to make statements or provide information about elements or facts which are not part of the specific scope of the Service requested by the Interested Party or on its behalf.

3.2. No report, statement, notation on a plan, review, Certificate of Classification, document or information issued or given as part of the Services provided by the Society shall have any legal effect or implication other than a representation that, on the basis of the checks made by the Society, the Ship, structure, materials, equipment, machinery or any other item covered by such document or information meet the Rules. Any such document is issued solely for the use of the Society, its committees and clients or other duly authorised bodies and for no other purpose. Therefore, the Society cannot be held liable for any act made or document issued by other parties on the basis of the statements or information given by the Society. The validity, application, meaning and interpretation of a Certificate of Classification, or any other document or information issued by the Society in connection with its Services, is governed by the Rules of the Society, which is the sole subject entitled to make such interpretation. Any disagreement on technical matters between the Interested Party and the Surveyor in the carrying out of his functions shall be raised in writing as soon as possible with the Society, which will settle any divergence of opinion or dispute.

3.3. The classification of a Ship, or the issuance of a certificate or other document connected with classification or certification and in general with the performance of Services by the Society shall have the validity conferred upon it by the Rules of the Society at the time of the assignment of class or issuance of the certificate; in no case shall it amount to a statement or warranty of seaworthiness,

structural integrity, quality or fitness for a particular purpose or service of any Ship, structure, material, equipment or machinery inspected or tested by the Society.

3.4. Any document issued by the Society in relation to its activities reflects the condition of the Ship or the subject of certification or other activity at the time of the check.

3.5. The Rules, surveys and activities performed by the Society, reports, certificates and other documents issued by the Society are in no way intended to replace the duties and responsibilities of other parties such as Governments, designers, ship builders, manufacturers, repairers, suppliers, contractors or sub-contractors, Owners, operators, charterers, underwriters, sellers or intended buyers of a Ship or other product or system surveyed.

These documents and activities do not relieve such parties from any fulfilment, warranty, responsibility, duty or obligation (also of a contractual nature) expressed or implied or in any case incumbent on them, nor do they confer on such parties any right, claim or cause of action against the Society. With particular regard to the duties of the ship Owner, the Services undertaken by the Society do not relieve the Owner of his duty to ensure proper maintenance of the Ship and ensure seaworthiness at all times. Likewise, the Rules, surveys performed, reports, certificates and other documents issued by the Society are intended neither to guarantee the buyers of the Ship, its components or any other surveyed or certified item, nor to relieve the seller of the duties arising out of the law or the contract, regarding the quality, commercial value or characteristics of the item which is the subject of transaction.

In no case, therefore, shall the Society assume the obligations incumbent upon the above-mentioned parties, even when it is consulted in connection with matters not covered by its Rules or other documents.

In consideration of the above, the Interested Party undertakes to relieve and hold harmless the Society from any third party claim, as well as from any liability in relation to the latter concerning the Services rendered.

Insofar as they are not expressly provided for in these General Conditions, the duties and responsibilities of the Owner and Interested Parties with respect to the services rendered by the Society are described in the Rules applicable to the specific Service rendered.

Article 4

4.1. Any request for the Society's Services shall be submitted in writing and signed by or on behalf of the Interested Party. Such a request will be considered irrevocable as soon as received by the Society and shall entail acceptance by the applicant of all relevant requirements of the Rules, including these General Conditions. Upon acceptance of the written request by the Society, a contract between the Society and the Interested Party is entered into, which is regulated by the present General Conditions.

4.2. In consideration of the Services rendered by the Society, the Interested Party and the person requesting the service shall be jointly liable for the payment of the relevant fees, even if the service is not concluded for any cause not pertaining to the Society. In the latter case, the Society shall not be held liable for non-fulfilment or partial fulfilment of the Services requested. In the event of late payment, interest at the legal current rate increased by 1.5% may be demanded.

4.3. The contract for the classification of a Ship or for other Services may be terminated and any certificates revoked at the request of one of the parties, subject to at least 30 days' notice to be given in writing. Failure to pay, even in part, the fees due for Services carried out by the Society will entitle the Society to immediately terminate the contract and suspend the Services.

For every termination of the contract, the fees for the activities performed until the time of the termination shall be owed to the Society as well as the expenses incurred in view of activities already programmed; this is without prejudice to the right to compensation due to the Society as a consequence of the termination.

With particular reference to Ship classification and certification, unless decided otherwise by the Society, termination of the contract implies that the assignment of class to a Ship is withheld or, if already assigned, that it is suspended or withdrawn; any statutory certificates issued by the Society will be withdrawn in those cases where provided for by agreements between the Society and the flag State.

Article 5

5.1. In providing the Services, as well as other correlated information or advice, the Society, its Surveyors, servants or agents operate with due diligence for the proper execution of the activity. However, considering the nature of the activities performed (see art. 2.4), it is not possible to guarantee absolute accuracy, correctness and completeness of any information or advice supplied. Express and implied warranties are specifically disclaimed.

Therefore, except as provided for in paragraph 5.2 below, and also in the case of activities carried out by delegation of Governments, neither the Society nor any of its Surveyors will be liable for any loss, damage or expense of whatever nature sustained by any person, in tort or in contract, derived from carrying out the Services.

5.2. Notwithstanding the provisions in paragraph 5.1 above, should any user of the Society's Services prove that he has suffered a loss or damage due to any negligent act or omission of the Society, its Surveyors, servants or agents, then the Society will pay compensation to such person for his proved loss, up to, but not exceeding, five times the amount of the fees charged for the specific services, information or opinions from which the loss or damage derives or, if no fee has been charged, a maximum of AED5,000 (Arab Emirates Dirhams Five Thousand only). Where the fees charged are related to a number of Services, the amount of the fees will be apportioned for the purpose of the calculation of the maximum compensation, by reference to the estimated time involved in the performance of the Service from which the damage or loss derives. Any liability for indirect or consequential loss, damage or expense is specifically excluded. In any case, irrespective of the amount of the fees charged, the maximum damages payable by the Society will not be more than AED5,000,000 (Arab Emirates Dirhams Five Millions only). Payment of compensation under this paragraph will not entail any admission of responsibility and/or liability by the Society and will be made without prejudice to the disclaimer clause contained in paragraph 5.1 above.

5.3. Any claim for loss or damage of whatever nature by virtue of the provisions set forth herein shall be made to the Society in writing, within the shorter of the following periods: (i) THREE (3) MONTHS from the date on which the Services were performed, or (ii) THREE (3) MONTHS from the date on which the damage was discovered. Failure to comply with the above deadline will constitute an absolute bar to the pursuit of such a claim against the Society.

Article 6

6.1. These General Conditions shall be governed by and construed in accordance with United Arab Emirates (UAE) law, and any dispute arising from or in connection with the Rules or with the Services of the Society, including any issues concerning responsibility, liability or limitations of liability of the Society, shall be determined in accordance with UAE law. The courts of the Dubai International Financial Centre (DIFC) shall have exclusive jurisdiction in relation to any claim or dispute which may arise out of or in connection with the Rules or with the Services of the Society.

6.2. However,

- (i) In cases where neither the claim nor any counterclaim exceeds the sum of AED300,000 (Arab Emirates Dirhams Three Hundred Thousand) the dispute shall be referred to the jurisdiction of the DIFC Small Claims Tribunal; and
- (ii) for disputes concerning non-payment of the fees and/or expenses due to the Society for services, the Society shall have the

right to submit any claim to the jurisdiction of the Courts of the place where the registered or operating office of the Interested Party or of the applicant who requested the Service is located.

In the case of actions taken against the Society by a third party before a public Court, the Society shall also have the right to summon the Interested Party or the subject who requested the Service before that Court, in order to be relieved and held harmless according to art. 3.5 above.

Article 7

- 7.1.** All plans, specifications, documents and information provided by, issued by, or made known to the Society, in connection with the performance of its Services, will be treated as confidential and will not be made available to any other party other than the Owner without authorisation of the Interested Party, except as provided for or required by any applicable international, European or domestic legislation, Charter or other IACS resolutions, or order from a competent authority. Information about the status and validity of class and statutory certificates, including transfers, changes, suspensions, withdrawals of class, recommendations/conditions of class, operating conditions or restrictions issued against classed ships and other related information, as may be required, may be published on the website or released by other means, without the prior consent of the Interested Party.
Information about the status and validity of other certificates and statements may also be published on the website or released by other means, without the prior consent of the Interested Party.
- 7.2.** Notwithstanding the general duty of confidentiality owed by the Society to its clients in clause 7.1 above, the Society's clients hereby accept that the Society may participate in the IACS Early Warning System which requires each Classification Society to provide other involved Classification Societies with relevant technical information on serious hull structural and engineering systems failures, as defined in the IACS Early Warning System (but not including any drawings relating to the ship which may be the specific property of another party), to enable such useful information to be shared and used to facilitate the proper working of the IACS Early Warning System. The Society will provide its clients with written details of such information sent to the involved Classification Societies.
- 7.3.** In the event of transfer of class, addition of a second class or withdrawal from a double/dual class, the Interested Party undertakes to provide or to permit the Society to provide the other Classification Society with all building plans and drawings, certificates, documents and information relevant to the classed unit, including its history file, as the other Classification Society may require for the purpose of classification in compliance with the applicable legislation and relative IACS Procedure. It is the Owner's duty to ensure that, whenever required, the consent of the builder is obtained with regard to the provision of plans and drawings to the new Society, either by way of appropriate stipulation in the building contract or by other agreement.
In the event that the ownership of the ship, product or system subject to certification is transferred to a new subject, the latter shall have the right to access all pertinent drawings, specifications, documents or information issued by the Society or which has come to the knowledge of the Society while carrying out its Services, even if related to a period prior to transfer of ownership.

Article 8

- 8.1.** Should any part of these General Conditions be declared invalid, this will not affect the validity of the remaining provisions.

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1 PREAMBLE

1.1 General

From the structural fire protection point of view, the fire categories of lockers and storerooms (i.e. the risk imposed by) are identified in SOLAS 74 Chapter II-2, regulations 9.2.2.3 (Passenger ships > 36 passengers), 9.2.2.4 (Passenger ships ≤ 36 passengers), 9.2.3 (Cargo ships except tankers) and 9.2.4 (Tankers) on the basis of two characteristics:

- the dimensions of deck area (commonly understood as being the “*total area available for storage*”, with a boundary limit of 4 m²), and/or
- the presence of flammable liquids stored within-

While the determination of the “*deck area*” is easy, problems may arise in trying to apply the term “*flammable liquid*” since this term is not clearly defined in current SOLAS 74 Chapter II-2.

From the active fire protection standpoint, SOLAS regulation II-2/10.6.3 requires that paint stores and flammable liquid lockers are protected by an appropriate fire-extinguishing arrangement.

Furthermore, to prevent explosions, regulation II-1/45.10 imposes restrictions to electrical equipment in spaces “...where flammable mixtures are liable to collect, e.g. in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces”.

In addition to the above, it is to be said that SOLAS is silent in respect of the storage of dangerous substances (see Note 1) used onboard ships.

Note 1: for the purposes of this document, dangerous substances are intended toxic, corrosive, oxidizing products, explosives compounds, etc. In addition, noting that the storage of explosives is prohibited on passenger ships, in this guide as explosive compounds are intended those substances which may give, in the presence of elevated heat sources, explosion outputs but are not classified as explosives.

1.2 Purpose of the Guide

The purpose of this Guide is to provide design and operational suggestions to mitigate the risk associated with dangerous substances stored on board for the ship's use.

They are not intended to address the carriage of dangerous goods as regulated by SOLAS regulation II-2/19 and the IMO IMDG Code.

2 NORMATIVE REFERENCE

2.1 Applicable rules and regulations

2.1.1 SOLAS

The International Convention for the Safety of Life at Sea and relevant amendments. The Chapter II-2, Part C, gives the definitions of the spaces in which the storage of flammable products is allowed.

2.1.2 IMDG Code

The IMO International Maritime Dangerous Goods Code, and relevant amendments. SOLAS does not

refer directly to the risk induced by those products that are not flammable but, at certain percentage of dilution, become toxic and/or corrosive. Due to the above, a reference to the IMDG Code is made in this Guide, although the Code would only be mandatory in case of transport of the concerned products as cargo.

2.1.3 Tasneef Rules

The specific requirement for electrical systems, given in Part C, Chapter 2 of the Rules, applicable and referred to spaces in which dangerous substances are stored.

2.2 Definitions

2.2.1 Corrosive substance

A substance capable, by chemical action, to damage or destroy other substances, which it may come into contact with, such as: metals, organic compounds, living tissues, etc.

2.2.2 Explosive substance

Substance which is not itself an explosive but which can form an explosive atmosphere of gas, vapours or dust, although not included in the class 1 of IMDG Code (see Note 2).

Note 2: the reference is made to substances, for instance benzoyl peroxide or similar, used in the production of paints, lacquers, food industry, etc. which require marking of tank, drums or cans with the label:



2.2.3 Flammable liquids

Liquids and mixtures of liquids, or liquids containing solids in solution or suspension, which give off flammable vapors at or below the temperature of 60°C, measured by the closed cup test (corresponding to 65.6 °C open cup test), this temperature is normally referred as “*flashpoint*”.

This category includes, for instance: paints, varnishes, lacquers, etc. but does not include substances which, notwithstanding their liquid state, belong to other of the definitions listed in this chapter because of their dangerous characteristics.

2.2.4 Flammable solids

Solids which under certain conditions are readily combustible and may cause, increase or contribute to the spread of fire.

This definition includes substances liable to spontaneous combustion and those substances which in contact with water release flammable gases.

2.2.5 Flashpoint

The lowest temperature, at which flammable substances form an ignitable mixture with air, measured by a closed cup test.

Substances with flashpoint equal or greater than 37.6 °C (100 °F) are also referred as “*combustible*”; while in case of flashpoint lower than 37.6 °C they are referred as “*flammable*”.

2.2.6 Limited or “Daily Use” quantity

Dangerous substance or substances stored within a space in a reduced or limited quantity.

The terms “*limited quantity*” and “*daily use*”, however, are considered too ambiguous for this Guide, thus reference has been made to the concept of “*limited quantity*” given by Chapter 3.4, Part 3, of IMDG Code, which refers to substances in quantities and packages such that they can be stored without restrictions on board of passenger and cargo ships as per Chapter 7.1 of the Code itself.

Based upon Chapter 3.4 of the Code, a “*limited quantity*” of a substance is considered a substance (or substances) contained within its original IMDG package (or group of packages) such that the whole maximum mass does not exceed 30 kg. In addition:

- substances, materials or articles, which are identified as “*marine pollutants*” are to be contained in individual packages not exceeding 5 l for liquids or 5 kg for solids;
- substances, materials or articles, which are identified as “*severe marine pollutants*” are to be contained in individual packages not exceeding 500 ml for liquids or 500 g for solids.

In other cases, it may be necessary to identify a quantity of substance or substances intended for “*daily use*”: this happens typically in those cases when for the operation of particular equipment, one or more containers of dangerous substances are to be kept within the relevant machinery space. Such quantity is to be determined on the basis of the given consumption of substances per day of the concerned equipment not exceeding the whole mass of 30 kg previously described.

These spaces are further examined in item [3.1.8].

2.2.7 Oxidizing substance and organic peroxide

Substance capable to cause (or contributing at) the combustion of other materials, yielding oxygen (O₂). The substance may not be a combustible.

2.2.8 Spirits

Edible liquids containing a certain percentage of alcohol (i.e. ethanol), having a measured flashpoint greater than 23°C, such as some wines and liquors. Because of their alcohol content, certain perfumes may also be considered belonging to this definition.

2.2.9 Toxic substance

Substance capable, when swallowed, inhaled or by skin contact, to cause injuries to human health, or even death.

2.3 Spaces where the storage of flammable liquids is allowed

This paragraph summarizes the fire category of storage spaces given by SOLAS Chapter II-2, regulation 9, per ship types and requirement of protection by a fire-extinguishing system.

Other technical considerations are provided where deemed necessary for the purposes of this guide.

2.3.1 Passenger ships carrying more than 36 passengers

a) Category (7) – Reg. 9.2.2.3.2.2(7)

Definition:

Isolated lockers and small store rooms in accommodation spaces having area less than 4 m² (in which flammable liquids are not stowed).

Conclusion:

- this category applies to locker or store room located only in accommodation area: this means that fire category (7) cannot be used, for instance, in machinery spaces;
- stowage of “*flammable liquid*” in such spaces (considered at the design stage or placed on board during ship’s life) does not fit with the structural fire protection of this category and is not to be allowed. For some cases reference can also be made to following paragraph [3.1.4].

b) Category (11) – Reg. 9.2.2.3.2.2(11)

Definition:

Refrigerated chambers.

Auxiliary machinery spaces as in category (10) which contain machinery having a pressure lubrication system or where storage of combustible is permitted.

Conclusion:

- apparently there are no restrictions to store flammable liquids within refrigerated chambers: this might be justified by the fact that the low temperature minimizes the risk of ignition. Another explanation consists in the fact that it is compulsory the use of category (14), described under subsequent point [2.3.1] d), whenever a flammable liquid is stored;
- applying the definition, combustibles (not specifying on what nature) may be stored within category (11) spaces without the need of creating separation boundaries for the area of such spaces dedicated to storage.

c) Category (13) – Reg. 9.2.2.3.2.2(13)

Definition:

Miscellaneous stores.

Lockers and store rooms having areas greater than 4 m², other than those spaces that have provisions for the storage of flammable liquids.

Conclusion:

- stowage of “flammable liquid” in these spaces (considered at the design stage or placed on board during ship’s life) does not fit with the structural fire protection of this category and are not to be allowed. For some cases reference can also be made to following paragraph 3.1.9.

d) Category (14) – Reg. 9.2.2.3.2.2(14)

Definition:

Paint lockers.

Store rooms containing flammable liquids (including dyes, medicines, etc.).

Laboratories (in which flammable liquids are stowed).

Conclusion:

- no limits for the deck area of these store rooms are given.

2.3.2 Passenger ships carrying not more than 36 passengers, Cargo ships and Tankers

a) Category (5) – Reg. 9.2.2.4.2.2(5)

Definition:

Lockers and store rooms not having provisions for the storage of flammable liquids and having areas less than 4 m².

Conclusion:

- what drafted in previous paragraph 2.3.1 a) applies.

b) Category (9) – Reg. 9.2.2.4.2.2(9)

Definition:

Paint and lamp rooms.

Lockers and store rooms having areas of 4 m² or more.

Spaces for the storage of flammable liquids.

Conclusion:

- what drafted in previous paragraph 2.3.1 d) applies.

c) Spaces to be protected by a fixed fire extinguishing system – Reg. 10.6.3

Definition:

6.3 Spaces containing flammable liquid

6.3.1 Paint lockers shall be protected by:

- .1 a carbon dioxide system, designed to give a minimum volume of free gas equal to 40% of the gross volume of the protected space;*
- .2 a dry powder system, designed for at least 0.5 kg powder/m³;*
- .3 water spraying or sprinkler system, designed for 5 l/m² min. Water spraying systems may be connected to the fire main of the ship; or*
- .4 a system providing equivalent protection, as determined by the Administration.*

In all cases, the system shall be operable from outside the protected space.

6.3.2 Flammable liquid lockers shall be protected by an appropriate fire-extinguishing arrangement approved by the Administration.

6.3.3 For lockers of a deck area of less than 4 m², which do not give access to accommodation spaces, a carbon dioxide portable fire extinguisher sized to provide a minimum volume of free gas equal to 40% of the gross volume of the space may be accepted in lieu of a fixed system. A discharge port shall be arranged in the locker to allow the discharge of the extinguisher without having to enter into the protected space. The required portable fire extinguisher shall be stowed adjacent to the port.

Alternatively, a port or hose connection may be provided to facilitate the use of fire main water.

Conclusion:

- on passenger ships, the coverage by the sprinkler/water fog system suffices.

2.4 Spaces where the storage of dangerous substances other than flammable liquids is allowed

- SOLAS does not provide specific requirements in respect to dangerous materials that are carried on board for the ship’s use. Some references used in this guide are derived from reading of regulation II-2/19 governing the carriage of dangerous goods in package form.
- The storage of the above mentioned materials can be carried out, in general, using the spaces of category (7), (11), (13) or (14) depending on the type of ships and of substances considered.

3 ADDITIONAL REQUIREMENTS

3.1 DESIGN REQUIREMENT

3.1.1 General

In previous item [2], the spaces which could be used for the storage of dangerous substances have been examined in the light of Chapter II-2 of SOLAS, therefore just about their fire category and consequent structural fire protection, however it is well known that many other aspects are involved.

Before going on, it is important to note that a wide range of substances having different hazards defined in previous item [2.2], actually fall within the term “flammable liquids”; about this aspect two macroscopic groups are identified:

- liquids having a flashpoint of 23 °C or above;
- liquids having a flashpoint lower than 23 °C.

With reference to the arrangement of electrical systems within the concerned spaces, for the purpose of this Guide, the applicable requirements are those stated in International Standard IEC

60092-506 *“Electrical Installations in Ships – Special Features- Ships carrying specific dangerous goods and materials hazardous only in bulk”*, recalled by footnote [†] at regulation II-2/19.3.2 of SOLAS.

3.1.2 Spaces containing flammable liquids, toxic substances and corrosive liquids, having flashpoint of 23 °C or above

As a general requirement, the part of the ventilation system serving these spaces is to be capable of being separated, in case of emergency or failure to ventilation, from the ventilation system of other spaces by means of manually operated closing devices: in this respect shut-off dampers within A/C Station or on duct branches and manual/automatic fire dampers are considered equivalent.

In case of limited quantities stored for daily use in spaces different from dedicated store such as swimming pools treatment, reference is to be made at [3.1.8].

3.1.3 Spaces containing flammable liquids, toxic substances and corrosive liquids, having flashpoint lower than 23 °C

In the arrangement of these spaces the following additional characteristics are to be complied with:

- boundaries and access door to the space are to be gas-tight, and the door self-closing without hold-back devices;
- it is recommended that door opens outward, due to the possible release of gases capable of generating pressure on the door leaf inside the space and making it difficult to open for escape;
- if working operations require the door to be kept open (for instance when personnel continuously work inside the paint store during service hours) local and remote release arrangement are to be provided;
- the power ventilation system, at least having mechanical exhaust is to be independent, capable to grant a minimum of:
 - 1) 6 air changes per hour in case of both supply and exhaust mechanical,
 - 2) 12 air changes per hour in case of exhaust only mechanical,
 - 3) as an alternative, calculated air changes per hour, for instance as per formula given in NFPA 69 Standard, may be accepted.
- negative pressure is always to be maintained within the space;
- ventilation ducts and dampers are to be made of steel and suitable means to prevent back-flow of flammable mixtures in case of ventilation failure are also to be provided; ventilation ducts on exhaust side are to be gas-tight in the whole path crossing other spaces;

- the construction of ventilation fan is to consider the risk given by dangerous mixtures in the atmosphere of the space and special attention is to be due to the electric motors driving fans (see Note 1)

Note 1: for spark-proof construction of fans, refer to materials and details set out in Pt C, Ch 4, Sec 1, [2.3] of Tasneef Rules for the Classification and Construction of Ships

- with reference to the electrical system, the following items are to be fulfilled (see Note 2):
 - 1) the use of electrical equipment of certified safe type suitable for Zone 1 installation is required, having explosion group and temperature class suitable for the dangerous substances stored into the space;
 - 2) additionally, electrical equipment of certified safe type suitable for Zone 1 installation are to be installed in areas on open deck within 1.5 m of exhaust ventilation openings;
 - 3) cables of armored type or installed in metallic conduits are to be used;
- in those cases, where liquids may egress from storage containers and to prevent spreading to adjacent materials, equipment, etc., proper containment arrangement is to be provided.

Note 2: about degree of protection and safety of electrical equipment, reference is to be made to Pt C, Ch 2, Sec 3, [10] of Tasneef Rules for the Classification and Construction of Ships.

3.1.4 Spaces containing dangerous substances within non-sealed containers and in quantity greater than that for “daily use”

The arrangement of these spaces has to comply with previous items [3.1.2] or [3.1.3], depending on the flashpoint of substances kept stored therein.

Furthermore, the characteristics of spaces mentioned in item [3.1.3] are to be applied in case of storage of:

- flammable solids, substances liable to spontaneous combustion and miscellaneous dangerous substances capable of creating explosive dust atmosphere;
- substances which in contact with water emit flammable gases.

3.1.5 Spaces containing edible liquids

This category of products typically includes liquors, spirits and can be extended, although not edible, to perfumes.

The definition of a spirit or perfume is a *“liquid having an alcohol content more than 24% ABV (Absolute Volume) provided in aqueous solution which water content is ≥ 50%”*.

These kind of liquids have a flashpoint deemed below 60 °C (see Note 1) but not lower than 23 °C, while the flashpoint is always to be considered lower than 23 °C for those liquids having alcohol content above 55% ABV.

Once the ABV is known and subsequently the flashpoint determined, reference shall be made to requirements given in previous items [3.1.2] and [3.1.3], as applicable.

Note 1: the alcohol content (generally ethanol – C₂H₅OH) of a given spirit can be calculated from the alcohol content by volume, normally marked on the container/bottle, by the following formulas:

$$\text{S.I. Units } \text{ABV}(\%) \times 0.78 = [\text{g alcohol}/100 \text{ [ml]}]$$

$$\text{U.S. Units } 55\% \text{ ABV} = 110 \text{ proof}$$

3.1.6 Spaces containing flammable gases or an atmosphere of flammable gases mixture may be present

a) General

Unless otherwise indicated in this chapter, any space used for the storage of bottles for flammable gases, either compressed or refrigerated or liquefied, is to comply with provisions set out in previous item [3.1.3].

b) Acetylene/oxygen bottles for welding

In case of fixed welding system, all requirements for safety of spaces where the acetylene and oxygen bottles are located are those in paragraph 19, Part C, Chapter 1, Section 10 of Tasneef Rules for the Classification and Construction of Ships.

It is underlined that criteria for the provision of enclosed stores to comply with items below, apply when the total number of Acetylene and Oxygen bottles is more than 4.

Whenever a fixed welding system is not present, the bottles are to be stored in a safe area on open deck or within a suitable store as follows:

- Acetylene bottles: ref. to item [3.1.3];
 - Oxygen bottles: ref. to item [3.1.6] c) 2);
- In case of a common store for both acetylene and oxygen bottles, item [3.1.3] applies, too.

c) Oxygen bottles for medical use

1) Preamble

The typical arrangement, to which this paragraph is applicable, may be found in the hospital area of passenger ships where one or more bottles are stored inside a dedicated space with connection to a piping system capable to supply oxygen at the berths.

The oxygen is a clear, colorless, odorless and tasteless gas.

The risk given by this kind of installation may be the generation of an oxygen-enriched

atmosphere (O.E.A.) due to gas leak from the bottles (see Note 1) or piping.

For what in the above it appears that under certain conditions a typical standard space having the main characteristics summarized in the next paragraph [3.1.6] c) 2) is deemed acceptable.

Note 1: NFPA 53-1999 "Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres".

2) Space containing Oxygen bottles

A space containing only oxygen bottles can be arranged as follows:

- the boundaries and the access door of the space are to be gas-tight;
- it is recommended that door opens outward, due to the possible release of gas, capable of generating pressure on the door leaf inside the space and making it difficult to open for escape;
- the space is to be adequately mechanical ventilated and the exhaust capable to grant a minimum of 6 air changes per hour;
- electric motors driving fans are to be placed outside the space and its ventilation ducts;
- penetrations are to be gas tight;
- ventilation ducts are to be capable of being separated from the ventilation system of other spaces by means of closing or non-return devices: in this respect shut-off dampers on duct branches at space boundaries and manual/automatic fire dampers are to be considered equivalent;
- in addition to previous point, the ventilation system of the space is to be capable at any times of discharging the overpressure generated by gas leaks from the bottles;
- an alarm in case of ventilation loss is to be provided;
- only oxygen bottles, piping and relevant fittings are allowed within the space: provisions for the storage of any kind of materials are to be avoided and "NO STORAGE ALLOWED" labels are to be permanently posted on the door and inside the space;
- no electrical equipment is allowed inside the space except certified safe type intrinsically safe (ia) equipment.

3.1.7 Spaces containing batteries

a) Battery rooms

The spaces for containment of batteries are subjected to provisions of Tasneef Rules for the Classification and Construction of Ships, based upon the type and size of batteries and to the power of charging equipment.

For Vented Batteries see Pt C, Ch 2, Sec 3, [10.3.1] and Pt C, Ch 2, Sec 11, [6.2], [6.3] and [6.4].

For Valve Regulated Batteries see Pt C, Ch 2, Sec 3 [10.3.2] and Pt C, Ch 2, Sec 11, [6.5.3]. See also Fig 2.

- b) Electrical lockers containing UPS units
In case of spaces where UPS units are installed, it is important to distinguish those using vented batteries (i.e. open-type batteries) from those using valve-regulated (i.e. sealed) batteries. In this latter case there are no particular requirements except for the ventilation system capacity "Q" that is to be not less than 0.25 of the capacity required for space containing open-type batteries.

3.1.8 Spaces containing limited quantity of substances for daily use

- a) Preamble
It is recognized that a certain amount of flammable liquids might be temporarily placed within spaces which have not been designed for storage purposes.
Typically, this happens in spaces such as pantries annexed to bars, shops and adjacent public areas, pools water treatment spaces, etc. This aspect can be regulated at the ship's design stage as per following arrangements [3.1.8] b); [3.1.8] c), or during the ship service putting in place the precautions described in [3.2] "Operational Requirements".
- b) Products used for treatment of water of the swimming pool
These products may be stored within the related machinery rooms, in an area suitably confined and dedicated for storage. An additional coaming or tray is to be provided at the storage area to avoid dispersion of product in case of leakages from the containers.
As mentioned in previous item [2.2.6], the quantity of products is to be estimated on the basis of the daily consumption of the water treatment machineries and however up to a mass of 30 kg. The containers are to be opened only when in use. Containers not yet in use are to be kept sealed.
- c) Edible liquids (liquors, etc.) including perfumes
This paragraph refers typically to those products exposed in shops for selling purposes, including those kept in reserve in the back shop lockers. The maximum quantity is not to exceed that evaluated on the basis of sales in a standard opening day of the shop, maintaining the maximum amount mentioned in item [2.2.6]. Also in this case it is recommended to keep closed any container not in used.

3.1.9 Spaces for the dry berthing of inflatable boats provided for particular tender services

Recently, some cruise operators expressed the needs to introduce tender services which required, for their particular sailing area or purposes (polar pack ice, whale-watching, etc.), the use of inflatable boats.

These boats are powered by outboard motors supplied by gasoline. This introduces the additional risk of handling a fuel with a flashpoint lower than 23°C, considered similar to presence of vehicles with fuel in their own tanks within special category spaces.

The request of additional requirements is deemed not necessary in case the fuel is not stored within the tender recovery space and any trace of residual fuel is removed from the engines at the end of tender service.

Since this latest request may be not practicable for the operation of ships engaged in these particular cruises, additional measures as per Reg. II-2/20, Solas '74 as amended, are to be considered, and in particular:

- structural fire protection: 20.5;
- fire detection: 20.4.1;
- fixed fire-fighting: 20.6.1.2;
- ventilation: 20.3.1;
- electrical equipment: 20.3.2 and 3.3;
- scuppers: 20.3.5;
- drainage, if any: 20.6.1.4.

In case a fixed system for re-fuelling is arranged within the space, the fuel system arrangement is to comply with provisions of Pt C, Ch 1, App 4 of Tasneef Rules – "Independent Fuel Oil Tanks".

Fuel hoses and guns are to be of type certified for their purpose.

3.2 OPERATIONAL REQUIREMENT

3.2.1 Preamble

Notwithstanding this Guide are mainly dedicated to aspects related to dangerous substances handling implication at the design stage of ships, inspections recently carried out on board gave the chance to better investigate particular operational situations worthy to be included in this paper and described in the following items.

3.2.2 Stowage of consumables within Engine Room, machinery spaces, laundries, etc.

In some case it could be necessary to keep continuously containers of dangerous substances within the concerned service or machinery space: a typical example are the plastic drums of detergent and additives in laundries permanently connected to the washing machines, or water softener connected to equipment in engine room during multiday cleaning processes.

These cases may be considered similar to the handling of "limited" or "daily use" quantities

described in previous item [3.1.8], provided that the area is continuously manned during operations.

3.2.3 Storage of large quantity of chemical products on pallets

This situation may occur before long voyages or huge maintenance works when large quantities of products are embarked over the capacity of the ship dedicated stores.

In case of substances identified as flammable, the storage outside of spaces as per items [3.1.2] and [3.1.3] as appropriate is not allowed. The same, as far as practicable, in case of substances identified as belonging to dangerous classes 5.1 and 5.2.

In all other cases the storage outside the dedicated spaces may be allowed provided that the following requirements are complied with:

- the closure of the containers is to be sealed and hermetic, as soon as a container is opened for use it is to be re-located into the relevant storeroom;
- the area identified for the storage of pallets is to be well ventilated: in this context the use of open deck is recommended, provided that it is protected against the solar radiation;
- monitoring is to be frequently carried out by the crew to ascertain the absence of leaks, ruptures, etc.;
- in case of partially enclosed spaces (i.e. mooring decks), the storage area is to be protected by detection and spray water systems;
- in case of toxic products, storage is to be made at a safe distance from ventilation or access openings to other enclosed spaces;
- corrosive products are to be stored outside areas where equipment for navigation and safety are located;
- the storage is always to be carried out in compliance with segregation criteria (see Fig 3).

3.2.4 Storage of large quantity of chemical products in intermediate bulk containers (IBC)

The use of IBC's has strongly increased in recent years, since their introduction as system for the storage and carriage of liquids chemical products.

large quantity of products, up to 1,000 l, within machinery spaces and, in general, outside of stores. Because the thickness of plastic is reduced in the bottom area, where the discharge valve is located, the most known effect of heat in case of fire is the rapid collapse of the IBC followed by the fast discharge of the whole content. Therefore the use on board outside of storage spaces should be avoided, unless for limited times (i.e. during temporary works), in manned areas, or when filled with non-dangerous liquids.

In addition, further precautions are to be followed, such as:

- the storage area is to be at a safe distance from heat sources or in a position not easily exposed to open flames in case of fire;
- the storage is to be preferably within spaces of category (7)/(10); if, for operative purposes the IBC are stored within machinery spaces of category A (i.e. (6)/(12)), they are to be at a safe distance from sources of ignition (combustion engines, equipment with fuel under pressure, burners, etc.) and covered by the fixed fire-fighting system of the space;
- suitable precautions to contain the spread of liquid from within the IBC are to be provided.

Figure 1



This type of containers, made of plastic and stiffened with steel profiles are often used for the storage of

Figure 2: Requirement for Batteries

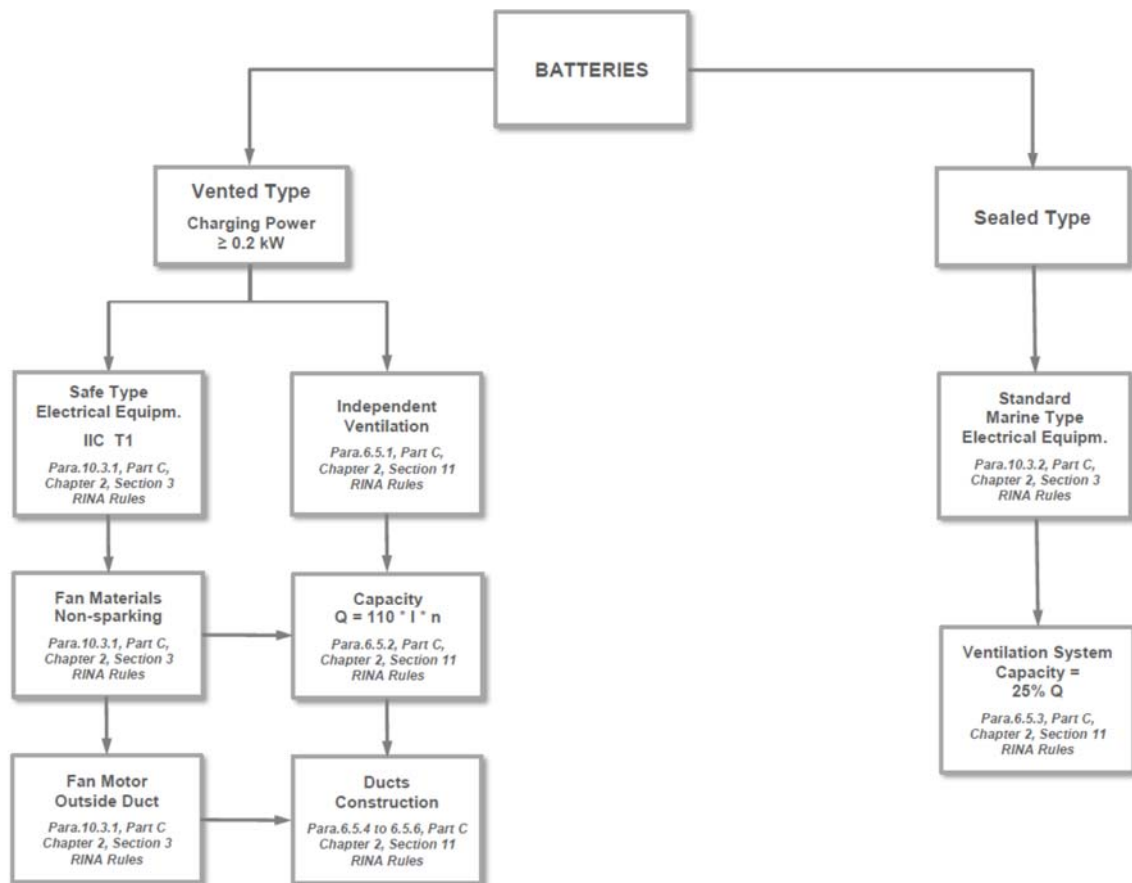


























Figure 3: Segregation Chart

DANGEROUS CLASS ID															Foods	Substances having risk of fire
	2.1	Y	Y	Y	Y	N	N	N	N	N	Y	N	Y	Y	Y	Y
	2.2	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y
	2.3	Y	Y	Y	N	Y	N	Y	N	N	Y	Y	Y	Y	N	Y
	3	Y	Y	N	Y	Y	N	Y	N	N	Y	N	Y	Y	Y	Y
	4.1	N	Y	Y	Y	Y	N	Y	N	N	Y	N	Y	Y	Y	Y
	4.2	N	N	N	N	N	Y	Y	N	N	Y	N	Y	Y	Y	Y
	4.3	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	Y	Y
	5.1	N	Y	N	N	N	N	N	Y	N	Y	N	N	Y	Y	N
	5.2	N	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N
	6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N ₍₈₎	Y
	7	N	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	N ₍₈₎	Y
	8	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N ₍₈₎	Y
	9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y