

**PART II RULES FOR THE CONSTRUCTION
AND CLASSIFICATION OF SHIPS
IDENTIFIED BY THEIR MISSION**

**INTERNATIONAL CODE FOR THE
CONSTRUCTION AND EQUIPMENT OF SHIPS
CARRYING LIQUEFIED GASES IN BULK, 2006, AS
AMENDED**

TITLE 33 CHEMICAL TANKERS

SECTION 1 NAVAL ARCHITECTURE

CHAPTERS

- A. PREAMBLE
- B. SHIP SURVIVAL CAPABILITY AND
 LOCATION OF CARGO TANKS
- C. SHIP ARRANGEMENTS

CONTENTS

CHAPTER A (1)	5
GENERAL	5
A1. GENERAL	5
100. 1.1 General	5
200. 1.2 Hazards	5
300. 1.3 Definitions	6
400. 1.4 Equivalents	7
500. 1.5 Surveys and certification	8
CHAPTER B (2)	11
SHIP SURVIVAL CAPABILITY* AND LOCATION OF CARGO TANKS	11
B1. GENERAL	11
100. 2.1.General	11
200. 2.2 Freeboard and intact stability	11
300. 2.3 Shiplside discharges below the freeboard deck	11
400. 2.4 Conditions of loading	12
500. 2.5 Damage assumptions	12
600. 2.6 Location of cargo tanks	13
700. 2.7 Flooding assumptions	13
800. 2.8 Standard of damage	14
900. 2.9 Survival requirements	14
CHAPTER C(3)	15
SHIP ARRANGEMENTS	15
C1. SHIP ARRANGEMENT	15
100. 3.1 Cargo segregation	15
200. 3.2 Accommodation, service and machinery spaces and control stations	15
300. 3.3 Cargo pump rooms	15
400. 3.4 Access to spaces in the cargo area	16
500. 3.5 Bilge and ballast arrangements	16
600. 3.6 Pump and pipeline identification	16
700. 3.7 Bow or stern loading and unloading arrangements.	16

CHAPTER A (1)

GENERAL

For ships constructed from 1986-07-01

CHAPTER CONTENTS

A1. GENERAL

A1. GENERAL

Guidance

“Code” in this transcription has been substituted by “Rules”.

End of guidance

100. 1.1 General

101. The Code applies to ships regardless of size, including those of less than 500 gross tonnage, engaged in the carriage of bulk cargoes of dangerous chemicals or noxious liquid substances (NLS), other than petroleum or similar flammable products as follows:

- a. .1 products having significant fire hazards in excess of those of petroleum products and similar flammable products;
- b. .2 products having significant hazards in addition to or other than flammability.

102. 1.1.2 Products that have been reviewed and determined not to present safety and pollution hazards to such an extent as to warrant the application of the Code are found in ANNEX IV (chapter 18).

103. 1.1.3 Liquids covered by the Code are those having a vapour pressure not exceeding 0.28 MPa absolute at a temperature of 37.8°C.

104. 1.1.4 For the purpose of the 1974 SOLAS Convention, the Code applies to ships which are engaged in the carriage of products included in Chapter 17 on the basis of their safety characteristics and identified as such by an entry of S or S/P in column d.

105. 1.1.5 For the purposes of MARPOL 73/78, the Code applies only to NLS tankers, as defined in regulation 1.16.2 of Annex II thereof, which are engaged in the carriage of Noxious Liquid Substances identified as such by an entry of X, Y or Z in column c of ANNEX III (chapter 17).

106. 1.1.6 For a product proposed for carriage in bulk, but not listed in ANNEX III or IV (chapters 17 or 18), the Administration and port Administrations involved in such carriage shall prescribe the preliminary suitable conditions

for the carriage, having regard to the criteria for hazard evaluation of bulk chemicals. For the evaluation of the pollution hazard of such a product and assignment of its pollution category, the procedure specified in regulation 6.3 of Annex II of MARPOL 73/78 must be followed. The Organization shall be notified of the conditions for consideration for inclusion of the product in the Code.

107. 1.1.7 Unless expressly provided otherwise, the Code applies to ships, the keels of which are laid or which are at the stage where:

- a. .1 construction identifiable with the ship begins; and
- b. .2 assembly has commenced comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less; on or after 1 July 1986.

108. 1.1.8 A ship, irrespective of the date of construction, which is converted to a chemical tanker on or after 1 July 1986 shall be treated as a chemical tanker constructed on the date on which such conversion commences. This conversion provision does not apply to the modification of a ship referred to in regulation 1.14 of Annex II of MARPOL 73/78.

109. 1.1.9 Where reference is made in the Code to a paragraph, all the provisions of the subparagraphs of that designation shall apply.

200. 1.2 Hazards

Hazards of products covered by the Code include:

201. 1.2.1 Fire hazard, defined by flashpoint, explosive/flammability limits/range and autoignition temperature of the chemical.

202. 1.2.2 Health hazard, defined by:

- a. .1 corrosive effects on the skin in the liquid state; or
- b. .2 acute toxic effect, taking into account values of:
 - a.1. LD50 (oral): a dose, which is lethal to 50% of the test subjects when administered orally;
 - a.2. LD50 (dermal): a dose, which is lethal to 50% of the test subjects when administered to the skin;
 - a.3. LC50 (inhalation): the concentration which is lethal by inhalation to 50% of the test subjects; or
- c. .3 Other health effects such as carcinogenicity and sensitization.

203. 1.2.3 Reactivity hazard, defined by reactivity:

- a. .1 with water;
- b. .2 with air;
- c. .3 with other products; or
- d. .4 of the product itself (e.g. polymerization).

204. 1.2.4 Marine pollution hazard, as defined by:

- a. .1 bioaccumulation;
- b. .2 lack of ready biodegradability;
- c. .3 acute toxicity to aquatic organisms;
- d. .4 chronic toxicity to aquatic organisms;
- e. .5 long term human health effects; and
- f. .6 physical properties resulting in the product floating or sinking and so adversely affecting marine life.

300. 1.3 Definitions

The following definitions apply unless expressly provided otherwise. (Additional definitions are given in individual chapters).

301. 1.3.1 **Accommodation spaces** are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces. **Public spaces** are those portions of the accommodation spaces which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

302. 1.3.2 **Administration** means the Government of the State whose flag the ship is entitled to fly. For Administration (Port) see Port Administration.

303. 1.3.3 **Anniversary date** means the day and the month of each year, which will correspond to the date of expiry of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk.

304. 1.3.4 **Boiling point** is the temperature at which a product exhibits a vapour pressure equal to the atmospheric pressure.

305. 1.3.5 **Breadth (B)** means the maximum breadth of the ship, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material. The breadth (B) shall be measured in metres.

306. 1.3.6 **Cargo area** is that part of the ship that contains cargo tanks, slop tanks, cargo pump rooms

including pump rooms, cofferdams, ballast or void spaces adjacent to cargo tanks or slop tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above mentioned spaces. Where independent tanks are installed in hold spaces, cofferdams, ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forward-most hold space are excluded from the cargo area.

307. 1.3.7 **Cargo pump room** is a space containing pumps and their accessories for the handling of the products covered by the Code.

308. 1.3.8 **Cargo service spaces** are spaces within the cargo area used for workshops, lockers and store-rooms of more than 2 m² in area, used for cargo-handling equipment.

309. 1.3.9 **Cargo tank** is the envelope designed to contain the cargo.

310. 1.3.10 **Chemical tanker** is a cargo ship constructed or adapted and used for the carriage in bulk of any liquid product listed in ANNEX III ([chapter 17](#)).

311. 1.3.11 **Cofferdam** is the isolating space between two adjacent steel bulkheads or decks. This space may be a void space or a ballast space.

312. 1.3.12 **Control stations** are those spaces in which ship's radio or main navigating equipment or the emergency source of power is located or where the fire-recording or fire-control equipment is centralized. This does not include special fire-control equipment which can be most practically located in the cargo area.

313. 1.3.13 **Dangerous chemicals** means any liquid chemicals designated as presenting a safety hazard, based on the safety criteria for assigning products to ANNEX ([chapter 17](#)).

314. 1.3.14 **Density** is the ratio of the mass to the volume of a product, expressed in terms of kilograms per cubic metre. This applies to liquids, gases and vapours.

315. 1.3.15 **Explosive/flammability limits/range** are the conditions defining the state of fuel-oxidant mixture at which application of an adequately strong external ignition source is only just capable of producing flammability in a given test apparatus.

316. 1.3.16 **Flashpoint** is the temperature in degrees Celsius at which a product will give off enough flammable vapour to be ignited. Values given in the Code are those for a "closed-cup test" determined by an approved flashpoint apparatus.

317. 1.3.17 **Hold space** is the space enclosed by the ship's structure in which an independent cargo tank is situated.

318. 1.3.18 *Independent* means that a piping or venting system, for example, is in no way connected to another system and that there are no provisions available for the potential connection to other systems.

319. 1.3.19 *Length (L)* means 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel, the waterline on which this length is measured shall be parallel to the designed waterline. The length (L) shall be measured in metres.

320. 1.3.20 *Machinery spaces of category A* are those spaces and trunks to such spaces which contain:

- a. .1 internal-combustion machinery used for main propulsion; or
- b. .2 internal-combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
- c. .3 any oil-fired boiler or oil fuel unit or any oil fired equipment other than boilers, such as inert gas generators, incinerators etc.

321. 1.3.21 *Machinery spaces* are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal-combustion engines, generators and major electrical machinery, oil filling station, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces.

322. 1.3.22 *MARPOL* means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

323. 1.3.23 *Noxious Liquid Substance* means any substance indicated in the Pollution Category column of chapters 17 or 18 of the International Bulk Chemical Code, or the current MEPC.2/Circular or provisionally assessed under the provisions of regulation 6.3 of MARPOL Annex II as falling into categories X, Y or Z.

324. 1.3.24 *Oil fuel unit* is the equipment used for the preparation of oil fuel for delivery to an oil fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a gauge pressure of more than 0.18 MPa.

325. 1.3.25 *Organization* is the International Maritime Organization (IMO).

326. 1.3.26 *Permeability of a space* means the ratio of the volume within that space which is assumed to be occupied by water to the total volume of that space.

327. 1.3.27 *Port administration* means the appropriate authority of the country in the port of which the ship is loading or unloading.

328. 1.3.28 *Products* is the collective term used to cover both Noxious Liquid Substances and Dangerous Chemicals.

329. 1.3.29 *Pump room* is a space, located in the cargo area, containing pumps and their accessories for the handling of ballast and oil fuel.

330. 1.3.30 *Recognized standards* are applicable international or national standards acceptable to the Administration or standards laid down and maintained by an organization which complies with the standards adopted by the Organization and which is recognized by the Administration.

331. 1.3.31 *Reference temperature* is the temperature at which the vapour pressure of the cargo corresponds to the set pressure of the pressure-relief valve.

332. 1.3.32 *Separate* means that a cargo piping system or cargo vent system, for example, is not connected to another cargo piping or cargo vent system.

333. 1.3.33 *Service spaces* are those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, store-rooms, workshops other than those forming part of the machinery spaces and similar spaces and trunks to such spaces.

334. 1.3.34 *SOLAS* means the International Convention for the Safety of Life at Sea, 1974, as amended.

335. 1.3.35 *Vapour pressure* is the equilibrium pressure of the saturated vapour above a liquid expressed in Pascals (Pa) at a specified temperature.

336. 1.3.36 *Void space* is an enclosed space in the cargo area external to a cargo tank, other than a hold space, ballast space, oil fuel tank, cargo pump room, pump room, or any space in normal use by personnel.

400. 1.4 Equivalents

401. 1.4.1 Where the Code requires that a particular fitting, material, appliance, apparatus, item of equipment or type thereof shall be fitted or carried in a ship, or that any particular provision shall be made, or any procedure or arrangement shall be complied with, the Administration may allow any other fitting, material, appliance, apparatus, item of equipment or type thereof to be fitted or carried, or any other provision, procedure or arrangement to be made in that ship, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance, apparatus, item of

equipment or type thereof or that any particular provision, procedure or arrangement is at least as effective as that required by the Code. However, the Administration may not allow operational methods or procedures to be made an alternative to a particular fitting, material, appliance, apparatus, item of equipment, or type thereof, which are prescribed by the Code, unless such substitution is specifically allowed by the Code.

402. 1.4.2 When the Administration allows any fitting, material, appliance, apparatus, item of equipment, or type thereof, or provision, procedure, or arrangement, or novel design or application to be substituted, it shall communicate to the Organization the particulars thereof, together with a report on the evidence submitted, so that the Organization may circulate the same to other Contracting Governments to SOLAS and Parties to MARPOL for the information of their officers.

500. 1.5 Surveys and certification

501. 1.5.1 Survey procedure

- a. 1.5.1.1 The survey of ships, so far as regards the enforcement of the provisions of the regulations and granting of exemptions therefrom, shall be carried out by officers of the Administration. The Administration may, however, entrust the surveys either to surveyors nominated for the purpose or to organizations recognized by it.
- b. 1.5.1.2 The recognized organization, referred to in regulation 8.2.1 of MARPOL Annex II shall comply with the guidelines adopted by the Organization by resolution A.739(18), as may be amended by the Organization, and the specification adopted by the Organization by resolution A.789(19), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article 16 of MARPOL and article VIII of SOLAS concerning the amendment procedures applicable to this Code.
- c. 1.5.1.3 The Administration nominating surveyors or recognizing organizations to conduct surveys shall, as a minimum, empower any nominated surveyor or recognized organization to:
 - a.1. .1 require repairs to a ship; and
 - a.2. .2 carry out surveys if requested by the appropriate authorities of a port State.

The Administration shall notify the Organization of the specific responsibilities and conditions of the authority delegated to nominated surveyors or recognized organizations for circulation to the Contracting Governments.

- d. 1.5.1.4 When a nominated surveyor or recognized organization determines that the condition of a ship or its equipment does not correspond substantially with the particulars of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk, or is such that the ship is not fit to proceed to sea without danger to the ship, or persons on board, or without presenting unreasonable threat of harm to the marine environment, such surveyor or organization shall immediately ensure that corrective action is taken and shall, in due course, notify the Administration. If such corrective action is not taken the Certificate shall be withdrawn and the Administration shall be notified immediately. If the ship is in a port of another Contracting Government, the appropriate authorities of the port State shall also be notified immediately. When an officer of the Administration, a nominated surveyor or a recognized organization has notified the appropriate authorities of the port State, the Government of the port State concerned shall give such officer, surveyor or organization any necessary assistance to carry out their obligations under this paragraph. When applicable, the Government of the port State concerned shall take such steps as will ensure that the ship does not sail until it can proceed to sea or leave the port for the purpose of proceeding to the nearest appropriate repair yard available without danger to the ship or persons on board or without presenting an unreasonable threat of harm to the marine environment.
- e. 1.5.1.5 In every case, the Administration shall guarantee the completeness and efficiency of the survey, and shall undertake to ensure the necessary arrangements to satisfy this obligation.

502. 1.5.2 Survey requirements

503. 1.5.2.1 The structure, equipment, fittings, arrangements and material (other than items in respect of which a Cargo Ship Safety Construction Certificate, Cargo Ship Safety Equipment Certificate and Cargo Ship Safety Radio Certificate or Cargo Ship Safety Certificate are issued) of a chemical tanker shall be subjected to the following surveys:

- a. .1 An initial survey before the ships is put in service or before the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk is issued for the first time, which shall include a complete examination of its structure, equipment, fittings, arrangements and material in so far as the ship is covered by the Code. This survey shall be such as to ensure that the structure, equipment, fittings, arrangements and material fully comply with the applicable provisions of the Code.
- b. .2 A renewal survey at intervals specified by the Administration, but not exceeding 5 years, except

where A1.507.c, g, h or f (1.5.6.2.2, 1.5.6.5, 1.5.6.6 or 1.5.6.7) is applicable. The renewal survey shall be such as to ensure that the structure, equipment, fittings, arrangements and material fully comply with the applicable provisions of the Code.

- c. .3 An intermediate survey within 3 months before or after the second anniversary date or within 3 months before or after the third anniversary date of the Certificate, which shall take the place of one of the annual surveys specified in A1.503.d (1.5.2.1.4). The intermediate survey shall be such as to ensure that the safety equipment, and other equipment, and associate pump and piping systems fully comply with the applicable provisions of the Code and are in good working order. Such intermediate surveys shall be endorsed on the Certificate issued under 1.5.4 or 1.5.5.
- d. .4 An annual survey within 3 months before or after each anniversary date of the Certificate, including a general inspection of the structure, equipment, fittings, arrangements and material referred to in A1.503.a (1.5.2.1.1) to ensure that they have been maintained in accordance with A1.504 (1.5.3) and that they remain satisfactory for the service for which the ship is intended. Such annual surveys shall be endorsed on the Certificate issued under A1.505 or 506 (1.5.4 or 1.5.5).
- e. .5 An additional survey, either general or partial according to the circumstances, shall be made when required after an investigation prescribed in A1.504.c (1.5.3.3), or whenever any important repairs or renewals are made. Such a survey shall ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are satisfactory; and that the ship is fit to proceed to sea without danger to the ship or persons on board or without presenting unreasonable threat of harm to the marine environment.

504. 1.5.3 Maintenance of conditions after survey

- a. 1.5.3.1 The conditions of the ship and its equipment shall be maintained to conform with the provisions of the Code to ensure that the ship will remain fit to proceed to sea without danger to the ship or persons on board or without presenting an unreasonable threat of harm to the marine environment.
- b. 1.5.3.2 After any survey of the ship under A1.502 (1.5.2) has been completed, no change shall be made in the structure, equipment, fittings, arrangements and material covered by the survey, without the sanction of the Administration, except by direct replacement.
- c. 1.5.3.3 Whenever an accident occurs to a ship or a defect is discovered, either of which affects the

safety of the ship or the efficiency or completeness of its life-saving appliances or other equipment covered by the Code, the master or owner of the ship shall report at the earliest opportunity to the Administration, the nominated surveyor or recognized organization responsible for issuing the Certificate, who shall cause investigations to be initiated to determine whether a survey, as required by A1.503.e (1.5.2.1.5), is necessary. If the ship is in a port of another Contracting Government, the master or owner shall also report immediately to the appropriate authorities of the port State and the nominated surveyor or recognized organization shall ascertain that such a report has been made.

505. 1.5.4 Issue or endorsement of International Certificate of Fitness

- a. 1.5.4.1 An International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk shall be issued after an initial or renewal survey to a chemical tanker engaged in international voyages which complies with the relevant provisions of the Code.
- b. 1.5.4.2 Such a Certificate shall be drawn up in the form corresponding to the model given in the appendix. If the language used is not English, French or Spanish, the text shall include the translation into one of these languages.
- c. 1.5.4.3 The Certificate issued under provisions of this section shall be available on board for examination at all times.

506. 1.5.5 Issue or endorsement of International Certificate of Fitness by another Government

- a. 1.5.5.1 A Government that is both a Contracting Government to the 1974 SOLAS Convention and a Party to MARPOL 73/78 may, at the request of another such Government, cause a ship entitled to fly the flag of the other State to be surveyed and, if satisfied that the provisions of the Code are complied with, issue or authorize the issue of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk to the ship, and, where appropriate, endorse or authorize the endorsement of the Certificate on board the ship in accordance with the Code. Any Certificate so issued shall contain a statement to the effect that it has been issued at the request of the Government of the State whose flag the ship is entitled to fly.

507. 1.5.6 Duration and validity of International Certificate of Fitness

- a. 1.5.6.1 An International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk shall be issued for a period specified by the Administration which shall not exceed 5 years.

- b. 1.5.6.2.1 Notwithstanding the provisions of A1.507.a (1.5.6.1), when the renewal survey is completed within 3 months before the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing Certificate.
- c. 1.5.6.2.2 When the renewal survey is completed after the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing Certificate.
- d. 1.5.6.2.3 When the renewal survey is completed more than 3 months before the expiry date of the existing Certificate, the new Certificate shall be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of completion of the renewal survey.
- e. 1.5.6.3 If a Certificate is issued for a period of less than 5 years, the Administration may extend the validity of the Certificate beyond the expiry date to the maximum period specified in A1.507.a (1.5.6.1), provided that the surveys referred to in A1 503.c and 503.d (1.5.2.1.3 and 1.5.2.1.4), applicable when a Certificate is issued for a period of 5 years, are carried out as appropriate.
- f. 1.5.6.4 If a renewal survey has been completed and a new Certificate cannot be issued or placed on board the ship before the expiry date of the existing Certificate, the person or organization authorized by the Administration may endorse the existing Certificate. Such a Certificate shall be accepted as valid for a further period which shall not exceed 5 months from the expiry date.
- g. 1.5.6.5 If a ship, at the time when a Certificate expires, is not in a port in which it is to be surveyed, the Administration may extend the period of validity of the Certificate but this extension shall be granted only for the purpose of allowing the ship to complete its voyage to the port in which it is to be surveyed, and then only in cases where it appears proper and reasonable to do so.
- h. 1.5.6.6 A Certificate, issued to a ship engaged on short voyages which has not been extended under the foregoing provisions of this section, may be extended by the Administration for a period of grace of up to one month from the date of expiry stated on it. When the renewal survey is completed, the new Certificate shall be valid to a date not exceeding 5 years from the date of expiry of the existing Certificate before the extension was granted.

- i. 1.5.6.7 In special circumstances, as determined by the Administration, a new Certificate need not be dated from the date of expiry of the existing Certificate as required by A1.507.c, g or h (1.5.6.2.2, 1.5.6.5 or 1.5.6.6). In these special circumstances, the new Certificate shall be valid to a date not exceeding 5 years from the date of completion of the renewal survey.
- j. 1.5.6.8 If an annual or intermediate survey is completed before the period specified in 1.5.2, then:
- j.1. .1 the anniversary date shown on the Certificate shall be amended by endorsement to a date which shall not be more than 3 months later than the date on which the survey was completed;
- j.2. .2 the subsequent annual or intermediate survey required by A1.502 (1.5.2) shall be completed at the intervals prescribed by that section using the new anniversary date; and
- j.3. .3 the expiry date may remain unchanged provided one or more annual or intermediate surveys, as appropriate, are carried out so that the maximum intervals between the surveys prescribed by A1.502 (1.5.2) are not exceeded.
- k. 1.5.6.9 A Certificate issued under A1.505 or A1.506 (1.5.4 or 1.5.5) shall cease to be valid in any of the following cases:
- k.1. .1 if the relevant surveys are not completed within the periods specified under A1.502 (1.5.2);
- k.2. .2 if the Certificate is not endorsed in accordance with A1.503.c or 503.d (1.5.2.1.3 or 1.5.2.1.4);
- k.3. .3 upon transfer of the ship to the flag of another State. A new certificate shall only be issued when the Government issuing the new Certificate is fully satisfied that the ship is in compliance with the requirements of A1.504.a and 504.b (1.5.3.1 and 1.5.3.2). In the case of a transfer between Governments that are both a Contracting Government to the 1974 SOLAS Convention and a Party to MARPOL 73/78, if requested within 3 months after the transfer has taken place, the Government of the State whose flag the ship was formerly entitled to fly shall, as soon as possible, transmit to the Administration copies of the Certificate carried by the ship before the transfer and, if available, copies of the relevant survey reports.

CHAPTER B (2) SHIP SURVIVAL CAPABILITY* AND LOCATION OF CARGO TANKS

CHAPTER CONTENTS

B1. SHIP SURVIVAL CAPABILITY* AND LOCATION OF CARGO TANKS

* Reference is made to the Guidelines for Uniform Application of the Survival Requirements of the Bulk Chemical Code and the Gas Carrier Code.

B1. GENERAL

100. 2.1.General

101. 2.1.1 Ships, subject to the Code, shall survive the normal effects of flooding following assumed hull damage caused by some external force. In addition, to safeguard the ship and the environment, the cargo tanks of certain types of ships shall be protected from penetration in the case of minor damage to the ship resulting, for example, from contact with a jetty or tug, and given a measure of protection from damage in the case of collision or stranding, by locating them at specified minimum distances inboard from the ship's shell plating. Both the assumed damage and the proximity of the cargo tanks to the ship's shell shall be dependent upon the degree of hazard presented by the products to be carried.

102. 2.1.2 Ships subject to the Code shall be designed to one of the following standards:

- a. .1 A type 1 ship is a chemical tanker intended to transport ANNEX III (chapter 17) products with very severe environmental and safety hazards which require maximum preventive measures to preclude an escape of such cargo.
- b. .2 A type 2 ship is a chemical tanker intended to transport ANNEX III (chapter 17) products with appreciably severe environmental and safety hazards which require significant preventive measures to preclude an escape of such cargo.
- c. .3 A type 3 ship is a chemical tanker intended to transport ANNEX III (chapter 17) products with sufficiently severe environmental and safety hazards which require a moderate degree of containment to increase survival capability in a damaged condition.

Thus, a type 1 ship is a chemical tanker intended for the transportation of products considered to present the greatest overall hazard and type 2 and type 3 for products of progressively lesser hazards. Accordingly, a type 1 ship shall survive the most severe standard of damage and its cargo tanks shall be located at the maximum prescribed distance inboard from the shell plating.

103. 2.1.3 The ship type required for individual products is indicated in column e in the table of ANNEX III (chapter 17).

104. 2.1.4 If a ship is intended to carry more than one product listed in ANNEX III (chapter 17), the standard of damage shall correspond to that product having the most stringent ship type requirement. The requirements for the location of individual cargo tanks, however, are those for ship types related to the respective products intended to be carried.

200. 2.2 Freeboard and intact stability

201. 2.2.1 Ships subject to the Code may be assigned the minimum freeboard permitted by the International Convention on Load Lines in force. However, the draught associated with the assignment shall not be greater than the maximum draught otherwise permitted by this Code.

202. 2.2.2 The stability of the ship in all seagoing conditions shall be to a standard which is acceptable to the Administration.

203. 2.2.3 When calculating the effect of free surfaces of consumable liquids for loading conditions it shall be assumed that, for each type of liquid, at least one transverse pair or a single centre tank has a free surface and the tank or combination of tanks to be taken into account shall be those where the effect of free surfaces is the greatest. The free surface effect in undamaged compartments shall be calculated by a method acceptable to the Administration.

204. 2.2.4 Solid ballast shall not normally be used in double-bottom spaces in the cargo area. Where, however, because of stability considerations, the fitting of solid ballast in such spaces becomes unavoidable, then its disposition shall be governed by the need to ensure that the impact loads resulting from bottom damage are not directly transmitted to the cargo tank structure.

205. 2.2.5 The master of the ship shall be supplied with a loading and stability information booklet. This booklet shall contain details of typical service and ballast conditions, provisions for evaluating other conditions of loading and a summary of the ship's survival capabilities. In addition, the booklet shall contain sufficient information to enable the master to load and operate the ship in a safe and seaworthy manner.

300. 2.3 Shiplside discharges below the freeboard deck

301. 2.3.1 The provision and control of valves fitted to discharges led through the shell from spaces below the freeboard deck or from within the super-structures and deck-houses on the freeboard deck fitted with weathertight doors shall comply with the requirements of the relevant regulation of the International Convention on Load Lines

in force, except that the choice of valves shall be limited to:

- a. .1 one automatic non-return valve with a positive means of closing from above the freeboard deck; or
- b. .2 where the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceeds 0.01L, two automatic non-return valves without positive means of closing, provided that the inboard valve is always accessible for examination under service conditions.

302. 2.3.2 For the purpose of this chapter, "summer load line" and "freeboard deck" have the meanings as defined in the International Convention on Load Lines in force.

303. 2.3.3 The automatic non-return valves referred to in B1.301.a and 301.b (2.3.1.1 and 2.3.1.2) shall be fully effective in preventing

admission of water into the ship, taking into account the sinkage, trim and heel in survival requirements in B1.900 (2.9), and shall comply with recognized standards.

400. 2.4 Conditions of loading

401. Damage survival capability shall be investigated on the basis of loading information submitted to the Administration for all anticipated conditions of loading and variations in draught and trim. Ballast conditions where the chemical tanker is not carrying products covered by the Code, or is carrying only residues of such products, need not be considered.

500. 2.5 Damage assumptions

501. See Table T.B1.501.1 below.

TABLE T.B1.501.1 – DAMAGE ASSUMPTIONS

.1	<i>Side damage:</i>		
.1.1	Longitudinal	$1/3L^{2/3}$ or	
	extent:	14.5 m whichever is less	
.1.2	Transverse	B/5 or 11.5 m,	
	extent	whichever is less (measured inboard from the ship's side at right angles to the centreline at the level of the summer load line)	
.1.3	Vertical	upwards without	
	extent:	limit (measured from the moulded line of the bottom shell plating at centreline)	
.2	<i>Bottom damage:</i>		Any other part of
		For 0.3L from the forward perpendicular of the ship of the ship	the ship
.2.1	Longitudinal	$1/3L^{2/3}$ or	$1/3L^{2/3}$ or 5 m,
	extent:	14.5 m, whichever is less	
.2.2	Transverse	B/6 or 10 m,	B/6 or 5 m,
	extent:	whichever is less	
.2.3	Vertical	B/15 or 6 m,	B/15 or 6 m,
	extent:	whichever is less	
		[measured from the moulded line of the bottom shell plating at centreline(see B1.602)]	[measured from the moulded line of the bottom shell plating at centreline (see B1.602)]

502. 2.5.1 The assumed maximum extent of damage shall be:

503. 2.5.2 If any damage of a lesser extent than the maximum damage specified in B1.502 (2.5.1) would result in a more severe condition, such damage shall be considered.

600. 2.6 Location of cargo tanks

601. .6.1 Cargo tanks shall be located at the following distances inboard:

- a. .1 Type 1 ships: from the side shell plating, not less than the transverse extent of damage specified in 2.5.1.1.2, and from the moulded line of the bottom shell plating at centreline, not less than the vertical extent of damage specified in 2.5.1.2.3 of the Code, and nowhere less than 760 mm from the shell plating. This requirement does not apply to the tanks for diluted slops arising from tank washing.
- b. .2 Type 2 ships: from the moulded line of the bottom shell plating at centreline, not less than the vertical extent of damage specified in 2.5.1.2.3 of the Code, and nowhere less than 760 mm from the shell plating. This requirement does not apply to the tanks for diluted slops arising from tank washing.
- c. .3 Type 3 ships: no requirement.

602. 2.6.2 Except for type 1 ships, suction wells installed in cargo tanks may protrude into the vertical extent of bottom damage specified in 2.5.1.2.3 of the Code provided that such wells are as small as practicable and the protrusion below the inner bottom plating does not exceed 25% of the depth of the double bottom or 350 mm, whichever is less. Where there is no double bottom, the protrusion of the suction well of independent tanks below the upper limit of bottom damage shall not exceed 350 mm. Suction wells installed in accordance with this paragraph may be ignored in determining the compartments affected by damage.

700. 2.7 Flooding assumptions

701. 2.7.1 The requirements of B1.900 (2.9) shall be confirmed by calculations which take into consideration the design characteristics of the ship; the arrangements, configuration and contents of the damaged compartments; the distribution, relative densities and the free surface effects of liquids; and the draught and trim for all conditions of loading.

702. 2.7.2 The permeabilities of spaces assumed to be damaged shall be as follows:

Spaces	Permeabilities
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Voids	0.95
Intended for consumable liquids	0 to 0.95*
Intended for other liquids	0 to 0.95*

* The permeability of partially filled compartments shall be consistent with the amount of liquid carried in the compartment.

703. 2.7.3 Wherever damage penetrates a tank containing liquids it shall be assumed that the contents are completely lost from that compartment and replaced by salt water up to the level of the final plane of equilibrium.

704. 2.7.4 Every watertight division within the maximum extent of damage defined in B1.502 (2.5.1) and considered to have sustained damage in positions given in B1.801 (2.8.1) shall be assumed to be penetrated. Where damage less than the maximum is being considered in accordance with B1.503 (2.5.2), only watertight divisions or combinations of watertight divisions within the envelope of such lesser damage shall be assumed to be penetrated.

705. 2.7.5 The ship shall be so designed as to keep unsymmetrical flooding to the minimum consistent with efficient arrangements.

706. 2.7.6 Equalization arrangements requiring mechanical aids such as valves or cross-levelling pipes, if fitted, shall not be considered for the purpose of reducing an angle of heel or attaining the minimum range of residual stability to meet the requirements of B1.900 (2.9) and sufficient residual stability shall be maintained during all stages where equalization is used. Spaces which are linked by ducts of large cross-sectional area may be considered to be common.

707. 2.7.7 If pipes, ducts, trunks or tunnels are situated within the assumed extent of damage penetration, as defined in B1.500 (2.5), arrangements shall be such that progressive flooding cannot thereby extend to compartments other than those assumed to be flooded for each case of damage.

708. 2.7.8 The buoyancy of any superstructure directly above the side damage shall be disregarded. The unflooded parts of superstructures beyond the extent of damage, however, may be taken into consideration provided that:

- a. .1 they are separated from the damaged space by watertight divisions and the requirements of B1.903

(2.9.3) in respect of these intact spaces are complied with; and

- b. .2 openings in such divisions are capable of being closed by remotely operated sliding watertight doors and unprotected openings are not immersed within the minimum range of residual stability required in B1.900 (2.9); however, the immersion of any other openings capable of being closed weathertight may be permitted.

800. 2.8 Standard of damage

801. 2.8.1 Ships shall be capable of surviving the damage indicated in B1.500 (2.5) with the flooding assumptions in 2.7 to the extent determined by the ship's type according to the following standards:

- a. .1 A type 1 ship shall be assumed to sustain damage anywhere in its length.
- b. .2 A type 2 ship of more than 150 m in length shall be assumed to sustain damage anywhere in its length.
- c. .3 A type 2 ship of 150 m in length or less shall be assumed to sustain damage anywhere in its length except involving either of the bulkheads bounding a machinery space located aft.
- d. .4 A type 3 ship of more than 225 m in length shall be assumed to sustain damage anywhere in its length.
- e. .5 A type 3 ship of 125 m in length or more but not exceeding 225 m in length shall be assumed to sustain damage anywhere in its length except involving either of the bulkheads bounding a machinery space located aft.
- f. .6 A type 3 ship below 125 m in length shall be assumed to sustain damage anywhere in its length except involving damage to the machinery space when located aft. However, the ability to survive the flooding of the machinery space shall be considered by the Administration.

802. 2.8.2 In the case of small type 2 and type 3 ships which do not comply in all respects with the appropriate requirements of B1.801.c (2.8.1.3) and B1.801.f (2.8.1.6), special dispensation may only be considered by the Administration provided that alternative measures can be taken which maintain the same degree of safety. The nature of the alternative measures shall be approved and clearly stated and be available to the port Administration. Any such dispensation shall be duly noted on the International Certificate of Fitness referred to in A1.505 (1.5.4).

900. 2.9 Survival requirements

901. 2.9.1 Ships subject to the Code shall be capable of surviving the assumed damage specified in B1.500 (2.5) to the standard provided in B1.800 (2.8) in a condition of stable equilibrium and shall satisfy the following criteria.

902. 2.9.2 *In any stage of flooding:*

- a. .1 the waterline, taking into account sinkage, heel and trim, shall be below the lower edge of any opening through which progressive flooding or downflooding may take place. Such openings shall include air pipes and openings which are closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and watertight flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, and sidescuttles of the non-opening type;
- b. .2 the maximum angle of heel due to unsymmetrical flooding shall not exceed 25°, except that this angle may be increased to 30° if no deck immersion occurs;
- c. .3 the residual stability during intermediate stages of flooding shall be to the satisfaction of the Administration. However, it shall never be significantly less than that required by B1.903 (2.9.3).

903. 2.9.3 *At final equilibrium after flooding:*

- a. .1 the righting-lever curve shall have a minimum range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 m within the 20° range; the area under the curve within this range shall not be less than 0.0175 m radians. Unprotected openings shall not be immersed within this range unless the space concerned is assumed to be flooded. Within this range, the immersion of any of the openings listed in B1.902.a (2.9.2.1) and other openings capable of being closed weathertight may be permitted; and
- b. .2 the emergency source of power shall be capable of operating.

ACS UI SC224 LL74 MPC95 (Aug 2008) *Measurement of Distances*

Several IMO instruments (e.g., ICLL, SOLAS and MARPOL Conventions, the IBC Code and the IGC Code, etc.) require distances to be measured such as tank length, height, width, ship (or subdivision or waterline) length, etc.

Interpretation

Unless explicitly stipulated otherwise in the text of the regulations in SOLAS, Load Line and

**CHAPTER C(3)
SHIP ARRANGEMENTS**

For ships constructed from 1986-07-01

CHAPTER CONTENTS

C1. SHIP ARRANGEMENTS

C1. SHIP ARRANGEMENT

100. 3.1 Cargo segregation

101. 3.1.1 Unless expressly provided otherwise, tanks containing cargo or residues of cargo subject to the Code shall be segregated from accommodation, service and machinery spaces and from drinking water and stores for human consumption by means of a cofferdam, void space, cargo pump room, pump room, empty tank, oil fuel tank or other similar space.

102. 3.1.2 Cargo piping shall not pass through any accommodation, service or machinery space other than cargo pump rooms or pump rooms.

103. 3.1.3 Cargoes, residues of cargoes or mixtures containing cargoes, which react in a hazardous manner with other cargoes, residues or mixtures, shall:

- a. .1 be segregated from such other cargoes by means of a cofferdam, void space, cargo pump room, pump room, empty tank, or tank containing a mutually compatible cargo;
- b. .2 have separate pumping and piping systems which shall not pass through other cargo tanks containing such cargoes, unless encased in a tunnel; and
- c. .3 have separate tank venting systems.

104. 3.1.4 If cargo piping systems or cargo ventilation systems are to be separated. This separation may be achieved by the use of design or operational methods. Operational methods shall not be used within a cargo tank and shall consist of one of the following types:

- a. .1 removing spool pieces or valves and blanking the pipe ends;

- b. .2 arrangement of two spectacle flanges in series, with provisions for detecting leakage into the pipe between the two spectacle flanges.

105. 3.1.5 Cargoes subject to the Code shall not be carried in either the fore or aft peak tank.

200. 3.2 Accommodation, service and machinery spaces and control stations

201. 3.2.1 No accommodation or service spaces or control stations shall be located within the cargo area except over a cargo pump room recess or pump room recess that complies with SOLAS regulations II-2/4.5.1 to 4.5.2.4 and no cargo or slop tank shall be aft of the forward end of any accommodation.

202. 3.2.2 In order to guard against the danger of hazardous vapours, due consideration shall be given to the location of air intakes and openings into accommodation, service and machinery spaces and control stations in relation to cargo piping and cargo vent systems.

203. 3.2.3 Entrances, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the cargo area. They shall be located on the end bulkhead not facing the cargo area and/or on the outboard side of the superstructure or deck house at a distance of at least 4% of the length (L) of the ship but not less than 3 m from the end of the superstructure or deck house facing the cargo area. This distance, however, need not exceed 5 m. No doors shall be permitted within the limits mentioned above, except that doors to those spaces not having access to accommodation and service spaces and control stations, such as cargo control stations and store rooms, may be fitted. Where such doors are fitted, the boundaries of the space shall be insulated to "A-60" standard. Bolted plates for removal of machinery may be fitted within the limits specified above. Wheelhouse doors and wheelhouse windows may be located within the limits specified above so long as they are so designed that a rapid and efficient gas- and vapour- tightening of the wheelhouse can be ensured. Windows and sidescuttles facing the cargo area and on the sides of the superstructures and deck houses within the limits specified above shall be of the fixed (non-opening) type. Such sidescuttles in the first tier on the main deck shall be fitted with inside covers of steel or equivalent material.

300. 3.3 Cargo pump rooms

301. 3.3.1 Cargo pump rooms shall be so arranged as to ensure:

- a. .1 unrestricted passage at all times from any ladder platform and from the floor; and
- b. .2 unrestricted access to all valves necessary for cargo handling for a person wearing the required personnel protective equipment.

302. 3.3.2 Permanent arrangements shall be made for hoisting an injured person with a rescue line while avoiding any projecting obstacles.

303. 3.3.3 Guard railings shall be installed on all ladders and platforms.

304. 3.3.4 Normal access ladders shall not be fitted vertical and shall incorporate platforms at suitable intervals.

305. 3.3.5 Means shall be provided to deal with drainage and any possible leakage from cargo pumps and valves in cargo pump rooms. The bilge system serving the cargo pump room shall be operable from outside the cargo pump room. One or more slop tanks for storage of contaminated bilge water or tank washings shall be provided. A shore connection with a standard coupling or other facilities shall be provided for transferring contaminated liquids to onshore reception facilities.

306. 3.3.6 Pump discharge pressure gauges shall be provided outside the cargo pump room.

307. 3.3.7 Where machinery is driven by shafting passing through a bulkhead or deck, gastight seals with efficient lubrication or other means of ensuring the permanence of the gas seal shall be fitted in way of the bulkhead or deck.

400. 3.4 Access to spaces in the cargo area

401. 3.4.1 Access to cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area shall be direct from the open deck and such as to ensure their complete inspection. Access to double bottom spaces may be through a cargo pump room, pump room, deep cofferdam, pipe tunnel or similar compartments, subject to consideration of ventilation aspects.

402. 3.4.2 For access through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening shall be not less than 600 mm by 600 mm.

403. 3.4.3 For access through vertical openings, or manholes providing passage through the length and breadth of the space, the minimum clear opening shall be not less than 600 mm by 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other footholds are provided.

404. 3.4.4 Smaller dimensions may be approved by the Administration in special circumstances, if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Administration.

500. 3.5 Bilge and ballast arrangements

501. 3.5.1 Pumps, ballast lines, vent lines and other similar equipment serving permanent ballast tanks shall be independent of similar equipment serving cargo tanks and of cargo tanks themselves. Discharge arrangements for permanent ballast tanks sited immediately adjacent to cargo tanks shall be outside machinery spaces and accommodation spaces. Filling arrangements may be in the machinery spaces provided that such arrangements ensure filling from tank deck level and non return valves are fitted.

502. 3.5.2 Filling of ballast in cargo tanks may be arranged from deck level by pumps serving permanent ballast tanks, provided that the filling line has no permanent connection to cargo tanks or piping and that non-return valves are fitted.

503. 3.5.3 Bilge pumping arrangements for cargo pump rooms, pump rooms, void spaces, slop tanks, double-bottom tanks and similar spaces shall be situated entirely within the cargo area except for void spaces, double-bottom tanks and ballast tanks where such spaces are separated from tanks containing cargo or residues of cargo by a double bulkhead.

600. 3.6 Pump and pipeline identification

(Provisions shall be made for the distinctive marking of pumps, valves and pipelines to identify the service and tanks which they serve.

700. 3.7 Bow or stern loading and unloading arrangements.

701. 3.7.1 Cargo piping may be fitted to permit bow or stern loading and unloading. Portable arrangements shall not be permitted.

702. 3.7.2 Bow or stern loading and unloading lines shall not be used for the transfer of products required to be carried in type 1 ships. Bow and stern loading and unloading lines shall not be used for the transfer of cargoes emitting toxic vapours required to comply with ANNEX I, A2.301.a (15.12.1), unless specifically approved by the Administration.

703. 3.7.3 In addition to Section 6, B1.100 (5.1), the following provisions apply:

- a. 3.7.3.1 The piping outside the cargo area shall be fitted at least 760 mm inboard on the open deck. Such piping shall be clearly identified and fitted with a shutoff valve at its connection to the cargo piping system within the cargo area. At this location, it shall also be capable of being separated by means of a removable spool-piece and blank flanges when not in use.

- b. .2 The shore connection shall be fitted with a shutoff valve and a blank flange.
- c. .3 The piping shall be full-penetration butt-welded, and fully radiographed. Flange connections in the piping shall only be permitted within the cargo area and at the shore connection.
- d. .4 Spray shields shall be provided at the connections specified in C1.703.a (3.7.3.1) as well as collecting trays of sufficient capacity, with means for the disposal of drainage.
- e. .5 The piping shall be self-draining to the cargo area and preferably into a cargo tank. Alternative arrangements for draining the piping may be accepted by the Administration.
- f. .6 Arrangements shall be made to allow such piping to be purged after use and maintained gas-safe when not in use. The vent pipes connected with the purge shall be located in the cargo area. The relevant connections to the piping shall be provided with a shutoff valve and blank flange.

704. 3.7.4 Entrances, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the cargo shore-connection location of bow or stern loading and unloading arrangements. They shall be located on the outboard side of the superstructure or deck house at a distance of at least 4% of the length of the ship but not less than 3 m from the end of the house facing the cargo shore-connection location of the bow or stern loading and unloading arrangements. This distance, however, need not exceed 5 m. Sidescuttles facing the shore connection location and on the sides of the superstructure or deck-house within the distance mentioned above shall be of the fixed (non-opening) type. In addition, during the use of the bow or stern loading and unloading arrangements, all doors, ports and other openings on the corresponding superstructure or deck-house side shall be kept closed. Where, in the case of small ships, compliance with C1.203 (3.2.3) and this paragraph is not possible, the Administration may approve relaxations from the above requirements.

705. 3.7.5 Air pipes and other openings to enclosed spaces not listed in C1.704 (3.7.4) shall be shielded from any spray which may come from a burst hose or connection.

706. 3.7.6 Escape routes shall not terminate within the coamings required by C1.707 (3.7.7) or within a distance of 3 m beyond the coamings.

707. 3.7.7 Continuous coamings of suitable height shall be fitted to keep any spills on deck and away from the accommodation and service areas.

708. 3.7.8 Electrical equipment within the coamings required by C1.707 (3.7.7) or within a distance of 3 m

beyond the coamings shall be in accordance with the requirements of Section 7 (chapter 10).

709. 3.7.9 Fire-fighting arrangements for the bow or stern loading and unloading areas shall be in accordance with Section 3, A1.316 (11.3.16).

710. 3.7.10 Means of communication between the cargo control station and the cargo shore connection location shall be provided and certified safe, if necessary. Provision shall be made for the remote shutdown of cargo pumps from the cargo shore-connection location.

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