



GUIDELINES

FOR THE PREPARATION OF

THE CARGO SECURING MANUAL

NI 429 DNC R01 E
April 2004

17 bis place des Reflets - La Défense 2 - 92400 Courbevoie
Tel. 33 (1) 42 91 52 91 - Telex 615676 F BVDNC - Fax 33 (1) 42 91 52 98
Postal Address 92077 Paris la Défense Cedex



MARINE DIVISION

GENERAL CONDITIONS

ARTICLE 1

1.1. - BUREAU VERITAS is a Society the purpose of whose Marine Division (the "Society") is the classification ("Classification") of any ship or vessel or structure of any type or part of it or system therein collectively hereinafter referred to as a "Unit" whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

The Society:

- prepares and publishes Rules for classification, Guidance Notes and other documents ("Rules");
- issues Certificates, Attestations and Reports following its interventions ("Certificates");
- publishes Registers.

1.2. - The Society also participates in the application of National and International Regulations or Standards, in particular by delegation from different Governments. Those activities are hereafter collectively referred to as "Certification".

1.3. - The Society can also provide services related to Classification and Certification such as ship and company safety management certification; ship and port security certification, training activities; all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board.

1.4. - The interventions mentioned in 1.1., 1.2. and 1.3. are referred to as "Services". The party and/or its representative requesting the services is hereinafter referred to as the "Client". **The Services are prepared and carried out on the assumption that the Clients are aware of the International Maritime and/or Offshore Industry (the "Industry") practices.**

1.5. - The Society is neither and may not be considered as an Underwriter, Broker in ship's sale or chartering, Expert in Unit's valuation, Consulting Engineer, Controller, Naval Architect, Manufacturer, Shipbuilder, Repair yard, Charterer or Shipowner who are not relieved of any of their expressed or implied obligations by the interventions of the Society.

ARTICLE 2

2.1. - Classification is the appraisalment given by the Society for its Client, at a certain date, following surveys by its Surveyors along the lines specified in Articles 3 and 4 hereafter on the level of compliance of a Unit to its Rules or part of them. This appraisalment is represented by a class entered on the Certificates and periodically transcribed in the Society's Register.

2.2. - Certification is carried out by the Society along the same lines as set out in Articles 3 and 4 hereafter and with reference to the applicable National and International Regulations or Standards.

2.3. - **It is incumbent upon the Client to maintain the condition of the Unit after surveys, to present the Unit for surveys and to inform the Society without delay of circumstances which may affect the given appraisalment or cause to modify its scope.**

2.4. - The Client is to give to the Society all access and information necessary for the performance of the requested Services.

ARTICLE 3

3.1. - **The Rules, procedures and instructions of the Society take into account at the date of their preparation the state of currently available and proven technical knowledge of the Industry. They are not a code of construction neither a guide for maintenance or a safety handbook.**

Committees consisting of personalities from the Industry contribute to the development of those documents.

3.2. - **The Society only is qualified to apply its Rules and to interpret them. Any reference to them has no effect unless it involves the Society's intervention.**

3.3. - The Services of the Society are carried out by professional Surveyors according to the Code of Ethics of the Members of the International Association of Classification Societies (IACS).

3.4. - **The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not in any circumstances involve monitoring or exhaustive verification.**

ARTICLE 4

4.1. - The Society, acting by reference to its Rules:

- reviews the construction arrangements of the Units as shown on the documents presented by the Client;
- conducts surveys at the place of their construction;
- classes Units and enters their class in its Register;
- surveys periodically the Units in service to note that the requirements for the maintenance of class are met.

The Client is to inform the Society without delay of circumstances which may cause the date or the extent of the surveys to be changed.

ARTICLE 5

5.1. - **The Society acts as a provider of services. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty.**

5.2. - The certificates issued by the Society pursuant to 5.1. here above are a statement on the level of compliance of the Unit to its Rules or to the documents of reference for the Services provided for.

In particular, the Society does not engage in any work relating to the design, building, production or repair checks, neither in the operation of the Units or in their trade, neither in any advisory services, and cannot be held liable on those accounts. Its certificates cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.

5.3. - **The Society does not declare the acceptance or commissioning of a Unit, nor of its construction in conformity with its design, that being the exclusive responsibility of its owner or builder, respectively.**

5.4. - The Services of the Society cannot create any obligation bearing on the Society or constitute any warranty of proper operation, beyond any representation set forth in the Rules, of any Unit, equipment or machinery, computer software of any sort or other comparable concepts that has been subject to any survey by the Society.

ARTICLE 6

6.1. - The Society accepts no responsibility for the use of information related to its Services which was not provided for the purpose by the Society or with its assistance.

6.2. - **If the Services of the Society cause to the Client a damage which is proved to be the direct and reasonably foreseeable consequence of an error or omission of the Society, its liability towards the Client is limited to ten times the amount of fee paid for the Service having caused the damage, provided however that this limit shall be subject to a minimum of eight thousand (8,000) Euro, and to a maximum which is the greater of eight hundred thousand (800,000) Euro and one and a half times the above mentioned fee.**

The Society bears no liability for indirect or consequential loss such as e.g. loss of revenue, loss of profit, loss of production, loss relative to other contracts and indemnities for termination of other agreements.

6.3. - All claims are to be presented to the Society in writing within three months of the date when the Services were supplied or (if later) the date when the events which are relied on of were first known to the Client, and any claim which is not so presented shall be deemed waived and absolutely barred.

ARTICLE 7

7.1. - Requests for Services are to be in writing.

7.2. - **Either the Client or the Society can terminate as of right the requested Services after giving the other party thirty days' written notice, for convenience, and without prejudice to the provisions in Article 8 hereunder.**

7.3. - The class granted to the concerned Units and the previously issued certificates remain valid until the date of effect of the notice issued according to 7.2. hereabove subject to compliance with 2.3. hereabove and Article 8 hereunder.

ARTICLE 8

8.1. - The Services of the Society, whether completed or not, involve the payment of fee upon receipt of the invoice and the reimbursement of the expenses incurred.

8.2. - **Overdue amounts are increased as of right by interest in accordance with the applicable legislation.**

8.3. - **The class of a Unit may be suspended in the event of non-payment of fee after a first unfruitful notification to pay.**

ARTICLE 9

9.1. - The documents and data provided to or prepared by the Society for its Services, and the information available to the Society, are treated as confidential. However:

- Clients have access to the data they have provided to the Society and, during the period of classification of the Unit for them, to the **classification file** consisting of survey reports and certificates which have been prepared at any time by the Society for the classification of the Unit;
- copy of the documents made available for the classification of the Unit and of available survey reports can be handed over to another Classification Society Member of the International Association of Classification Societies (IACS) in case of the Unit's transfer of class;
- the data relative to the evolution of the Register, to the class suspension and to the survey status of the Units are passed on to IACS according to the association working rules;
- the certificates, documents and information relative to the Units classed with the Society may be reviewed during IACS audits and are disclosed upon order of the concerned governmental or inter-governmental authorities or of a Court having jurisdiction.

The documents and data are subject to a file management plan.

ARTICLE 10

10.1. - Any delay or shortcoming in the performance of its Services by the Society arising from an event not reasonably foreseeable by or beyond the control of the Society shall be deemed not to be a breach of contract.

ARTICLE 11

11.1. - In case of diverging opinions during surveys between the Client and the Society's surveyor, the Society may designate another of its surveyors at the request of the Client.

11.2. - Disagreements of a technical nature between the Client and the Society can be submitted by the Society to the advice of its Marine Advisory Committee.

ARTICLE 12

12.1. - Disputes over the Services carried out by delegation of Governments are assessed within the framework of the applicable agreements with the States, international Conventions and national rules.

12.2. - Disputes arising out of the payment of the Society's invoices by the Client are submitted to the Court of Nanterre, France.

12.3. - **Other disputes over the present General Conditions or over the Services of the Society are exclusively submitted to arbitration, by three arbitrators, in London according to the Arbitration Act 1996 or any statutory modification or re-enactment thereof. The contract between the Society and the Client shall be governed by English law.**

ARTICLE 13

13.1. - **These General Conditions constitute the sole contractual obligations binding together the Society and the Client, to the exclusion of all other representation, statements, terms, conditions whether express or implied. They may be varied in writing by mutual agreement.**

13.2. - The invalidity of one or more stipulations of the present General Conditions does not affect the validity of the remaining provisions.

13.3. - The definitions herein take precedence over any definitions serving the same purpose which may appear in other documents issued by the Society.

INTRODUCTION..... 5

Application 5

Model of Cargo Securing Manual 5

**How to use this Model of Cargo Securing
Manual..... 6**

BVLASH program 6

MODEL OF CARGO SECURING MANUAL..... 7

Contents 8

Ship identification 11

Preamble 12

General 13

Securing devices and arrangements 16

**Stowage and securing of non-standardized
and semi-standardized cargo 19**

**Stowage and securing of containers and
other standardized cargo 73**

INTRODUCTION

1. APPLICATION

In accordance with Regulations VI/5 and VII/6 of SOLAS 1974, as amended, cargo units and cargo transport units are to be loaded, stowed and secured throughout the voyage in accordance with the Cargo Securing Manual approved by the Administration, which is to be drawn up to a standard at least equivalent to the Guidelines developed by IMO.

The Guidelines developed by IMO were adopted on 13 June 1996 under the reference MSC/Circ.745 « Guidelines for the preparation of the Cargo Securing Manual ».

As indicated in the preamble of these Guidelines, the Cargo Securing Manual is required on all types of ships covered by the SOLAS Convention and engaged in the carriage of all cargoes other than solid and liquid bulk cargoes. In particular, it means that a Cargo Securing Manual is also required for those ships equipped or adapted for the carriage of freight containers

The Cargo Securing Manual is required to be on board ship,

2. MODEL OF CARGO SECURING MANUAL

The « Model of Cargo Securing Manual », attached to the present Guidelines is established by BUREAU VERITAS, taking into account the following IMO documents :

- Guidelines for the preparation of the Cargo Securing Manual (MSC/Circ.745),
- Code of Safe Practice for Cargo Stowage and Securing (Resolution A.714(17)), called CSS Code,
- 1994 Amendments to the Code of Safe Practice for Cargo Stowage and Securing (MSC/Circ.664),
- 1995 Amendments to the Code of Safe Practice for Cargo Stowage and Securing (MSC/Circ.691),
- 1997 Amendments to the Code of Safe Practice for Cargo Stowage and Securing (MSC/Circ 812),
- 2002 Amendments to the Code of Safe Practice for Cargo Stowage and Securing (MSC/Circ1026),
- Elements to be taken into account when considering the safe stowage and securing of cargo units and vehicles in ships (Resolution A.533(13))
- Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (Resolution A.581(14)),
- 1997 Amendments to the Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships (MSC/Circ 812).

In order to facilitate the reading of the« Model of Cargo Securing Manual », the requirements coming from CSS Code as amended, and from Resolutions A.533 and A.581 are identified by *italic characters*.

3. HOW TO USE THIS MODEL OF CARGO SECURING MANUAL

The « Model of Cargo Securing Manual » is established to give the Owners a basic Cargo Securing Manual, prepared in accordance with the IMO Guidelines (MSC/Circ.745).

This Model gives a large information on what to be included in the Cargo Securing Manual. Consequently, for the preparation of a Cargo Securing Manual for a particular ship, starting from this Model, some items are to be specified or added, and some other ones, not applicable to the ship considered, are to be deleted.

In order to obtain easily the Cargo Securing Manual for a particular ship from the Model, the complete text of the Model is available upon request. The Head Office of the Society or a local office should be contacted in order to have information on how to obtain this text.

To facilitate the use of the « Model of Cargo Securing Manual », the requirements coming from CSS Code as amended, and from Resolutions A.533 and A.581 are identified by *italic characters*.

4. BVLASH PROGRAM

The BVLASH program, as referred to in 3.2.3, which is developed for carrying out the calculation of lashing in accordance with annex 13 of CSS Code, as amended, is available to the clients of the Society. It runs on personal computers under Windows operating systems. It may be downloaded from the web site: <http://www.veristar.com>

MODEL of CARGO SECURING MANUAL

CARGO SECURING MANUAL

CONTENTS

Ship identification	11
Preamble	12
1 - General	13
1.1 Definitions.....	13
1.2 General information	15
2 - Securing devices and arrangements	16
2.1 Fixed cargo securing devices.....	16
2.2 Portable cargo securing devices.....	17
2.3 Inspection and maintenance schemes	17
2.3.1 Regular inspections and maintenance.....	17
2.3.2 Procedures and records.....	18
2.3.3 Inspections and adjustment during voyage.....	18
2.3.4 Computerised maintenance procedure.....	18

3 - Stowage and securing of non-standardized and semi-standardized cargo..... 19

3.1 Handling and safety instructions 19

3.1.1 General principles of cargo securing	19
3.1.2 Suitability of cargo for transport.....	19
3.1.3 Cargo distribution	20
3.1.4 Cargo securing arrangements	20
3.1.5 Residual strength after wear and tear	20
3.1.6 Friction forces.....	20
3.1.7 Shipboard supervision	20
3.1.8 Entering enclosed spaces	20
3.1.9 General elements to be considered by the master	21
3.1.10 Cargo stowage and securing declaration	21

3.2 Evaluation of forces acting on cargo units 21

3.2.1 Accelerations.....	21
3.2.2 Forces	21
3.2.3 Calculation method.....	22
3.2.4 Methods to assess the efficiency of securing arrangements of non-standardized cargo.....	23

3.3 Application of portable securing devices on various cargo units, vehicles and stowage blocks 39

3.3.1 General.....	39
3.3.2 Safe stowage and securing of containers on deck of ships which are not specially designed and fitted for the purpose of carrying.....	40
3.3.3 Safe stowage and securing of portable tanks.....	43
3.3.4 Safe stowage and securing of portable receptacles.....	46
3.3.5 Safe stowage and securing of wheel-based (rolling) cargoes.....	48
3.3.6 Safe stowage and securing of heavy cargo items such as locomotives, transformers, etc.	49
3.3.7 Safe stowage and securing of coiled sheet steel	52
3.3.8 Safe stowage and securing of heavy metal products	56
3.3.9 Safe stowage and securing of anchor chains.....	57

3.3.10 Safe stowage and securing of metal scrap in bulk	58
3.3.11 Safe stowage and securing of flexible intermediate bulk containers	59
3.3.12 General guidelines for the under-deck stowage of logs	61
3.3.13 Safe stowage and securing of unit loads.....	63
3.3.14 Elements to be taken into account when considering the safe stowage and securing of cargo unit and vehicles in ships	66
3.4 Supplementary requirements for ro-ro ships	68
3.4.1 General.....	68
3.4.2 Guidelines for securing arrangements for the transport of road vehicles on ro-ro ships	68
3.5 Bulk carriers	72
4 - Stowage and securing of containers and other standardized cargo	73
4.1 Handling and safety instructions	73
4.1.1 Instructions on the proper handling of the securing devices.....	73
4.1.2 Safety instructions related to handling of securing devices and to securing and unsecuring of containers or other standardized cargo by ship or shore personnel.	73
4.2 Stowage and securing instructions	75
4.2.1 General.....	75
4.2.2 Stowage and securing plan	75
4.2.3 Stowage and securing principle on deck and under deck.....	75
4.3 Other allowable stowage patterns	76
4.4 Forces acting on cargo units.....	76
4.4.1 General.....	76
4.4.2 Ship motions and accelerations	77
4.4.3 Forces applied to containers	77

SHIP IDENTIFICATION

1. Ship data

Name	
BUREAU VERITAS section number	
Class notation	
Flag	
IMO Number	

2. Ship dimensions

Length L (m)	
Breadth B (m)	
Depth D (m)	
Draft T (m)	
Speed V (knots)	
GM max. (m)	
GM min. (m)	

3. Reference documents

	Reference of drawing	Date of review
Loading Manual		
Trim & stability booklet		
Local permissible uniform and/or concentrated loads per deck (wheel load axles,...) : Deck 1 : Deck 2 : Deck 3 : Deck 4 : Deck 5 :		

PREAMBLE

In accordance with the International Convention for the Safety of Life at Sea, 1974 (SOLAS) chapters VI, VII and the Code of Safe Practice for Cargo Stowage and Securing (IMO Resolution A714(17), adopted 6 November 1991, called « CSS Code »), cargo units, including containers are to be stowed and secured throughout the voyage in accordance with this Cargo Securing Manual.

This Cargo Securing Manual has been established, for the ship identified above, in accordance with the IMO/MSC/Circ. 745 « Guidelines for the preparation of the Cargo Securing Manual »(adopted 13 June 96), with the CSS Code, as amended, with IMO Resolutions A.533(13) and A.581(14) and with the applicable requirements of BUREAU VERITAS Rules and Regulations for the Classification of Ships.

It is important that securing devices meet acceptable functional and strength criteria applicable to the ship and its cargo. It is also important that the officers on board are aware of the magnitude and direction of the forces involved and the correct application and limitations of the cargo securing devices. The crew and other persons employed for the securing of cargoes are to be instructed in the correct application and use of the cargo securing devices on board the ship.

This Cargo Securing Manual is to be kept on board this ship and shall be available for inspections by Authorities concerned by it and by Classification Society, if any..

This Cargo Securing Manual is to be re-examined by BUREAU VERITAS, in case of any modification of the cargo securing arrangement described in it.

It is recommended that the CSS Code, as amended, and the IMO/MSC/Circ. 745 be available on board.

1. GENERAL

1.1 Definitions

- 1.1.1** *Administration means the Government of the State whose flag the ship is entitled to fly.*
- 1.1.2** *Cargo Securing Devices are all fixed and portable devices used to secure and support cargo units.*
- 1.1.3** *Maximum Securing Load (MSL) is a term used to define the allowable load capacity for a device used to secure cargo to a ship. Safe Working Load (SWL) may be substituted for MSL for securing purposes, provided this is equal to or exceeds the strength defined by MSL.*
- 1.1.4** *Standardized Cargo means cargo for which the ship is provided with an approval securing system based upon cargo units of specific types*
- 1.1.5** *Semi-standardized Cargo means cargo for which the ship is provided with a securing system capable of accommodating a limited variety of cargo units, such as vehicles, trailers, etc..*
- 1.1.6** *Non-standardized Cargo means cargo which requires individual stowage and securing arrangements.*
- 1.1.7** *Cargo unit means a vehicle, container, flat, pallet, portable tank, packaged unit, or any other entity, etc., and loading equipment, or any part thereof, which belongs to the ship but is not fixed to the ship as defined in IMO Resolution A.489(XII) (adopted 19 November 1981).*
- 1.1.8** *Intermediate bulk container (IBC) means a rigid, semi-rigid or flexible portable bulk container packaging of a capacity of not more than 3 m³ (3000 litres), designed for mechanical handling and tested for its satisfactory resistance to handling and transport stresses.*
- 1.1.9** *Portable tank means a tank which is not permanently secured on board the ship, and has a capacity of more than 450 litres and a shell fitted with external stabilizing members and items of service equipment and structural equipment necessary for the transport of gases, liquids or solids.*
- 1.1.10** *Road tank-vehicle means a vehicle with wheels and fitted with a tank or tanks intended for the transport of gases, liquids or solids by both road and sea modes of transport, the tank or tanks of which are rigidly and permanently attached to the vehicle during all normal operations of loading, transport and discharge and are neither filled nor emptied on board.*

- 1.1.11** *Road vehicle means a commercial vehicle, semi-trailer, road train, articulated road train or a combination of vehicles, as defined hereafter.*
- 1.1.12** *Commercial vehicle means a motor vehicle which, on account of its design and appointments, is used mainly for conveying goods. It may be towing a trailer.*
- 1.1.13** *Semi-trailer means a trailer which is designed to be coupled to a semi-trailer towing vehicle and to impose a substantial part of its total mass on the towing vehicle.*
- 1.1.14** *Road train means the combination of a motor vehicle with one or more independent trailers connected by draw-bar. (For the purpose of article 3.4.2.4, each element of a road train is considered a separate vehicle.)*
- 1.1.15** *Articulated road train means the combination of a semi-trailer towing vehicle with a semi-trailer.*
- 1.1.16** *Combination of vehicles means a motor vehicle coupled with one or more towed vehicles. (For the purpose of article 3.4.2.4, each element of a combination of vehicles is considered a separate vehicle.)*
- 1.1.17** *Roll-trailer means a low vehicle for the carriage of cargo with one or more wheel axles on the rear and a support on the front end, which is towed or pushed in the port to and from its stowage on board the ship by a special tow-vehicle.*
- 1.1.18** *Ro-ro ship means a ship which has one or more decks either closed or open, not normally subdivided in any way and generally running the entire length of the ship, in which goods (packaged or in bulk, in or on road vehicles (including road tank-vehicles), trailers, containers, pallets, demountable tanks or in or on similar cargo transport units or other receptacles) can be loaded or unloaded normally in horizontal direction.*
- 1.1.19** *Unit load means that a number of packages are either:*
- *placed or stacked, and secured by strapping, shrink-wrapping or other suitable means, on to a load board such as a pallet; or*
 - *placed in a protective outer packaging such as a pallet box; or*
 - *permanently secured together in a sling.*

1.2 General information

- 1.2.1** The guidance given herein should by no means rule out the principles of good seamanship, neither can it replace experience in stowage and securing practice.
- 1.2.2** The information and requirements set forth in this Manual are consistent with the requirements of the ship's trim and stability booklet, International Load Line Certificate (1966), the hull strength loading manual (if provided) and with the requirements of the International Maritime Dangerous Goods (IMDG) Code (if applicable).
- 1.2.3** This Cargo Securing Manual specifies arrangements and cargo securing devices provided on board the ship for the correct application to and the securing of cargo units, containers, vehicles and other entities, based on transverse, longitudinal and vertical forces which may arise during adverse weather and sea conditions.
- 1.2.4** It is imperative to the safety of the ship and the protection of the cargo and personnel that the securing of the cargo is carried out properly and that only appropriate securing points or fittings should be used for cargo securing.
- 1.2.5** The cargo securing devices mentioned in this Manual are to be applied so as to be suitable and adapted to the quantity, type of packaging, and physical properties of the cargo to be carried. When new or alternative types of cargo securing devices are introduced, the Cargo Securing Manual is to be revised accordingly. The strength of alternative cargo securing devices introduced is to be not less than the strength of the devices they replace.
- 1.2.6** A sufficient quantity of reserve cargo securing devices is to be on board the ship.
- 1.2.7** Information on the strength and instructions for the use and maintenance of each specific type of cargo securing device, where applicable, is provided in this Manual. The cargo securing devices are to be maintained in a satisfactory condition. Items worn or damaged to such an extent that their quality is impaired are to be replaced.

2. SECURING DEVICES AND ARRANGEMENTS

2.1 Fixed cargo securing devices

2.1.1 The types and MSL values of the fixed securing devices are given in Table I.

2.1.2 The drawings of the arrangement of the fixed securing devices on board this ship are attached to this chapter (drawings references....).

2.1.3 The maximum securing load imposed by any connection to the ship's structure is not to be greater than :

- tonnes, for attachment to 'tween deck frames,
- tonnes, for attachment to lower hold frames,
- tonnes, for attachment to transverse bulkhead stiffeners,
- tonnes, for attachment to decks and tank tops.

Lashing arrangements such that applied loads exceeds the above given maximum values, may imply some damage to the ship's structure, and have to be avoided.

2.1.4 It is recommended to :

- avoid out of plane loading on stiffening members.
- align welded attachments to decks and bulkheads with stiffeners by using a weld area suitable for the load considered.
- design new eyeplates, lugs, etc. in accordance with recognized national or international standards suitable for the considered maximum securing load.

All these structural arrangement are to be submitted to the Classification Society.

Table I - Fixed securing devices

Manufacturer	Type designation	Sketch	Quantity	Material	Identification marking	Breaking load	MSL
	elephant foot						
	pad-eye						
	eyebolt						
	etc...						

2.2 Portable cargo securing devices

2.2.1 The types and MSL values of the portable securing devices are given in Table II.

2.2.2 Individual drawings and relevant certificates of the portable securing devices, if any, are attached to this chapter.

2.3 Inspection and maintenance schemes

2.3.1 Regular inspections and maintenance

Regular inspection and maintenance are to be carried out under the responsibility of the Master. Cargo securing devices inspections as a minimum are to include :

- 1 - routine visual examinations of components being utilised :
All cargo securing devices, both fixed and portable, including pad-eyes, eyebolts, container fittings, wire ropes, container stacking fittings, deck securing fittings, interlock fittings, rods, turnbuckles, tensioners, etc., including spares, are to be subjected to routine visual examinations every time they are used, but at least once every three months.
- 2 - periodic examinations / re-testing as required by the Administration:
When required, the cargo securing devices concerned are to be subjected to inspections by the Administration.

Table II - Portable securing devices

Manufacturer	Type designation	Sketch	Quantity	Material	Identification marking	Strength test	MSL
	stacking cone						
	twistlock						
	locking pin						
	hook						
	lashing wire						
	chain						
	rod						
	tensioner						
	twin-buckle						
	etc.						

2.3.2 Procedures and records

- Accepting procedure :

Cargo securing devices, as referenced in Tables I and II, are accepted on board this ship, subjected they are type approved by a Classification Society. The values of the maximum securing load (MSL) and/or the safe working load (SWL) and/or the breaking load of the securing device are to be indicated on the type approval certificate.

- Maintaining procedure :

The Master is responsible for the maintenance of all cargo securing devices. Corrosion is to be kept as low as possible by ensuring that coatings or grease layers provide a good protection. Manufacturer's instructions, if any, are also to be considered.

- Repairing procedure :

Generally, repairs are only acceptable for mild-steel fittings welded to the ship's structure. In such a case, re-welding is to be carried out carefully. Manufacturer's instructions, if any, are also to be considered.

- Rejecting procedure :

Any cargo securing device which has been cracked, bent, chipped or damaged and which cannot be repaired must be removed from service.

Any cargo securing device which presents some visible signs of overloading must be removed from service.

The rejected devices which are kept on board are to be clearly identified, and are to be stored in a separate space.

- Record of inspections :

Inspections, repairs and rejection are to be entered in a « record book of inspection ». These records are to be kept on board and attached to this Cargo Securing Manual. This « Record Book » can be presented in a computerised way.

2.3.3 Inspections and adjustment during voyage

During the voyage, all cargo securing devices, and in particular turnbuckles and chain tensioners, are to be regularly inspected, as far as practicable. In particular, these inspections are to be carried out during and after heavy weather voyages.

It is recommended to check that pre-tensioning are never too tight. In such a case, they stretch the wire rope or the tension bar, so that the Safe Working Load of the lashing decreases.

2.3.4 Computerised maintenance procedure

Computerised maintenance procedure may be referred to in this sub-chapter

3. STOWAGE AND SECURING OF NON-STANDARDIZED AND SEMI-STANDARDIZED CARGO

3.1 Handling and safety instructions

3.1.1 General principles of cargo securing

All cargoes are to be stowed and secured in such a way that the ship and persons on board are not put at risk.

The safe stowage and securing of cargoes depend on proper planning, execution and supervision.

Personnel commissioned to tasks of cargo stowage and securing is to be properly qualified and experienced.

Personnel planning and supervising the stowage and securing of cargo is to have a sound practical knowledge of the application and content of the Cargo Securing Manual, if provided.

In all cases, improper stowage and securing of cargo will be potentially hazardous to the securing of other cargoes and to the ship itself.

Instructions of manufacturers of cargo securing devices, if any, are also to be considered. In such a case, they are to be attached to this Cargo Securing Manual.

All the cargo securing operations are to be fulfilled before the ship leaves the quay or its safe anchorage.

No cargo unsecuring operations are to be carried out before the ship is safely moored at quay or its safe anchorage.

Decisions taken for measures of stowage and securing cargo are to be based on the most severe weather conditions which may be expected by experience for the intended voyage.

Ship-handling decisions taken by the master, especially in bad weather conditions, are to take into account the type and stowage position of the cargo and the securing arrangements.

3.1.2 Suitability of cargo for transport

Cargo carried in containers, road vehicles, shipborne barges, railway wagons and other cargo transport units are to be packed and secured within these units so as to prevent, throughout the voyage, damage or hazard to the ship, to the persons on board and to the marine environment.

3.1.3 Cargo distribution

It is of the utmost importance that the master takes great care in planning and supervising the stowage and securing of cargoes in order to prevent cargo sliding, tipping, racking, collapsing, etc.

The cargo is to be distributed so as to ensure that the stability of the ship throughout the entire voyage remains within acceptable limits so that the hazards of excessive accelerations are reduced as far as practicable.

Cargo distribution is to be such that the structural strength of the ship is not adversely affected.

3.1.4 Cargo securing arrangements

Particular care is to be taken to distribute forces as evenly as practicable between the cargo securing devices. If this is not feasible, the arrangements are to be upgraded accordingly.

If, due to the complex structure of a securing arrangement or other circumstances, the person in charge is unable to assess the suitability of the arrangement from experience and knowledge of good seamanship, the arrangement is to be verified by using an acceptable calculation method.

3.1.5 Residual strength after wear and tear

Cargo securing arrangements and equipment are to have sufficient residual strength to allow for normal wear and tear during their lifetime.

3.1.6 Friction forces

Where friction between the cargo and the ship's deck or structure or between cargo transport units is insufficient to avoid the risk of sliding, suitable material such as soft boards or dunnage are to be used to increase friction.

3.1.7 Shipboard supervision

The principal means of preventing the improper stowage and securing of cargoes is through proper supervision of the loading operation and inspections of the stow.

As far as practicable, cargo spaces are to be regularly inspected throughout the voyage to ensure that the cargo, vehicles and cargo transport units remain safely secured.

3.1.8 Entering enclosed spaces

The atmosphere in any enclosed space may be incapable of supporting human life through lack of oxygen or it may contain flammable or toxic gases. The master is to ensure that it is safe to enter any enclosed space.

3.1.9 General elements to be considered by the master

Having evaluated the risk of cargo-shifting, taking into account the criteria set out in 3.1.5, the master is to ensure, prior to loading of any cargo, cargo transport unit or vehicle that:

- the deck area for their stowage is, as far as practicable, clean, dry and free from oil and grease;
- the cargo, cargo transport unit or vehicle, appears to be in suitable condition for transport, and can be effectively secured;
- all necessary cargo securing equipment is on board and in good working condition; and
- cargo in or on cargo transport units and vehicles is, to the extent practicable, properly stowed and secured on to the unit or vehicle.

3.1.10 Cargo stowage and securing declaration

Where there is reason to suspect that a container or vehicle into which dangerous goods have been packed or loaded is not in compliance with the provisions of regulation VII / 5.2 or 5.3 of SOLAS 1974, as amended, or with the provisions of section 12 or 17, as appropriate, of the General Introduction to the IMDG Code, or where a container packing certificate/vehicle packing declaration is not available, the unit is to be not accepted for shipment.

Where practicable and feasible, road vehicles are to be provided with a cargo stowage and securing declaration, stating that the cargo on the road vehicle has been properly stowed and secured for the intended sea voyage, taking into account the IMO/ILO guidelines for packing cargo in freight containers or vehicles. The vehicle packing declaration, recommended by the IMDG Code (see paragraph above), may be acceptable for this purpose.

3.2 Evaluation of forces acting on cargo units

3.2.1 Accelerations

Tables or diagrams giving a broad outline of the accelerations which can be expected in various positions on board the ship in adverse sea conditions and with a range of applicable metacentric height (GM) values are to be included in this Cargo Securing Manual.

These accelerations may be obtained from Annex 13 to the CSS Code (MSC/Circ.664 -1994), as given in paragraph 3.2.4, or by the application of BUREAU VERITAS Rules for the Classification of Steel Ships in force (Pt B, Ch 5, Sec 3).

3.2.2 Forces

The following information are to be included in this Cargo Securing Manual :

- examples of forces acting on typical cargo units when subjected to the accelerations referred to in paragraph 3.2.1,
- angles of roll and metacentric height (GM) values above which the forces acting on the cargo units exceed the permissible limit for the specified securing arrangements as far as practicable.

Forces, which have to be absorbed by suitable arrangements for stowage and securing to prevent cargo shifting, are generally composed of components acting relative to the axes of the ship:

- longitudinal;
- transversal; and
- vertical.

Remark: For the purpose of stowage and securing cargo, longitudinal and transverse forces are considered predominant.

Transverse forces alone, or the resultant of transverse, longitudinal and vertical forces, normally increase with the height of the stow and the longitudinal distance of the stow from the ship's centre of motion in a seaway. The most severe forces can be expected in the furthest forward, the furthest aft and the highest stowage position on each side of the ship.

The transverse forces exerted increase directly with the metacentric height of the ship. An undue metacentric height may be caused by:

- improper design of the ship;
- unsuitable cargo distribution; and
- unsuitable bunker and ballast distribution.

Cargo is to be so distributed that the ship has a metacentric height in excess of the required minimum and, whenever practicable, within an acceptable upper limit to minimize the forces acting on the cargo.

In addition to the forces referred to above, cargo carried on deck may be subjected to forces arising from the effects of wind and green seas.

Improper shiphandling (course or speed) may create adverse forces acting on the ship and the cargo.

The magnitude of the forces may be estimated by using the appropriate calculation methods as contained in this Cargo Securing Manual, if provided.

Although the operation of anti-roll devices may improve the behaviour of the ship in a seaway, the effect of such devices are not to be taken into account when planning the stowage and securing of cargoes.

3.2.3 Calculation method

The following data are to be included in this Cargo Securing Manual :

- examples of how to calculate number and strength of portable securing devices required to counteract the forces referred to in paragraph 3.2.2,
- safety factors to be used for the different types of portable cargo securing devices.

Calculations may be carried out according to Annex 13 to the CSS Code, as amended and as explained in paragraph 3.2.4, or by any other agreed method.

The BVLASH program has been developed by BUREAU VERITAS for carrying out the calculation in accordance to Annex 13 to the CSS Code, as amended.

3.2.4 Methods to assess the efficiency of securing arrangements of non-standardized cargo

3.2.4.1 Scope of application

This method is to be applied to non-standardized cargoes, but is not applicable to containers on containerships.

Very heavy units as carried under the provisions of Chapter 1.8 of the Code of Safe Practice for Cargo Stowage and Securing and those items for which exhaustive advice on stowage and securing is given in the annexes to the Code are to be excluded.

All lashing assemblies used in the application of the methods described in 3.2.4 must be attached to fixed securing points or strong supporting structures marked on the cargo unit or advised as being suitable, or taken as a loop around the unit with both ends secured to the same side as shown in 3.3.6, Figure 15. Lashings going over the top of the cargo unit, which have no defined securing direction but only act to increase friction by their pre-tension, cannot be credited in the evaluation of securing arrangements under 3.2.4.

Nothing in this article should be read to exclude the use of computer software, provided the output achieves design parameters which meet the minimum safety factors applied in this article.

The application of the methods described in this article are supplementary to the principles of good seamanship and shall not replace experience in stowage and securing practice.

3.2.4.2 Presentation of the methods

The methods are presented in a universally applicable and flexible way. It is recommended that designers of Cargo Securing Manuals convert this presentation into a form suiting the particular ship, its securing equipment and the cargo carried. This form may consist of applicable diagrams, tables or calculated examples.

3.2.4.3 Strength of securing equipment

Manufacturers of securing equipment are, at least, to supply information on the nominal breaking strength of the equipment in kilo-Newton (kN).

"Maximum Securing Load" (MSL) is a term used to define the load capacity for a device used to secure cargo to a ship. Safe Working Load (SWL) may be substituted for MSL for securing purposes, provided this is equal to or exceeds the strength defined by MSL.

The MSL for different securing devices are given in Table III if not given under following paragraph.

The MSL of timber should be taken as $0.3 \text{ kN} / \text{cm}^2$ normal to the grain.

Table III - Determination of MSL from breaking strength

Material	MSL
shackles, rings, deckeyes, turnbuckles of mild steel	50 % of breaking strength
fibre rope	33 % of breaking strength
Web lashing	50 % of breaking strength
wire rope (single use)	80 % of breaking strength
wire rope (re-usable)	30 % of breaking strength
steel band (single use)	70 % of breaking strength
chains	50 % of breaking strength

For particular securing devices (e.g. fibre straps with tensioners or special equipment for securing containers) a permissible working load may be prescribed and marked by authority. This is to be taken as the MSL.

When the components of a lashing device are connected in series, for example, a wire to a shackle to a deck eye, the minimum MSL in the series apply to that device.

3.2.4.4 Rule of thumb method

The total of MSL values of the securing devices on each side of a unit of cargo (port as well as starboard) is to be equal to the weight of the unit, in kN.

This method, which implies a transverse acceleration of 1 g (9.81 m/s²), applies to nearly any size of ships regardless of the location of stowage, stability and loading conditions, season and area of operation. The method however, neither takes into account the adverse effects of lashing angles and non-homogeneous distribution of forces among the securing devices nor the favourable effect of friction.

Transverse lashing angles to the deck are not to be greater than 60 degrees and it is important that adequate friction is provided by the use of suitable material. Additional lashings at angles of greater than 60 degrees may be desirable to prevent tipping but are not to be counted in the number of lashings under the rule-of-thumb.

3.2.4.5 Safety factor

When using balance calculation methods for assessing the strength of the securing devices, a safety factor is used to take account of the possibility of uneven distribution of forces among the devices or reduced capability due to the improper assembly of the devices or other reasons. This safety factor is used in the formula to derive the calculated strength (CS) from the MSL and shown in the relevant method used.

$$CS = MSL / \text{safety factor}$$