New Postpanamax Container Ships and more
- Design and Safety -

Fédération Française des Sociétés d'Assurances

New Postpanamax Container Ships and more – Design and Safety –

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Panama extension

Global container ship fleet

MARPOL Fuel Tank Protection (FTP)

Design aspects

IMO code of safe practice for cargo stowage and security (CSS) code

Damages/Emergency Response Service (ERS)

Container ships – next steps

New Postpanamax Container Ships and more – Design and Safety –

Panama Canal extension and the future ship design

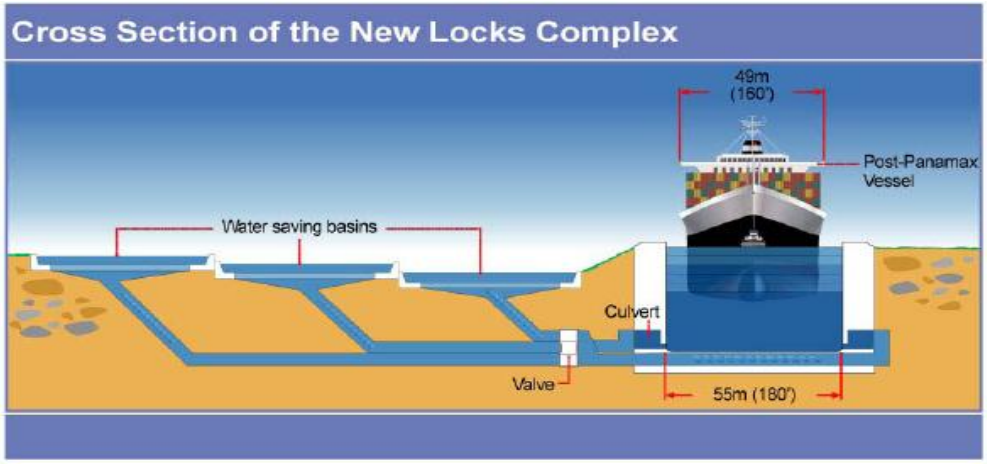
<u>The current plan for two new sets of locks:</u>

The new lock chambers will feature sliding gates, doubled for safety and will have a

length of 427,0 m (1,400 ft)

width of 55,0 m (180 ft)

depth of 18,3 m (60 ft)



<u>Extension for ships with:</u>

Loa of up to 366,0 m (1,200 ft)

Width of beam of up to 49,0 m (160 ft)

Draught of up to 15,0 m (50 ft)

New Postpanamax Container Ships and more – Design and Safety –

The new panamax container ship with and above a capacity of 13.000 TEU

Principal Dimensions (with up to 13.000 TEU):

Loa 365,8 m

B 48,8 m

H 29,6 m (or above 30,0 m)

T_{scant} 15,0 m (up to 16,0 m)

Principal Dimensions (up to 18.000 TEU):

Loa 380,6 m – 395,0 m

B 51,2 m – 59,2 m

H 29,6 m – 30,2 m

T_{scant} 15,0 m – 16,0 m

Shipyard:

DMSE
Hanjin H.I.C.
Hanjin H.I.C. Philippines
Hyundai H.I.
Hyundai Samho H.I.
Samsung H.I.
STX Shipyard

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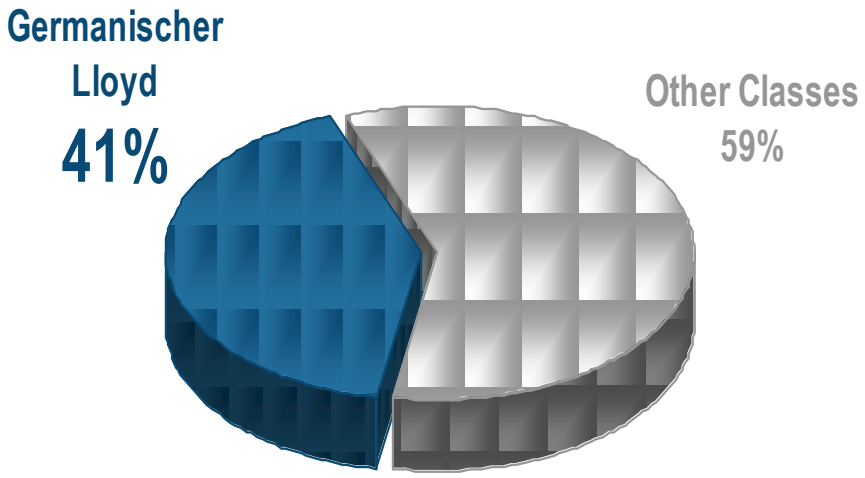
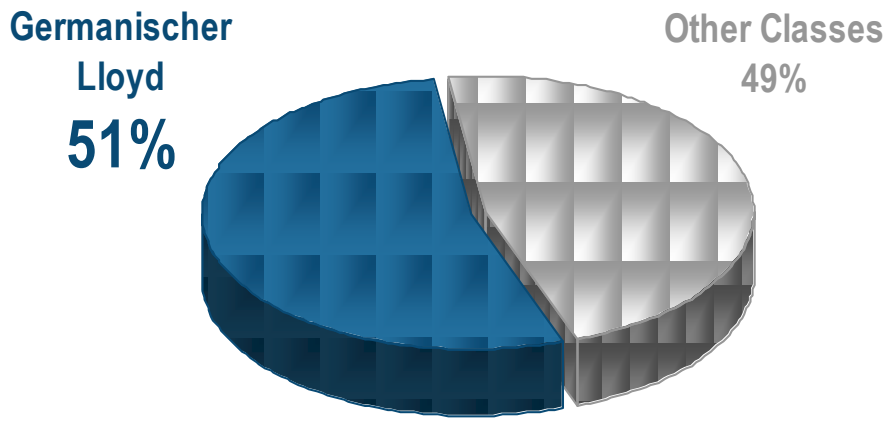
New Postpanamax Container Ships and more – Design and Safety –

GL Maritime – A dominant share of the global container ship fleet

Global Fleet in Service [in GT]



Global Orderbook [in GT]



Source: GL Analysis

New Postpanamax Container Ships and more – Design and Safety –

World container fleet

Vessel Type	Size	In Service			Under Construction		
		No. of Ships	GT	No. of Mgr./Own.	No. of Ships	GT	No. of Mgr./Own.
Container Ship							
Post Panamax Container Ships 3	> 11.700 TEU						
Post Panamax Container Ships 2	7.501 - 11.700 TEU						
Post Panamax Container Ships 1	5.101 - 7.500 TEU						
Panamax Container Ships 2	4.001 - 5.100 TEU						
Panamax Container Ships 1	3.101 - 4.000 TEU						
Sub-Panamax Container Ships 2	2.601 - 3.100 TEU						
Sub-Panamax Container Ships 1	1.801 - 2.600 TEU						
Handy Container Ships 2	1.301 - 1.800 TEU						
Handy Container Ships 1	1.001 - 1.300 TEU						
Feedermax Container Ships	501 - 1.000 TEU						
Feeder Container Ships	<= 500 TEU						
Container Ship		**4.866**	**155.198.559**	**726**	**646**	**42.318.120**	**118**

Source: GL Analysis

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Container ships – next steps

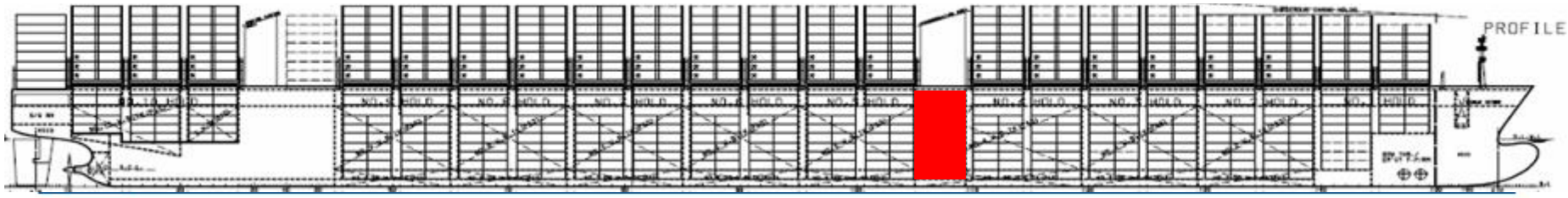
- Concerning location and size for fuel oil tanks.
- Capacity ≤ 600 m³.
- Applicable for all ships, where keel laid on or after 1 February 2008.

New Postpanamax Container Ships and more – Design and Safety –

Influence of the MARPOL FTP requirement on the CV Design

Fuel oil tank in cargo hold area → loss of container

Fuel oil below deck house → optimum design concept



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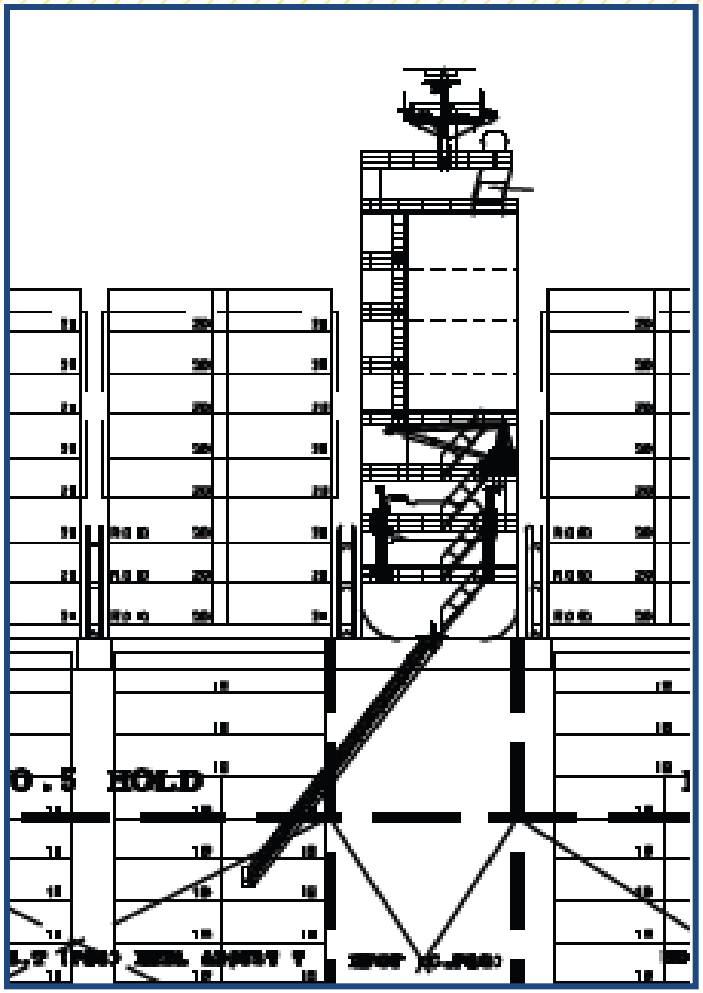
Container ships – next steps

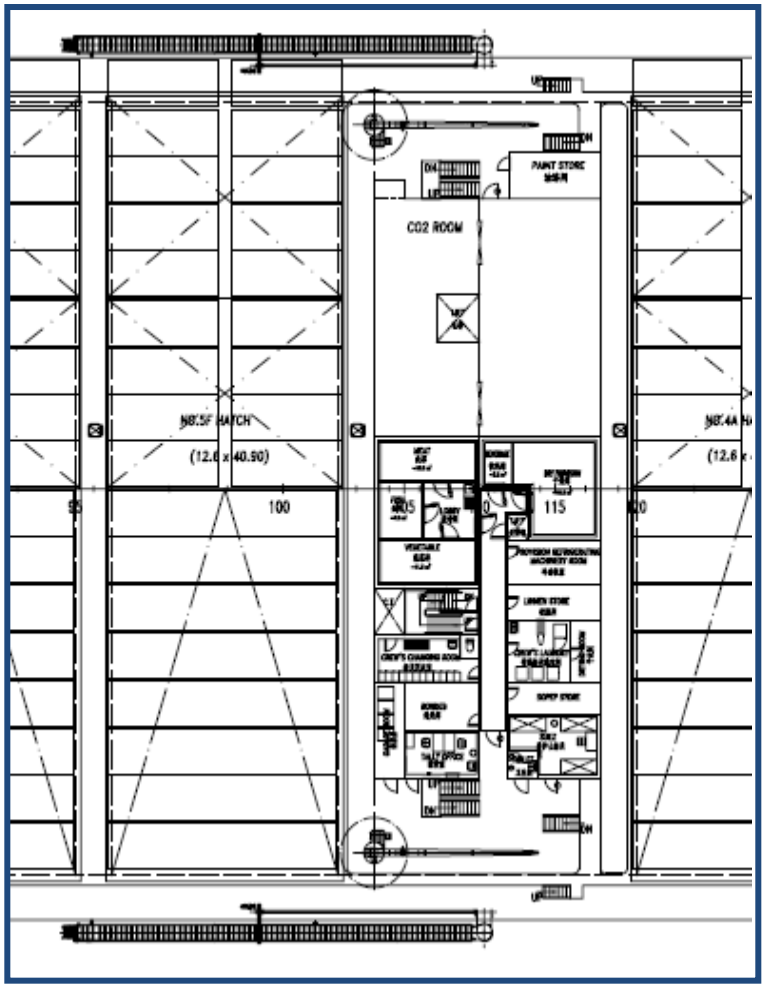
Points to be observed:

- Save exit to the vessel in the harbour, see ILO
- Angle of accommodation ladder of maximum 55^0 should be observed
- Longitudinal hatch coaming must be continuous due to longitudinal strength



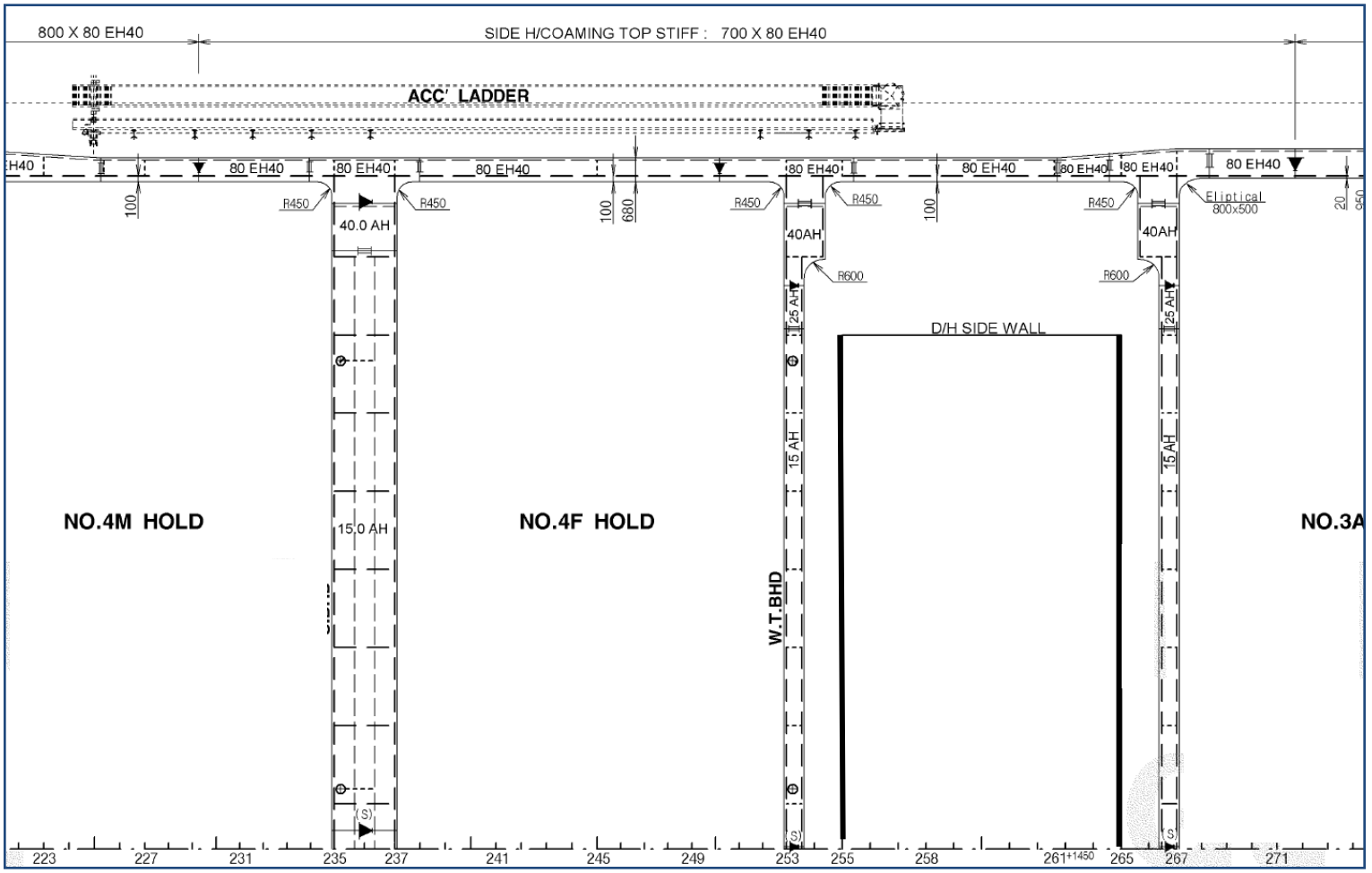
Continuous longitudinal hatch coaming for:

- Global strength
- Sufficient still water bending moment (Msw) values is necessary



New Postpanamax Container Ships and more – Design and Safety –

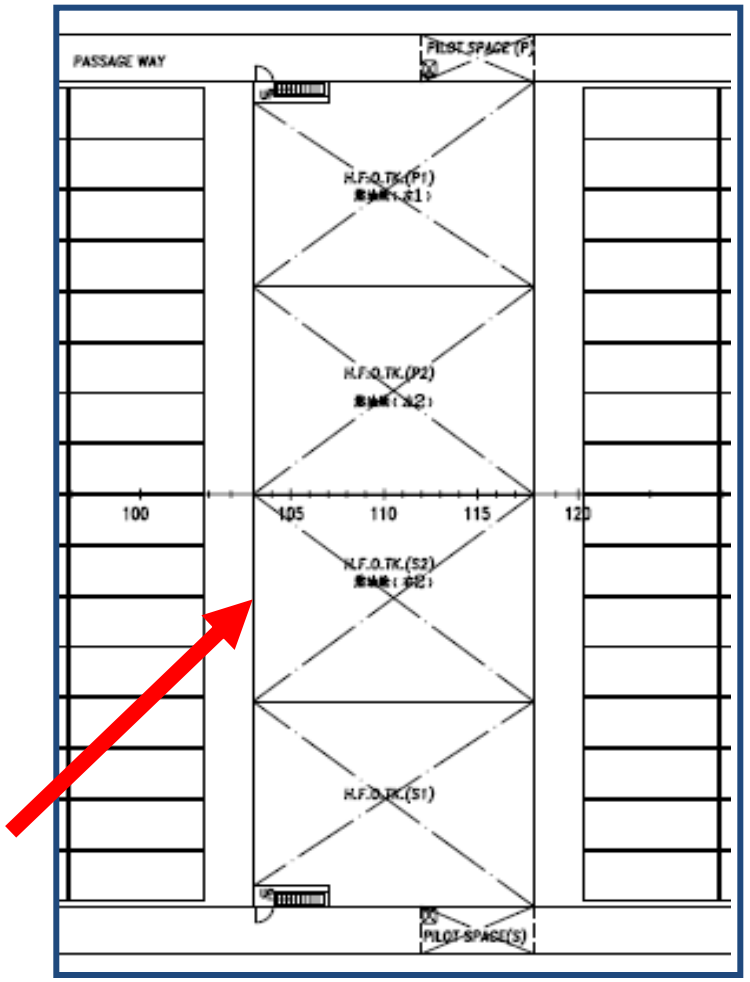
Straight coaming (plan view)



Fuel oil tanks should be divided in five (5) or six (6) tanks to allow a larger flexibility for low sulphur.

<u>Deformation of the tank structure must be considered for:</u>

- Cell guides
- Corner stresses
- Global deformation
- Hatch intersection of structure

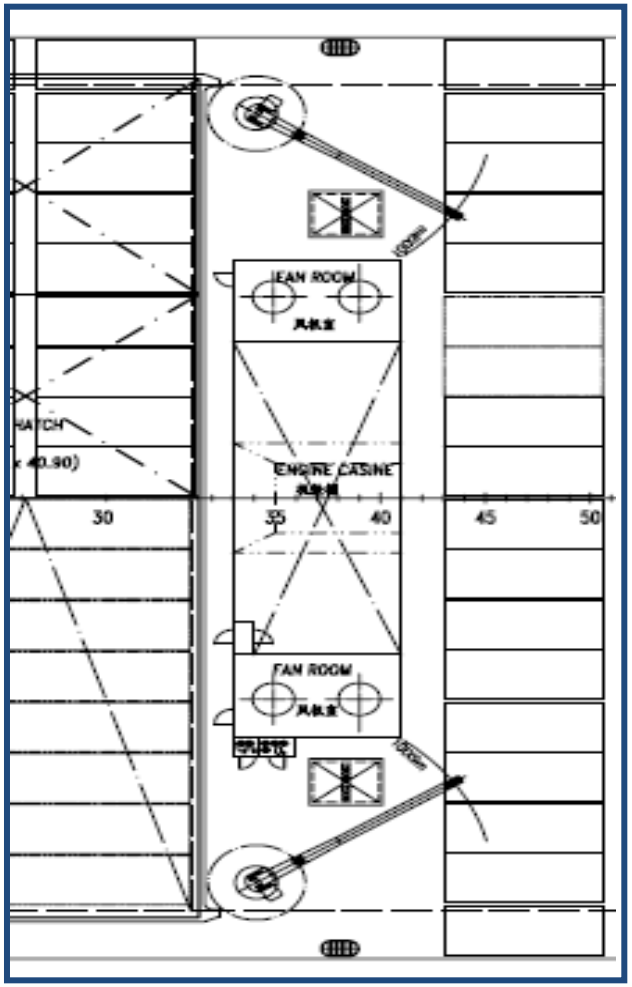


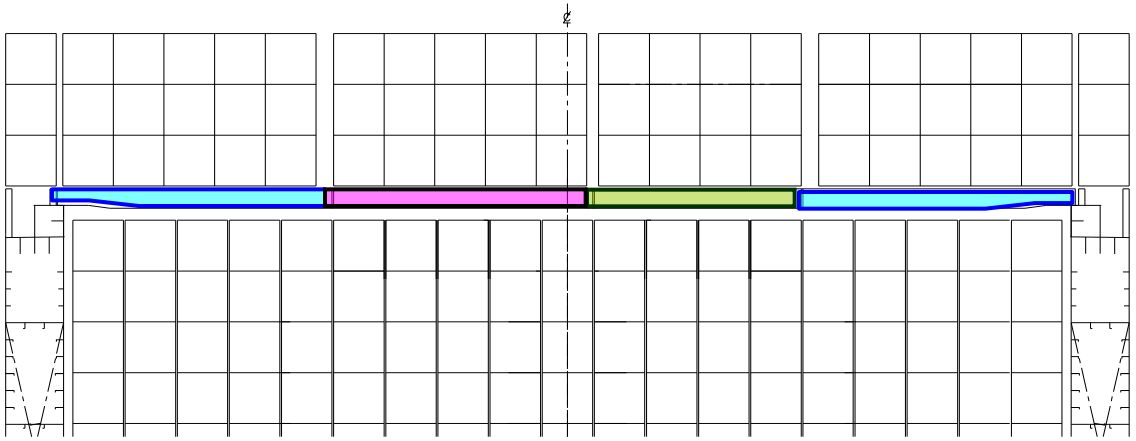
New Postpanamax Container Ships and more – Design and Safety –

Space in way of engine room

Space for crane for handling of spare parts should be considered:

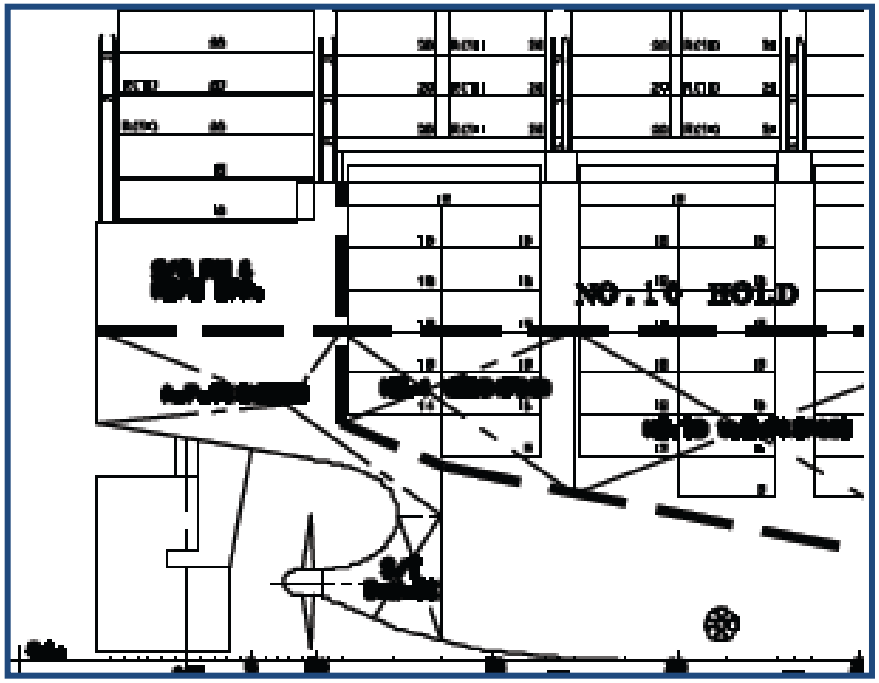
- One cranes at each side
- Or monorail crane
- Or combination of both



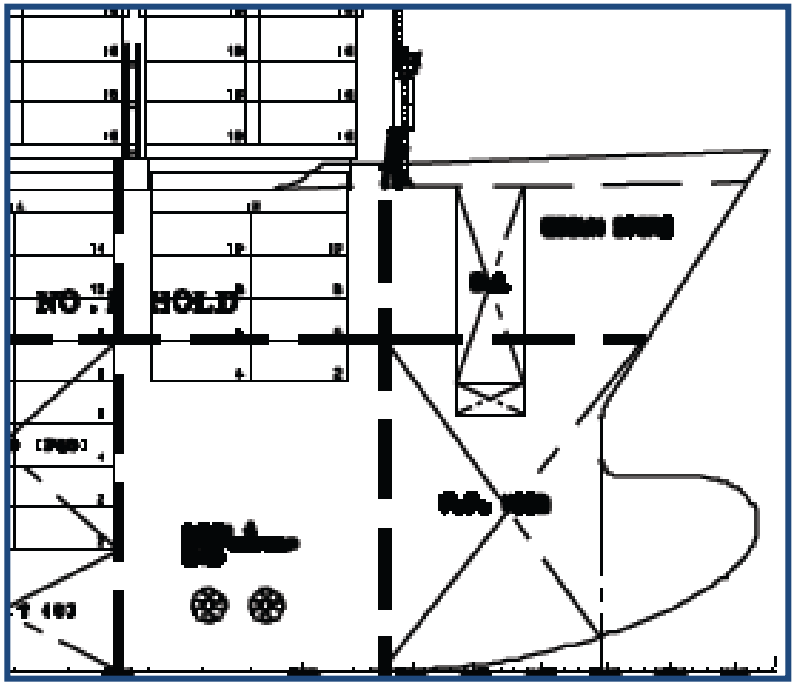


Number of rows per panel	5
Stack load for 20'/ 40'	100 ton / 130 ton
Maximum panel lifting weight including twist lock and turn buckle	44.0 ton

Maneuverability in port



Stern Area

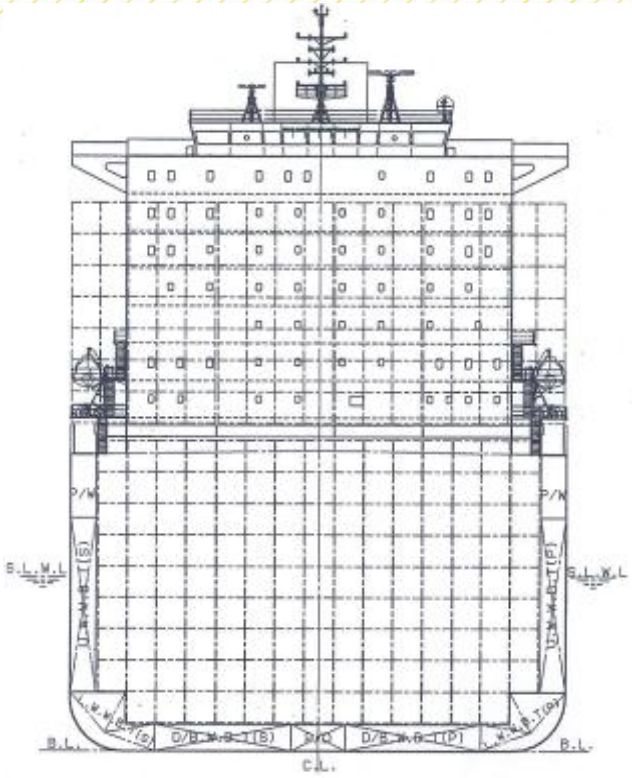


Bow Area

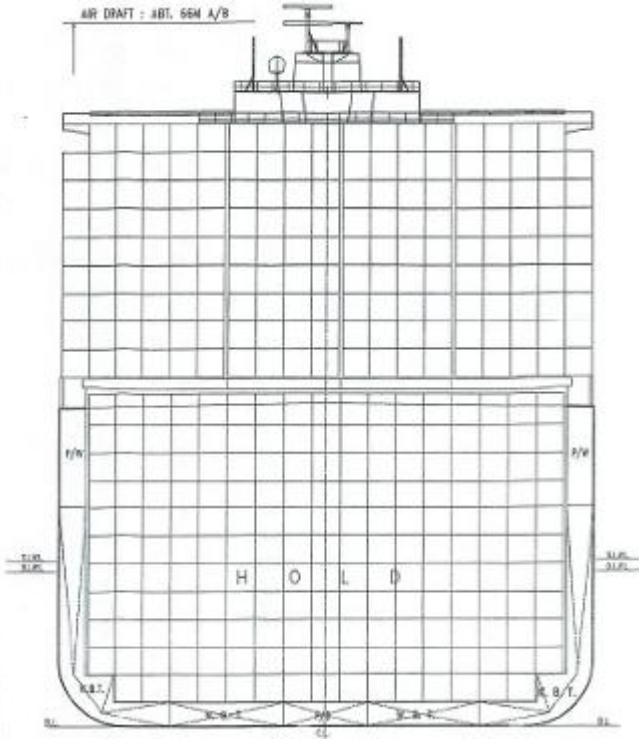
New Postpanamax Container Ships and more – Design and Safety –

Principal dimensions of 8200/13000 TEU vessels

8200 TEU



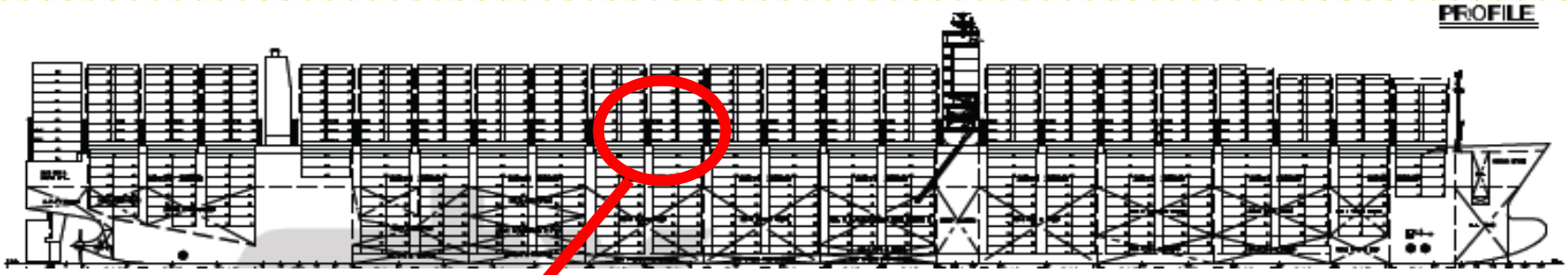
13000 TEU

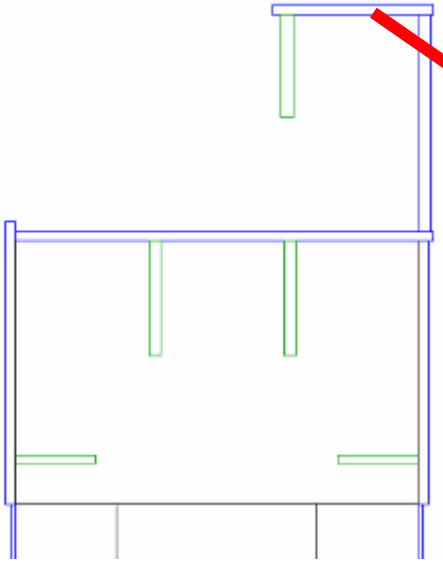


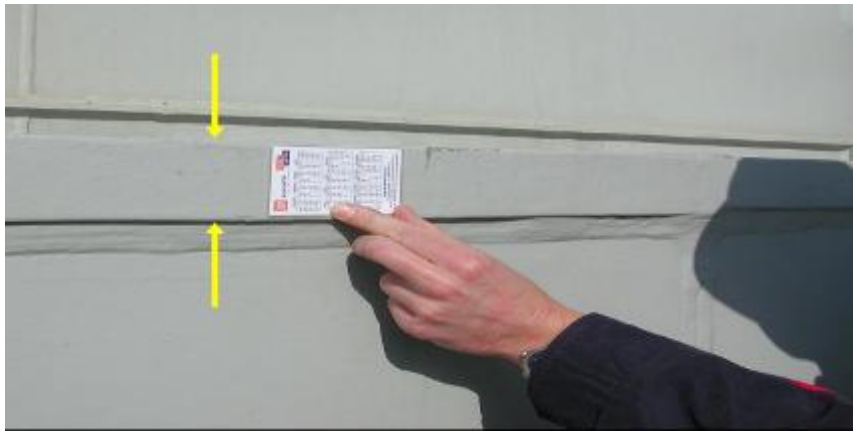
Size	L_{BP}	Breadth
8200 TEU	319,00 m	42,8 m
13000 TEU	366,00 m	48,2 m

New Postpanamax Container Ships and more – Design and Safety –

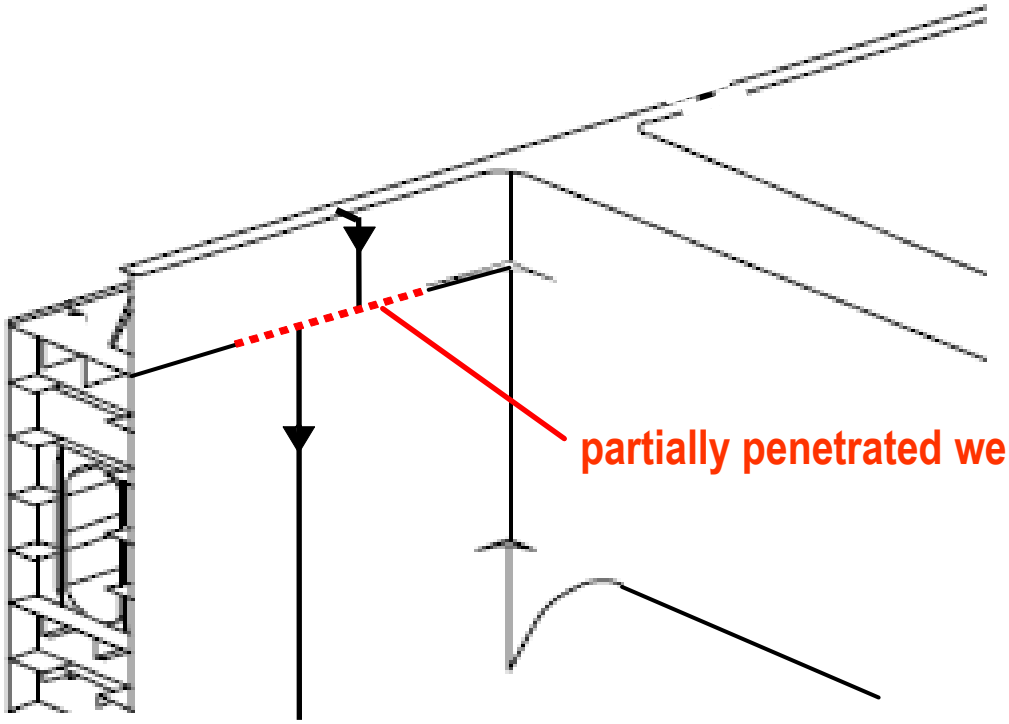
Plate thickness of 80 mm at the longitudinal coaming



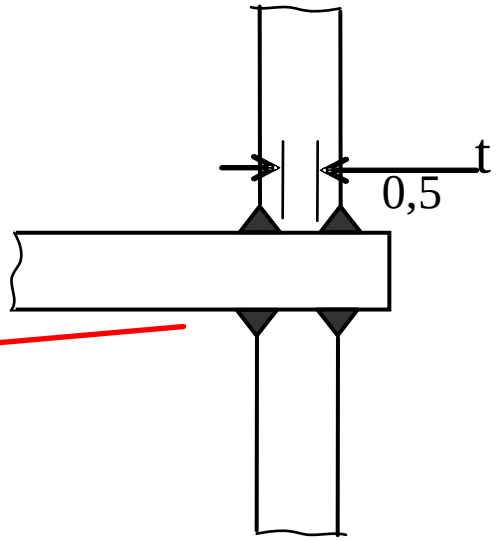




Due to higher tensile steel the plate thickness could be reduced

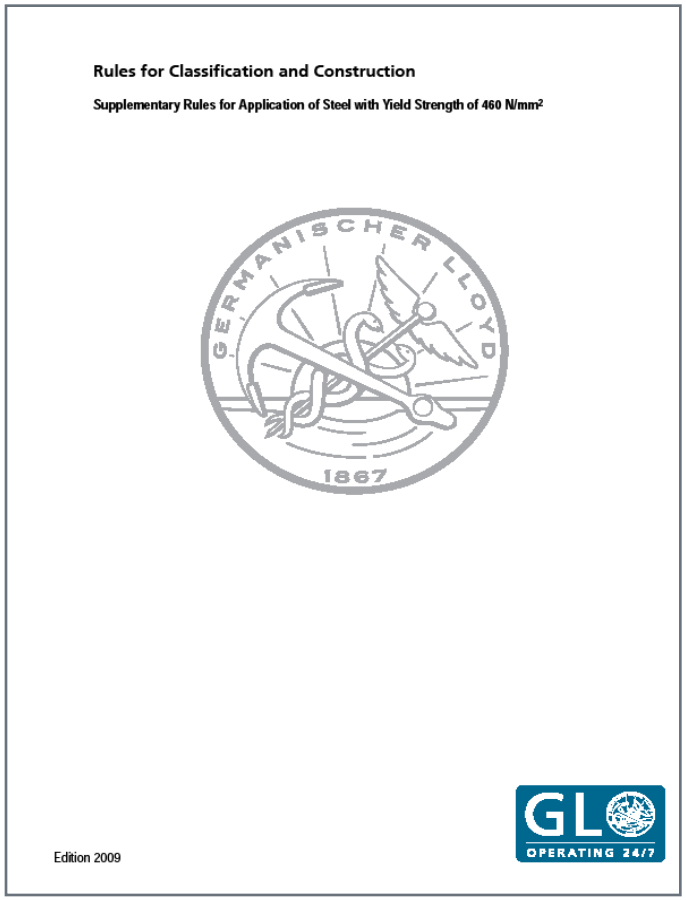


partially penetrated weld



GL is the only Classification Society with published Rules for higher tensile steel of 460 N/mm². This includes:

- Material properties
- Production of steel
- Welding
- NDT testing and parameter



Benefits:

- Reduction in hull weight (250 - 300 tons)
- Reduction in plate thickness of the coaming
- Increased dead weight capacity compared to an EH40 design
- Improved production quality assurance due to 100 % NDT requirement

GL's leading position:

- First and only Class to develop rules for the application of EH47 material
- Vast experience – more than 18 vessels delivered/on order
- Applied to latest generation ultra-large Container Vessels
- Detailed fatigue calculations carried out including crack growth calculations etc.
- JDPs with world leading companies

Criteria	YP 32, 36, 40	YP 47
Approval and agreed welding procedure	X	X
NDT during new building period	X (25 %)	X (100 %)

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Container ships – next steps

The Aim behind:

- To ensure that persons engaged in carrying out container securing operations have safe working conditions!

How does the amendments try to achieve that aim?

- Training and familiarization of people engaged in container securing.
- Implementation of Cargo Safe Access Plan (CSAP).
- Guidelines on ship design.
- Guidelines on the design of lashing system and fittings.
- Operational and maintenance procedures.
- Specialized container safety design.

New container ships:

- Where the keels of which were laid or which are at a similar stage of construction on or after 1 January 2015.

Existing container ships:

- Apply section 4.4 (Training and familiarization), 7.1 (Introduction), 7.3 (Maintenance) and section 8 (Specialized container safety design) with keel laying at a similar stage of construction before 1 January 2015.

Cargo Safe Access Plan (CSAP)

Overview of content:

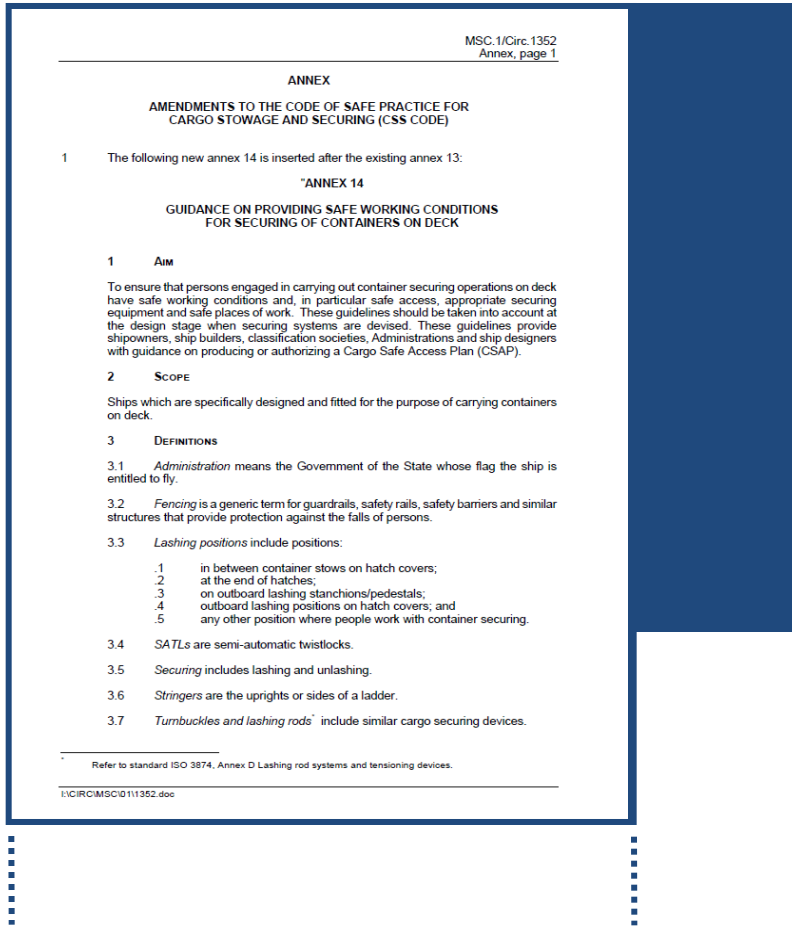
1. Aim
2. Scope
3. Definitions
4. General

   ...

   4.3 Cargo Safe Access Plan (CSAP)

   ...

5. Responsibilities of involved Parties
6. Design
7. Operational and Maintenance Procedure
8. Specialized Container Safety Design
9. References



MSC.1/Circ.1352
Annex, page 1

ANNEX

AMENDMENTS TO THE CODE OF SAFE PRACTICE FOR CARGO STOWAGE AND SECURING (CSS CODE)

1 The following new annex 14 is inserted after the existing annex 13:

"ANNEX 14

GUIDANCE ON PROVIDING SAFE WORKING CONDITIONS FOR SECURING OF CONTAINERS ON DECK

1 AIM

To ensure that persons engaged in carrying out container securing operations on deck have safe working conditions and, in particular safe access, appropriate securing equipment and safe places of work. These guidelines should be taken into account at the design stage when securing systems are devised. These guidelines provide shipowners, ship builders, classification societies, Administrations and ship designers with guidance on producing or authorizing a Cargo Safe Access Plan (CSAP).

2 SCOPE

Ships which are specifically designed and fitted for the purpose of carrying containers on deck.

3 DEFINITIONS

3.1 *Administration* means the Government of the State whose flag the ship is entitled to fly.

3.2 *Fencing* is a generic term for guardrails, safety rails, safety barriers and similar structures that provide protection against the falls of persons.

3.3 *Lashing positions* include positions:

.1 in between container stows on hatch covers;
.2 at the end of hatches;
.3 on outboard lashing stanchions/pedestals;
.4 outboard lashing positions on hatch covers; and
.5 any other position where people work with container securing.

3.4 *SATLs* are semi-automatic twistlocks.

3.5 *Securing* includes lashing and unlashing.

3.6 *Stringers* are the uprights or sides of a ladder.

3.7 *Turnbuckles and lashing rods** include similar cargo securing devices.

* Refer to standard ISO 3874, Annex D Lashing rod systems and tensioning devices.

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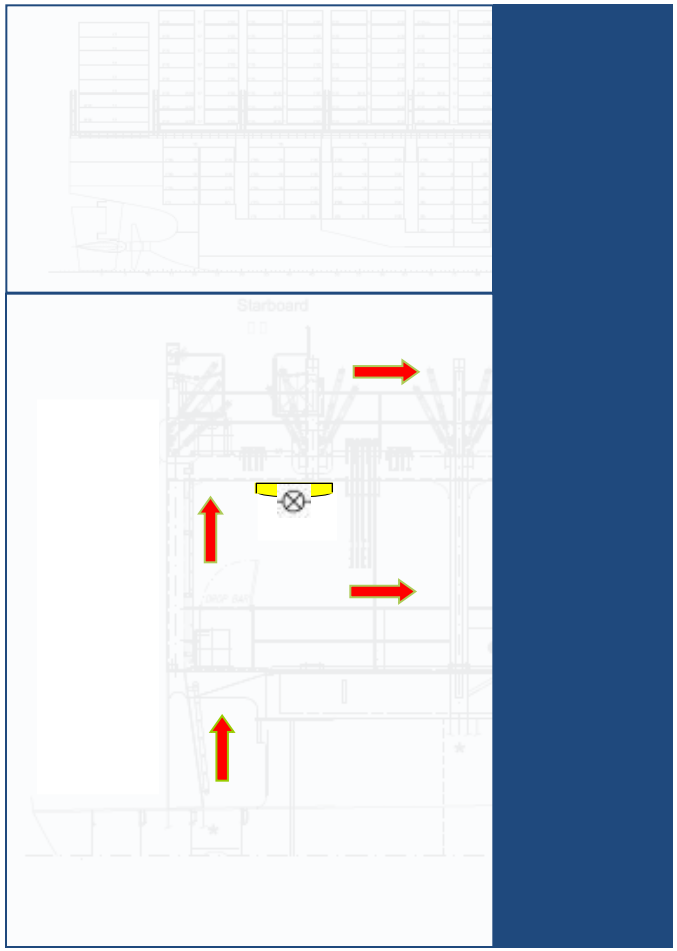
Section 4 – General 4.3 Cargo Safe Access Plan (CSAP):

- An **approved** Cargo Safe Access Plan (CSAP) shall be on board, for all areas where containers are secured.
- Shipowners, ship designers, shipbuilders, administrations, classification societies and lashing equipment manufacturers, should be involved at **an early stage in the design** of securing arrangements and development of CSAP.
- The CSAP should be developed **at the design stage** in accordance with chapter 5 of the annex to MSC.1/Circ.1353.



Section 6 – Design – 6.2 Provisions for safe access,
6.2.1 General provisions:

- **Minimum clearance for transit areas** should be at least **2 m high** and **600 mm wide**.

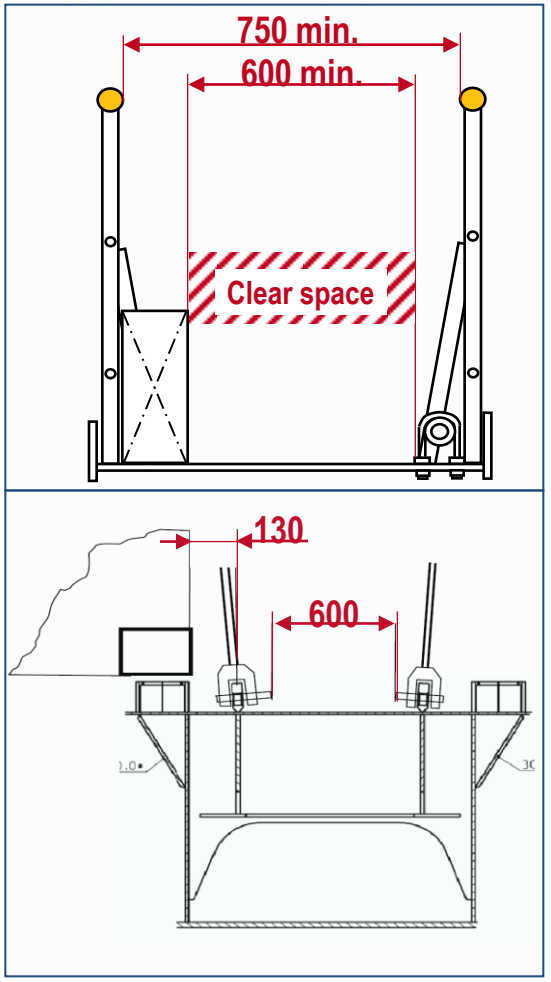
May effect the basic design

- **Relevant deck surfaces** used for movement about the ship and all passageways and stairs **should have non-slip surfaces**.
- Where necessary for safety, **walkways on deck should be delineated** by painted lines or otherwise **marked by pictorial signs**.
- **All protrusions** in access ways, such as cleats, ribs and brackets that may give rise to a trip hazard **should be highlighted in a contrasting colour**.

Section 6 – Design – 6.2 Provisions for safe access, 6.2.2 Lashing position design (platforms, bridges and other lashing positions)

- Lashing positions should be designed to eliminate the use of three high lashing bars.
- Horizontal operating distance from the securing point to the container does not exceed 1,100 mm and not less than 220 mm for lashing bridges and 130 mm for other positions.
- The width of the lashing positions should preferably be 1,000 mm, but not less than 750 mm.
- The width of permanent lashing bridges should be:
  - 750 mm between top rails of fencing and
  - a clear minimum of 600 mm between storage racks, lashing cleats and any other obstruction.

May effect the basic design



Section 6 – Design – What is the main influence of ship design? Length of ships might be increased due to following items:

- According to the amendments the **minimum width between top rail fencing of permanent lashing bridges is 750 mm**.

  (In current designs the width between fencings is 600 mm.)

- The **width of the lashing positions** should preferably be 1,000 mm, **but not less than 750 mm**.
- The **minimum clearance** for transit areas should be at least 2 m high and **600 mm wide**.

  (In current designs the clearance between turnbuckles on hatch cover is about 500 mm.)

Section 6 – Design – 6.4 Lighting Design. A lighting plan should be developed to provide for:

- Proper illumination of access ways of not less than 10 lux.
- Separate fixed or temporary lighting system for each working space between the container bays, with not less than 50 lux.
- Lights to be arranged in a way to minimizes glare to the deck workers.
- Adequately guarded against damages.

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Container ships – next steps

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Internal evaluation by GL of damages on container ships ≤ 10.000 TEU

Damages are related to:

- Cargo e.g. indents hatch cover.
- Collision e.g. bulbous bow deformed, shell plate.
- Main and auxiliary engines, e.g. fuel oil pump striking.

50 % of all GL classed container ships apply for ERS (Emergency Response Service)

Advantages for ERS clients:

- Permanent emergency preparedness
- Computer based contingency planning system
- Appropriate technical response by experienced specialists
- Competent advice with regard of damage stability, residual strength and salvage manoeuvres
- Data model already existing prior casualty, no time loss
- Precise modelling due to availability of technical information
- Recommendations on remedial actions
- Reduced downtime / days off hire due to quick response
- Reduced cost for salvage operation and tugs
- In several casualties due to GL ERS salvage company not needed
- GL ERS provides second opinion even when salvor involved

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Container Ships – Next steps

Germanischer Lloyd's newbuilding study with a big Korean shipyard to develop container ships with:

TEU:	**22.000**
Length:	**470 m**
Breadth:	**60 m**

→ Technically absolute feasible

Thank you very much for your kind attention

Any Questions?

Matthias Galle

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