New Postpanamax Container Ships and more
- Design and Safety -
New Postpanamax Container Ships and more – Design and Safety –
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
The current plan for two new sets of locks:

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)

Extension for ships with:

- 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

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**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<sub>scant</sub>**: 15.0 m (up to 16.0 m)

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**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<sub>scant</sub>**: 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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Container ships – next steps
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]

Germanischer Lloyd: 41%
Other Classes: 59%

Global Orderbook [in GT]

Germanischer Lloyd: 51%
Other Classes: 49%

Source: GL Analysis
## New Postpanamax Container Ships and more – Design and Safety – World container fleet

<table>
<thead>
<tr>
<th>Vessel Type</th>
<th>Size</th>
<th>In Service</th>
<th>Under Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No. of Ships</td>
<td>GT</td>
</tr>
<tr>
<td>Container Ship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Panamax Container Ships 3</td>
<td>&gt; 11.700 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Panamax Container Ships 2</td>
<td>7.501 - 11.700 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Panamax Container Ships 1</td>
<td>5.101 - 7.500 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panamax Container Ships 2</td>
<td>4.001 - 5.100 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panamax Container Ships 1</td>
<td>3.101 - 4.000 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Panamax Container Ships 2</td>
<td>2.601 - 3.100 TEU</td>
<td></td>
<td></td>
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<tr>
<td>Sub-Panamax Container Ships 1</td>
<td>1.801 - 2.600 TEU</td>
<td></td>
<td></td>
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<tr>
<td>Handy Container Ships 2</td>
<td>1.301 - 1.800 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handy Container Ships 1</td>
<td>1.001 - 1.300 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedermax Container Ships</td>
<td>501 - 1.000 TEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeder Container Ships</td>
<td>&lt;= 500 TEU</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Source: GL Analysis
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
Concerning location and size for fuel oil tanks.
Capacity \( \leq 600 \text{ m}^3 \).
Applicable for all ships, where keel laid on or after 1 February 2008.
Fuel oil tank in cargo hold area → loss of container

Fuel oil below deck house → optimum design concept
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
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.

**Deformation of the tank structure must be considered for:**

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

<table>
<thead>
<tr>
<th>Size</th>
<th>$L_{BP}$</th>
<th>Breadth</th>
</tr>
</thead>
<tbody>
<tr>
<td>8200 TEU</td>
<td>319,00 m</td>
<td>42,8 m</td>
</tr>
<tr>
<td>13000 TEU</td>
<td>366,00 m</td>
<td>48,2 m</td>
</tr>
</tbody>
</table>
Due to higher tensile steel the plate thickness could be reduced.
partially penetrated weld

0,5

Detail design – second line of defence
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

<table>
<thead>
<tr>
<th>Criteria</th>
<th>YP 32, 36, 40</th>
<th>YP 47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approval and agreed welding procedure</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NDT during new building period</td>
<td>X (25 %)</td>
<td>X (100 %)</td>
</tr>
</tbody>
</table>
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Global container ship fleet

MARPOL Fuel Tank Protection (FTP)

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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.
- 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
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.

- **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.

*May effect the basic design*
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
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
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
Panama extension

Global container ship fleet

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Damages/Emergency Response Service (ERS)

Container Ships – Next steps
Germanischer Lloyd’s newbuilding study with a big Korean shipyard to develop container ships with:

<table>
<thead>
<tr>
<th>TEU:</th>
<th>22,000</th>
</tr>
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<tbody>
<tr>
<td>Length:</td>
<td>470 m</td>
</tr>
<tr>
<td>Breadth:</td>
<td>60 m</td>
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</tbody>
</table>

Technically absolute feasible
Thank you very much for your kind attention

Any Questions?

Matthias Galle

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✉ Matthias.Galle@gl-group.com