Agenda Item 3  Accidents and ship traffic in the Baltic Sea

Document code: 3/1
Date: 18.12.2013
Submitted by: Secretariat

**DRAFT GUIDELINES ON VESSEL’S SAFE UNDER KEEL CLEARANCE**

This document contains a draft for guidelines on vessel’s safe under keel clearance.

This version of the document was originally communicated by Mr. Bogdan Rojek, Poland, on 6 October 2008 to the HELCOM Expert Working Group on transit routeing (HELCOM Transit Route EWG).

The document was further circulated to the contacts of HELCOM SAFE NAV by the HELCOM Secretariat on 13 February 2013 for comments by 8 March 2013.

The calculation figure provided in Annex was communicated by Mr. Vladimir Vasilyev 19 March 2013 to the Secretariat as part of the commenting.

The Meeting is invited to:
- consider the draft and act as appropriate with a view of developing a document on UCK for adoption by HELCOM.
[DRAFT] HELCOM GUIDELINES [FOR MARINERS] ON DETERMINATION [ESTIMATION] OF VESSEL’S SAFE UNDER KEEL CLEARANCE

1. Introduction [Scope and purpose]
These Guidelines are intended to provide basic guidance on determination of vessel’s minimum under keel clearance to provide safe navigation through the areas with restricted available depth of water and thus enhancing safety of shipping and protection of environment.

The purpose of these Guidelines is to provide Contracting Governments, shipmasters, navigating officers and Companies (particularly in connection with the ISM Code and procedures arising therefrom) with a framework enabling them to respond effectively to ensure vessels maintain sufficient under keel clearance (UKC) and safe draught during its whole intended voyage.

Nothing in these Guidelines shall prejudice the rights of shipmasters to act accordingly in the distress and emergency situations or any other extenuating circumstances in order to ensure the safety of life at sea, safety of the vessel and protection of environment.

These Guidelines are without the prejudice to the rights and obligations of coastal and port States to exercise their powers under existing international conventions.

2. [General guidance]
The master is responsible for estimating the minimum under keel clearance along the whole transit route of the vessel, including the port facility or anchorage. To assist the master with this requirement, the vessel’s Company should provide the master with written under keel clearance guidance. Vessel draft, controlling depth of the port, and the impact of weather and other environmental conditions such as sea conditions and vessel traffic must be addressed in written guidance. If conditions which mandate when the Company must be contacted are not prescribed in writing, the guidance should provide the master with direct authority to delay the transit or take any action necessary to ensure the vessel’s safe navigation.

Prior to berthing to port facility with port pilot or transiting sea passage with a deep-sea pilot, the shipmaster shall plan the ship's passage using the Company's written guidance and estimate the anticipated under keel clearance. The shipmaster and the relevant pilot shall discuss and agree the transit plan including the anticipated under keel clearance.

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1 See relevant paragraph below
3. Under Keel Clearance [detailed factors]

Ship’s [maximum] [safe] navigational draft should be equal to the difference between the
- [corrected] sea depth; and
- required under keel clearance (UKC).

Sea depth should be estimated as the depth as charted on the navigational chart and corrected according to correction value. The correction value should be determined according to tide calculations (on tidal waters) or changes to the Mean Sea Level (areas with no tides). The relevant data shall be obtained through common channels of information to mariners and local warnings i.e.: any pertinent information found in the Coast Pilot or Local Notice to Marines and Navigational and Hydro-meteorological Warnings.

UKC is estimated from some or all of the following factors:
- The vessels maneuvering characteristics
- Accuracy in the assessed vessel’s draft including influence of water density and hogging or sagging
- The vessels squat and or settlement (related to vessel’s speed)
- Increase in draft due to vessels trim
- Increase in draft due to vessels roll
- Increase in draft due to vessels pitch
- Increase in draft due to vessels heave
- Accuracy in the predicted or measured tide height or Mean Sea Level
- Accuracy in the declared charted depth
- Allowance for possible siltation since last survey.

Taking into account the above factors the under keel clearance should be determined as sum of:
- minimal navigation clearance [reserve],
- correction due to the sea state conditions,
- correction due to ship’s squat, heave, trim, list, pitch and roll.

Minimum safe under keel clearance should never be less than minimum navigational clearance [reserve] established as an arithmetic product of ship’s maximum draught (on even keel) and not dimensional coefficient (\(\frac{d}{L}\), dependent on the type of sea area or fairway, described in the following Table.

<table>
<thead>
<tr>
<th>No</th>
<th>Type of area or fairway</th>
<th>(\frac{d}{L})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Harbour areas sheltered from waves</td>
<td>0,05</td>
</tr>
<tr>
<td>2</td>
<td>Interior fairways, ship’s rotary area, basin and port channel in which vessels use tugs</td>
<td>0,05</td>
</tr>
<tr>
<td>3</td>
<td>Exterior approaching lane from sea to port and marina</td>
<td>0,10</td>
</tr>
<tr>
<td>4</td>
<td>Open sea areas</td>
<td>0,15</td>
</tr>
</tbody>
</table>

4. Under Keel Clearance [example calculation]

For detailed example of UKC calculations see Annex to this Guideliness.

5. Simplified UKC assessment [and recommendations]

In Port:
- When navigating within a port or secured to a berth, it is recommended that UKC is never less than 2 feet (0.60m); unless under extenuating circumstances, when Master may allow for a reduced UKC provided considered safe. In case a UKC of 2 feet (0.6m) cannot be maintained and if
extenuating circumstances do not apply, the Master must advise and consult with the Company to seek further guidance.

**At Sea:**
- Except in extenuating circumstances:
  - In confined waters and approaches to ports, a minimum dynamic UKC of 10% of the draft shall be maintained;
  - In open coastal waters, a minimum dynamic UKC of 20% of the draft shall be maintained;
  - On ocean passages the vessel should be kept clear of any localized shallow areas and as far as possible in depths greater than 50m.

**Transiting the Deep Water Routes:**
- Under this recommendations when transiting these routes, other then in port areas, a vessel having a draft of 15 meters and more is deemed to be a deep draft vessel (DDV) and a tanker of more than 150,000 dwt is deemed to be a VLCC.
- Unless directed by other local regulations, such vessel's shall allow for an under keel clearance of at least [2.0] meters or of [15% of maximum ship's draught], whichever is greater value.

**Local requirements:**
- Where a Government, port authority, or pilot organization establishes a mandatory or recommended minimum under-keel clearance, the master must ensure that, as a minimum, such under keel clearance is maintained after taking into account the factors listed above.

**Pilotage:**
The ship’s draft, controlling depth of the port transit, and the anticipated under-keel clearance shall be discussed with the vessel's pilot. The pilot should be consulted for any additional information that may affect the controlling depth of the port transit. This discussion shall highlight important parts of the transit plan such as transit speed, squat effect, shoals, turn bearings, etc. The anticipated affect of weather and sea conditions must also be discussed with the pilot and considered in the transit plan. An entry must be made in the official log book reflecting this discussion.

**Effect of squat:**
- The speed of a vessel through water is of great importance when evaluating the effects of squat. Squat is approximately proportional to the square of the ship's speed through the water, hence halving the speed reduces the squat effect only by a factor of four.
- On full form ships the trimming effect of squat is to increase the forward draught more than that aft, thus tending to trim a vessel by the head.
- Squat may become critical under circumstances where a channel width of less than 5 times the beam of the ship is combined with a static under keel clearance of less than 20% of the vessel's draft.
Extenuating circumstances:
*See relevant paragraph below.

6. Responsibilities

Master
- Ensuring that the vessel maintains sufficient under keel clearance (UKC) within the limits set in the Company procedures.
- Taking into account local / port regulations / charterer’s instructions requiring UKC differing from those stipulated hereunder.
- Ensuring awareness of Company’s UKC policy and its compliance amongst navigating officers while preparing passage plans.
- Inform Company when these procedures cannot be complied with or when Master considers UKC to be unsafe. In such cases, initiate mitigating measures.

Navigating Officers
- Being aware of UKC requirement and constraints thereof at all times while navigating a vessel.
- Being aware of Master’s UKC requirements.
- Making provisions for required minimum UKC while preparing a passage plan.

Company
- Set and review UKC limitations.
- If deemed necessary, set guidelines and draft limitations for transit to certain ports or areas to ensure safety of its vessels.

7. Recommended procedures
- Carefully consider controlling depths in channel / canal / restricted depths areas with due regard for frequency of surveys and maintenance of depths in waterway. Tides, currents, environmental conditions and local phenomena should be taken into account. Local navigational warnings regarding shoaling and submerged objects should be obtained.
- Determine deepest draft after considering the water density, sag, list, and heel. Make squat allowance for anticipated speed through the water, vessel’s movement in open seaway and complete relevant Company Underkeel Clearance Calculation Form. While in the U.S., also be guided by USCG Publication 33 CFR 157.455.
- Ensure safe conduct of the vessel during transits bearing in mind vessel’s steering ability, maneuvering characteristics, speed, and any other operational constraints that may be applicable due to the vessel’s UKC.
- Present UKC calculations to pilot along with the passage plan. Transits through shallow areas are to be discussed in detail with reference to dynamic UKC. It is important that appropriate logbook entries are made regarding this discussion.
• Note that at many ore berths due to falling ore / coal from discharging grabs, the depths along the dock wall may be considerably less than that denoted on official charts.
• Should it ever be suspected that the vessel has touched bottom, it is important to bring it to the notice of the pilot and make appropriate logbook entries including date, time and position. The Company must be notified and an investigation made to check for damage as per relevant shipboard procedures.

8. Extenuating circumstances:
• If voyage orders specify a draught or cargo nomination that will result in a lesser UKC than that stipulated above, the Master shall notify the Company. Provided there are reasonable local regulations, rules or recommendations by relevant authorities, which endorse such voyage orders / nominations, the Master shall apply due diligence and, in consultation with the Company, may comply with such voyage orders and/or nominations.
• Consideration shall be given to the possible applicability of the below given conditions in reaching such decision:
  • The vessel is in calm sheltered waters, speed is controlled at which the effect of squat is minimal, and the draught of the vessel as well as the water depth can be verified accurately.
  • The vessel is crossing lock or dock sills.
  • Vessels of similar build, size, draft and speed have already established the safety of a transit under prevailing environmental conditions.
• The following conditions might require to be confirmed with the relevant authorities or terminals, as the case may be, and complied with as deemed necessary:
  • Obtaining the latest sounding chart / information for the berth, including the nature of the sea bottom, directly from the local authorities or terminals well before arrival / lightering.
  • Berthing at discharge ports and unberthing at load ports only at the time of high water.
  • At discharge ports commencing cargo operations well before low water.
  • Vacating the berth if in any doubt about the risk of grounding.
  • Keeping all relevant parties fully informed of the situation.
  • Maintaining suitable records.
ANNEX

Example of UKC calculations [TABLED step by step calculations] [at least 2 types of vessels, e.g: container ship, VLCC]

vertical axis represents Navigational depth

Wave height

Ver 1.0