TECHNICAL CIRCULAR No. 303 of 12th November 2015

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| To: | All Surveyors/Auditors |
| Applicable to flag: | All Flags |
| Subject: | **On and Upper – deck Inspection** |
| Reference: | **Structural detail failure and repairs** |

**Structural detail failure and repairs,**

What to look for On-deck and Under-deck inspection- Hull Surveyor

## a) What to look for On-deck inspection

1 Material wastage

1.1 The general condition with regard to corrosion of the deck structure, the cargo hatch coamings and the hatch covers may be observed by visual inspection. Special attention should be paid to areas where pipes, e.g. fire main, hydraulic pipes, pipes for compressed air, are fitted close to the plating, making proper maintenance of the protective coating difficult to carry out.

1.2 Grooving corrosion may occur at the transition between the thicker deck plating outside the line of cargo hatches and the thinner cross deck plating, especially when the difference in plate thickness is large. The difference in plate thickness causes water to gather in this area resulting in corrosion ambience which may subsequently lead to grooving.

1.3 Pitting corrosion may occur throughout the cross deck strip plating and on hatch covers. The combination of accumulated water with scattered residue of certain cargoes may create a corrosive reaction.

1.4 Wastage/corrosion may seriously affect the integrity of the steel hatch covers, and also the additional moving parts, e.g. cleats, pot-lifts, roller wheels, etc. In some ships pontoon hatch covers together with tarpaulins are used. The tarpaulins are liable to tear due to deck cargo, such as timbers, and cause heavy corrosion to the hatch covers.

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2 Deformations

2.1 Plate buckling (between stiffeners) may occur in areas subjected to in-plane compressive stresses, particularly if corrosion is evident. Special attention should be paid to areas where the compressive stresses are perpendicular to the direction of the stiffening system. Such areas may be in the foreship where deck longitudinals are terminated and replaced by transverse beams, but also in the cross deck strips between hatches when longitudinal stiffening is applied.

2.2 Deformed structures may be observed in areas of the deck, hatch coamings and hatch covers where cargo has been handled/loaded or mechanical equipment, e.g. hatch covers, has been operated. Also in other areas, in particular exposed deck forward, deformation may result when green seas on deck have been suffered.

2.3 Sagging plate panel may have been caused by lateral overloading as a consequence of excessive deck cargo, improper distribution /support of deck cargoes, sea water on deck in heavy weather, or a combination of these factors. It is essential that an under-deck inspection is also carried out to assess the extent of such damage.

2.4 Deformed/twisted exposed structures above deck, such as side-coaming brackets, may result from impact of cargo or cargo handling machinery due to improper handling. Such damages may also be caused by sea water on deck in heavy weather.

3 Fractures

3.1 Fractures in areas of structural discontinuity and stress concentration will normally be detected by close-up inspection. Special attention should be given to the structures at cargo hatches in general and to corners of deck openings in particular.

3.2 Fractures initiated in the deck plating outside the line of hatches, may develop across the deck, with the most serious consequences. Also fractures initiated in the deck plating of the cross deck strip, in particular at the transition between the thicker deck plating outside the line of cargo hatches and the thinner cross deck plating, may have serious consequences if not repaired immediately.

3.3 Other fractures that may occur in the deck plating at hatches and in connected coamings can result/originate from:

(a) Fillet weld connection of the coaming to the deck, particularly at a radiused coaming plate at the hatch corner plating.

(b) Welded attachment and shedder plate close to or on the free edge of the hatch corner plating.

(c) The geometry of the corners of the hatch openings.

(d) The termination of the side coaming extension brackets.

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(e) Grooving caused by wire ropes of cargo gear.

(f) Wasted plating.

(g) Attachments, cut-outs and notches for securing devices, and operating mechanisms for opening/closing hatch covers at the top of the coaming and/or coaming top bar, if any, at the mid-length of the hatch (See Examples 7-a and 7-b).

(h) Hatch coaming stays supporting the hatch cover resting pads in case of deck loads on the hatch covers and the connection of resting pad to the top of the coaming as well as the supporting structures.

3.4 Fractures in deck plating often occur at the termination of bulwarks, such as pilot ladder recess, due to stress concentration. The fractures may propagate themselves resulting in serious casualty when the deck is subject to high longitudinal bending stress.

b) **What to look for Under-deck inspection**

1 Material wastage

1.1 The level of wastage of under-deck stiffeners/structures may have to be established by means of thickness measurements. As mentioned previously the combination of the effects from the marine environment and the local atmosphere will give rise to high corrosion rates.

1.2 Severe corrosion of the hatch coaming from inside and of under deck girders may occur due to difficult access for maintenance of the protective coating. This may in turn lead to fractures.

2 Deformations

2.1 Buckling should be looked for in the primary supporting structure, e.g. hatch end beams and longitudinal girders beneath the longitudinal hatch coamings, if sagging of deck panels has been observed during on-deck inspection. Such buckling may also be the initial observation of damage caused by lateral overloading as a consequence of excessive deck cargo, improper distribution/support of deck cargoes, sea water on deck in heavy weather, or a combination of these causes.

3 Fractures

3.1 Fractures in the connection between the transverse bulkheads, girders/stiffeners and the deck plating may occur. This is often associated with a reduction in area of the connection due to corrosion.

3.2 Fractures in the primary supporting structure, e.g. hatch end beams may be found in the weld connections at the ends of the beams/girders.

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REFERENCES:

- CONARINA Instructions

ATTACHMENTS: No.

Kindest Regards,
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