



## TECHNICAL CIRCULAR No. 022 of 31 August 2011

To:	All Surveyors
Applicable to flag:	All Flags
Subject:	Drydock Survey: Hull; Anchors and anchor chains; Overboard discharge pipes
Reference:	Conarina Surveyor Instructions - Classification

The following are Conarina Technical Office instruction to surveyor when the ship is in drydock.

### **1. Hull**

Start the Drydocking Survey is at the head of the drydock, working down the port side and up the starboard side.

The stem plating or the stem bar should next be sighted. The first few plates in the Keel, "A" and "B" strakes call for particular attention as they are vulnerable to pounding damage and also to erosion and corrosion of welded or riveted connections, particularly where chafed by the anchor chains.

Eroded or corroded butts and seams should be cleaned or back chipped to sound metal and rewelded. A minimum of reinforcing is desirable on these welds to prevent entrapped air from the bow wave attacking the weld again. The rewelded joints should be cleaned of all slag and carefully primed and coated. Corroded or slightly leaking rivets may be caulked or ring welded if condition is not widespread and the rivets are not loose.

If it is impossible to weld eroded butts, seams and rivets at time of survey because tanks in way are not gas freed and condition does not affect the structural integrity of the vessel, consideration may be given to cleaning affected welds or rivets and epoxy coating same until the next Drydocking Survey. All such temporary measures should of course be noted in the report "for record only".

Lapped seams and butts at the forward end of the vessel are relatively rare, however if present they should be examined for wear corrosion caused by a combination of wash effect and anchor chain rubbing. If this is excessive it may call for plate edge build-up or plate renewals, or as a preventative measure, the installation of chain chafing protection strips.

The underwater bottom should be sighted frequently as the survey progresses towards the

stern for hogging, sagging, grounding damage, or distortion possibly indicative of structural weakness. A good way to sight for deformation is to bend over and look through your legs upside down at the bottom - any hills or valleys seem to stand out better from this viewpoint. Optical keel sights or checking with a tight string may be called for and Surveyors frequently carry two small magnets and a length of string for this purpose. The bottom and sideshell plating in the midship area, particularly below and in line with deckhouse or hatch ends, calls for close examination for the possible presence of transverse deformation between frames. It is important to look carefully for signs of deformation possibly attributable to structural weakness (e.g. wastage) as differentiated from grounding or striking indents.

Unfair or set-in plating is common forward. A fair degree of deformation, say up to 75 mm (3 in.) of the underwater bottom plating forward ordinarily may be accepted without resulting in serious impairment of structural strength provided the internal framing in way is not significantly "tripped" or rendered ineffective. However for transversely framed ships, severe or sharp transverse buckling of bottom plating within the amidships half-length, can significantly affect longitudinal strength of the hull girder. As might be expected, the greater the athwartship extent of such buckling, the greater the impairment of hull strength. Any appreciable buckle of sufficient athwartship extent so as to cross the keel strake and center vertical keel, or say two strakes including an inner bottom girder, is serious. Such a buckle should be corrected by replacement of plating and the buckled portion of affected girders. If there is no evidence to indicate the buckle was caused by grounding or other excessive local loading, or that it is associated with excessive wastage, it may be an indication of need for providing additional internal reinforcement, i.e. a design deficiency. In such instances, the Surveyor-in-Charge should be advised of the circumstances and the Conarina Technical Director contacted for suitable corrective measures. Buckles of shorter athwartship extent may also require correction, depending upon their depth and sharpness, the number of buckles, and their respective locations. Obviously several bottom buckles within the same frame space transversely are more serious than the same number and of buckles distributed in a random manner. Localized transverse bands of accelerated corrosion or grooving may be found in association with buckling. These are indicative of advanced localized stress, which experience indicates may lead to cracking. In such cases, plating replacement may be called for even though the deterioration may be less than the allowable wastage. In such cases it may be feasible to replace less than full length plates.

Any sharp or very deep indent should be scaled and examined for excessive corrosion "grooving", thickness gauged and renewals or partial renewals made if found necessary. If sharp indents or creases are in line across several bottom or sideshell strakes, they should generally be dealt with immediately. Smooth indents, say of less than three inches in maximum depth, may require no action, particularly if there are no signs of significant damage to the internal structure or of accelerated corrosion at the bottom of the indent. These should be noted in the survey report "for record only" however, together with the maximum depth, extent and location.

Bottom or "docking" plugs should be carefully examined not only for tightness but also for excessive corrosion along the edge of the weld of the bossing to the bottom plating.

Directly attached bilge keels or bilge keels landing bars should be examined for fractures or corrosion grooving of the shell plating in way of any discontinuities of their attachment. While most bilge keel are attached via a landing bar, there are some vessels currently in service with the bilge keels welded direct to the shell plating with no intervening landing bar. No modifications are required to these installations, however they should be examined and if fatigue fracturing or grooving of shell plating in way of bilge keel discontinuities is encountered, consideration should be given to modification by insertion of a continuous landing bar under the full length of the bilge keel. Fractured butt welds in the bilge keel should be chipped to sound metal and rewelded and any slack rivets renewed. The decision on whether to repair or crop and remove a damaged bilge keel should be left up to the Owner. Conarina surveyor has to see that fractures in the bilge keel do not propagate into the hull, and that no "notches" or "hard spots" are left which might lead to cracking of the bilge strake.

## **2. Anchors and anchor chains**

Anchors and anchor chain cable if ranged should normally first be examined as follows:

Anchor heads, flukes and shanks should be surface examined for cracks. If any such defects are found they may be weldable, otherwise renewal will probably be necessary. In such cases welding may be attempted as a temporary measure pending availability of the new equipment, which may take 3 to 6 months.

Anchor head crown pins and anchor shackle pins should be hammer-tested, hardened-up if slack, or renewed if excessively worn or bent.

Swivels if fitted, should be closely examined so far as possible in way of the threaded connection, as many have been lost in service due to concealed wastage in this area. If in doubt, the swivel should be recommended to be removed. Consideration should be given to simply eliminating any questionable swivels; they are normally not essential.

Patented type detachable connecting links should be opened out and slack or corroded taper locking pins renewed, their holes re-reamed and new lead keeper plugs peened in.

"U" type connecting shackles should be examined for excessive neck wear, slackness in the pins and for shearing of keeper pins. The pin must be a snug fit all around in these shackles; otherwise the keeper pin may shear when a strain is put on the chain.

Anchor chain cable should be surface examined, hammer-tested and loose or missing studs replaced by welding at one end of the stud only, at the end of the stud opposite the link butt weld. The rest of the chain cable should be further examined for excessive wear and gauged if necessary.

Verify that the number of shots of anchor chain as fitted port and starboard, equal the total length required by initial ship documentation.

## **3. Overboard discharge pipes**

Overboard discharge pipes, their shell reinforcement rings and external shell plating beneath the outlets should be checked for excessive corrosion. This is particularly applicable to

evaporator drain, boiler blow-down, and inert gas scrubber discharges. Sea chests should be examined for fractures particularly in way of the corners, for aerated water corrosion, and the condition of the strainers and their securing devices.

**REFERENCES:**

CONARINA SURVEYOR INSTRUCTIONS - CLASSIFICATION

**ATTACHMENTS:**

No.

Kindest Regards,  
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