Loss of anchors and chain

Gard has noted an increase in cases of lost anchors. The Club experiences about one case per 200 ships per year and class societies experience about twice as many: one anchor lost per 100 ships a year. Most Gard cases involving lost anchors are P&I-related. More and more port authorities require that lost anchors be removed from the sea bed, so these cases become "wreck removal" operations. There are fewer cases related to hull and machinery insurance, as the value of the lost anchor and chain is normally lower than the applicable deductibles.

Published 02 September 2024

The weakest link

Gard has looked at the technical reasons behind loss of anchors, and noted that anchors may be lost due to breakage of a common chain link, joining shackle, swivel, anchor shackle or crown shackle, and also through breakage of the anchor itself. One or both flukes may break and, surprisingly, also the solid anchor shank.

"A chain is only as strong as its weakest link" is an old saying, and when a part of the chain breaks it may be due to wear and corrosion or to over-stressing of that part. Class societies require anchors and chain to be ranged in dry-dock every five years and that is the time to pay attention to every part of the chain. Gard's advice to vessels' masters and superintendents is to take an active part in the inspection, and not just to leave it to the yard and the class surveyor. Class societies will require the common chain links to be measured at the ends, where they are most worn, and allow a reduction of up to 12 per cent of the diameter.

Second-hand chains are on offer in the market, but one should not buy them without a certificate of quality. Consult the class society. One should also be aware that chains and anchors have been offered with false class certificates. The low price may be an indicator.

In addition to reduction by wear and corrosion, one of the common problems of anchor chain is loose or lost studs. The studs are there to keep the sides of the common links apart during pulling, to avoid that the chain "kinks", and they also add weight to the chain. If a stud is lost, the strength of the link is severely reduced. It is common to see loose studs being welded up, but one should be very careful in doing so. The class society should always be consulted, the amount of welding should be limited, and the link should be both pre-heated and slowly cooled down afterwards. In many cases it would be better to scrap the length of chain or to replace a single link by a joining shackle.

An anchor chain is composed of lengths of 15 fathoms (27.5 metres) joined by kenter shackles, as well as a "fore-runner" next to the anchor. It is relatively rare for a swivel or a kenter shackle to break, but if a worn chain has to be replaced, the "fore-runner", consisting of swivel, large link and joining shackles, should also be renewed. The spile pin, i.e., the conical pin locking the kenter shackle parts together, is important. It is hammered in and sealed by a lead pellet, and this has to be done in a proper way. Be sure to buy only quality goods with proper certificates.

Lost spile pins

The pin of the anchor shackle (D-shackle), which links the "fore-runner" to the crown shackle of the anchor, is sealed in the same way as for kenter shackles. There have been several cases where a chain in good condition comes up without the anchor and without the pin of the anchor shackle. The spile pin, securing the main pin of the shackle, seems to fall out relatively often, and Gard's investigation saw two reasons for that. One is found at the shipyard where the chain was fitted. The conical shape of the spile pin must match the hole in the shackle parts perfectly, so this is a question of quality at the manufacturers. Sealing the hole of the spile pin used to be done in the shipyard by hammering in a lead pellet with a special tool, but today this is sometimes done by pouring melted lead into the hole. That lead may shrink during cooling, and needs a hammering to serve its purpose. That is not always done.

The other reason for lost spile pins is found on board. Most anchors, if not all, will hammer within the hawse pipe while on voyage in heavy seas. The repeated hammering may at times loosen the spile pin of the anchor shackle and cause it to fall out. The anchors should be secured as tightly as possible by tensioners or turnbuckles/lashing wire, etc., to reduce anchor movements on voyage.

Breakage

If parts of an anchor break, there are good reasons to suspect defects of the cast metal, like inclusions and fissures, but it can also be caused by uncontrolled dropping of the anchor on a rocky seabed. Gard has also seen some anchor shanks breaking off, and that has been a surprise. Normally one would expect a chain link to part under strain long before the anchor shank. Examinations of the remaining part of the broken shanks have revealed a brittle metal structure, caused by insufficient annealing at the makers'. The anchor shank and anchor crown are made of cast steel, which requires a long heat treatment after casting. The manufacturers may have speeded up the production, cut time and temperatures needed for heat treatment, and that may not have been discovered by the authorities involved in testing and certification. If an anchor shank breaks, Gard recommends sending the remaining part to a test facility and comparing the results with the certificate.

Operational circumstances

As for operational circumstances when anchors are lost, some happen during normal anchoring, if one is not able to control the speed of the drop by the windlass brake, or if the anchor is dropped while the vessel is still moving forward. Anchors and chains may also be lost when anchoring in an area exposed to bad weather, if the vessel starts drifting. In such situations, there is of course also a risk of losing the vessel, or causing collisions, which have happened more than once. A vessel dragging its anchor also risks causing damage to pipelines and cables on the seabed, a very expensive affair. Anchors have also been lost when anchoring in too deep water and when attempting to stop a vessel as a last resort in a black-out situation.

Gard also has some cases of anchors dropping out while at sea, obviously a result of inadequate securing. If an anchor drops out while the vessel is under way, it has overcome the chain-stopper, the lashing-wire/tensioning arrangements and the windlass brake, or these have not been correctly engaged. If an anchor has dropped out while at sea, this would normally be felt by a smaller vessel's behaviour, such as loss of speed or tendency to steer to the side of the anchor. However, Gard has experienced cases where the personnel on the bridge blames a loss of speed on the conditions of waves and winds, or the lack of efficiency of the engine, instead of going forward to check the securing of the anchors. Approaching ports or shallow passages with an anchor in tow can become very expensive if cables and pipelines on the seabed are pulled off or damaged.

The efficiency of the windlass brake is extremely important, and worn brake band linings should be replaced without delay. Also, be aware that when the lining is worn, this makes the band more "roomy" and a full braking force will not be obtained by tightening the brake spindle alone. On large windlasses there is an arrangement at the lower part, to adjust the brake band. Service people working for a windlass manufacturer report that this is hardly ever done by the crew. It is just a case of reading the maintenance booklet and acting accordingly to obtain a better braking efficiency.

Class rules

The rules regarding specifications of anchoring equipment are established by the class societies. It is important to be aware that these requirements are minimum requirements, and also to be aware of assumptions made in the calculations used. Class societies stress that anchoring equipment is only intended for temporary mooring of a vessel, within a harbour or a sheltered area, when awaiting berth, tide, etc. It is also underlined that the equipment is not designed to hold a ship off a fully exposed coast in bad weather or to stop a vessel from drifting. The class rules will only require the vessel to have an anchoring equipment designed to hold the vessel in good holding ground, and are based on the assumption that a scope of chain cable between 6 and 10 is used. Such a scope, being the ratio between the length of chain paid out and the water depth, is just not obtainable for large ships in some of the deeper designated anchorages. With these limitations in mind, and the type of incidents mentioned above, it becomes apparent that some masters may at times put too much trust in their vessel's anchoring equipment, and that they should be more proactive and put out to sea more often when the weather deteriorates.

The full text of the rules for anchoring equipment can be found at the IACS website at: www.iacs.org.uk/document/public/Publications/Unified_requirements/PDF/UR_A_pdf148.PDF. Gard has addressed these rules in Loss Prevention Circular No. 12-10, which can be found at www.gard.no.