

Hatch Cover Supplement

An expensive problem with a low-cost solution

Ask anyone in the marine business which item of shipboard equipment they think causes the largest and most frequent claims and the chances are they will get the answer right – hatch covers.

Despite regular features in *Signals* and production of a loss-prevention guide on the subject by North of England, the level of losses from defective or poorly maintained hatch covers shows no signs of diminishing. This *Signals Supplement* aims to remind Members that useful improvements can be achieved without huge cost – it is often just a case of applying good practice and decent maintenance.

The mention of cost of improvement is pertinent because the imbalance between this and the cost of failure to maintain weathertight integrity can be enormous. For example, in North of England alone there are typically three or four claims each year valued between \$500,000 and \$1,000,000 for water-damaged cargoes resulting from hatch cover defects – not to mention numerous smaller claims. In general, the cost of preventing these losses can usually be measured in a few thousand dollars or less – such as replacing some defective rubber seals, repairing some minor steelwork or sometimes just cleaning down a coaming before closing the hatch covers. This supplement aims to show just how easy it can be to avoid costly failures.

In practice most problems are experienced by older ships and smaller ships. But larger ships and newer ships are not exempt from hatch cover problems and often give rise to the largest individual claims. No one is immune!



Water damaged cargo

Testing for weathertightness

The Association may periodically require a ship's hatch covers to be tested for weathertightness. Similar surveys are also often required by classification societies, and representatives of cargo shippers, particularly where the cargo is sensitive to water damage. These surveys may be done by the traditional hose test or using the more modern method of ultrasonic leak detection.

There are some practical difficulties with the traditional hose test – for example, the surveyor has to go inside the hold to look for leaks, the source of which can be difficult to find. During this time he or she is also unable to monitor the application of the water jet on the deck above. Furthermore, a hose test may not be wise when the hold is loaded with a cargo sensitive to water damage.

Ultrasonic leakage detection equipment was introduced some years ago to overcome difficulties with the hose test. An ultrasound transmitter is placed in the empty hold or on top of the cargo stow, with the hatch covers closed. An ultrasound detector is then moved by the surveyor around the outer sides of the cover and the cross-joints to locate any leaks.

There are classification society rules governing the use of ultrasound testing equipment, both to

ensure the equipment is up to the task and that the surveyor understands the hatch covers being surveyed. The rules also cover the recording and reporting of results. Only approved equipment may be used on class surveys and only approved service suppliers can carry out the tests. The requirements are contained in the International Association of Classification Societies (IACS) requirement UR Z17.

In addition, the Association requires that any leaks detected by ultrasound testing equipment do not exceed 10% of the "open hatch value", which is a control reading determined at the start of the test. Readings in excess of 10% will require defects to be properly rectified before the vessel sails if the ship's operators are to be able to demonstrate that they have exercised due diligence to make the ship seaworthy at the commencement of the voyage.

Neither the hose nor ultrasound tests can replicate the conditions experienced when a ship is rolling and pitching in a seaway with water cascading over decks and hatches – which is why testing is only part of the loss-prevention process. Well-maintained seals, cleats, supports, drains and other hatch cover components are the key to achieving weathertightness.

What is weathertightness?

We always refer to hatch covers needing to be 'weathertight', but what does this actually mean?

The statutory requirement contained in Regulation 3(12) of the International Convention on Load Lines 1966, states:

"weathertight" in relation to any part of a ship other than a door in a bulkhead means that the part is such that water will not penetrate it and so enter the hull of the ship in the worst sea and weather conditions likely to be encountered by the ship in service.



Ultrasonic testing

Inspection Check List

When a ship undertakes to carry a cargo safely it is taking on an onerous responsibility. The ship's personnel and ship superintendent are at the end of the chain of that responsibility – and their influence in spotting problems and helping to avoid them cannot be over-stated.

The task is not easy, largely because of the physical scale. For example, a typical Panamax bulk carrier will have hatch covers with steel surfaces larger than a football pitch, hundreds of cleats, 100 wheels, 600 metres of hydraulic piping and, crucially, about half a kilometre of rubber seal.

The answer lies in regular close inspection of the coamings, hatch covers and in particular the sealing arrangements when the covers are being opened or closed. Close inspection can identify problems before they become a serious threat and alert the maintenance team to intervene as soon as possible to avoid problems developing.

Close inspection need not take too much time or effort: – it simply involves making some observations and then recording what is seen. A check list is the ideal way to systemise these observations. The check list given here falls into three sections:

1. Coamings
2. Panels
3. Closure / sealing.

1. Coamings

- Are the compression bars in good condition, undamaged by corrosion, pitting, grab or wire damage and with uniform height and thickness?
 (Record height and width in mm)
- Is the coaming top water channel between the compression bar and the vertical coaming plate clean and not corroded?
- Is the extension of coaming plate forming one side of the water channel in good condition without thinning, not bent from grab contact and a uniform height all around?
 (Record height – minimum preferred is 20mm)
- Are the coamings free of any vertical rust staining which would indicate water leakage, especially at the cross-joints or split-joints?
- Are drains free from previous cargo and are there efficient means of closing, such as non-return valves?..... Are these in place and working?
- Are quick-acting cleats all in place and in good, free working condition?..... Are the under-coaming consoles in strong condition?
- If the hatch panel side and end plates are in steel-to-steel contact to the coaming tops when closed, are the coaming tops free of grooving or wear?
- If the hatch covers are supported by bearing pads, chocks or support blocks, are they free of wear or damage?
- Are the coamings free of corrosion and are the coaming brackets fully connected?

2. Panels

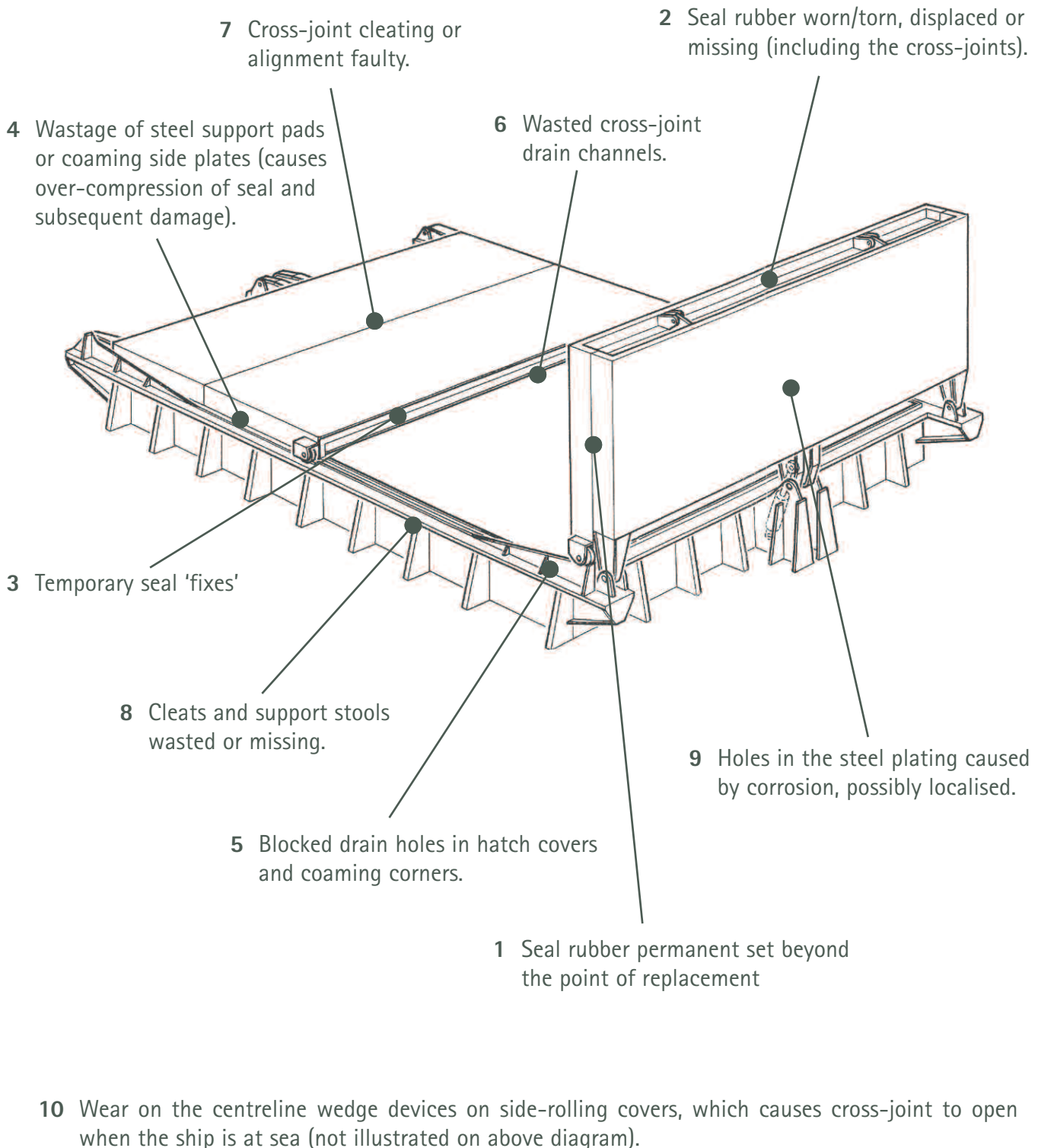
- Are the side and cross-joints seals in good condition?..... (Record permanent deflection at about 1 metre intervals and record width of existing rubber-renewal of seals is recommended if permanent deflection in excess of half the design compression.)
- Is the permanent deflection in the centre of the rubber and not to one side?..... (indicating misalignment)?
- Are the rubber seals free of deformation or tipping to one side?
- Are corner pads, joints and end pieces intact and in correct position? Are they properly glued?.....
- Are the hatch panel tops in corrosion-free condition and well painted externally? Are they smooth and not pitted?
- Are the undersides and internal structure of the hatch panels in corrosion-free condition and well painted?
- Are the sides of the panels by the rubber seal retaining channel and where the edge lands steel-to-steel on the coaming tops in good condition and free from distortion?
- Are seal retaining channels in good, corrosion free condition?
- Are the cross-joint seal retaining channels straight and corrosion-free and channel supports and brackets in good condition?
- Are the cross-joint compression bars in good scale-free condition, undamaged, straight and with uniform width?
- Are secondary drainage channels in scale-free condition, of adequate depth and draining into the coaming top water channel?
- Are the covers free of any deficiencies such as worn wheels/bearings, hatch cover end distortion, link pin wear, hydraulic oil leaks or worn hoses, arm pin wear, pontoon cover locating guide wear?

3. Closure

- Are the adjacent hatch cover panels in alignment, that is without one higher or lower than the next or skewed relative to each other?
- Is the necessary steel-to-steel contact or support occurring properly?
- Are the cleats correctly applied, that is applying a holding down force?
- Are the anti-lift bolts properly engaged and in sound condition, if fitted?
- Are cross-joint wedges (where fitted) sound, with a degree of tension when closed and slotted in?
- Are cross-joint wedge bridges strong?
- Are cross-joint wedge support areas on panel tops in good condition, with end panel supports corrosion-free?.....
- Do hatch panel sides form good steel-to-steel contact, with coaming tops without gaps?
- Are sufficient spares onboard, such as cleats, corner rubber pieces, linear rubber?.....
- Is there no evidence of use of hatch tape sealing at the joints?
- Have closed hatch panels been subjected to and proved weathertight by a) ultrasonic testing b) hose test using water pressure of about 2 bar pressure, through 15-18mm nozzle, aimed not more than 1 metre from and directly at, every part of the peripheral, cross-joint or split-joint seals?

Top 10 hatch cover defects

The top 10 hatch cover defects giving rise to claims for water damage are based on experience of many hatch cover surveys and damage claims. In most cases, the cost of early remedial work which would avoid possibly significant claims is not large.



Carrying out temporary repairs

The question arises: what do we do if, as a result of careful checking of the hatch covers in the known areas of likely defects, we find a problem? In practice there are real problems carrying out repairs during the limited time available in port and with limited resources of people and materials.

Often a temporary repair can be carried out that will alleviate the problem until more permanent repairs are possible. As long as the repair is such that it remains effective during the remaining voyage, then there is nothing wrong with this in principle.

Regular inspections of the hatch covers and regular maintenance according to the hatch cover supplier's operating and maintenance manual should help to avoid surprises and the need for emergency temporary repairs. But when an unexpected defect is found, there are some basic rules to be observed.

- If an area of the rubber seal is found to be damaged or defective, then it can be repaired by cutting out and replacing the defective length. The hatch cover supplier's manual should give detailed instructions as to the size and type of seal, the type of glue, the cutting and fitting instructions and so on. In general, the minimum length which should be inserted is 500mm as shorter lengths are very unlikely to be satisfactory.
- Inserting rubber pieces to pack out defective areas will not provide a reliable seal. Once the ship is at sea, with relative movement occurring between the hatch covers and the coaming, then leaks are inevitable.
- If possible complete lengths of seal should be replaced to avoid steps in the seal level.
- If end pieces of seal or special nosings of solid rubber are needed, experience suggests that 'do-it-yourself' inserts will never be satisfactory – the manufacturer's specified items should be used.
- The use of temporary steel packers to build up wasted supports or wedges can be effective as a temporary measure, but such work should not be undertaken without taking into account the whole hatch cover system. Sometimes what seems like a helpful remedial measure can bring into play some other unrecognised defects.

The rule on 'quick fixes' is to try to avoid them by spotting trouble early. If a temporary repair becomes necessary for any reason, then the ideal solution is to call in a service engineer familiar with hatch cover repairs. If all this fails, then repairs using all of the information available in the supplier's operating and maintenance manual can be carried out by competent persons onboard – assuming of course that there is an adequate supply of spares onboard.

When to replace seals

Rubber seals on hatch covers can normally be expected to last about 4 or 5 years in normal service.

However, if the seal is over-compressed because of deterioration in the hatch cover steel work, or misalignment of the hatch cover panels, then the seal will become damaged. This damage may be tearing of the rubber seal or removal of the seal from its retaining channel, in which case it is easy to see that an immediate repair is required.

More commonly, the over-compression causes the elasticity of the seal to be lost resulting in a deep groove in the rubber known as 'permanent set'. It is quite easy to measure the depth of the permanent set using a ruler or a gauge. This should then be compared to the designed compression of the seal (to be found in the hatch cover operating and maintenance manual that will be onboard). The simple rule for replacement of the seal is:

When permanent set reaches half the design compression – replace the seal.

It is, of course, tempting to continue with the seals in poor condition, on the basis of cost saving. This is a false economy, as the relatively small cost of seal replacement is much more than offset by the costs of claims for damaged cargoes. Additionally, the presence of permanent set may be a symptom of other, more serious, problems with the hatch covers, particularly wastage of the steel support structures or misalignment. These need to be dealt with.



Permanent Set

Sealing tapes – to use or not to use?

The use of sealing tapes at the cross-joints of hatch covers is common, sometimes even being expressly called for by the shipper or charterer. On the face of it, this seems like a sensible additional precaution to enhance weathertightness. However, there are negative aspects to using hatch cover sealing tape, which include:

- it can lead to a false sense of security
- the tape can wash off in heavy seas, just when it is needed most
- the tape can obstruct drain holes trapping water in the cross-joint
- complete sealing may be difficult due to the presence of cross-joint cleats or other fittings
- the tape can cause accelerated corrosion and associated deterioration of the structure due to the removal of coatings.

Proprietary tape or other material should not be used between compression bars and rubber seals as an alternative to proper repairs.

It may be that rather than paying for expensive tape, the money could be better spent on maintenance of the rubber seals and associated steelwork.

Similarly, high-expansion foam is often used as a 'belt and braces' measure to achieve reliable weathertightness. This type of foam is hard to control in practice and can block drain holes and drain channels, such that water leaking in can find its way to the cargo rather than draining out as the system designers intended.

North of England policy is that the use of such tape or foam is acceptable as an additional precaution on well-maintained weathertight hatch covers, but is not acceptable as an alternative to proper permanent repairs.

A Guide to Good Practice

The Association is very grateful to David Byrne for writing this supplement.

The second edition of North of England's comprehensive loss-prevention guide entitled Hatch Cover Maintenance and Operation: A Guide to Good Practice, also written by David Byrne, will be published in April 2005.

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