Are your hatch covers weathertight?

Cargo damage due to wetting represents a significant percentage of the claims presented to Gard every year. One of the leading causes is defective hatch covers which in our experience remains a recurring problem. Many hatch cover related defects are also found during condition surveys carried out within the scope of our inspection program.

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Introduction

The purpose of this article is to increase awareness of the issue and provide guidance on the importance of correct maintenance and testing of the hatch covers. We will first touch upon some of the more frequently occurring problems with hatch cover systems. Then we will discuss the different methods of testing the weathertightness of hatch covers followed by the issues concerning the use of extra sealants and finally provide some recommendations to our members.

Common problems with hatch covers

*Experience from Gard's condition survey programme: *During P&I condition surveys of bulk carriers, Gard instructs the appointed surveyors to pay particular attention to the weather tightness of hatch covers and, in many cases, ultrasonic tests are also required to be carried out. Based on our experience, the following three items from the survey questionnaire result in most observations:

1. Are rubber gaskets in apparent satisfactory condition? Are any repairs correctly performed (paying particular attention to corner pieces)?

2. *Is the chain pull / hydraulic system in apparent satisfactory condition?

3. *Are hatch covers without any signs or remnants of Ramnek tape, foam, or use of other extra sealants?*

We will now look at some of these defects which we notice both in relation to the above-mentioned survey questions and from wet damage cargo claims. It must be stressed that below is not an exhaustive list of damages or defects.

Rubber packing: This is by far the most commonly noted defect. Whilst physical damage to packing rubbers, e.g. as a result from contact with stevedore's gear etc., is generally easily identified as damage during routine inspections, the equally important ageing and steady deterioration of packing rubbers, caused by abrasion and over compression can get overlooked.

Other practices impacting hatch covers' sealing and performance are inserting new rubber sections adjacent to old rubber, use of a backing strip on top of the sealing surface of a packing rubber, off-centre imprints, and short inserts to fill gaps.

It is also important to keep in mind the design compression of the rubber packing. This will be stated in the manufacturer's manual. Too little compression may create leaks when the ship is in motion, and over-compression will, within a short period of time, damage the rubber packing and affect the elastic and flexible properties of the rubber.

One of things that often gets overlooked is the permanent set or imprint on the rubber packings in excess of the limits mentioned by the manufacturer caused by over compression, over tightness of cleats or worn-out landing pads. This can adversely impact the resilience of the packing rubber. In general, the discard criteria for rubber packing is when the permanent set has exceeded 50% of the design compression, but reference should always be made to the manufacturer's manual.

Landing pads: Also known as support pads, chocks, resting pads, or bearing pads are often noted to be thinned down or wasted beyond the limits specified in the maker's manual. The pads are also noted to be missing sometimes. This can result in the following:

• Over compression of the rubber packing leading to deterioration.

• Steel to steel contact between coaming table and hatch cover side plating which can result in fretting damage; and

• Relative movement between the covers and coaming can be restricted during hull flexing in seaway.

Compression bars: These bars compress the rubber packing to provide weathertight sealing. Sometimes it is noted that the bar is wavy, bent, wasted or corroded thereby leading to an uneven or inadequate compression of the rubber packing.

Operating systems: There are a variety of hatch cover operating systems and each system has its peculiarities and areas prone to failure or damage. The systems most commonly found are hydraulic and chain drive systems.

• *Hydraulic systems:*
Overpainted or cracked hoses, leaks in the system (pipework, valves, actuating cylinders or motor), damaged hydraulic cylinders, impurities in the hydraulic oil and leaks from the jacking system due to lack of lubrication, and lack of maintenance or spares are defects commonly noted. Any defect in the hydraulic system can result in the hatch cover not closing properly.

• *Chain drive:*
This could either be electric, manual or even hydraulic. One of the defects we see often is that the chains are heavily corroded and wasted. The gypsy wheel assembly is another area which can be affected by corrosion.

Drain channel and valves: The drain channel is a crucial barrier to prevent water seeping into the hold. If the drain channel and associated non-return valves are clogged or not functioning as intended, then water will accumulate and ultimately spill over the drain channel and into the cargo hold. While this may not immediately affect the safety of the ship, it is generally enough to wet the cargo and cause substantial cargo claims. Some commonly noted defects in relation to the drain systems are:

• Drain pipe or valve cracked or holed. It has also been noted on a few occasions that the holes are covered by paint or masking tape;

• Flexible hoses attached to drain openings in the underside of the hatch coamings;

• Presence of debris, remnants of previous cargo and rust / scale in coaming drain channel blocking the flow of water to the drain valves; and

• Drain channel holed or corroded.

Securing devices: Cleats play an important role in holding the hatch covers in place when the ship is moving and flexing at sea. There are many different designs of securing systems available, such as quick acting cleats, wedge cleats, shoe type cleats and hydraulically operated cleats. Common observations are:

• Overtightening of cleats;

• Corroded or thinned down cleats;

• Damaged, cracked or dented cleats;

• Cleats not properly positioned;

• Damaged or missing washers; and

• In a few wet damage cargo claims the surveyors had highlighted that the cleats had come loose in heavy weather and this resulted in the hatch covers losing their weathertight integrity.

There is a common misconception that overtightening of cleats will help achieve better compression of the rubber packing. Such overtightening is in fact counterproductive and can lead to conditions such as:

• Restricting the flexibility of the hatch cover system, i.e. the relative movement between the hatches and coamings;

• Damage to the rubber packing because of over compression.

• Quicker wearing down of the landing pads; and

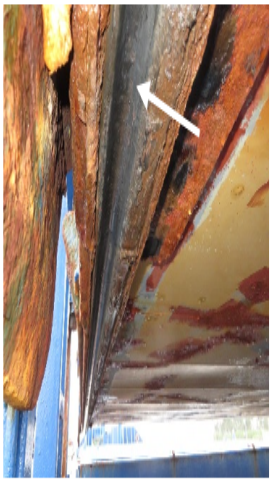
• Reducing the life of the rubber washers.

Other areas: It is worth highlighting that while the focus has to be on hatch cover systems, crew and managers should not overlook openings to the cargo holds such as the vents and booby / access hatches. Defects or damage to their packing or securing system can lead to water ingress into the holds. It is also important that maintenance checks in the planned maintenance system (PMS) are comprehensive enough to cover all the requirements of the manufacturer. Maintenance checks should be recorded because without evidence that checks have been performed according to the manufacturer's instructions, it can be difficult for the owner to show that due diligence had been exercised should there be a cargo claim.

Some images of defects related to hatch covers from our condition surveys:

Gaps between insert repairs

Deteriorated rubber packing near the edges



Permanent set in the rubber packing

Testing for weathertightness of hatches

The three most commonly used testing methods are the chalk test, hose test and the ultrasonic test. Ultrasonic testing is considered the preferred way of testing hatch covers from a loss prevention point of view when compared to other two for reasons discussed below.

Chalk test: It is the most rudimentary of the three tests and checks only for contact between the rubber packing and compression bar but gives no indication on the compression.

Hose test: It involves directing water under pressure (typically 2-3 kg/cm2) from a hose at the hatch cover joints. Any ingress of water is an indication of defective sealing arrangements. The conditions to be met for a hose test are listed in IACS document 'Rec 14 Hatch cover securing and tightness' . If water enters the hold during a test whilst the ship is in static condition, it can be expected that larger volumes of water will be able to enter the holds when the ship is bending and flexing in a seaway dynamic condition. Some of the shortcomings with such a test are:

• The water jet from the hoses sometimes may not be powerful enough to penetrate defective areas;

• The person testing may not cover all the joints;

• Does not provide information on the degree of compression of the packing rubber; and

• Cannot be carried out if water sensitive cargo is in the holds, or in sub-zero temperatures.

Ultrasonic test (UST): It involves placing a sound emitter inside the cargo hold and a trained operator then checks for leakages by comparing the 'open hatch value' (the value that is measured with open holds and reflects the highest ultrasound level that can be measured on a particular hold/hatch) and the readings obtained with the hatches / other openings closed. Any reading greater than 10% of the open hatch value (or as indicated by the equipment manufacturer) is indicative of leaking hatch covers. Some of the main advantages with UST are:

• A weather tightness test with ultrasonic equipment can be carried out with cargo in the holds, and regardless of the prevailing atmospheric temperature;

• Position of leak can be identified accurately; and

• Gives an indication about compression.

Whilst this is the most accurate way to test the weathertightness of the hatch cover system, there are a few things to keep in mind when doing this test. Some of which are:

• Only a certified and trained operator should be engaged. Ship's crew is normally not competent to conduct such testing.

• The equipment must be type approved and be properly calibrated.

Use of sealing tape and foam

From a P&I Club's perspective, the use of ramnek /sealing tape and foam is generally not recommended as properly maintained hatch covers are designed to withstand the rigours of sea. Any evidence of ramnek tape or foam can be construed as an indication of defective hatch covers by the cargo receivers to support a cargo claim for wet cargo damage. If a charterer however requires the use of sealing tape or foam, it is recommended that owners have the hatch covers tested (preferably by ultrasonic test) and inspected by an independent surveyor to confirm that the hatch covers are weathertight prior departing the load port. The test and inspection results should be properly documented to show that the Ramnek tape or expansion foam was only used as an extra precaution upon charterer's request.

Ramnek tape or foam must be properly applied in order to be effective. Some things to watch out for are:

• If the hatch covers are inadvertently opened before the expansion foam is removed, foam particles can fall into the cargo hold and cause contamination.

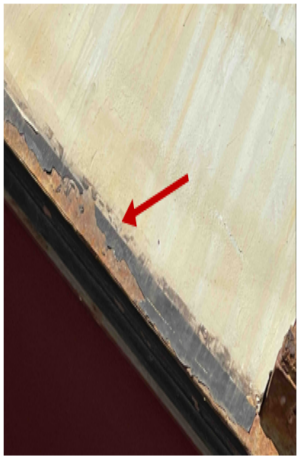
• Foam can also block the drain channels and inter-panel void spaces and not allow the water to drain out.

• Ramnek tape and expansion foam are also difficult to remove and may prevent covers from closing properly after completion of the voyage in question.

• When removing Ramnek tape the paint in way of the hatch cover edges will be damaged and can lead to corrosion.

• Expansion foam could cause physical damage to the rubber packing.

Ramnek tape



Evidence of ramnek tape form previous voyages

Foam between hatch covers

Recommendations

To comply with the requirements in the Load Line Convention and to ensure that the ship is safe, cargo is delivered in the same condition as loaded, and that due diligence can be demonstrated in the event of a cargo claim, the following are our recommendations for owners, managers and their crew to consider:

• **Maintenance and record-keeping**
Maintenance and repairs for the hatch cover system and associated components must be in line with manufacturer's guidelines and only original spare parts should be used.
All inspections, maintenance and repair carried out on any component should be recorded preferably along with images or videos as evidence for the work done. In case of a wet damage cargo claim, such evidence can help protect owners.
Sufficient spares should be carried onboard to replace defective or damaged parts. Identification of such has to be based on a risk analysis done by the owner/ manager and the crew. Their experience will play a key part here.

• **Operation**
Ship specific procedures should be in place to guide the crew on things such as the operation and tightening of the hatch covers.

• **Testing**
Regular testing of the hatch covers is advisable. The frequency should be defined in the safety management procedures.

• **Use of extra sealants**
When using sealing tapes and foams, it is advised that weathertightness of hatch covers is first ensured without the use of extra sealants.

Links to reference documents:

• IACS document on Hatch cover securing and tightness (Rec 14)

• IACS requirements for service suppliers engaged in tightness testing of hatch covers using ultrasonic equipment (Z17)