

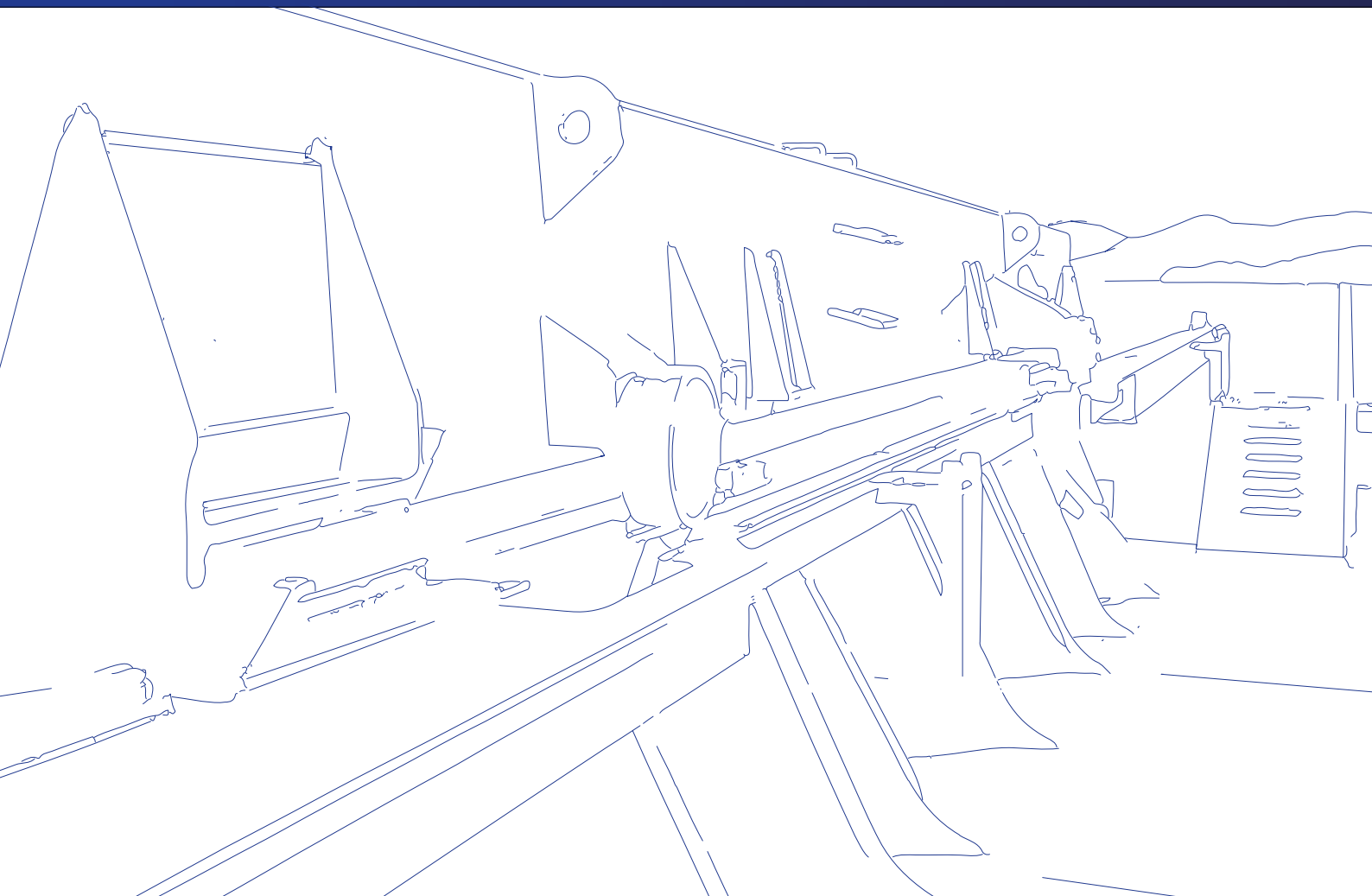


**Standard
Club**

By your side

A Master's Guide to:

Hatch cover maintenance



About this Guide

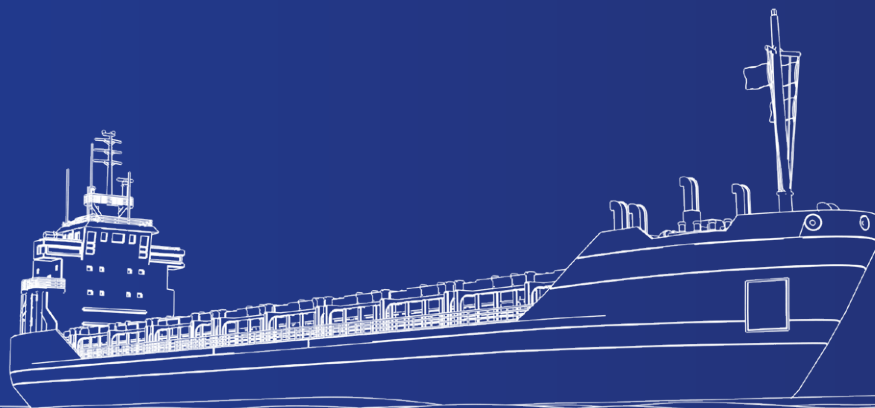
The purpose of this guide is to explain the key issues of hatch cover security and to steer mariners towards active maintenance. Ensuring hatch covers are well maintained reduces the number and cost of cargo wet damage claims.

As part of the Loss Prevention department's continuing commitment to safety at sea, a number of 'Master's Guides' have been produced. They focus on delivering best practice advice on key areas of vessel operations to avert avoidable claims and prevent accidents, casualties and incidents at sea. These guides were created by harnessing the professional knowledge of members in the Loss Prevention team who have served at sea.

A Master's Guide to Hatch cover maintenance is an original Standard Club document, first produced in 2002. This revised version provides further information about the type of hatch covers commonly used on merchant vessels, emphasizes the importance of vessel's cargoworthiness and shares loss prevention advice on preventing cargo damage resulting from hatch cover defects. Appendices are included which provide checklists for routine operation, inspections, repair and maintenance.

This guide sets out to promote industry best practice and was written in collaboration with Lloyd's Register, one of the world's leading providers of professional services for engineering and technology.

Captain Yves Vandeborn, Director of Loss Prevention



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01. Introduction

The most common cause of cargo wet damage claims on dry cargo ships is attributed to leaking hatch covers.

Hatches leak for a variety of reasons, but mainly because of poor maintenance or failure to close them properly. Leaking or badly maintained hatch covers can lead to more serious consequences than wet cargo, including flooding, accelerated corrosion or even loss of the ship. It is crucial for safety at sea and protection of the environment to maintain hatch cover weathertightness and strength. These issues are addressed in the guide.

The requirements for hatch covers are laid out in the International Convention on Load Lines, and the structural strength requirements are laid down in the SOLAS Convention and Classification Rules. Compliance with these requirements is confirmed during periodical ship surveys but may also be confirmed at any time by Port State Control Officers during an intervention.

There is a common misconception and a degree of confusion throughout the industry as to whether hatches are constructed to be watertight or weathertight. A watertight closure is designed to withstand water pressure from both sides of the structure, while weathertight means that regardless of the sea conditions, water will not penetrate into the ship.

Hatch covers are constructed to be weathertight, which means that, in any transient condition, water shall not penetrate through the covers or the double drainage system. However, it is apparent that minor leakage into a cargo hold during a hatch cover test is often erroneously considered to

be within a weathertight standard; in practice, no leakage is the standard for weathertightness. For this reason, we include guidance on procedures for conducting leak detection tests on hatch covers.

Our research shows that many mariners consider hatches to be robust, monolithic structures and thereby fail to appreciate the small tolerances on panel alignment and gasket compression. In fact, hatch covers are complex, precision-made structures that need to be handled with care.

For example, 4mm of wear on the steel-to-steel contact is enough to damage the rubber sealing gaskets beyond repair and a 5mm sag along the cross joint can cause a large gap between the compression bar and the gasket.

The club's condition surveys and claims analysis indicate that, in many cases, hatch cover maintenance is not considered to be important and, when maintenance is carried out, it is often not done in line with the manufacturers' guidance or industry best practice.

Repairs are often only carried out after a ship has failed a hatch cover tightness test at the load port. In such cases, maintenance is often done in haste, in an unplanned manner and without proper care. Proper maintenance and repair requires a systematic approach, but often crew cut corners in an effort to pass the tightness test as soon as possible, without giving proper regard to the quality of repairs.

02. Hatch covers and their function

Hatch covers on bulk carriers have two basic functions: in open position, they provide access to the holds for loading/discharging cargo; and in closed position, they prevent water ingress by sealing the hatchway in a weathertight condition, so that there is no leakage into the cargo hold in any sea condition.

Hatch cover construction

Typically, hatch covers are lightweight steel grillages, either of open or closed box-type construction. Modern design methods using finite element technology enable more efficient material distribution, which results in lighter (thinner) structures. Construction from high-tensile steel results in even thinner plate being used. For this reason, these lightweight structures must be 'handled with care'. Prevention of corrosion is essential as safety margins are finite.



Figure 1: Hatch cover construction

Hatch cover function

Hatch covers provide a primary structural and weathertight barrier to prevent water ingress into cargo holds. Although hatch covers might look big and heavy, they are sensitive to misalignment.

During the life of the ship, hatch covers are subjected to the various forces caused by the ship's movement, wave accelerations, and load and stress factors (such as racking and sheering forces, bending moments and hogging/sagging). Rigorous inspection, regular maintenance and prompt repair of damaged covers, including securing and supports, are essential to ensure they:

- maintain sufficient strength to resist green seas in extreme weather
- maintain a barrier against ingress of water during normal seagoing weather conditions.

Failure to maintain hatch covers correctly can lead to physical loss of a cover in extreme weather as well as hold flooding and possible foundering. Minor leakages can cause cargo damage and, if they occur over a prolonged period, damage to the ship's internal structure. Long-term structural decline can lead to structural collapse and total loss.

03. Types of hatch covers

Folding hatch covers

Folding hatch covers are commonly used on general cargo ships, multipurpose vessels or smaller bulk carriers, such as handysize, handymax and supramax vessel types. They consist of two (or more) panels, which are connected by hinges to form a folding pair. In many cases, the hatch cover comprises two folding pairs. One pair is stowed at the aft end of the hatch and the other pair is stowed at the forward end. The folding pair is operated by hydraulic cylinders acting directly on the end hinge arms, which are connected at stools on the deck. When the cylinders push the end panel up from the closed position, the cover folds and the second panel, fitted with wheels, rolls on rails to a stowage position. The panels are usually secured in the open position by semi-automatic locking devices interacting with the wheel arms.



Figure 2: Folding hatch cover



Figure 3: Multi-folding hatch covers

Side-rolling hatch covers

Side-rolling hatch covers are commonly used on the large bulk carriers, such as panamax and capesize vessel types. They consist of two panels per hatch, with each rolling sideways on a pair of transverse ramps. This minimises the obstacles to be considered by the shore crane or other loading/unloading device operator when loading and unloading.

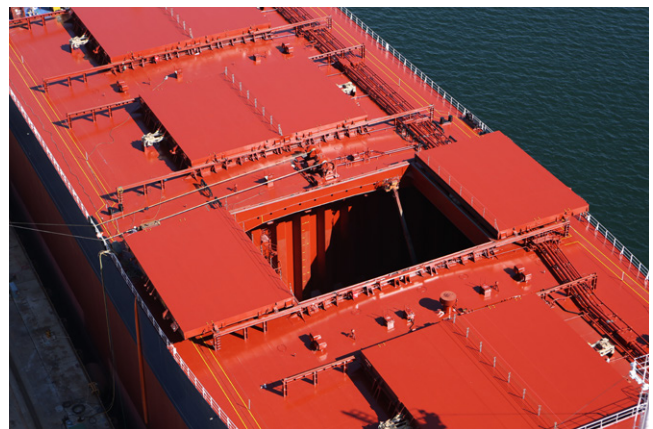


Figure 4: Side-rolling hatch covers

Lift-away hatch covers

Lift-away hatch covers are commonly used on containerships and multipurpose vessels to facilitate quick and flexible cargo-handling operations. Lift-away panels are handled with a spreader using either shoreside container cranes or the vessel's own cranes. The panels can be stacked together on the quay and/or on the ship's deck.



Figure 5: Lift-away hatch cover



Figure 6: Lift-away (pontoon) hatches

Single-flap hatch covers

This is a hydraulically operated single-flap cover, which can be supplied to a length of more than 40 feet. The design uses a short lever arm together with a powerful hydraulic system for safe operation. Two trailing arms secure the hatch cover in its opened position. Two single-flap hatch covers (one forward, one aft) can be supplied to accommodate long hatches.



Figure 7: Single-flap hatch cover

Piggy-back hatch covers

Piggy-back hatch covers are used when the available deck space is insufficient to accommodate folding or rolling hatch covers. This system comprises two panels, with one panel being raised high enough for the other to roll underneath and to support the lifted panel on to its 'back'. Both panels can then be rolled back and forth.



Figure 8: Piggy-back hatch covers

Stacking hatch covers

Stacking hatch covers for weather decks are usually all hydraulic in operation and the panels move into stowage or closure positions in a specific sequence. A set will comprise several panels – each of which is fitted with a towing device that can be connected to move the panels to and from a stacking position by a continuous chain drive mechanism. The chain-driven stacking hatch cover system employs the same hoisting principles as the piggy-back system.



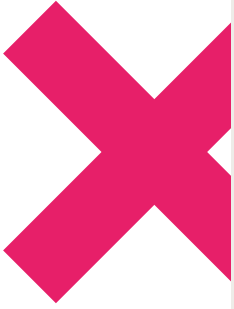
Figure 9: Stacking hatch covers

04. Basic advice

The following best practice procedures and advice will help to keep your ship's hatch covers in good condition.

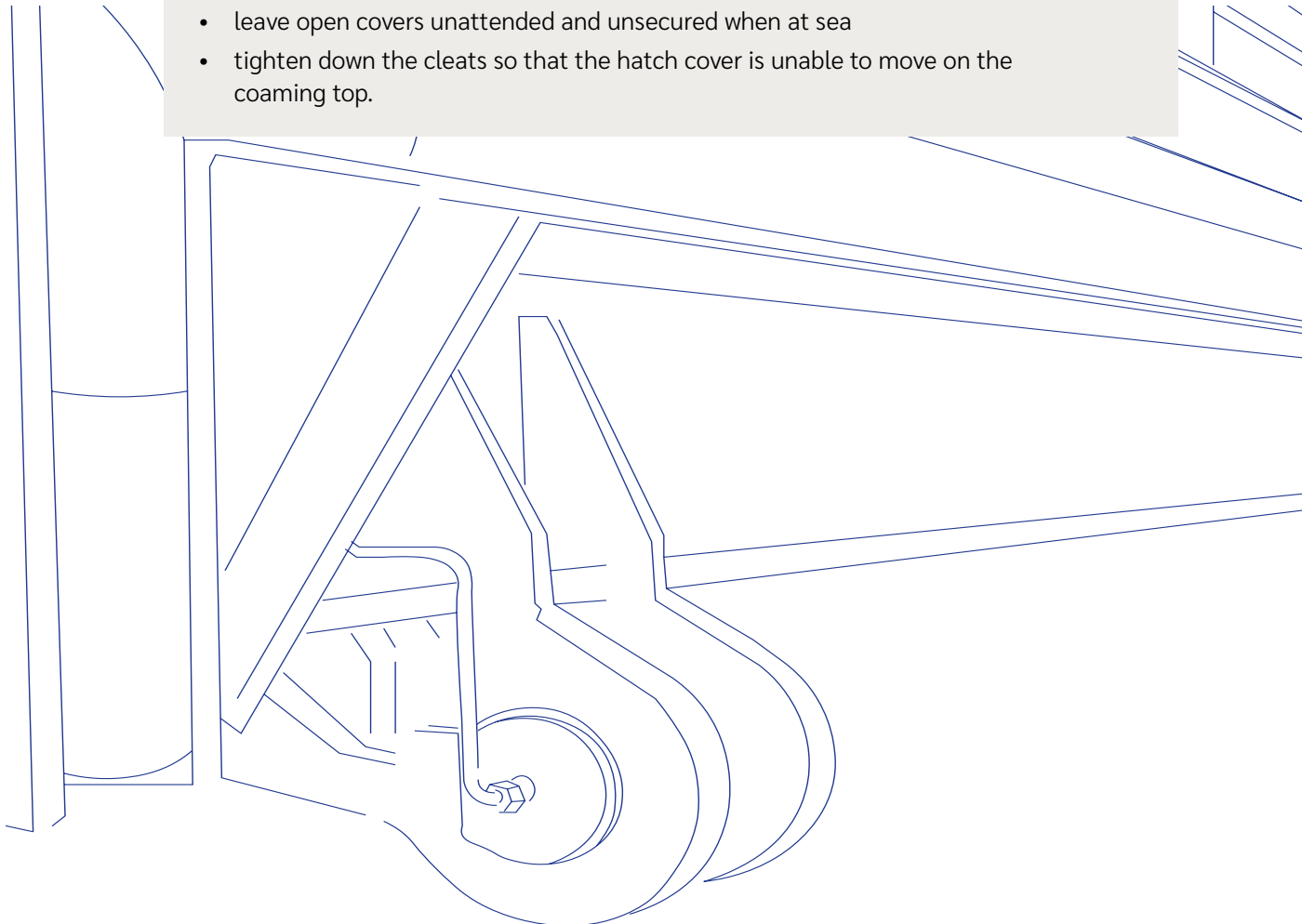
Always:

- carry out regular examinations of the hatch covers, internal structure (where possible) and coamings to identify:
 - general levels of corrosion (check with your classification society for corrosion allowances)
 - localised corrosion at welded connections (grooving)
 - cracks in joints and weld metal
 - permanent distortion of plating and stiffeners
 - misalignment between panels
- call a class surveyor and carry out repairs as soon as possible when there are:
 - indications of excessive corrosion, eg holes or local buckling of the top plate
 - cracks in main structural joints
 - areas of significant indentation, other than localised mechanical damage
 - areas of distortion or buckling on the top plate, side and end plates, and internal structure
- be particularly vigilant after heavy weather
- rectify any steel-to-steel fault before renewing rubber packing. If steel-to-steel contact points are defective, expensive rubber packing will be ruined after only a few months of use. Refer to the manufacturer's manual for the design and wear limits/tolerances
- replace missing or damaged hatch gaskets (rubber packing) immediately. The minimum length of replaced gasket should be one metre
- keep hatch coaming tops clean and the double drainage channels free of obstructions. (Open hatch covers to clean coaming tops and the double drainage channels after loading bulk cargo through grain or cement ports)
- keep cleats, wedges and locking devices in serviceable condition and correctly adjusted
- keep hauling wires and chains adjusted correctly
- attach locking pins and chains to open doors and hatches
- keep wheels, cleats, hinge pins, haul wires and chain tension equipment well-greased
- test hydraulic oil regularly for contamination and deterioration
- keep hydraulic systems oil-tight
- ensure the oil tank of the hydraulic system is kept filled to the operating level and with the correct oil
- clean up oil spills. If the leak cannot be stopped immediately, construct a save-all to contain the oil and empty it regularly
- engage tween deck hatch cover cleats when the panels are closed (where applicable)
- give notice that maintenance is being performed so that no one tries to open/close the hatch
- remember that continuing and regular maintenance of hatches is more effective and less expensive than sporadic inspections and major repairs.



Never:

- treat temporary repairs as if these were permanent. The strength of the cover, and ultimately the ship, will depend on the quality of the repairs carried out
- ignore serious corrosion, cracking or distortion in the covers and supports. These are signs of weakness and are potentially hazardous
- allow grooves to form in the coaming top, especially where the hatch side or end panel rests when the hatch is closed
- apply petroleum-based grease or paint to rubber packing
- remove the rubber ball from a non-return drain valve
- use anything other than the recommended hydraulic oil
- leave cleats unfastened when proceeding to sea
- attempt to open or close any hatch that has a load or cargo on it, or has any cleats or wedges engaged
- open hatch covers at sea unless absolutely essential
- leave open covers unattended and unsecured when at sea
- tighten down the cleats so that the hatch cover is unable to move on the coaming top.



Basic advice continued

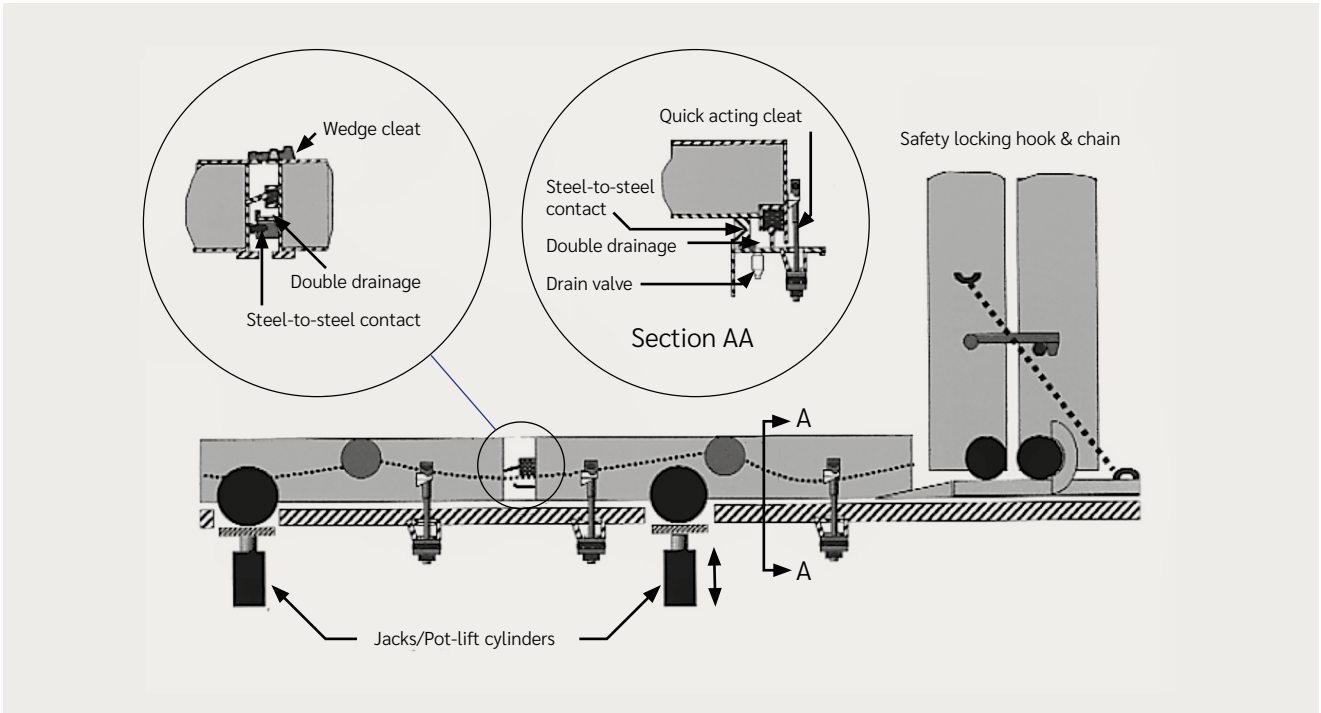


Figure 10: Typical arrangement of a multi-panel hatch cover

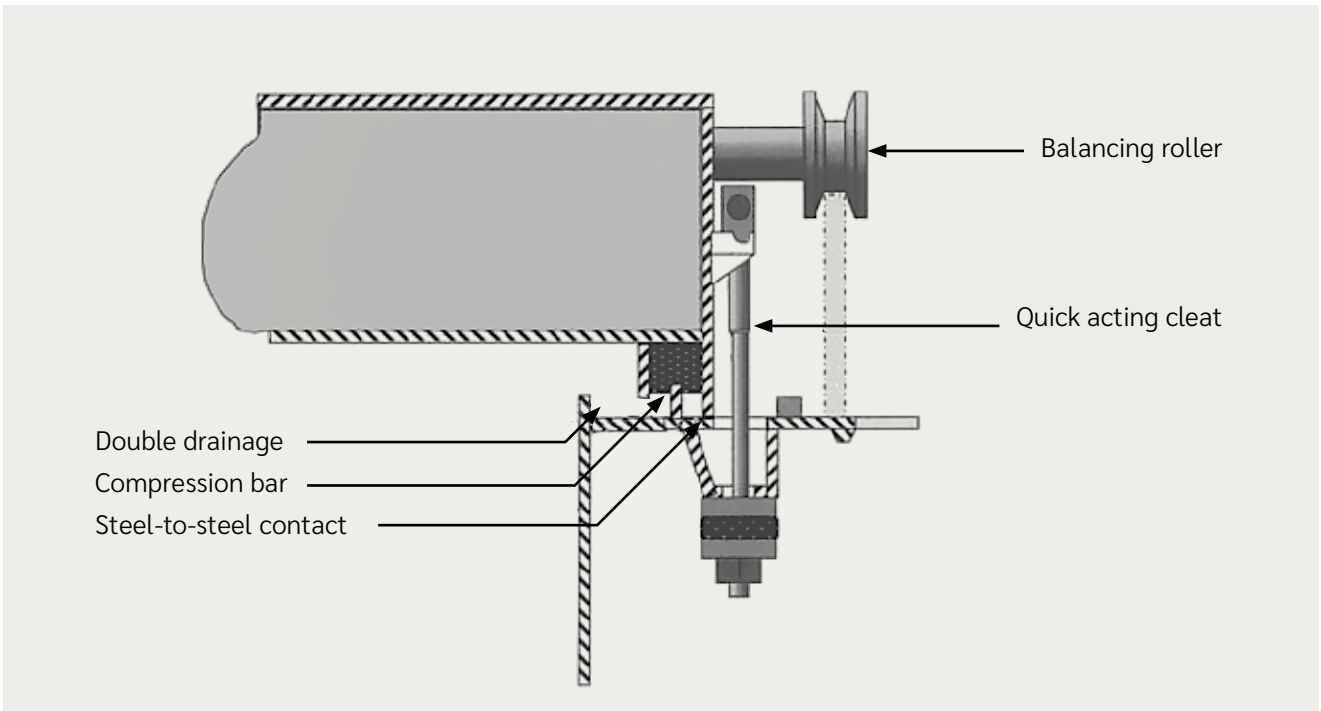


Figure 11: The double drainage channel and 'steel-to-steel' contacts are shown

05. Common false beliefs about hatch covers

- **Hatch covers are non load-bearing – they are only there to keep the water out.**

Hatch covers can be subjected to very high-pressure loadings during heavy weather. This in turn induces significant shock loadings and in-plane stresses in the component plating, girders and stiffeners.

- **Leakage is an inconvenience resulting in cargo wetting.**

Leakage can, where unchecked, cause serious flooding and, ultimately, endanger the ship and its personnel.

- **Internal cracking at joints, corrosion/cracking in welding and distortion of plating do not affect the hatch cover function.**

Such problems change the way a structure works and can significantly reduce the load carrying capacity.

- **Hatch covers constructed of high-tensile steel are more robust than those made from mild steel.**

This is not the case. A cover constructed from high-tensile steel will normally comprise thinner plating than one constructed from mild steel.

- **It is the rubber seal that keeps the water out of the cargo.**

The double drainage system is as important in keeping water away from cargo.

- **Renewing a worn rubber seal is all that is needed to keep a hatch weathertight.**

Worn rubber is usually the result of worn steel-to-steel contact surfaces or a deformed structure. Rubber renewal alone is futile unless the steel-to-steel contact surface is repaired.

- **The hatch cover side plate when closed should rest on the coaming top.**

If the weight of a hatch panel is sufficient to cause distortion of its side plate (hatch skirt), then landing pads should be fitted to the panel to transfer the weight evenly across the coaming top.

- **Hatch covers will always leak in heavy weather.**

Hatch covers are designed to withstand the rigours of the sea. Provided the cleats are correctly adjusted, the hatch gaskets are in good condition and the construction material is sound, then hatch covers should not leak, regardless of the weather.

- **Screwing cleats down hard will ensure weathertightness.**

No amount of tightening of cleats beyond their correct position will improve hatch cover weathertightness. Hatch cover manufacturers usually test for weathertightness without engaging cleats. The weight of a hatch is sufficient to create the required gasket compression.

The primary function of the cleats is to hold the panels down when the ship is at sea. However, as there will be relative movement between the panels and coaming, cleats should also cater for some movement. Excessive tightening of cleats will make the system too rigid relative to ship structural movement – consequently damaging the cleats and the rubber packing.



Figure 12: Damaged cleat

- **The use of hatch cover tape and foam fillers will ensure weathertightness.**

The use of sealing tape and/or foam fillers gives a false sense of security. In bad weather, they can (and do) wash off. Hence, their use should never be solely relied upon to prevent water ingress.

Common false beliefs about hatch covers continued

- **Drain valves are not important; therefore, it does not matter if they are blocked.**

Drain valves are an essential feature of the double drainage system as they allow water that has penetrated the hatch gasket (rubber packing) to drain away. If the drainage system or valve is blocked or closed, water will spill from the drainage channel into the cargo hold.



Figure 13: Blocked drain channel

- **When carrying a cargo on top of a hatch cover, it is not necessary to fasten cleats.**

Cleats prevent excessive movement of the hatch cover as a ship bends and flexes in a seaway. They allow limited movement to ensure correct contact between the cover and its coaming, preventing hatch cover damage. Cargo loaded on the hatch does not secure the hatch cover to its coaming.

- **Tween deck cleats are not essential because the tween deck covers are not weathertight.**

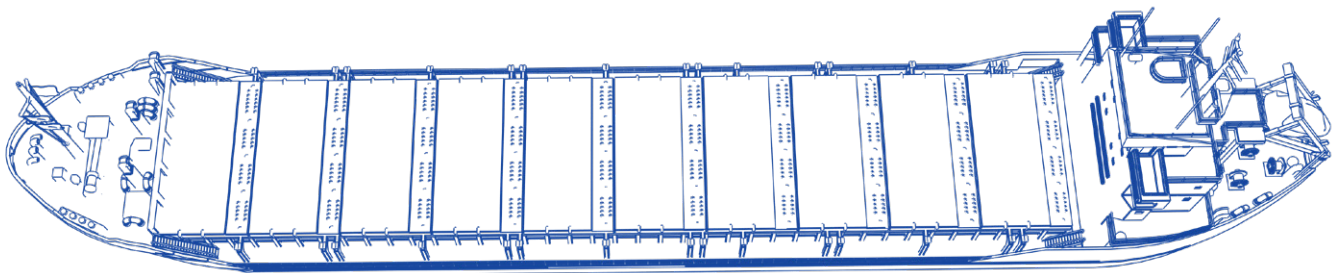
Cleats on tween deck covers should always be engaged when the covers are closed. This is because they stop tween deck panels from jumping when a ship pitches or slams, ensuring maintenance of tween deck strength. When cargo is stowed on a tween deck panel, the panel must be secured to the ship's structure.



Figure 14: Tween deck panel

- **Any rubber gasket can be used, provided the gasket fits the channel.**

No, only use the gasket type recommended by the hatch cover manufacturer.



06. Leakage problems

Most leakage problems occur because of poor maintenance. Although robust, hatch covers will leak if compression surfaces are not aligned correctly, if gaskets are damaged or worn, if there are cracks or holes in the plating, or if there is permanent overall distortion of the covers.

The quality of sealing is affected by lack of alignment and poor gasket compression. When hatch covers are opened at the end of an ocean voyage, look

for signs of leakage such as rust staining or drip marks. Regular adjustment and repair by ship's staff will reduce the overall cost of maintenance.

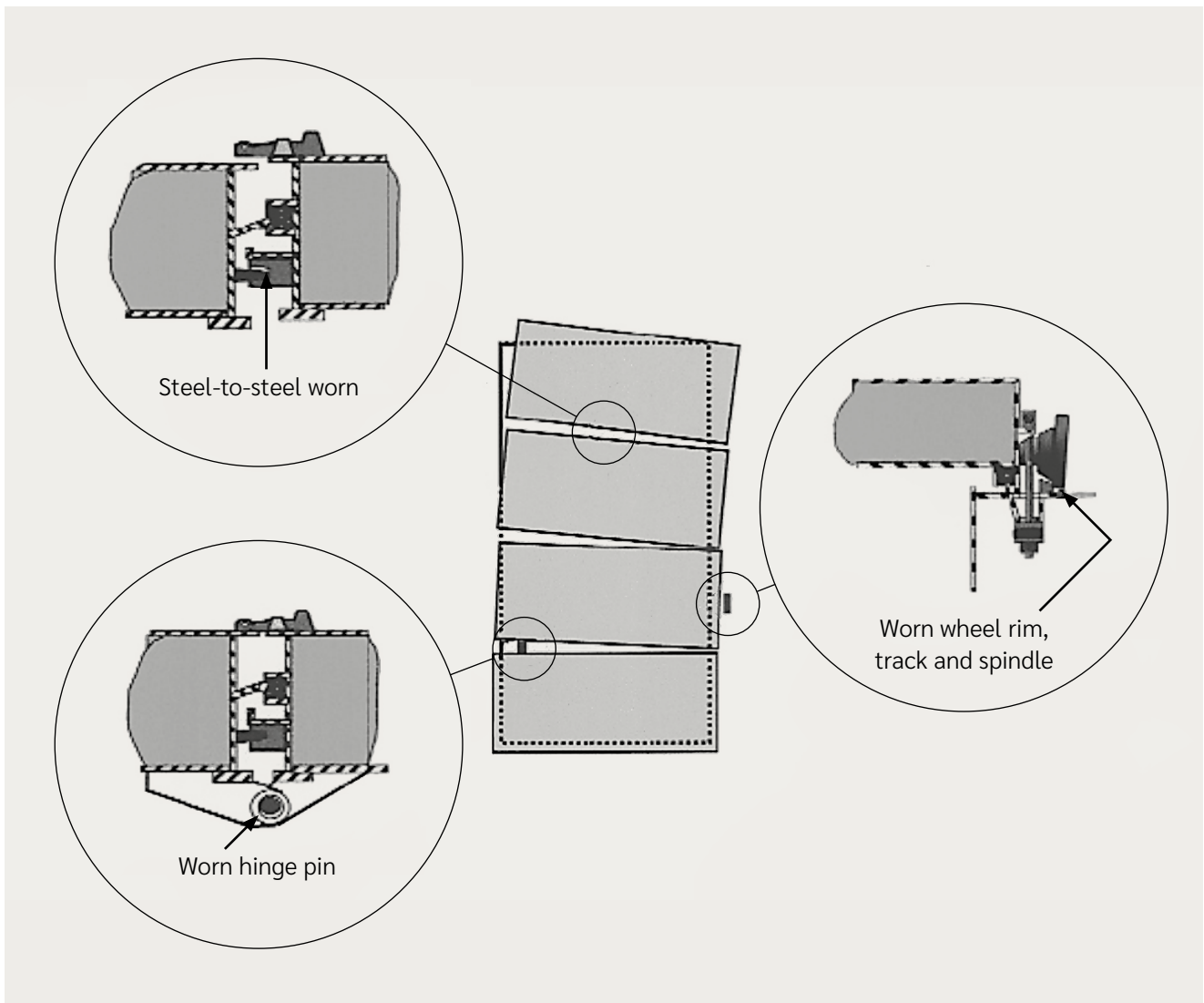


Figure 15: Typical defects that will cause poor sealing

07. Use of sealing tape and foam fillers

The use of sealing tape and/or high expansion foam fillers could be considered as an extra precaution, but these are not substitutes for having well-maintained hatch covers.

Hatch cover sealing tape is a short-term temporary measure that is used to stop water from entering cross or side joints. However, the prolonged use of tape increases corrosion in the cross joint and side plate.

High-expansion foam fillers are used to fill the air space that is formed along the cross joint of two closed panels. In heavy weather, foam fillers could be washed away. Hence, their use should never be solely relied upon to prevent water ingress.

The use of sealing tape and foam fillers should be limited to:

- emergency use (after commencement of voyage), when hatches are known or thought to be leaking and there is insufficient time or opportunity to complete satisfactory permanent repairs
- charterers' requirement. Charterers may require owners to additionally apply sealing tape when highly water-sensitive cargoes are carried
- fumigation. Fumigation tape is usually applied to hatch covers during fumigation. The tape is not heavy duty and should be removed when fumigation has finished.

Members should avoid using sealing tape and/or high-expansion foam fillers as these give a false sense of security and can be easily washed away by waves. The club does not recommend using sealing tape or foam fillers as a permanent means of achieving weathertightness of hatch covers.

Further, the usage of sealing tape and/or high-expansion foam fillers may indicate that the ship is aware of the potential leakage of the hatch covers. If the cargo receivers are presented with such an evidence, shipowners would be in a weak and disadvantageous position in cargo claim negotiations. The hatch covers should be well maintained and their weathertightness should be ensured without additional measures.



Figure 16: Hatch cover sealing tape

08. Leak detection tests

Testing of hatch cover weathertightness can be performed by different methods. The two most common leak detection tests are the water hose test and the ultrasonic test. Ultrasonic testing is the preferred method because areas of inadequate hatch sealing are accurately located.

There are other methods such as light test, chalk test, air test and putty or moulding test, but these cannot generate measurable results. Light testing is potentially dangerous because personnel are in a closed, dark hold looking for light infiltration between panels, while chalk testing gives only an indication of poor compression and potential leaks. Chalk testing is not a leak detection test.

Chalk testing

When performing a chalk test, the top edge of every compression bar is covered with chalk. Hatches are then fully closed and reopened. The rubber packing is examined for a chalk mark, which should run continuously along the packing's centre. Gaps in the chalk mark indicate lack of compression. Chalk testing merely indicates whether hatch panels are aligned and compression is achieved. It does not show whether compression is adequate and, therefore, it is not a test for weathertightness.



Figure 17: Chalk test

Water hose leak detection test

Water hose tests are commonly used to determine hatch cover leaks. The general procedure for hose testing is to apply a powerful jet of water from a 20-50mm diameter hose fitted with a 12mm diameter nozzle held at a distance of 1-1.5 metres from a hatch joint, moving along the joint at a speed of 1 metre every 2 seconds. The pressure in the hose nozzle should be maintained at not less than 2.0 bar during the test.

The drawbacks of hose testing are:

- the hold needs to be empty
- it cannot be performed in sub-zero conditions
- it causes large amounts of water to be washed onto the deck and into sea (potentially causing pollution)
- the test cannot pinpoint leaks on the cross joint or side joint accurately
- two people are needed to supervise the test. Care should be taken to avoid excessive nozzle back-pressure.



Figure 18: Water hose leak detection test

Leak detection tests continued

Ultrasonic leak detection test

Ultrasonic leak detection is the best way to generate measurable and reliable results, as it accurately locates potential points of leakage. This is necessary to determine whether the hatch covers are in an acceptable condition.

The International Association of Classification Societies (IACS) has developed standards and criteria under IACS UR Z17 'Procedural Requirements for Service Suppliers' for firms engaged in ultrasonic testing. This ensures that service suppliers engaged to support surveyors in the checking of hatch covers for class and statutory purposes are familiar with the theory of ultrasound, and have practical testing experience and basic knowledge of hatch-cover design, maintenance and repairs.

Ultrasonic leak detection tests should be carried out by approved service suppliers. The assigned operator(s) must present their service supplier approval certificate and equipment calibration certificates.

The test involves closing and securing the hatches, and placing an electronic signal generator inside the cargo hold. A sensor is then passed around the outside of all compression joints. Readings taken by the sensor indicate points of low compression or potential points of leakage.

Prior to the closed hatch test, an Open Hatch Value (OHV) for ultrasonic reception should be established, with the hatch covers in the open position. The acceptable range of leakage is less than 10% of the OHV. During the closed hatch test, any anomalies registering greater than 10% of the OHV indicate potential leakage, which should be examined further.

Ultrasonic testing overcomes most of the limitations associated with hose testing and can be carried out when holds are loaded.

The drawbacks of ultrasonic leak detection tests are:

- the equipment requires an experienced and specialist operator to interpret the readings
- the equipment requires regular calibration
- the equipment is not normally part of the ship's equipment.

It has been noted that abundant quantities of Vaseline or grease are often applied to the packing rubbers and/or compression bars in order to pass the weathertightness test and satisfy (actually mislead) the attending surveyor, so that the order to begin loading can be given without any further delay. This entails a big risk as hatch covers treated and prepared in such a way might pass a test in port but will allow water entry when at sea. In such cases, although the ship passed a hatch test whilst in port, the cargo is frequently delivered in the discharge port with wet damage.

Whenever a substantial claim is filed against the ship, surveyors will be instructed to attend on board and carry out an investigation into the cause of the damage. This typically reveals that quick or improper temporary repairs were carried out in the load port, which were not sufficient to withstand the rigours of an ocean voyage. Moreover, these types of improper or quick repairs raise another important issue, namely that of due diligence.

Under the due diligence principle, owners are required to carry out a reasonable inspection to ensure that the hatch covers are in good condition. If a defect is found during this inspection, repairs should be carried out in line with industry good practice in order to restore the condition of the hatch covers.

Whilst hose tests give an idea of the physical contact between a packing rubber and its compression bar/mating surface, ultrasonic tests give an idea of areas where the compression of the sealing system is compromised. Contact and compression are two different things; consequently, the test results of hose tests and ultrasonic tests cannot be compared in practice.

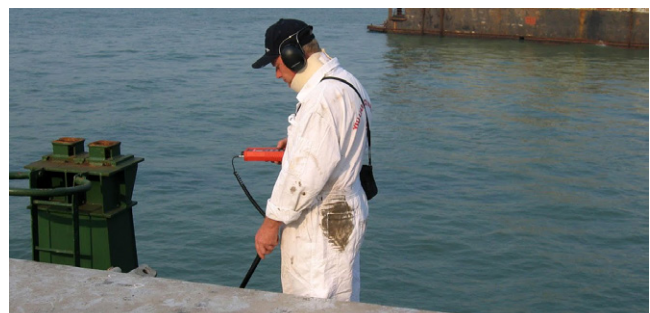


Figure 19: Ultrasonic leak detection test

09. Monitoring and inspection

Hatch covers and their fittings should be inspected at the end of every cargo voyage and all findings should be recorded. The IMO resolution [MSC.169\(79\)](#) list a number of hatch cover items that should be inspected on each voyage cycle. As certain items can be inspected only while the covers are open or semi-open, eg the sealing and draining arrangements, other items may be inspected during the voyage to reduce interference with cargo operations as far as possible.

A hatch cover inspection and maintenance routine that fits chronologically into the hull inspection and maintenance plan should be implemented. Inspections should be planned and held in time for repairs to be completed before the next cargo voyage. Cargo spaces should be emptied of all cargo and combustible material if welding and burning torches are used. The checklist in Appendix 2 can be followed.

The overall objective is to implement an efficient inspection and maintenance routine that is cost-effective and allows the crew to conduct a thorough examination rather than just ticking a check box due to time constraints.

Inspect and check

- Hatch condition. Covers and coamings should be well painted and free from significant corrosion, cracks and distortion. During an inspection look for:
 - holes and permanent distortion in the plating
 - distortion of beams and/or stiffeners on the underside of the top plate
 - corrosion around the welded connections of beams or stiffeners
 - cracking of connecting joints and welds.
- Hatch movement. This should be smooth. If violent movement is observed, investigate and remove the cause.
- Towing and backhaul wires. These should be free of kinks or broken strands. Repair or replace damaged or worn wires. Use extreme care when handling wires to avoid injury.
- Hydraulic system. Check for leakage.

- Hinge pins. Look for wear, particularly at cross joints and hydraulic cylinders. Worn hinge pins can cause hatches to slew and misalign at the cross joint(s). Misaligned hatch panels will leak.
- Drive chain tensioners. Check their condition and adjustment.
- Cleats and wedges. Check for physical damage, corrosion and tension when locked.



Figure 20: Inspect condition of cleats and panel for distortion

Drive chains – check their length

Drive chains and associated equipment are fitted in pairs, opposite one another. The side towing chains, sprockets and hydraulic cylinders on opposite sides should match. Adjust the tension of chains between panels so that the chains on both sides are exactly the same length. Do this by removing or adding chain links. If the entire length of chain needs to be replaced, then replace the chains on both sides at the same time. Always consult the hatch cover manufacturer for details of chain length. As a rule, chain sag, measured from the assumed horizontal at mid-point along the chain, should be a fist wide.

Monitoring and inspection continued



Figure 21: Check chain length

Steel landing pads – check for wear

Worn landing pads will damage hatch gaskets and cause leakage. When newly fitted and closed in the sea position, the top plates of adjacent hatch panels should be level. Any deviation from level is an indication of landing pad wear or permanent distortion. If noted, investigate fully and repair immediately.



Figure 22: Landing pads – check if they are worn down

End stop pads – check for damage

End stop pads prevent hatch panels from overrunning when hatches are fully open. Look for physical damage.

Hatch wheels – check for alignment

Hatch wheels should align squarely with the hatch trackway. If the wheel axle is worn, the wheel will loll. If the wheel lolls, repair it immediately.



Figure 23: Hatch wheels – check for alignment

Rubber seals – check for elasticity, mechanical damage and permanent deformation

When hatches are opened, rubber seals should regain their original shape. If they do not, check for ageing. Permanent deformation should not exceed 50% of the design compression.



Design compression = 25% of thickness = 10mm
Discard criteria = 50% of design compression = 5mm

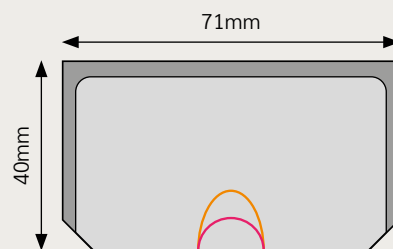


Figure 24 (a and b): Rubber packing – check damage and deformation

Locking devices and hydraulic cut-outs – check that they operate

Locking devices are often pins or hooks, these should engage when the hatch is open. Look for physical damage, rusting and seizure. Hydraulic cut-outs should move freely.

Spares

It is essential to maintain sufficient spares of cleats, wedges and different shapes of rubber packing (linear, L-shaped end pieces, flat corners and vertical corners, as applicable) to complete planned routine maintenance. Rubber packing and adhesives have a limited shelf life, so check the date stamp and discard them if they are beyond the use-by date.

It is recommended to always use the manufacturer’s approved spare parts. While it may be tempting to order spares that are cheap or do repairs that are not in line with the manufacturer’s guidelines, it should not be forgotten that well-maintained hatch covers can make the difference between a profitable or a loss-making voyage. Claims resulting from cargo wet damage due to leaking hatch covers rank high on the overall loss figures on dry cargo ships and can weigh heavily on the owner’s operational budget and profit.



Figure 25 (a and b): Spare rubber packings

10. Maintenance and repair

Poor maintenance of hatch covers can cause leakages, leading to cargo damage, and represents a hazard to the ship and its crew. Although hatch covers are simple and durable, their sealing gaskets are easily damaged.

Based on the club's experience, continuing and regular maintenance of hatches is more effective and less expensive than sporadic inspection and major repair.

Always keep a detailed record of maintenance. In the event that a claim for wet damage is filed against the ship, well-documented records will be of great value in defending the owner's interest and proving that due diligence was exercised.

Take care during extensive hatch cover repair to avoid cover distortion. Major repairs, such as inserting large sections of plating or stiffening, are best done with the hatch covers removed from the ship in order to minimise distortion.

A good maintenance strategy includes proper record-keeping. Maintenance-related documents, such as test reports, work orders, spare part orders, work schedules, hatch manual and drawings, onboard checklists and inspection reports, etc. should be properly kept and filed.

It is recommended that the routine inspection and maintenance regime conforms with the manufacturer's instructions and IMO resolution [MSC.169\(79\)](#). It should be recorded in the ship's Planned Maintenance System (as required by the ISM Code), with ship-specific hatch cover checklists developed, if manufacturer's instructions are not available.

Continuous maintenance should be scheduled, according to the manufacturer's guidelines and at least:

- after every cargo operation
- every three months
- every 12 months.

Maintenance of the hatch cover structure

Corrosion reduces the strength of a hatch cover. Reduced strength gives rise to increased deflections and possible loss of the steel-to-steel contact when a cover is loaded (green seas or cargo). If advanced, corrosion can weaken a hatch cover to the point where normal loading causes permanent deformation and permanent loss of the steel-to-steel contact. Good contact is an essential prerequisite for weathertightness. Accelerated pitting corrosion leads to holes in the top plate, and cracks may appear, generally progressing from the landing pad into the coaming.

Corrosion occurs mainly at the panel ends along the cross joint or where access is difficult, but it can also occur on the underside of a panel, especially along hatch beams. Regular maintenance and painting are necessary.



Figure 26: Maintenance of the hatch cover structure

Whilst doublers might, under certain circumstances, be acceptable as a temporary repair, they should never be considered as a substitute for a proper insert repair. Doublers will cover up damage and prevent

water ingress, but they will not restore the required strength or stop the corrosion process. Welding work on hatch covers should be carried out by trained and qualified personnel, as excessive heat during welding may cause distortion of the panel structure.

It is recommended to consult with the ship's classification society before commencing repairs.

Hatch covers with a double skin, in the form of a closed box, are filled with inert gas. After structural repair, the inner spaces must be re-inerted. This is done by inserting special tablets (available from the hatch cover manufacturer) into the space and welding it shut. Never allow water to penetrate the box construction.

Maintenance of hatch cross joints

It is essential for the cross joint to be in good condition and properly aligned. Maintenance and repair should focus on:

- examining the cross joint structure for corrosion
- examining the joint hinges for pin wear, blade cracking or weld failure (regrease the hinge pin bushes, making sure grease reaches the hinge pins)
- examining the steel-to-steel inter-panel blocks and locators for wear (check the top plate of hatch panels, which should be level when closed)
- checking the gap between panels when they are closed (misalignment could be caused by an incorrectly adjusted cylinder or the wheel tracks could be worn).



Figure 27: Maintenance of hatch cross joints

Maintenance of hatch coamings

Look for cracks at coaming corners, particularly in the structural joints. Also look for grooving abrasion caused by the steel wire ropes of cranes. If damage is found, consult the ship's classification society before commencing repairs in case the coaming or deck needs to be reinforced.

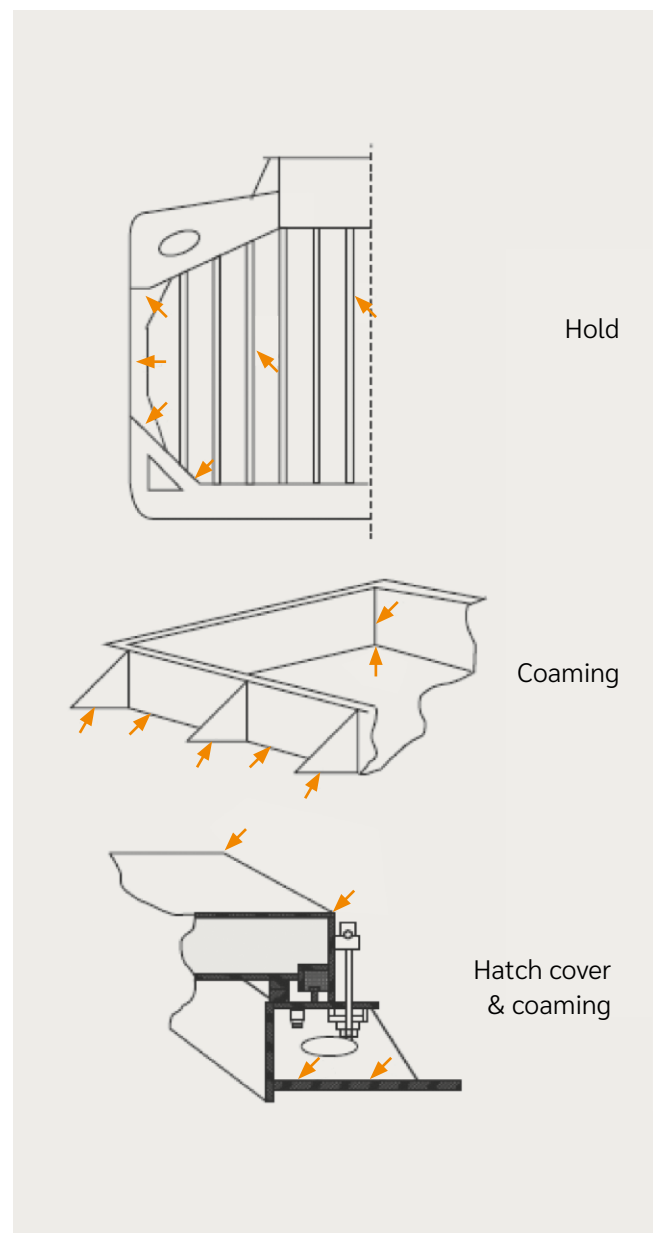


Figure 28: Known areas where cracks may occur

Maintenance and repair continued

Examine coaming support brackets for corrosion where they connect with the ship's deck for signs of grooving and cracking. Make sure coamings and their support brackets are painted.

Coamings can be damaged by cargo equipment during loading or discharge. Look out for damage and repair the coamings if damaged.



Figure 29: Maintenance of hatch coamings

Maintenance of the landing pads (steel-to-steel contact surfaces)

Hatch covers are designed to make steel-to-steel contact between a defined part of the hatch cover and coaming when closed. This steel-to-steel contact determines the amount of compression between the hatch gasket and the compression bar. Contact might be nothing more than the hatch skirt sitting on the horizontal coaming plate, although some hatches are fitted with metal landing pads.



Figure 30: Maintenance of the landing pads

When the horizontal coaming plate or hatch landing pad is worn, pressure on the hatch gasket (rubber packing) increases. If this wear is greater than 4mm, increased pressure on the gasket will cause damage. In this case, repair of the landing pad is essential. Before considering such a repair, the manufacturer's manual should be consulted or the manufacturer should be contacted for advice.

The size and dimensions of a landing pad are dependent on the size and weight of the hatch cover. Landing pads are normally located adjacent to cleats. The pads are fitted to the top of the coaming and to the side of the hatch panel. Landing pads should always be repaired to their original design height. Correct adjustment of them can only be achieved during repair when the ship is out of service. Some ships are provided with cassette-type landing pads, which are easily replaceable.

Maintenance of hatch wheels and trackways

Hatch wheel spindles and bearings (where fitted) need to be greased regularly. Re-grease them every month, and always apply new grease.

Check the wheel spindle for wear and the wheel housing for physical damage. Repair the spindle if it is worn or if the wheels are out of alignment.

Trackways can corrode. They are weakened by abrasive wear and tear. When weakened, trackways can distort and break, affecting hatch movement and alignment. Deterioration is visible to the naked eye. Repair by replacing the worn or damaged material with sufficient new material to restore strength. Always keep hatch wheel trackways clean and painted.



Figure 31: Maintenance of hatch wheels and trackways

Maintenance of rubber packing – surface damage

Rubber packing that is physically damaged, cut, perished or chafed should be renewed immediately. Keep clean and free from paint. Specific right-angled corner sections should be used where specified by the manufacturer. The use of silicon fillers is considered to be evidence of poor repairs.



Figure 32 (a and b): Maintenance of rubber packing

Maintenance of rubber packing – permanent deformation

Rubber packing is designed to be compressed to a certain depth, referred to as the design compression, which should be specified in the manufacturer's manual or indicated in the drawings. Rubber packing that is permanently impressed to 50% of its design compression should be completely replaced. Always follow the manufacturer's instructions when renewing gaskets.

Where these are not known, a rule of thumb to estimate design compression is to use 25% of the packing's thickness. Permanently impressed rubber packing indicates worn steel-to-steel contact surfaces. Never replace permanently impressed gaskets without checking the steel-to-steel contact points for wear and repairing these if they are worn.

It is often noted that short inserts are used to make up the gaps in between the rubber packing. The minimum length of replaced packing should be one metre. Specific right-angled corner sections should be used where specified by the manufacturer. The rubber packing may be cut with slanting edges to ensure satisfactory sealing.

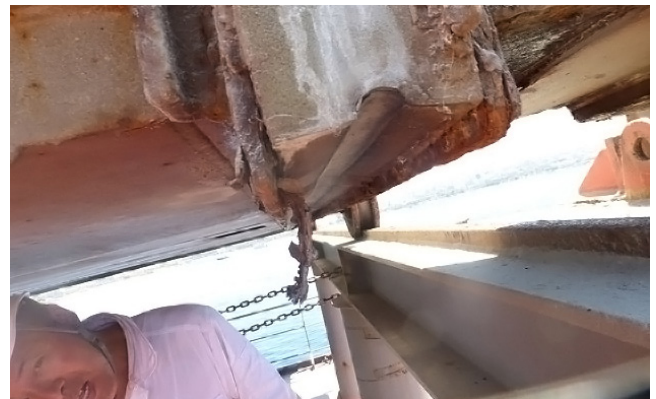


Figure 33: Rubber packing with permanent set

Maintenance of rubber packing – aged gaskets

Ozone will age rubber, so that it becomes hard and loses elasticity. The entire length of an aged gasket should be replaced.



Figure 34: Replacement of the entire length of aged gasket

Maintenance and repair continued

Maintenance of compression bars

Effective sealing is only possible with a straight, undamaged and non-corroded compression bar. The rubber packing does not slide over the compression bar but acts on the compression bar surface with significant force. As such, the compression bars, particularly the conventional raised type of compression bar, should be of strong construction. Compression bars that are not in this condition should be repaired or replaced, with care taken to align the bars properly.

To achieve a tight seal, packing rubbers need to be compressed up to their design compression and, as such, they need to act against a compression surface. The sealing surface of the compression bar should be smooth, as a rough surface causes rapid deterioration of the rubber packing. Whilst on older ships the standard was to have a mild steel compression bar, more modern designs use stainless steel.

In order to ensure that the packing rubber interacts correctly with the compression bar or sealing surface, contact must be made in the correct position and, therefore, compression bars or sealing surfaces need to be properly aligned. Whilst some limited tolerances are allowed with regards to straightness (these should be stipulated in the manufacturer's manual), waviness (either + or -) will lead to over or under compression of the seal, both of which should be avoided.

Taking into consideration that design compression is a matter of millimetres (generally in the range of 10-12mm), even slight unevenness or waviness by a few millimetres represents a significant percentage of under or over compression.

Sharp edges can easily cause damage to the packing rubber. This is the reason why the sealing surface of the compression bars will be rounded rather than square in form. Replacing damaged sections of compression bars with ordinary steel flat bars should be avoided. In such cases, it is best to weld a stainless-steel strip on the coaming table as the smooth surface will contribute to the longevity of the seal during its in-service life. Remember to carry out a chalk test to check alignment, both during and after repair.



Figure 35: Compression bar – straight, undamaged and non-corroded

Maintenance of gasket channels

If gasket channels are badly corroded, causing the hatch packing to hang loose, the packing should be removed and the channel should be repaired by welding new metal strips, which should be painted and dried before fitting new rubber. Always follow proper fire prevention safety procedures. Make sure that cargo spaces are free of cargo and combustible material.



Figure 36: Maintenance of gasket channel

Maintenance of the double drainage system

Hatches are designed to drain away water that has penetrated the gasket or that lies in the inner channel after hatch opening. Drainage channels should always be cleaned before hatches are closed and should be kept free from rust scale and cargo debris. Damaged channels should be repaired immediately. Painting double drainage channels will help to prevent corrosion. Drainage channels are located along the cross joint and on the coaming between the compression bar and the inner coaming.



Figure 37: Poorly maintained drain channel

Maintenance of non-return drain valves

Hatch coaming non-return drain valves are an essential feature of the hatch double drainage system. They let water that has come through the hatch cover drain away and prevent ingress of water from outside.

The drainpipes are often small in diameter and easily susceptible to clogging. They are fitted with a non-return device (eg a ball float) in order to avoid seawater finding its way into the cargo hold through the drains. Non-return valves easily clog up, so they must be frequently cleaned. The float and internal sealing rubber may degrade and require replacement.

Drain valve screw plugs (or caps), if fitted, should be attached by chain, but not closed. They must be kept ready for quick deployment in case of a fire in the hold or when sealing is required during fumigation of cargo in the hold.

These screw plugs (or caps) fitted on the drains assist in maintaining the gas-tight integrity of the cargo holds, ie in case of a fire, they prevent outside air from entering in and ensure that the extinguishing medium (CO₂) does not escape out from the cargo holds.

When the cargo is fumigated, these caps should be closed to seal off the cargo spaces. However, in the event that some seawater penetrates the gasket during heavy weather, it is important that the water does not enter the cargo hold. Hence, it is recommended to open these caps regularly during the voyage (weather permitting) to drain any water. The crew should be mindful of the fumigant gases and use appropriate precautions and PPE (personal protective equipment) to prevent exposure.

Damaged, missing or defective non-return drain valves and associated piping should be repaired or renewed.

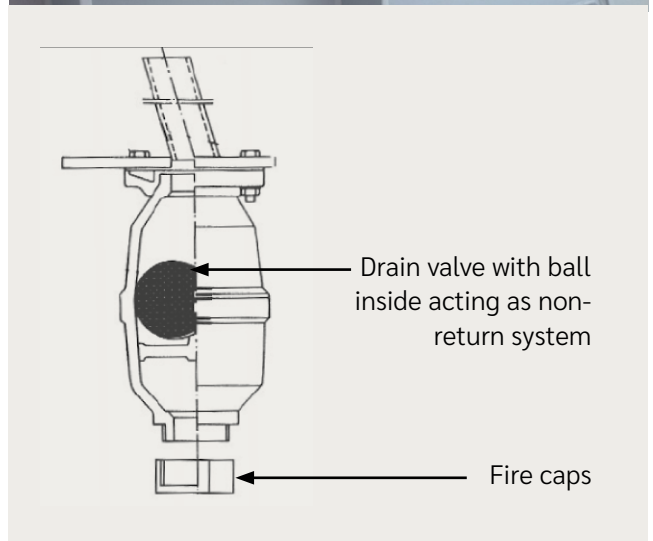


Figure 38 (a and b): Non-return drain valves

Maintenance and repair continued

Maintenance of hatch cleats and wedges

Cleats and wedges hold the hatch in position with adequate gasket compression. Cleats are fitted with a rubber washer or 'grommet' to aid compression. Compression of the washer determines tension in the cleat. Washers are prone to both physical damage and age hardening (weathering). When damaged or aged, the washer loses its elasticity and should be replaced. Some operators protect the washer and screw threads with a layer of grease or by applying 'denzo' tape.

It is important for compression washers to be adjusted correctly. A locking nut for adjusting compression is situated at the base of the cleat. The procedure to alter compression is as follows:

1. close hatch and secure for sea
2. place the cam of the cleat in the hatch socket as if to lock it, but leave it unlocked (the cam should move freely and fit snugly in its housing)
3. adjust the locking nut until the compression washer touches the underside of the hatch coaming or its steel washer
4. turn the locking nut one full turn to achieve the desired tension
5. do not over-tighten
6. protect the thread on completion.

When closing and securing a hatch for sea passage, check the tension in the side cleats.

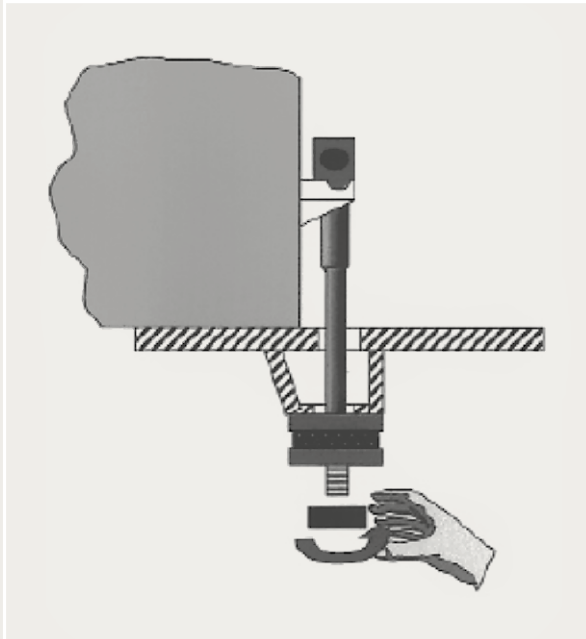
Cleats should never be adjusted in isolation, adjust all cleats along the hatch skirt at the same time.

In addition, cleats should be checked for seizure, for other damage and whether they are complete in number. Cleat crutches and other parts to which cleats may be connected (eg coaming table, snugs/panel side plating, etc) should regularly be inspected for damage and wastage.

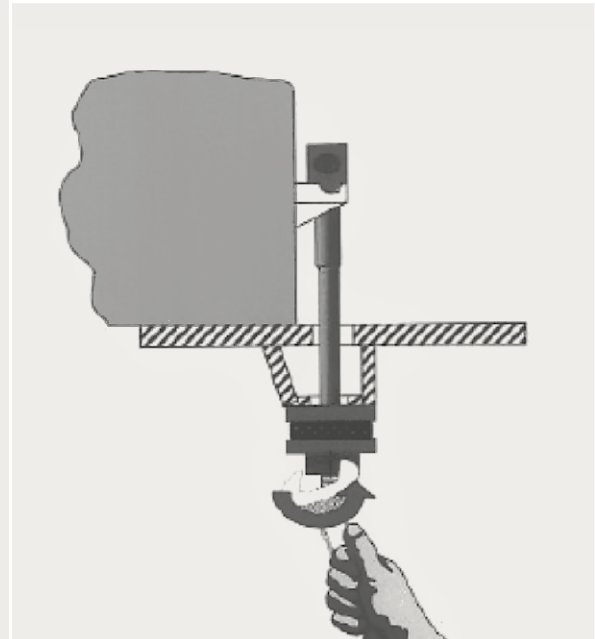
Cross-joint wedges require less maintenance than cleats, and provided the wedge side spring is in place, the wedge will work efficiently. Check the springs regularly and replace them if they are damaged or missing. On a closed hatch, the wedge should make contact with its strike plate on the opposite hatch panel. If there is a gap, it is likely that the panel is distorted. The steel-to-steel contact may be worn. Repair and alignment of the hatch panel is necessary. Never repair the strike plate by building it up with weld metal above its original design height.



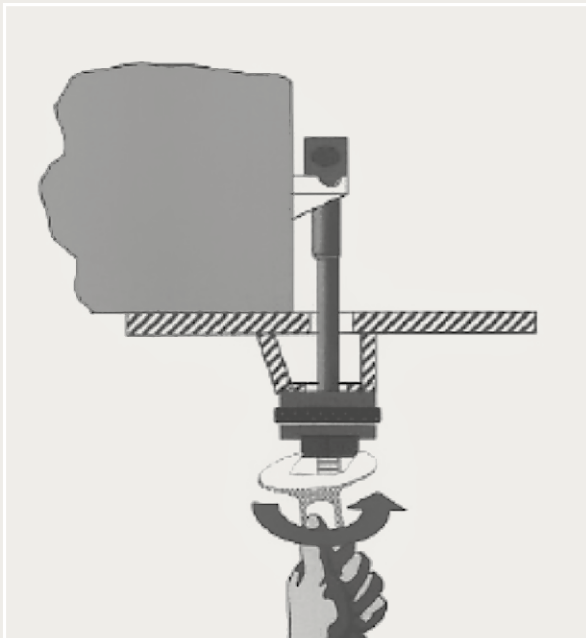
Figure 39 (a and b): Maintenance of hatch cleats



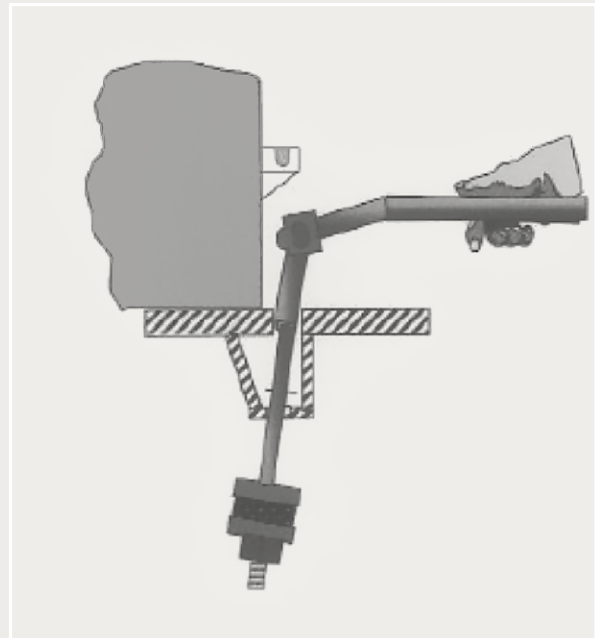
a) Assemble cleat in snug and crutch



b) Screw nut on spindle until it touches washer



c) Tighten one complete turn of the nut



d) Disengage cleat with quick release lever

Figure 40: Procedure to adjust a quick acting cleat

Maintenance and repair continued

Maintenance of locators

Locators guide the hatch cover panel into its correct closing position and ensure that panels are kept in position during the voyage. Correct positioning is important to avoid problems with opening systems, wheels, hinges, cross-joint drains, securing mechanisms, etc, and slight wear on the locators in one place may result in significant loss of compression or improper positioning at another place. Therefore, locator wear should also be regularly monitored. More recent designs of locators have replaceable mating surfaces and allow for the use of shim plates, which facilitates installation and adjustment in case of wear down.

Maintenance of stoppers

While a ship is at sea, hatch covers are exposed to severe loads and accelerations, which have the potential to dislocate them from their correct sealing positions. Failure to restrict hatch cover movement can lead to excessive loads acting on component parts of the hatch covers, accelerating wear and damage as a result.

Stoppers (or restraints) are used to restrict this movement. Whilst some degree of movement is allowed, stopper wear should be closely monitored. It is recommended to consult the manufacturer's manual to obtain information on the allowable wear limits.

Maintenance of hydraulic systems and components

Depending on the hatch cover design, differing types of opening/closing mechanisms are used. Apart from lift-away type hatch covers, consisting of pontoons that rely on shore gear to be lifted on and off, all other systems are operated with the ship's own equipment or have their own operating system. In many cases, and in view of the weights involved, hydraulic systems are the most appropriate to drive the hatch cover opening/closing system, and most of these hydraulic systems incorporate cylinders, control valves, motors and pump units, all of which should be properly inspected and maintained. Hydraulic systems should also be inspected for leakages, which could result in pollution as well as present a slip and fall hazard.

The use of hydraulics (which often operate at pressures of up to 250 bar) in combination with heavy moving objects presents a safety hazard for operators and crew in the vicinity of the hatch covers. Therefore, both operators and assisting crew should be well informed and familiar with the safe operation of the system.

The cleanliness and viscosity of hydraulic oil must be checked. Samples of the oil should be sent to a chemist for testing (use the same company that checks and tests your fuel and lubricating oil). The hydraulic system is provided with bleed points from which samples can be taken.

Hydraulic oil should be changed every five years or after there have been significant repairs, such as piping or cylinder replacement.

Hydraulic oil filters should be changed every 12 months. Do not contemplate repairing the hydraulic system without the proper components and skilled fitters.

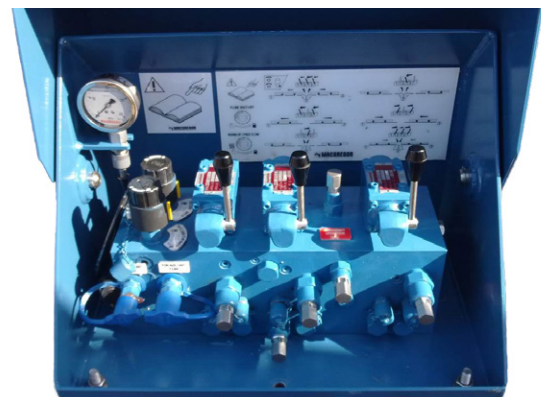


Figure 41 (a and b): Maintenance of hydraulic systems and components

Maintenance of rubber seals on hold access doors, access hatches and ventilators

Water can enter the cargo hold through access doors, hatches and ventilator covers. Maintain them in the same way as you would hatch covers.

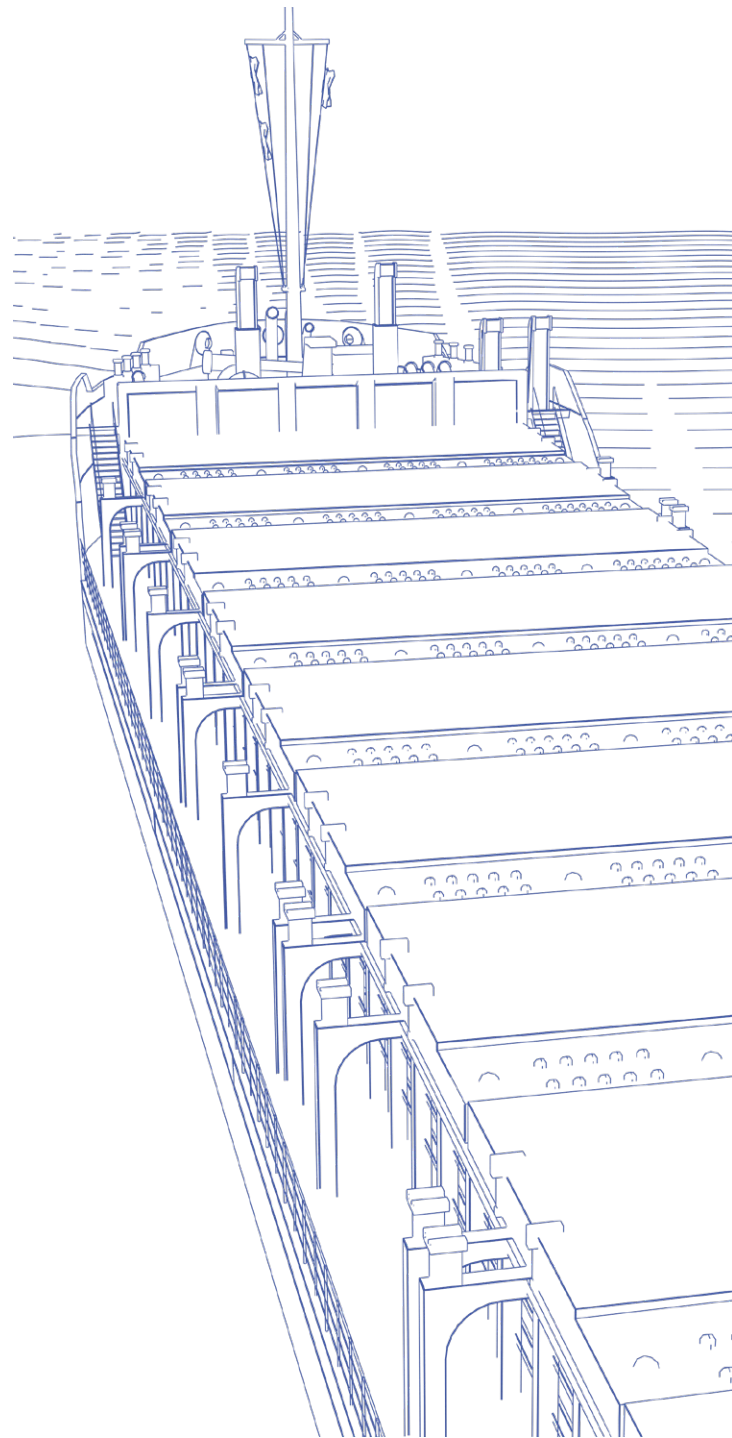


Figure 42 (a and b): Maintenance of rubber seals on access hatches and ventilators

11. Heavy weather precautions

The following precautions should be taken in rough or heavy weather or when high swells are expected or when it is likely that water will be shipped on deck.

Prior to rough weather:

- Check that hatch cleats are properly secured and adjusted. In rough weather, hulls are subjected to high racking forces, so it is essential that hatch covers are held in place but allowed to flex.
- Check that all drain valves are operating correctly and that they are not clogged. Drain valves are the last defence against water entering the cargo space. The drainage and non-return system will be needed during heavy weather, so it must be fully operational.
- As a precaution, briefly pressurise the hydraulic system to ensure that it is fully charged and that the piping is filled with oil. This has two benefits: firstly, it prevents the possibility of seawater entering loose couplings or seals; and secondly, it eliminates any creep that may have occurred.



Figure 43: Hatch covers are designed to withstand the rigours of the sea

After rough weather:

- Inspect all cleats, drain valves, guides and hydraulic components for damage. If hydraulic components have been damaged, do not attempt to open the covers. The emergency opening procedure should be followed until the hydraulic components have been checked and tested.
- Check hatch covers for buckling or distortion.
- When opening the hatch covers, check for uneven movement and any unusual noises that may indicate damage.
- Wheel spindles, cleat spindles, hinge pins, hydraulic cylinder protective sheaths, cleat wedges, drive chain sprockets, toothed rack and cylinder spherical bearings need to be kept well greased. It is recommended to check all grease points after the ship has passed through heavy weather and re-grease if necessary.

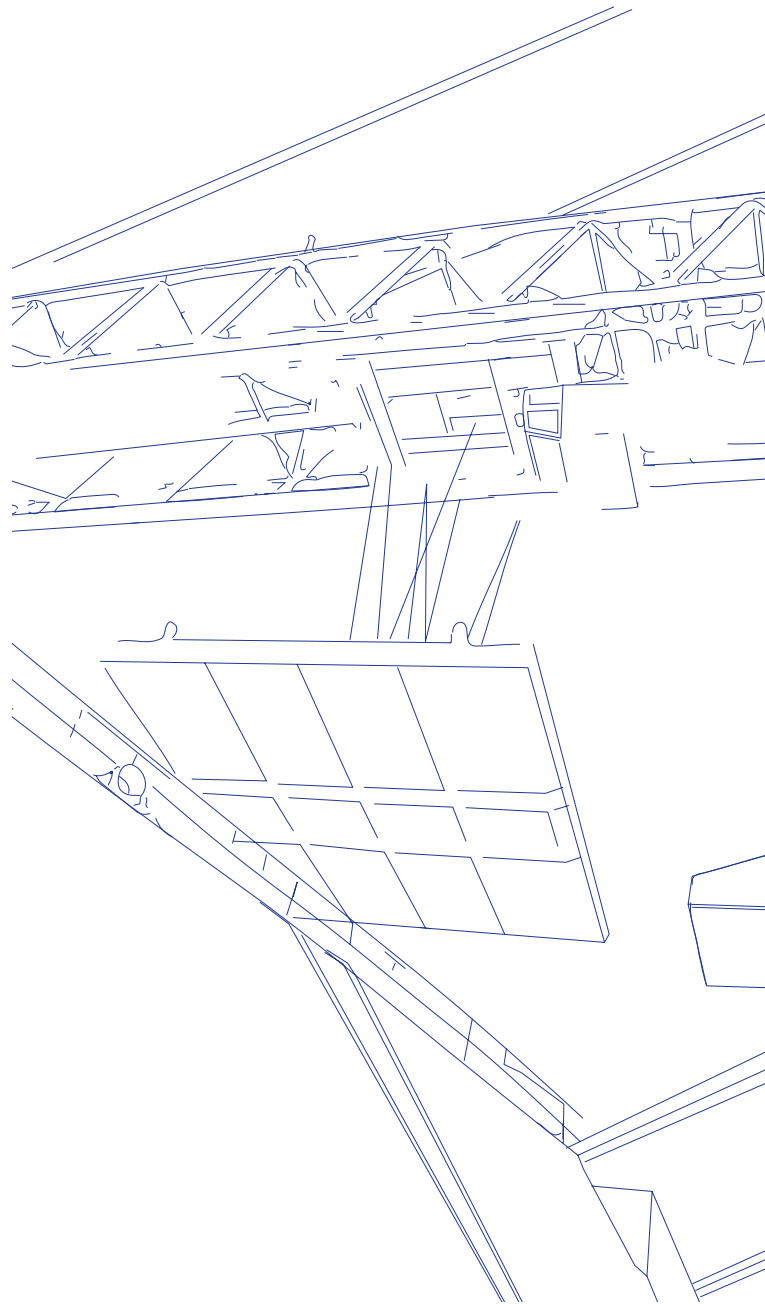
If the cargo is fumigated, the hatch cover non-return drain valve caps should be closed to seal off the cargo spaces. In the event that some seawater penetrates the gasket during heavy weather, it is important that the water does not enter the cargo hold. Hence, it is recommended to open non-return drain valve caps regularly during the voyage (weather permitting) to drain any water. The crew should be mindful of the fumigant gases (if applicable) and use appropriate precautions and PPE (personal protective equipment) to prevent exposure.

12. Safety when working with hatch covers

The avoidance and prevention of injuries is of paramount importance. Before working on a hatch, a risk assessment should be completed to identify all hazards. Control and safety procedures should be examined and modified so that hazards are reduced to minimal levels.

The following points should be borne in mind:

- always wear the correct protective clothing, boots and hard hats
- always test the hold atmosphere before entering
- never stand on a moving hatch cover
- never stand on a hatch coaming when the hatch is open
- never work on a hatch cover when the locking pin or hook is not fitted and secure
- never open or close a hatch cover without ensuring the coaming is clear of debris and checking that all personnel are clear of the moving hatch and its channels or wires
- when opening or closing a hatch, never attempt to clear an obstruction with your hands
- when hatches are opened at sea, always secure them to the coaming top by lowering the wheels into a guide pocket, or by fixing restraining wires.



13. Appendix 1 – Procedures to open and close hatch covers

Prior to opening or closing a hatch, the watch officer should be informed, the condition of the hauling wires or chains should be checked, and the hydraulic system should be topped up. Never open or close more than one set of hatch covers at a time.

Opening procedures

- Check that the hatch cover panel stowage area is clear of people, equipment and dunnage.
- Disengage all cleats.
- Attach towing or hauling wires, switch the power on and ensure the controls are in neutral.
- Ensure that all personnel are clear of the hatch and its tracking. Position crewmembers to observe both sides of the hatch.
- Raise hatch covers to the roll position by using jacks or raising the lifting system. (The panels need to clear the hatch guides).
- Check that towing chains are free and do not foul tracks or the coaming top.
- Start to open the hatch, slowly at first, then at normal operating speed until the hatch is almost open and then reduce to slow speed until fully open. Care must be taken when opening hatch covers, especially when the speed of opening can be only partially controlled.
- When fully open, secure the hatch with the safety hook or pin before the power is switched off. If applicable, remove the towing and hauling wires.
- Install portable safety rails, if applicable.

Closing procedures

- Check that the coaming top is clear of cargo or debris.
- Check that drain valves are clear and operating freely.
- Check and clear drain channels and entrances to the drain valves.
- Check that any damaged wheel tracks, compression bars and landing pads have been repaired.
- Ensure that the hold is clear of people and that access hatches or entrance doors are open.
- Attach towing or hauling wires, switch the power on and ensure the controls are in neutral.
- Remove portable handrails.
- Release hatch locking pins or hooks.
- Avoid injuries by ensuring that all personnel are clear of the hatch. Position crewmembers to observe both sides of the hatch.
- Check that towing chains are free and do not foul the tracks or the coaming top.
- Start to close the hatches slowly at first with the speed of closure being gradually increased to the normal operating speed. As the hatch reaches the closed position, the speed should be gradually reduced. Great care must be taken when closing hatch covers.
- Lower hatch covers into guide pockets by using jacks or lifting cylinders. Some hatches are lowered automatically.
- Attach cleats before removing the towing wire or switching the power off.
- Finally, check that no one is in the hold before closing the hold access hatches or other hold entry points.

14. Appendix 2 – Hatch cover inspection checklist

Checklist 1 (for single pull, side rolling, folding type hatch covers)

| | |
|------------|-------|
| MV: | Date: |
| Hatch No.: | Port: |

| S.No. | Items | Condition | Action |
|-------|--|-----------|--------|
| 1 | Hatch structure (outer) | | |
| 2 | Hatch structure (inner) | | |
| 3 | Coaming structure | | |
| 4 | Opening/closing mechanism | | |
| 5 | Hydraulic jacks | | |
| 6 | Hydraulic pipes | | |
| 7 | Steel-to-steel contact points [landing pads] | | |
| 8 | Panel alignment | | |
| 9 | Panel wheels | | |
| 10 | Wheel trackway | | |
| 11 | Pulling chains/rollers | | |
| 12 | Side/end quick acting cleats | | |
| 13 | Cross-joint wedges/cleats | | |
| 14 | Stacking mechanism | | |
| 15 | Retaining hooks | | |
| 16 | Compression bars | | |
| 17 | Double drainage channel | | |
| 18 | Non-return drain valve | | |
| 19 | Cargo hold access hatch | | |
| 20 | Cargo hold ventilator | | |
| 21 | Side gaskets | | |
| 22 | Cross-joint gaskets | | |
| 23 | Edge gaskets | | |
| 24 | Evidence of leakage | | |
| 25 | Quality and condition of cargo spaces | | |

Comments

Signed:
Master

Signed:
Chief Officer

Signed:
Superintendent

Appendix 2 – Hatch cover inspection checklist continued

Checklist 2 (for pontoon type hatch covers with tarpaulin)

| | |
|------------|-------|
| MV: | Date: |
| Hatch No.: | Port: |

| S.No. | Items | Condition | Action |
|----------|---|-----------|--------|
| 1 | Hatch structure | | |
| 2 | Pontoon structure | | |
| 3 | Coaming structure | | |
| 4 | Wooden covers, portable beams, carriers or sockets for the portable beams, and their securing devices | | |
| 5 | Cleats, battens and wedges | | |
| 6 | Loading pads/bars and the side plate edge | | |
| 7 | Guide plates and chocks | | |
| 8 | Compression bars, drainage channels and drain pipes (if any) | | |
| 9 | Lifting socket | | |
| 10 | Lifting eye | | |
| 11 | Tarpaulin | | |
| 12 | Securing net | | |
| 13 | Securing rope | | |
| 14 | Hatch securing bars and their securing devices | | |
| 15 | Wooden wedge | | |
| 16 | Rope, net hook | | |
| 17 | Trace of leakage on inner coaming | | |
| 18 | Cargo hold access hatch | | |
| 19 | Cargo hold ventilator | | |
| 20 | Quality and condition of cargo spaces | | |
| Comments | | | |

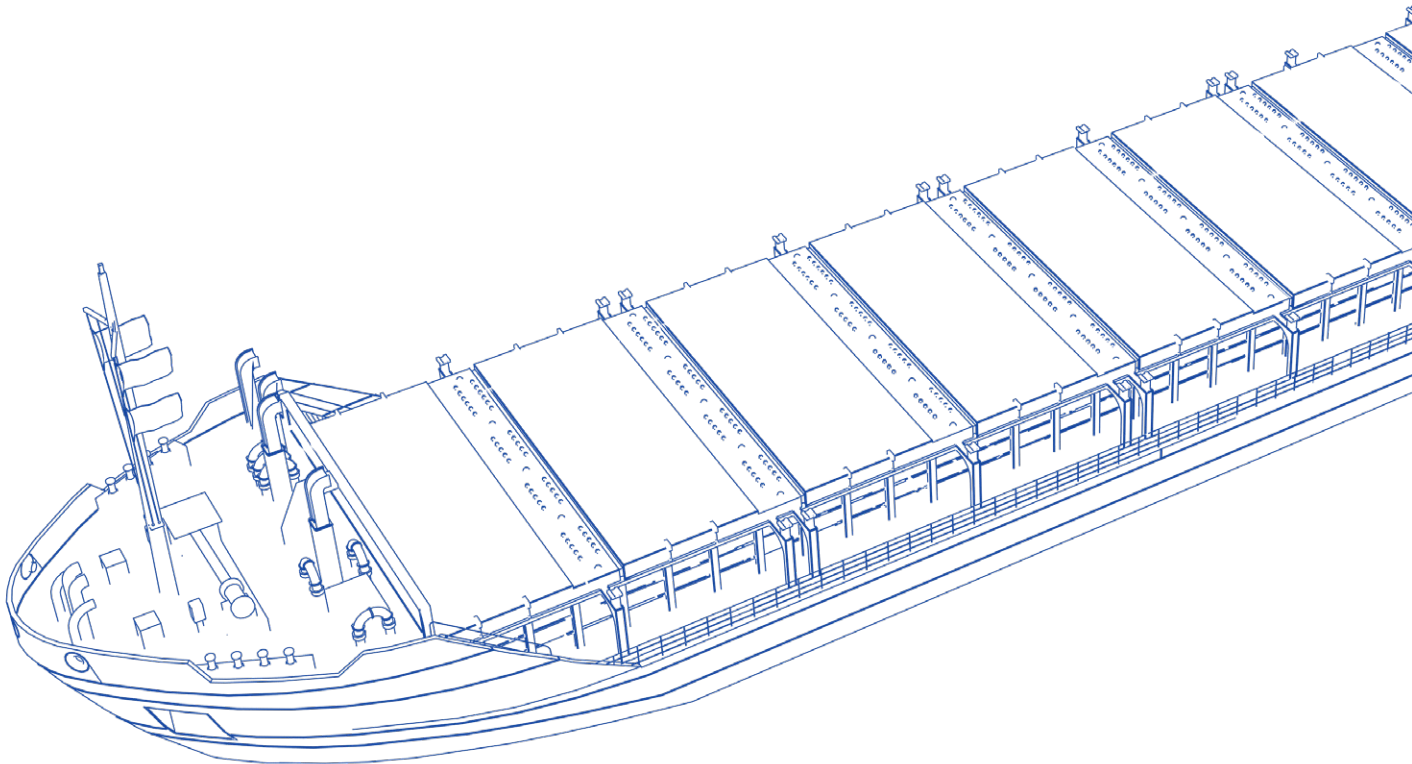
Signed:
Master

Signed:
Chief Officer

Signed:
Superintendent

15. Appendix 3 – Hatch cover operation checklist

1. Rectify any steel-to-steel contact before renewing rubber gaskets.
2. Replace missing or damaged rubber gaskets immediately (minimum length of replaced gasket should be one metre).
3. Keep retaining channels and compression bars in good condition.
4. Keep hatch coaming tops clean and the drainage channels free from any obstructions.
5. Check non-return drain valve free from obstruction and operating correctly.
6. Keep cleats and wedges in serviceable conditions and correctly adjusted.
7. Keep hauling wires and chains adjusted correctly.
8. Attach locking pins and chains to open doors and hatches.
9. Keep wheels, cleats, hinge pins, haul wires and chain tension equipment well greased.
10. Test hydraulic oil regularly for contamination and deterioration.
11. Keep hydraulic systems oil-tight.
12. Ensure that the oil tank of the hydraulic system is kept filled to the operating level and with the correct oil.
13. Clean up oil spills.
14. Engage tween deck hatch cover cleats when the panels are closed.
15. Give notice that maintenance is being performed, so that no one tries to operate the hatch.



16. Appendix 4 – Sample form for ultrasonic weathertightness test of hatch covers

Leak test of cargo hatch covers by ultrasonic equipment

| | | | |
|---|--|---|---|
| Name of vessel: | | | |
| Hatch No: _____ of _____ (from forward) | | Date: | |
| Hatch type: | | | |
| Ultrasonic equipment type: Transmitter: | | Receiver: | |
| 1 | Initial measurements with open hatch (Minimum preferred OHV is 40dB) Open hatch value, OHV (to be uniform over the tested area): _____ dB 10% of OHV: _____ dB | | |
| 2 | Fail/pass criterion | If the dB reading is more than 10% of OHV the hatch cover is not considered weathertight and corrective action needs to be taken. | |
| 3 | Measurements with closed hatch where reading > 10% OHV | | |
| | Position | dB Reading | Remarks |
| | | | dB Reading after corrective action |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 4 | Remarks | | |

Ultrasonic leak test of hatchcovers

(A copy is to be left with the Master)

Surveyor to insert positions of cross-joints etc. Indicate areas where leakage (>10% OHV) by X

| | |
|-----------------|-------------|
| Name of vessel: | Hatch No: |
| FWD | |
| PORT | STBD |
| AFT | |

Signature of Master:

Name and signature of Surveyor:

For receipt only

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Date:

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