webinar

15 October 2024, 10:00am CEST

Sealing the Deal:
How to Prevent Hatch Cover Leaks

The Swedish Club

IMCS Training Academy

Hatch Cover Webinar

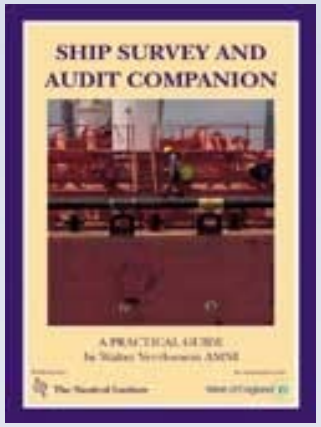
Swedish Club

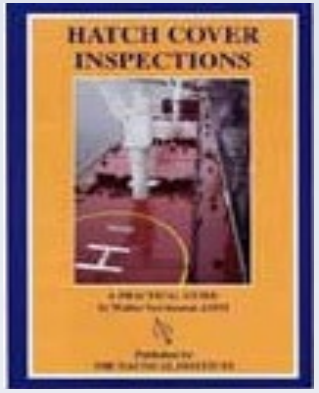
15 October 2024

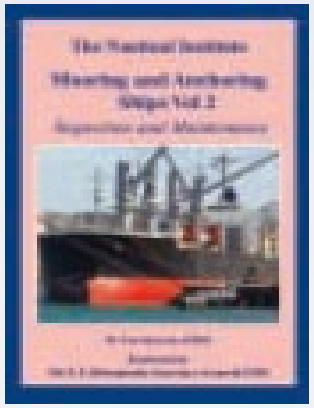
Welcome

Walter Vervloesem (FNI-Sen. VP)

- Ex Chief Officer (reefer, gen. cargo, container & LPG)
- Working as marine surveyor since 1989
- Chairman of IMCS Group – survey & consultancy
- Director IMCS Training Academy
- Senior Vice President Nautical Institute
- Chairman NI-Belgian Branch







- Author of several major reference works for the NI
- Co-Author of several publications for NI
- Loss prevention bulletins for P&I clubs,…
- Instructor for the SDT-IMCS hatch cover training course since 2001

AGENDA

- Welcome
- Intro: Are hatch covers important?
- Part 1: The owner shall provide…
- Part 2: Rules & Regulations
- Part 3: About hatch covers
- Part 4: Hatch covers, how do they work?
- Part 5: Hatch covers & key parts
- Part 6: Hatch cover tightness & tests
- Part 7: Claims
- Part 8: Due diligence
- Part 9: Extra sealants
- Part 10: Common mistakes

Q&A

INTRO

Are hatch covers important?

Are hatch covers important?

- Some figures
- Cargoes affected (importance of cargoes)
- Environmental impact
- Safety ship (structural) & crew

Are hatch covers important?

2.1. WORLD FLEET ≥ 100 GT

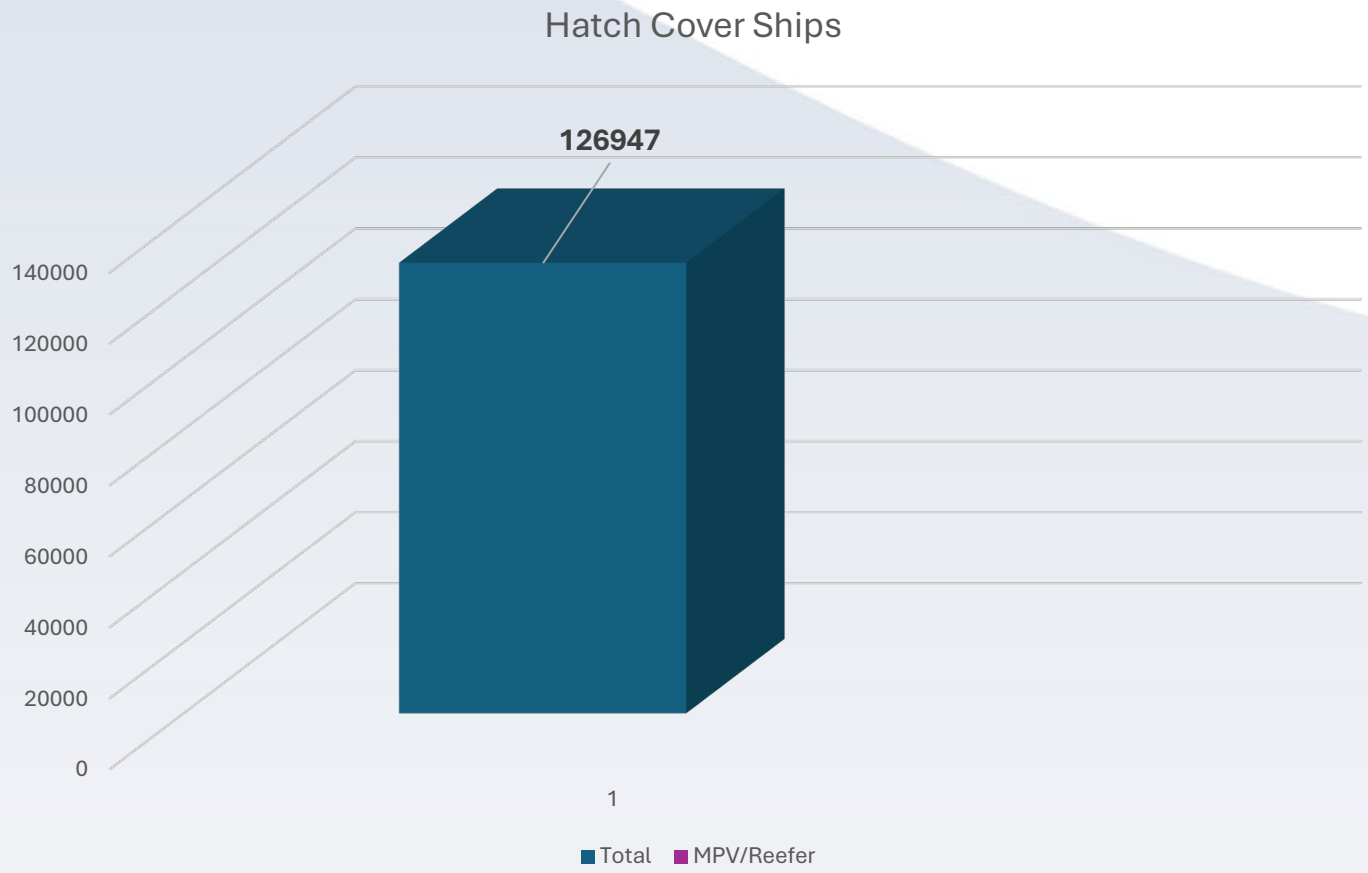
Table 1 - World fleet: total number of ships, by type and size

Ship type	Small[1]		Medium[2]		Large[3]		Very large[4]		Total	
Bulk carriers	279	0.5%	3,901	8.1%	7,103	52.7%	1,937	26.6%	13,220	10.4%
Container ships	19	0.0%	2,409	5.0%	1,684	12.5%	1,624	22.3%	5,736	4.5%
Fishing vessels	20,124	34.5%	5,806	12.1%	4	0.0%	1	0.0%	25,935	20.4%
Gas tankers	34	0.1%	1,182	2.5%	475	3.5%	619	8.5%	2,310	1.8%
General cargo ships	4,105	7.0%	12,181	25.4%	288	2.1%	0	0.0%	16,574	13.1%
Offshore vessels	2,871	4.9%	5,097	10.6%	122	0.9%	319	4.4%	8,409	6.6%
Oil and chemical tankers	1,985	3.4%	7,513	15.7%	2,827	21.0%	2,291	31.4%	14,616	11.5%
Other tankers	448	0.8%	776	1.6%	16	0.1%	0	0.0%	1,240	1.0%
Passenger ships	4,417	7.6%	2,945	6.1%	299	2.2%	205	2.8%	7,866	6.2%
Ro-ro cargo ships	1,025	1.8%	1,111	2.3%	553	4.1%	277	3.8%	2,966	2.3%
Service ships	3,801	6.5%	3,810	7.9%	38	0.3%	8	0.1%	7,657	6.0%
Specialized cargo ships	8	0.0%	287	0.6%	63	0.5%	9	0.1%	367	0.3%
Tugs	19,131	32.8%	920	1.9%	0	0.0%	0	0.0%	20,051	15.8%
Total	**58,247**	100%	**47,938**	100%	**13,472**	100%	**7,290**	100%	**126,947**	100%

Source: Equasis [1] GT<500 - [2] 500≤GT<25,000 - [3] 25,000≤GT<60,000 - [4] GT≥60,000

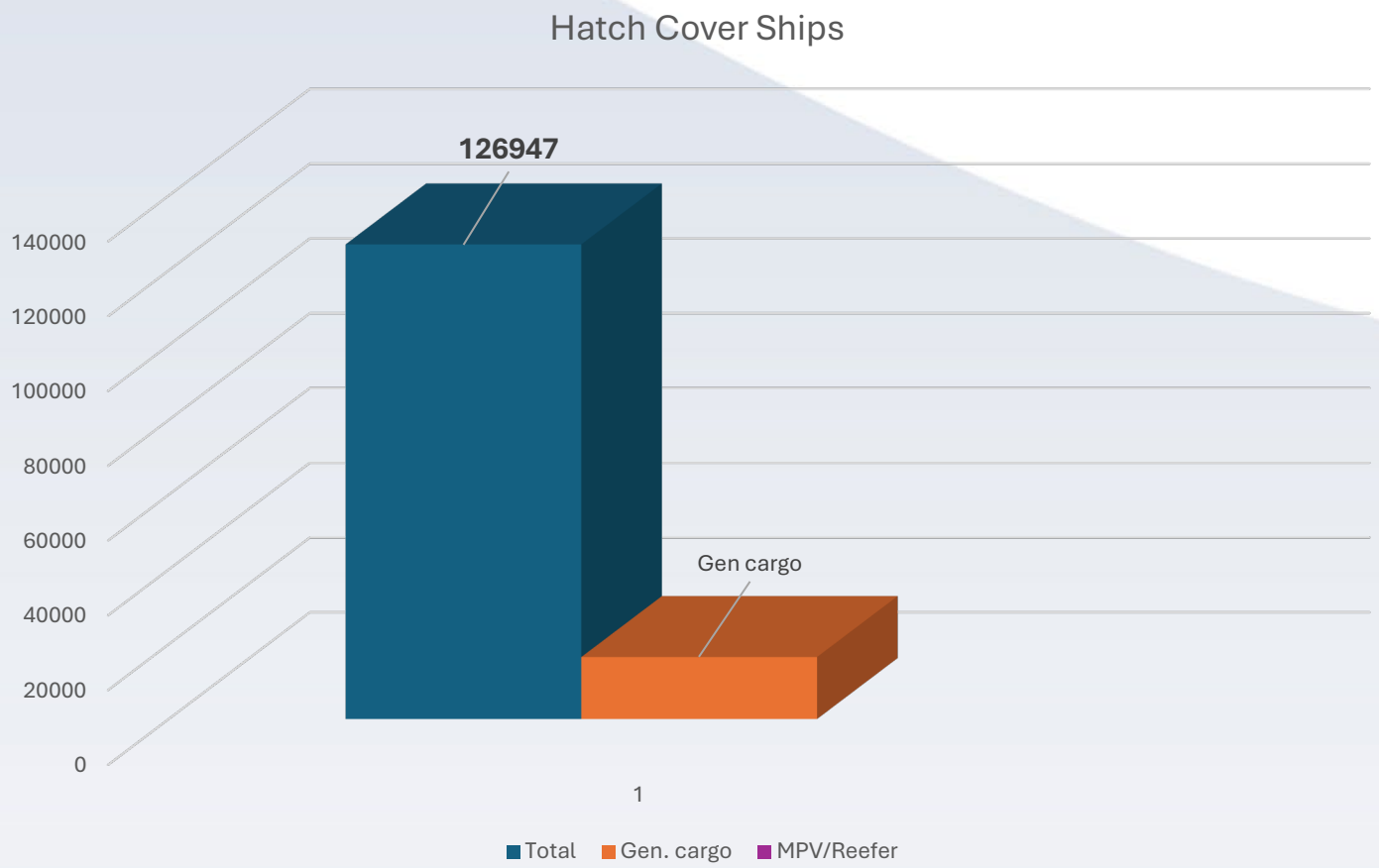
Are hatch covers important?

- World trade & ships
- “Hatch cover” ships
- How many ships
- % of world trade



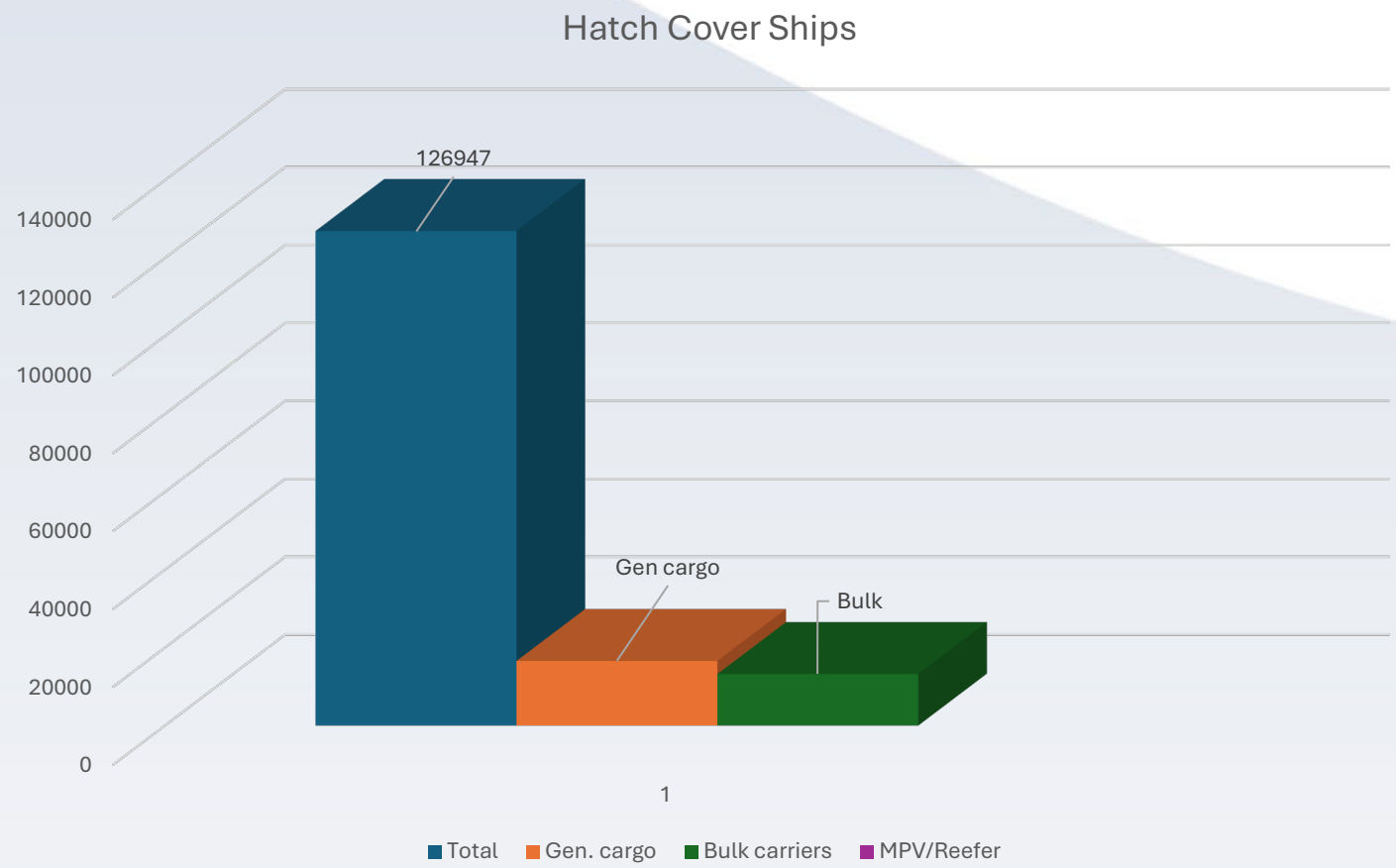
Are hatch covers important?

- World trade & ships
- “Hatch cover” ships



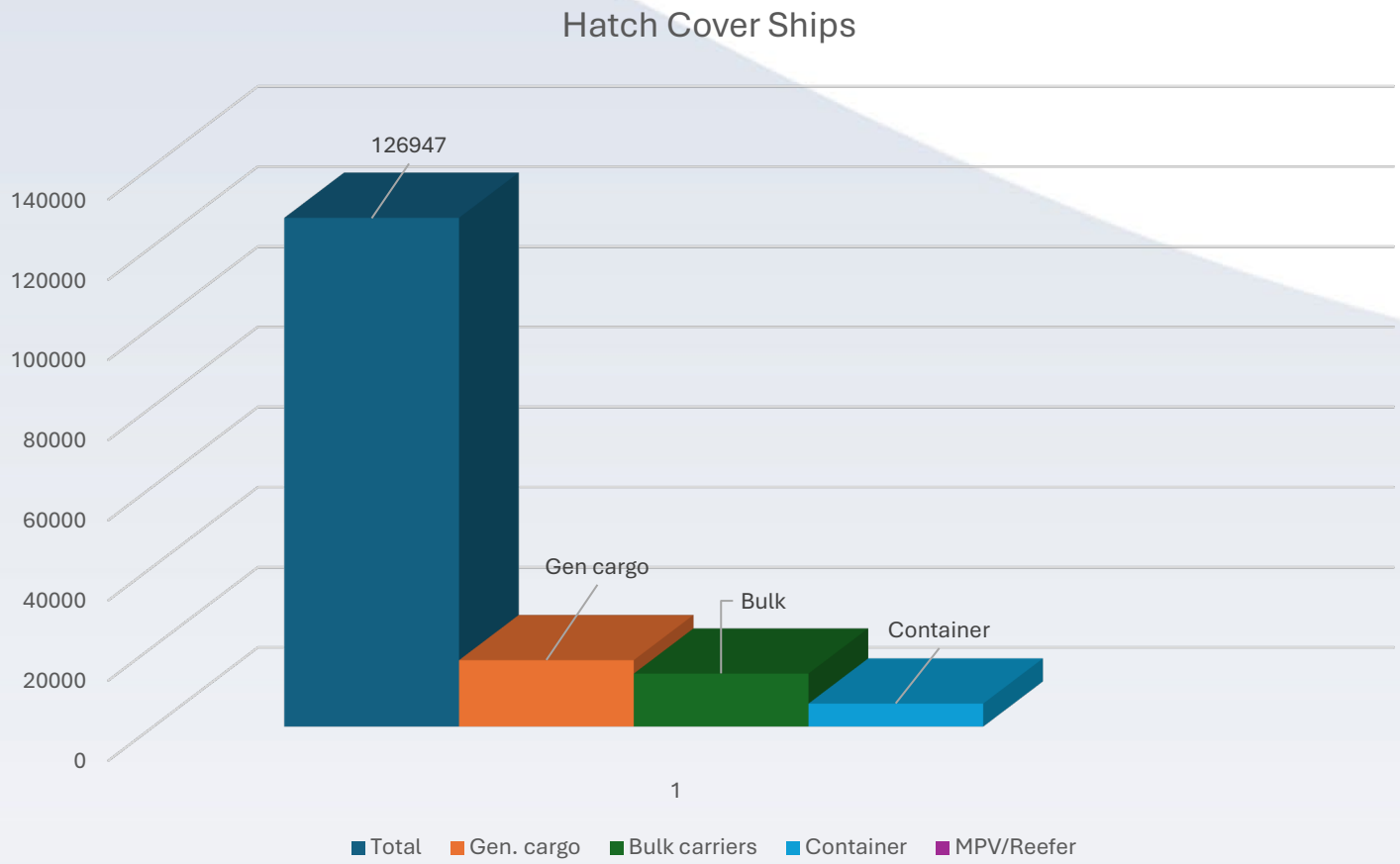
Are hatch covers important?

- World trade & ships
- “Hatch cover” ships



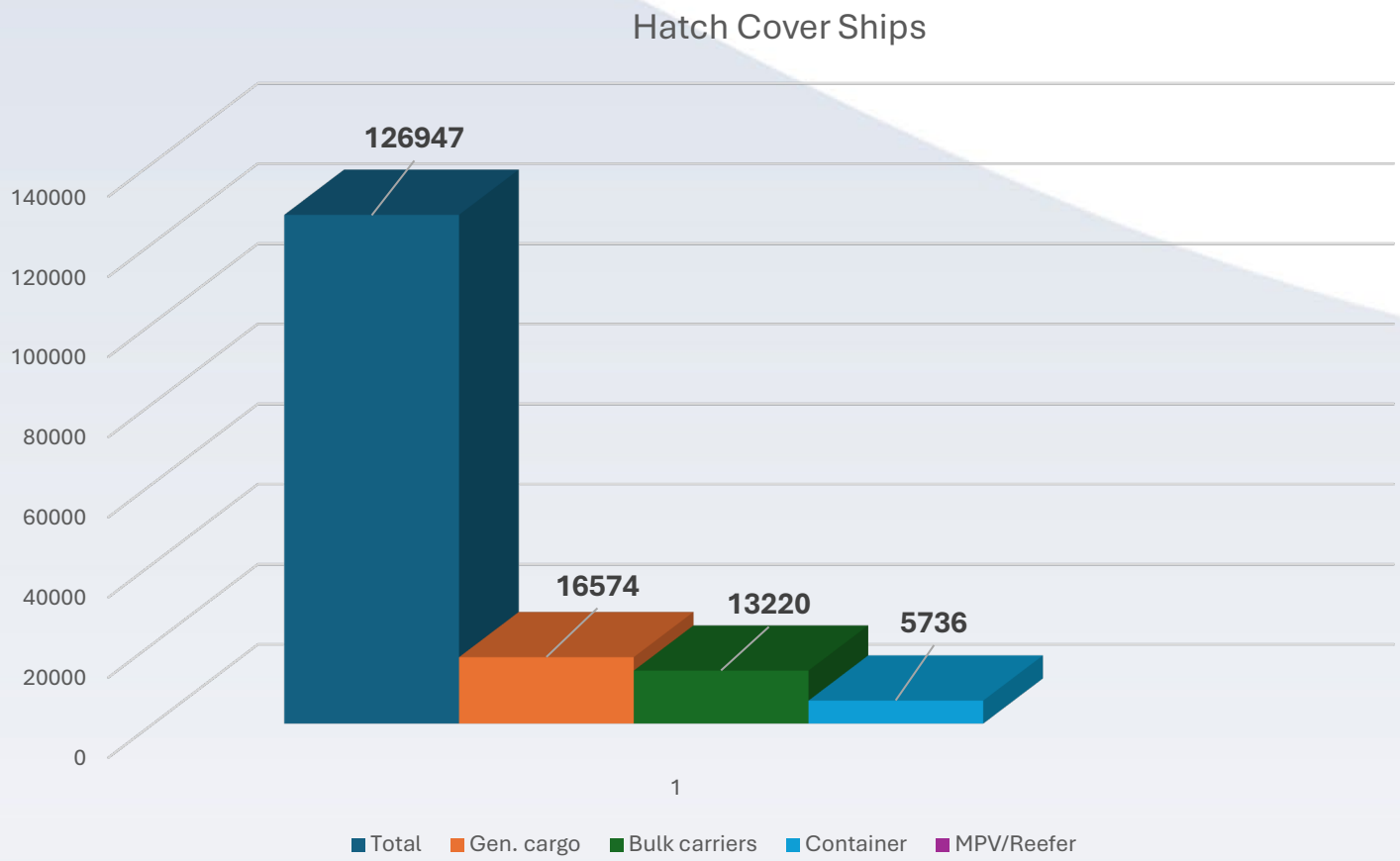
Are hatch covers important?

- World trade & ships
- “Hatch cover” ships



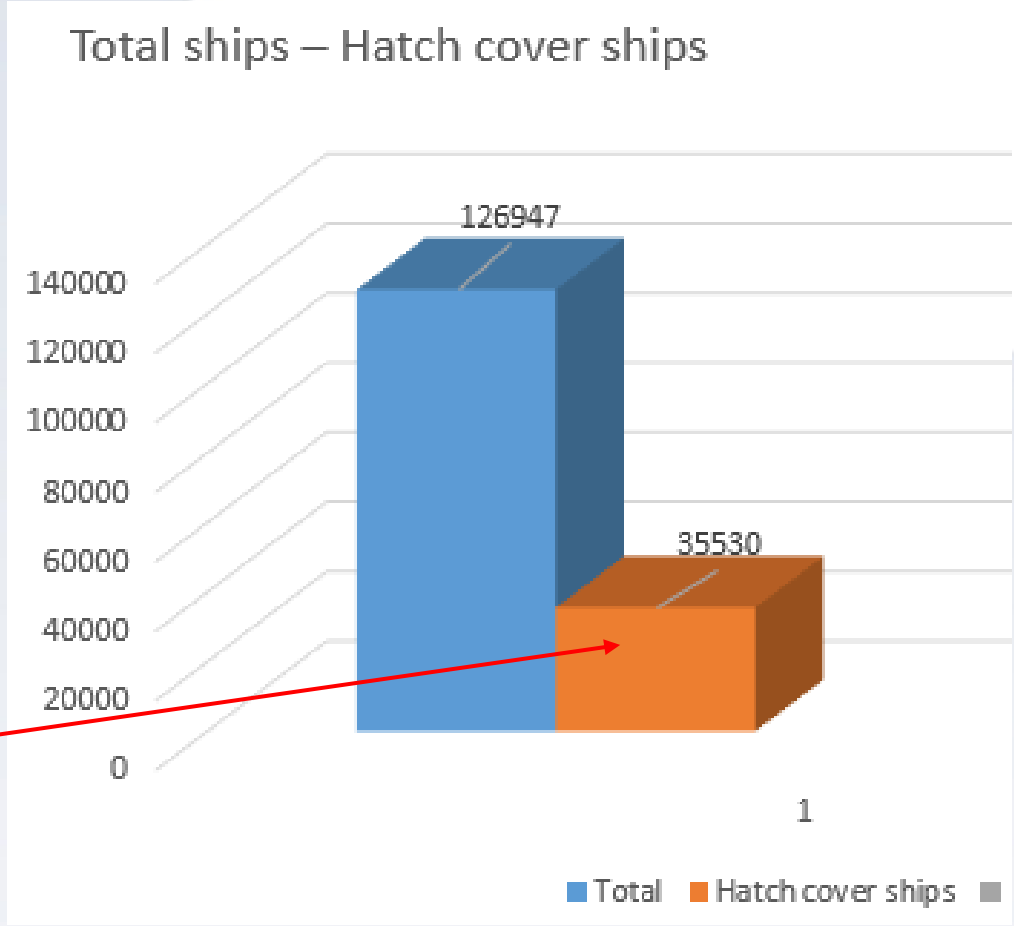
Are hatch covers important?

- World trade & ships
- Which ships
- How many ships
- % of world trade

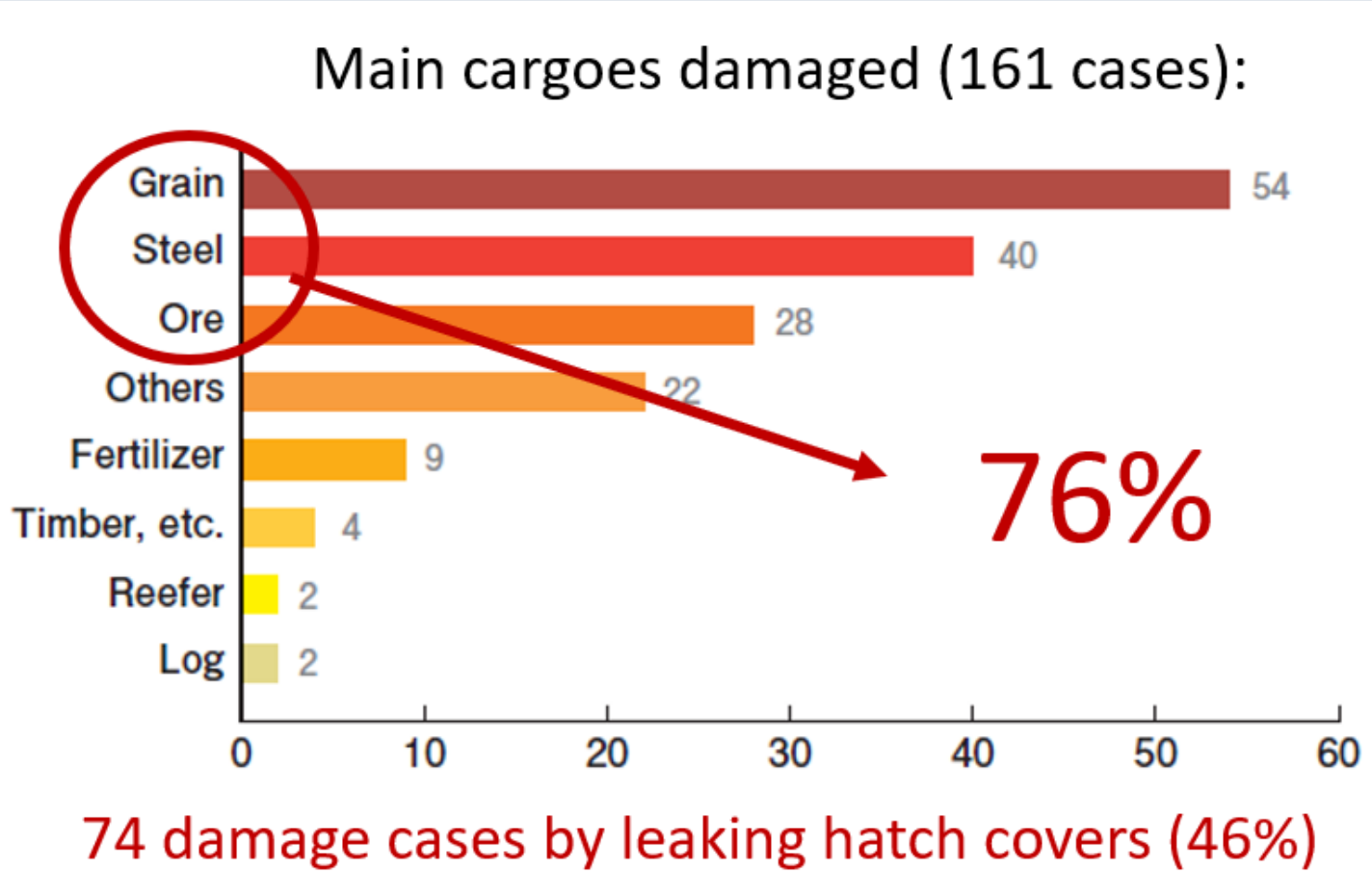


Are hatch covers important?

- World trade & ships
- “Hatch cover” ships
- How many ships
- 25-30 % of worldfleet



Main cargoes damaged



Are hatch covers important? (Food)

- Cargoes damaged:
  - Grain, agricultural products
  - Fertilizer
  - Water sensitive

Are hatch covers important? (Steel)

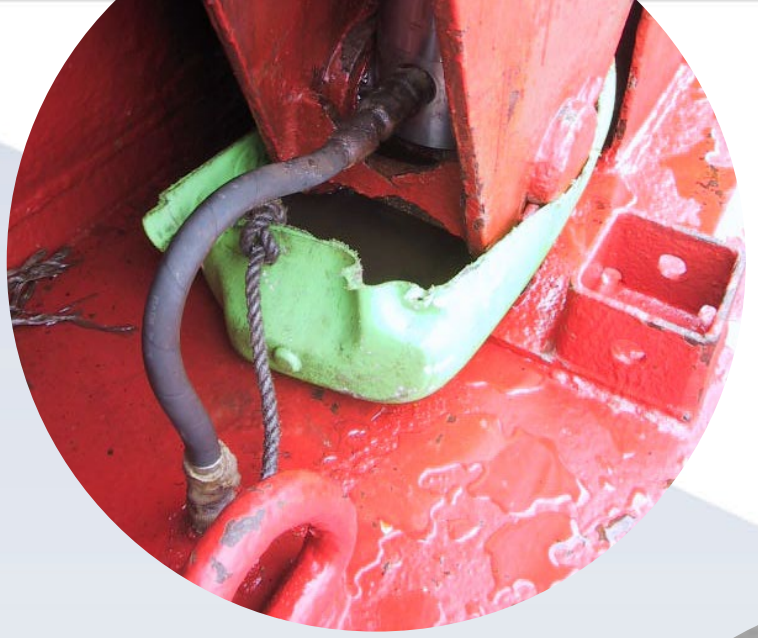
Corrosion:

- Steel & seawater = corrosion
- Cost of corrosion

Are hatch covers important?

- Cost of corrosion:
  - Gross National Domestic Product:
  - EU: 3.8% = 531 Billion Eur/year
  - Marine sector: 20% of every euro we spend for steel and seawater interaction goes to corrosion, corrosion repairs, prevention, maintenance, inspections
  - Underestimation (health, accidents, leakage,…)

Are hatch covers important?



- Planet respected = environment
- Hydraulics
- Small leaks, big problems (pollution, cargo)

Are hatch covers important?

Key Takeaways:

- Number of “hatch cover ships” = 30000 ≈ 25 - 30% World trade = Important
- Most cargoes affected by wetting damage = vital day to day products (food, steel,…)
- Leaky hatch covers → Biggest part of wet damage claims
- Expensive claims
- Impacts shipowner’s business model

Hatch covers are important!

PART 1:

Hatch covers & business model

The owner shall …

The owner’s business model → Shipping cargo from A-B:

- Safely
- Timely
- Environmental friendly
- Carefully (avoid damage to cargo)

The owner shall …

- Requirements:
- …Provide a seaworthy ship which complies with the charterparty description;
- …Properly and carefully load, handle, stow, carry, keep, care for, discharge and deliver the cargo (well maintained hatch covers)
- …Comply with charterers' legitimate employment instructions (Tightness, ventilation, request for Ramnek tape)
- …Prosecute voyages with reasonable dispatch (Spare parts)

The owner shall …

The owner shall …

- Leaking hatch covers affect:
  - Validity of certificates & exemptions
  - Safety risk for ship/crew
  - Suitability for transporting intended cargo
  - Continuation of voyage (EMY repairs, deviation, urgent spare part delivery)

The owner shall …

- Hatch covers = important for business model
    - Revenue: Prevent wetting damage, less claims, image,…
    - Cost: Hatch cover maintenance
    - Business = Balance & manage!!!

The owner shall …

Key takeaways:

- Owners need to present a Quality ship:
    - Compliance with statutory rules/regs
    - Compliance with commercial requirements (suitable for trading cargo)
    - Not making money with sailing but only with successful TRADING!

PART 2:

Rules & Regulations

Rules & Regulations

- Regulations & hatch covers:
  - Not widely known
  - Important (understand legal framework)
  - Responsibility (more than just a claim)
  - Failed test affects:
    - Statutory requirements = Law (maritime)
    - Compliance (Certificate)
    - Commercial requirements (contracts of affreightment)
    - Exemptions (FiFi)

Rules & Regulations

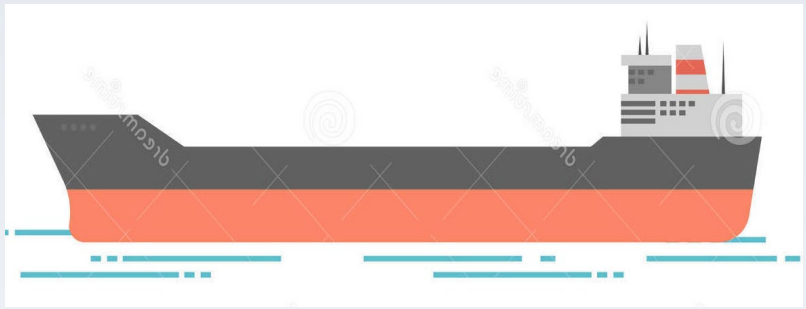
- International Convention on Loadlines:
  - Business model = loading as much cargo as possible
  - ICLL = safety of ship & crew (& cargo)
  - Loadline: Loading limit
  - Freeboard: Reserve buoyancy = safety
  - Hatch covers: Big openings
  - ICLL: “weathertight” in <u>any</u> sea condition.

Rules & Regulations





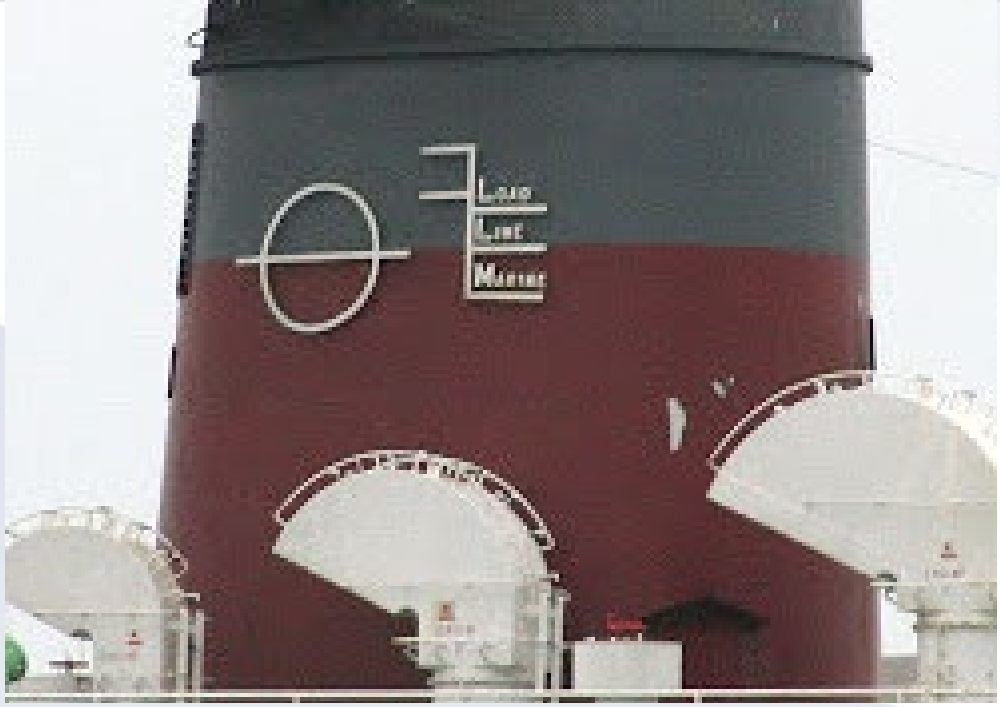


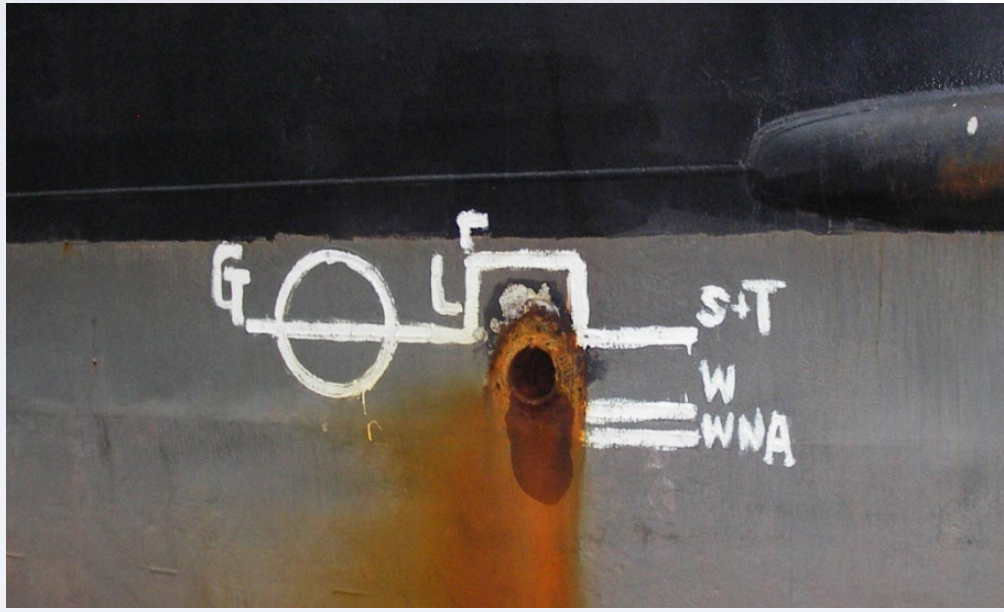



"Weather tight means that in ANY sea condition water will not penetrate into the ship“ (Reg. 3-12). (from the weatherside)

Rules & Regulations

- Logic:
  - If water enters into the ship → weight is added → loadline exceeded → ship is overloaded → reduction of freeboard → enhanced exposure to elements & excessive stresses on the ship's structure → ship can sink





Rules & Regulations

To prevent water ingress from outside into the ship, ICLL requires hatch covers to be:

- Strong
- Tight (not weathertight!!)
- Secured

Rules & Regulations

Hatch covers : SOLAS:

I	Maintenance & repairs
II-2	Efficient firefighting & CO^2
VI	Fumigation
VII	Cargo “Dangerous when wet”
IX	Safety, Accidents, Pollution, Damage (critical?)
XII	Enhanced safety measures for bulk carriers

Rules & Regulations

- Other rules:
  - MARPOL
  - ILO/MLC
  - CSWP
  - Class rules

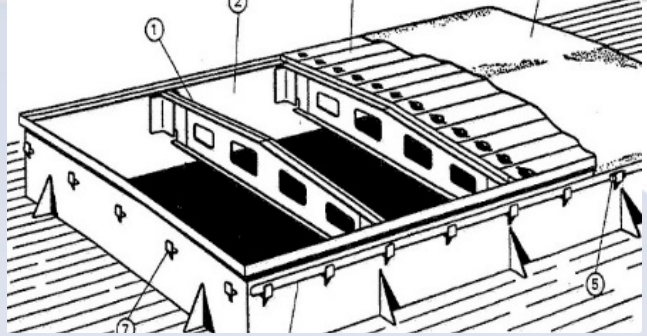
Rules & Regulations

Key takeaways:

- Weathertight ≠ tight (ICLL)
- Leaky hatch covers:
  - Infringement against several statutory instruments = Non-compliance with law
  - Cargo claims = Non-compliance with industry requirements/contracts
  - Invalid certificates (Class, statutory, P&I, H&M) (seaworthiness)

PART 3:

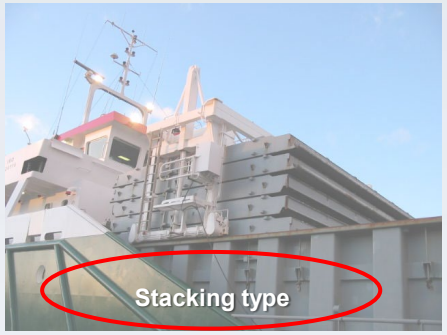
About hatch covers

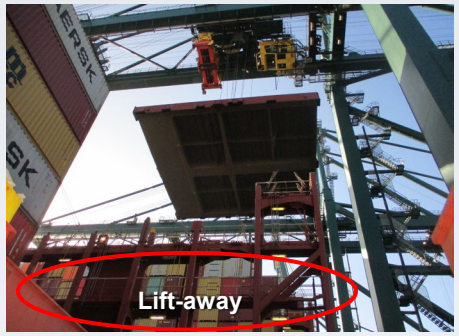


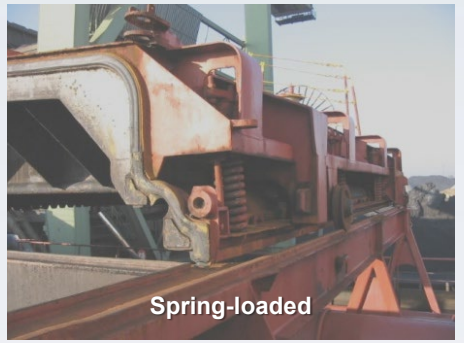
About hatch covers

- <1850: Small hatch ways (2x4m), wooden boards & tarpaulins
- 1850 – 1900: Different constructions (web beams, longitudinal configuration)
- Industrial revolution & increase in demand → different types of ships = different types of hatch covers

About hatch covers







About hatch covers

Making hatch covers = Complicated!

- Hatch way dimensions
- Available deck space for stowing the panels
- Available stowage height for panels
- Required coaming height
- Required extent of opening
- Type of operation (opening and actuating mechanisms)
- Available power, required opening/closing time,
- Available crew, time to prepare for departure…
- Repair possibilities (shore specialists/ship's crew, spare part availability)…

About hatch covers

...Making hatch covers = Complicated!

- Carriage of cargo on hatch covers
- Required degree of tightness
- Cost (min – max scantling, steel price,...)
- Required/Max. panel weight (ship's gear, shore gear,...)
- Construction type (open web, double skin,..)&required fittings (cleats, packing,..
- Trading pattern (warm/cold, tropical rainshowers/speed of closing)
- Alternative components = dimensions and performance same as original component.

AND.... HATCH COVERS HAVE TO BE TIGHT IN ANY SEA CONDITION (ICLL)!!!

About hatch covers

Key takeaways:

- Different types for different ships & trades
- Many criteria to consider & to maintain tightness in ANY sea condition
- Fine pieces of engineering
- Jigsaw puzzle: many pieces & tight fit – mm work

PART 4:

Hatch covers, how do they work ...

Hatch covers, how do they work …

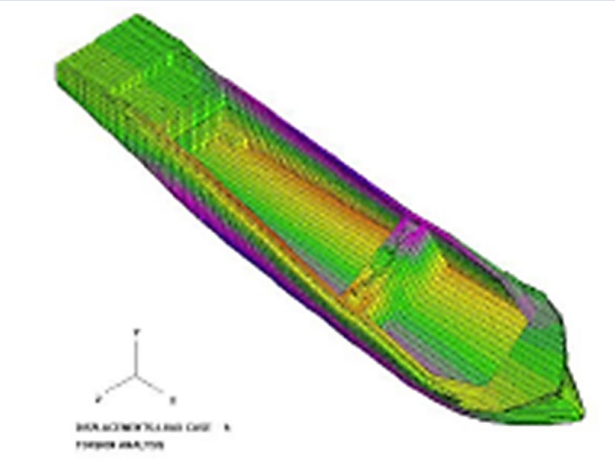
Cookie box principle:

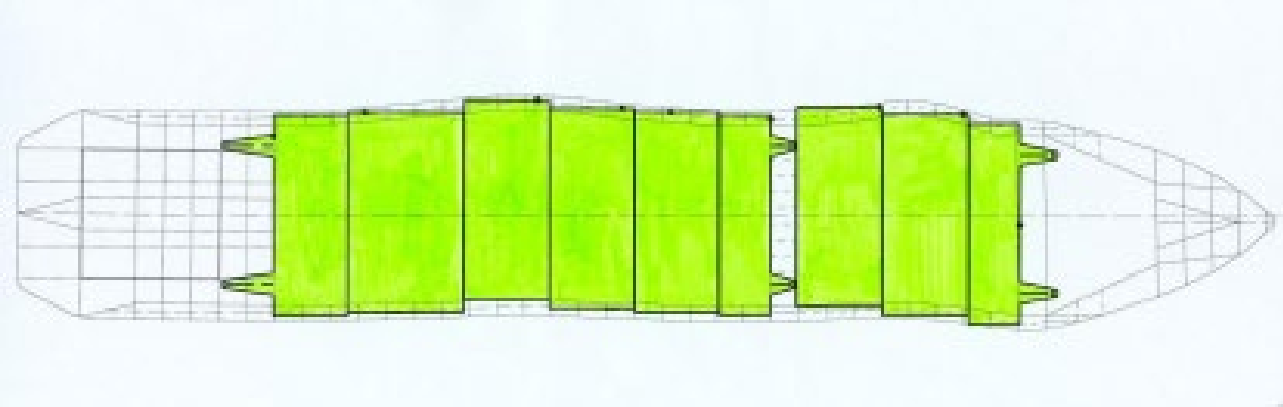
- Closed v/s Open
- Rigid v/s Flexibe

Closed

Open

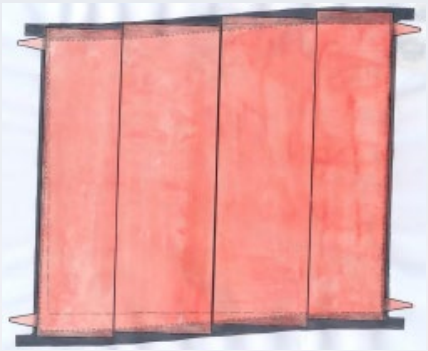
Hatch covers, how do they work …

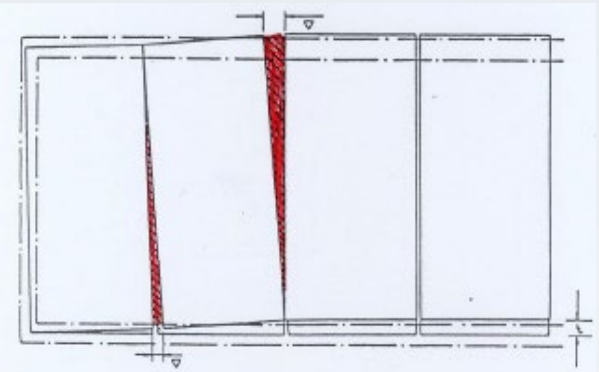




Relative movement between coaming and hatch covers (hull deflections)

Hatch covers: rigid
Ship is flexible

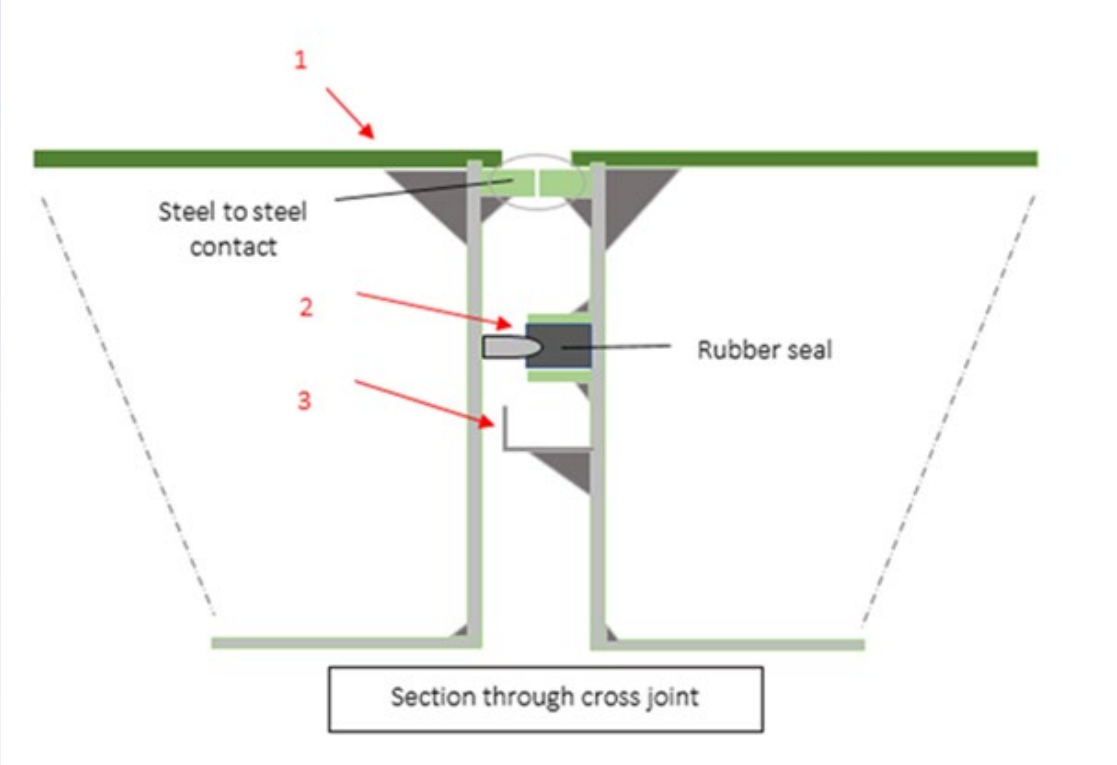


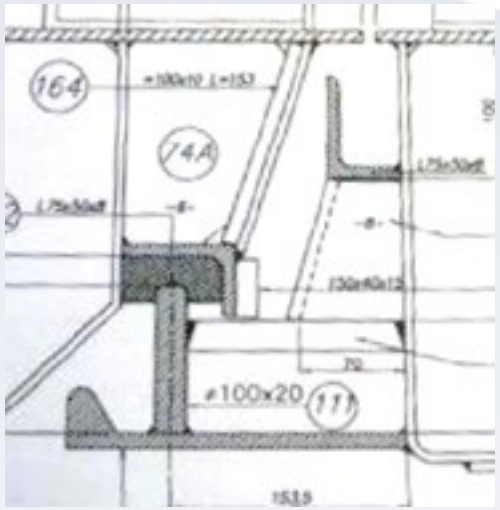


Bing Videos

Hatch covers, how do they work …

- ICLL: Keeping water out in ANY sea condition
- 3 safety barriers
  - Panel plating
  - Sealing system
  - Drain





Hatch covers, how do they work …

- Hatch covers
  - Ship's Hull – Hatch covers → Relative movements
  - Flexible medium to compensate for relative movements (Rubbers)
  - Flexibility & compression in rubber packing needs to be maintained to ensure a tight seal during the relative movements
  - Design compression needs to be respected
  - Relative movements to remain between compression limits
  - Need for KEY PARTS

Hatch covers, how do they work …

Key takeaways:

- Ship is flexible, hatch covers are rigid
- Hatch covers move relative to the coaming and each other
- 3 safety barriers: Panels – Rubber packing & Drain channel
- Role of the packing rubber: compensate relative movements
- Role of other parts: support packing rubber (remain in contact with compression bar) – maintain the tightness status whilst the ship is at sea.

PART 5:

Hatch cover key parts

Hatch covers, how do they work …

Different types of hatch covers but 10 Key component parts:

- Panels
- Locators
- Bearing pads
- Stoppers
- Packing rubber
- Compression bars
- Securing mechanism
- Drains
- Coaming
- Opening/closing systems

“Hatch covers is more than packing rubbers alone. Changes to one part can lead to changes in other component parts – all needs to fit and be correctly balanced”

Hatch cover key parts

No inspection without measuring

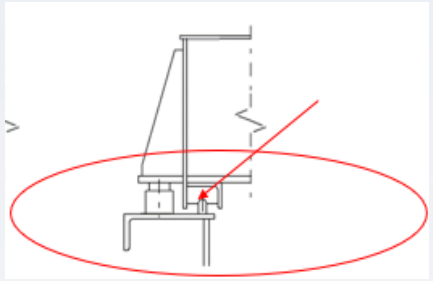
No inspection without manual & drawings

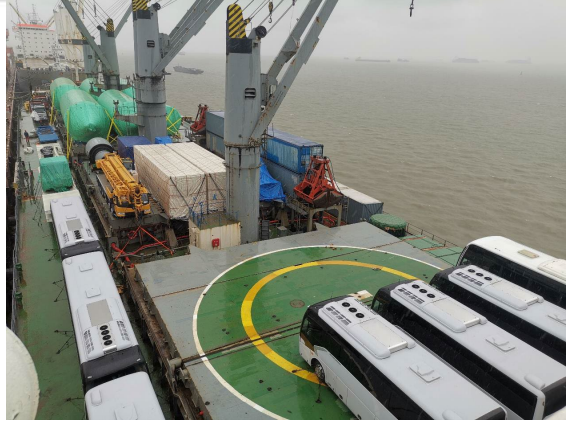
Panels

- Keep most of water out
- Structural integrity/strength
- Deformations
- Repairs (temporary)

Bearing pads

- Design compression (vertical)
- Taking up panel load
- Free movement
- Correct steel surfaces/grades
- Skirt clearance – Measures!

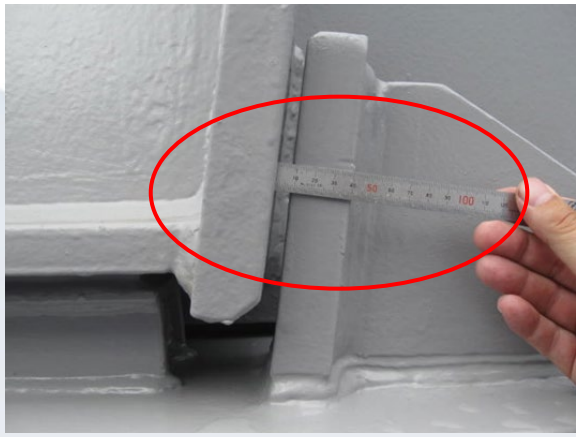




Locators

Positioning of panels

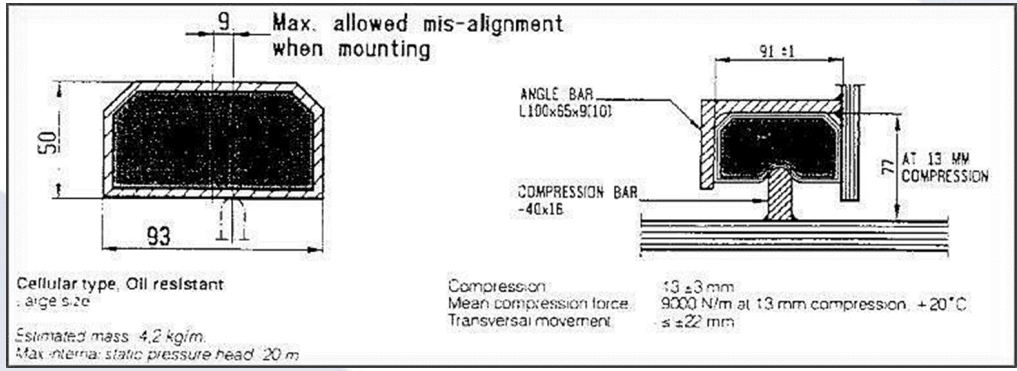
- Geometry
- Controlling packing rubber line pressure in cross joint
- Small clearance (avoid taking up forces from hull girder)
- Measure (2mm)



Stoppers

- Limit panel movement as result from ship movement
- Absorb accelleration forces
- Measures!

Packing rubbers

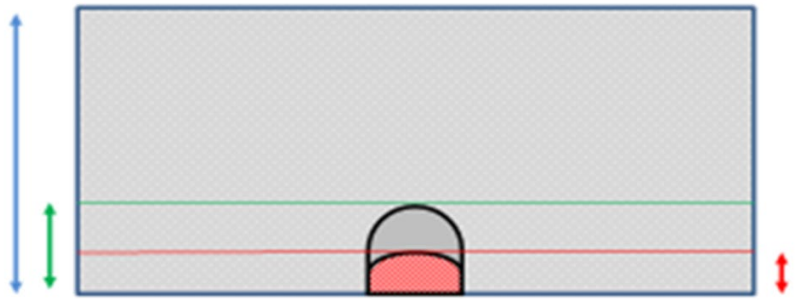


- Various types
- Compensating relative movements panel/coaming
- Design compression (mm!!)
- Flexibility
- Physical damage (cuts, gaps, permanent set,…)
- Showing symptoms, not the cause

Rubber size: 70 x 40

Design compression: 25% of thickness = 10mm

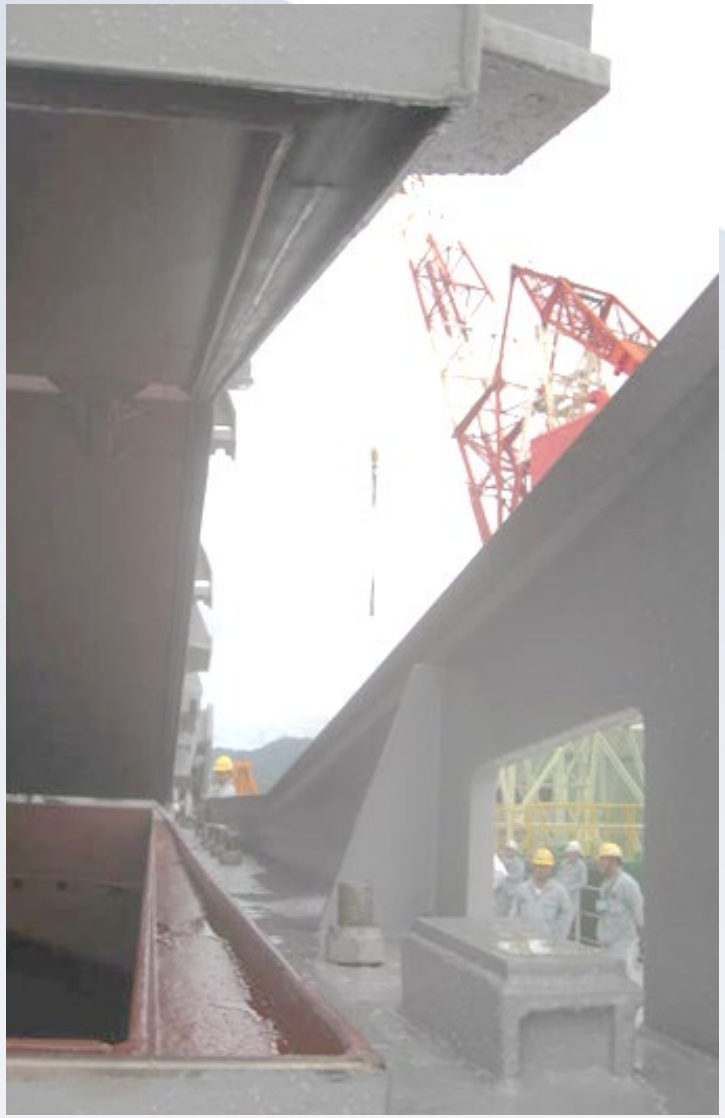
Discard criteria: 50% of design compression = 5mm



Packing rubbers

Compression bars

- Mating surface for rubber
- Round shaped v/s flat steel mating surface
- Strong
- Straight
- Smooth



Compression bars

Securing mechanisms

- Various types
  - Manual (short – long rod)
  - Automatic (hydraulic, torsion bar, …)
  - Holding down devices
- Strength
- Alignment
- Flexible (relative movement of panels)

Securing mechanisms

Drains

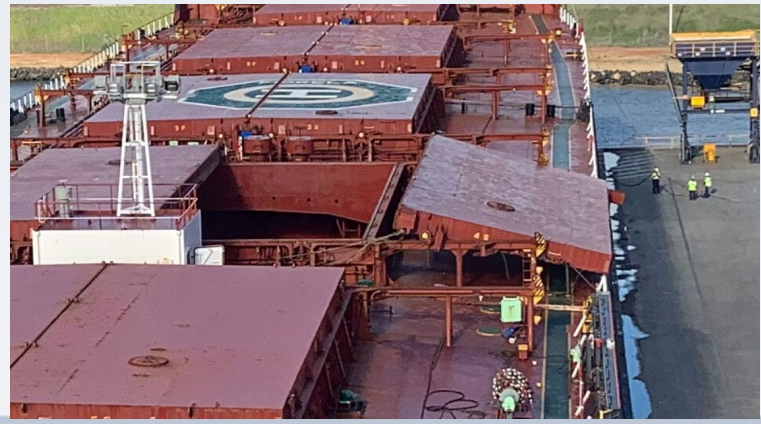
- Weathertightness & last safety barrier
- Fire & fumigation
- Firecaps
- Drain channel & valves free
- Drain channel free of damage
- Fire hose is only temporary

Coaming

- Longitudinal strength
- Supporting important parts
- Structural integrity
- Plating
- Table
- Brackets

Opening/closing mechanisms

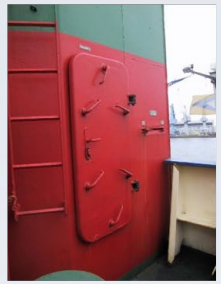
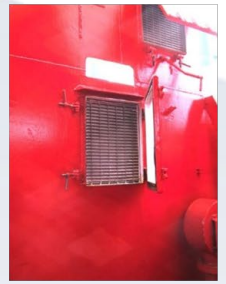
- Speed
- Safety
- Pollution
- Damage
- Bad practice (see manual)



Other openings

- ICLL
- Openings that allow water into ship
- Structural integrity
- Tightness
- Securing arrangements & safety





Hatch cover key parts

Key takeaways:

- 10 key parts (tightness & operation)
- All important
- To measure is to know!
- Manual & drawings
- Correct reporting - Avoid “satisfactory”, “operational”, “in good order for age”, … in reports – Use parameters and criteria instead

PART 6:

Hatch covers weathertightness & tests…

Hatch covers weathertightness & tests…

- Loadline requires **weathertightness**:
  - Strong
  - **Tight**
  - Secured
- **Regular tests** to confirm hatch covers are weathertight
- Which tests??

HOSE TEST

SMOKE TEST

LIGHT INFILTRATION TEST

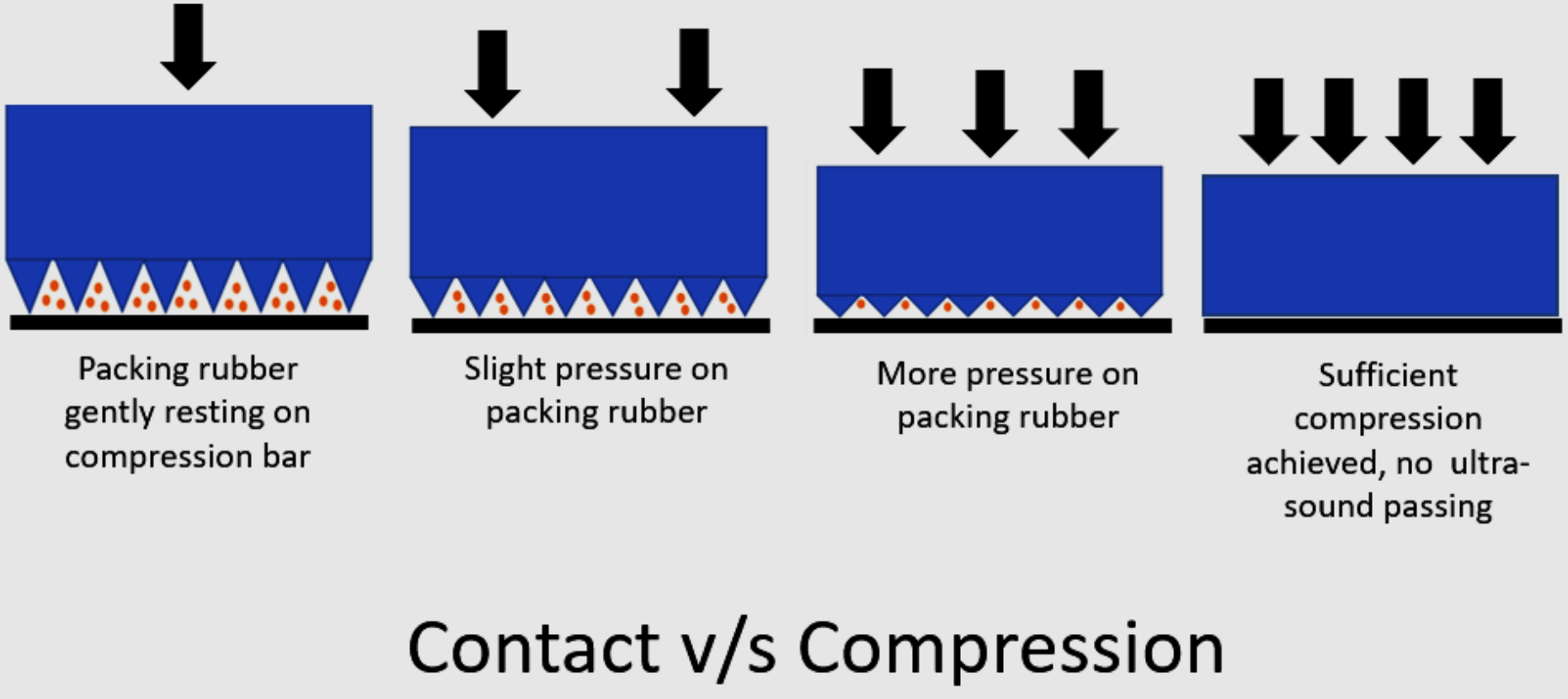
CHALK TEST

PAPER TEST

VISUAL INSPECTION

ULTRASONIC TEST

Ultrasonic tightness testing...



Ultrasonic tightness testing…

- Why is rubber packing compression so important?
  - Relative movements & compensation by packing rubber
  - Tight seal = continuous contact between rubber - compression bar
  - Rubber packing: quick response to relative movement → compression force
  - Problem with old packing rubber:
    - Deformed (permanent imprint) = less reaction force
    - Slow response

Risk for Leakage

Ultrasonic tightness testing…

- Advantages:
  - One man operation (observe safety!)
  - Evaluating importance of leak (10% OHV)
  - No pollution risk
  - No limitations by temperature/weather
  - Pinpoint accuracy
  - Quick & easy
  - Holds can be loaded/empty
  - Compression measured/fail pass criteria can be set/enhanced safety
  - Report generated in a few seconds
  - Qualified operator

Ultrasonic tightness testing…

- Key takeaways:
  - Different testing methods (each with different benefits)
  - Ultrasound = preferred
  - If Ultrasonic test in port is OK, this means that;
    - Packing rubber compression is OK
    - Packing rubber will properly respond to relative movements when at sea
    - Packing rubber will always be in contact with the compression bar = tightness OK
    - If visual inspection is OK then hatch covers are weathertight
    - **Hatch covers will keep the ship & crew safe & cargo dry**

PART 7:

Claims

Claims: Ultrasonic tightness testing

- **Passing ultrasonic inspection does not necessarily mean that the hatch covers are fit for duty and/or weathertight. WHY???**
  - Strength/structural issues
  - Securing issues
  - Positioning/allignment of panels
  - Incorrect operation…

  …which can only be checked during a visual inspection

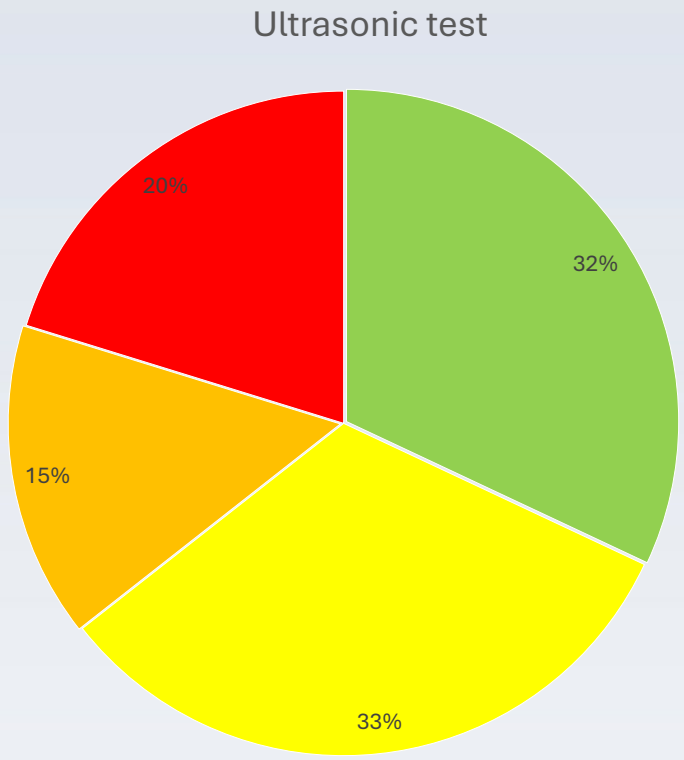
Claims

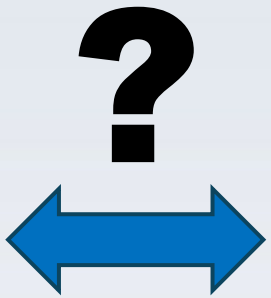
- Wetting damage claims in disport after good US test in loadport?
  - If US is the best and most stringent test, how is this possible?
  - US test = not good???
  - Surveyors asked to do an US test only instead of a full inspection (class rules)
  - DNV states: no readings > 10% OHV = weathertight subject to a **visual inspectior**

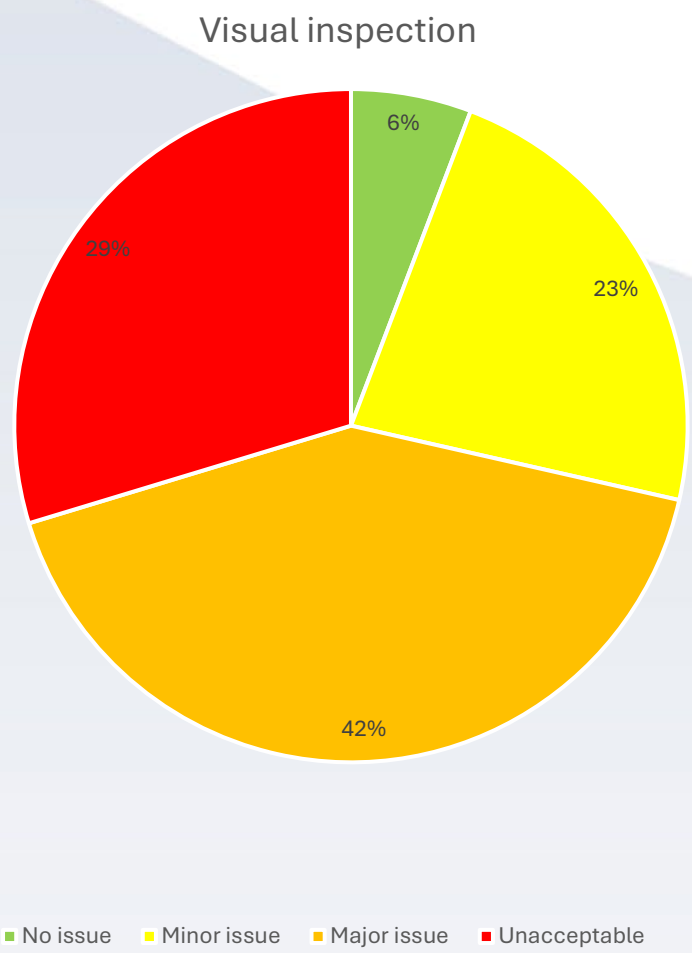
Claims

- Wetting damage claims in disport after good US test in loadport?
  - Full inspection is too expensive, too complicated, time consuming
  - Perception is: US difficult to pass, so if you pass hatch covers must be good.
  - No visual inspection asked & not carried out
  - Impossible to conclude hatch covers are weathertight without visual inspection
  - Problem = improper instructions

Claims: Statistics

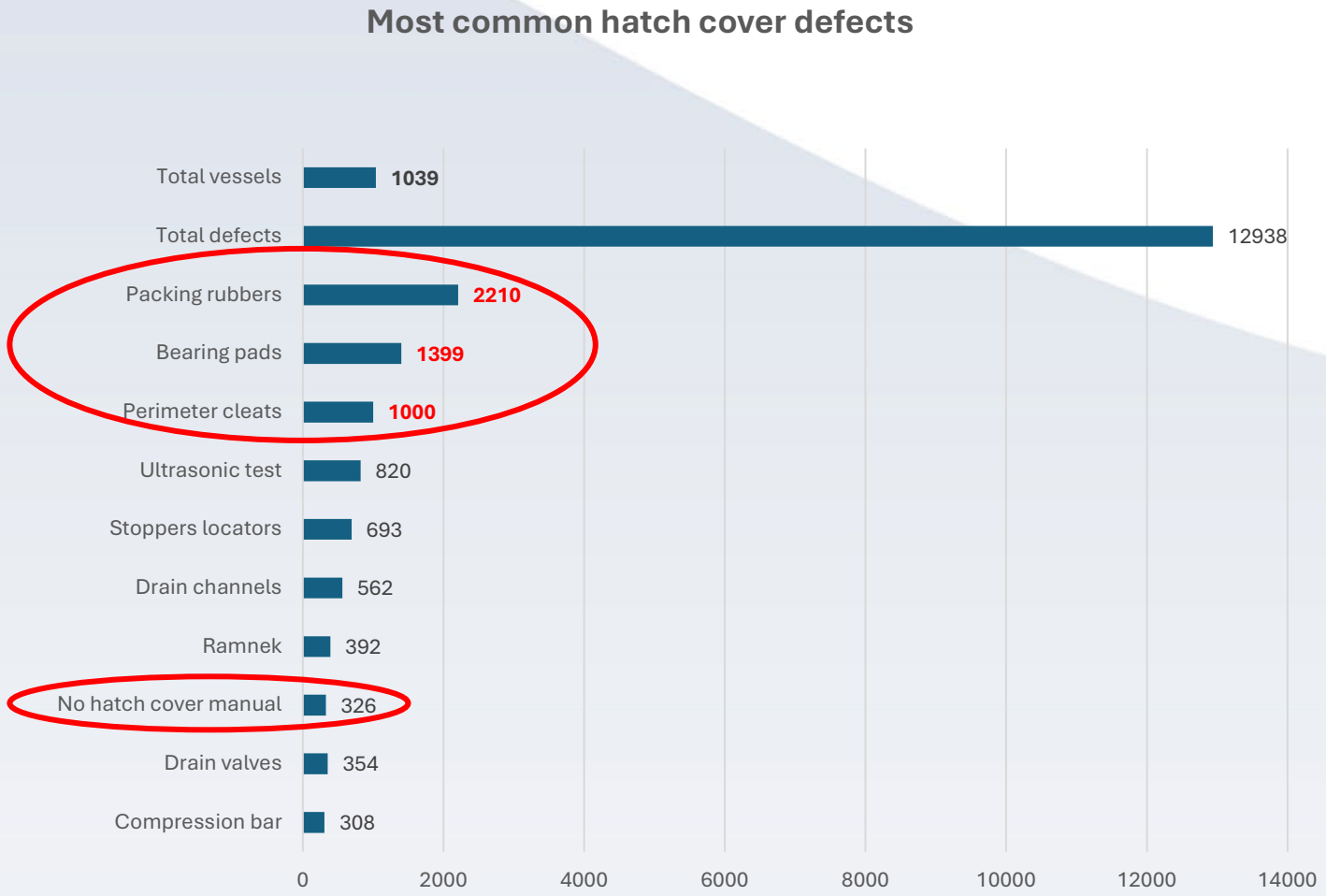






Claims: Statistics

- 12 defects / ship
  - Mainly key parts
  - 32% no manual:
    - Inspection?
    - Maintenance?
    - Spares?



Claims: Statistics

Key Takeaways:

- Hatch covers to be regularly tested (correctly)
- Results have to be correctly evaluated
- Weathertightness = Test (tightness) + visual inspection
- Do your ships pass the test and inspection?
- Sure???

PART 8:

Due Diligence

Proving due diligence

- Work schedules
- Maintenance logs & test reports
- Work specifications
- Accounts
- Standing instructions
- Reports and correspondence
- Logbook entries
- Hatch patentee manual

- Holding valid (relevant) certificates
- Evidence of planning voyage
- Proof of operating the ship in a good/seamanlike manner during the voyage (C/C, RPM)
- (Part of documentation to be o/b as part of Owner's SMS and/or required by CSWP or IACS Rec 14)

DUE DILIGENCE

Key Takeaways:

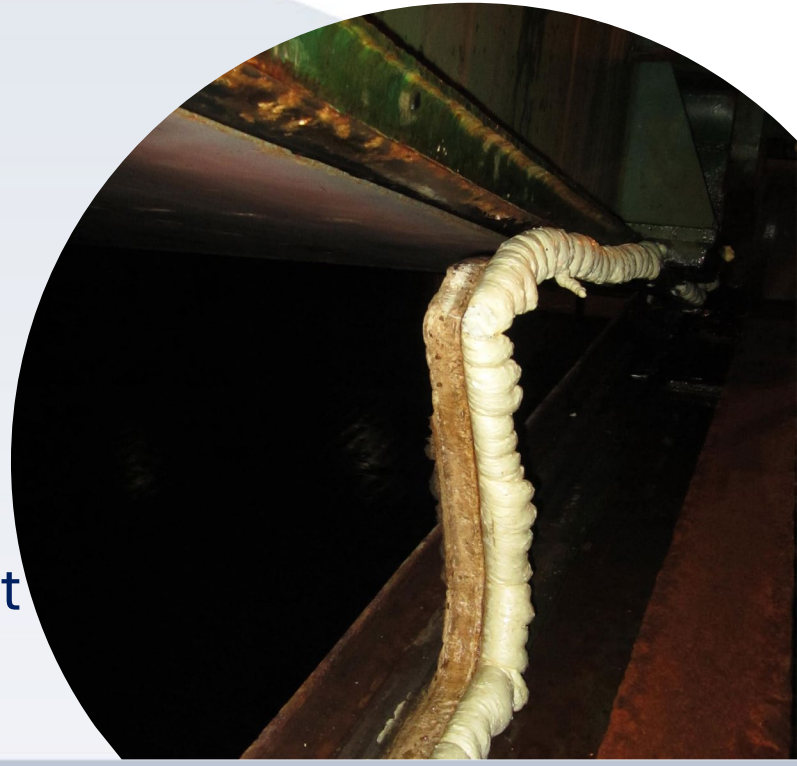
- Defending claims requires due diligence from ship owner
- ICLL: Strength – tightness – securing = weathertight!
- US test: Tightness testing = Testing seal and compression only
- Visual inspection:
  - Checking all parts that contribute in achieving tightness (proper maintenance = due diligence)
  - Ensuring that weathertight integrity can be maintained during voyage
- **Only US test results + visual inspection → weathertightness**

PART 9:

Extra sealants

EXTRA SEALANTS

- Use of extra sealants in case of leakage:
  - No substitute for proper repairs
  - Lack of due diligence
  - Can be washed away/become damaged during transit
  - Prima facie evidence that hatch covers were leaking
  - Owners to prove that hatch covers were in order (test & visual inspection)



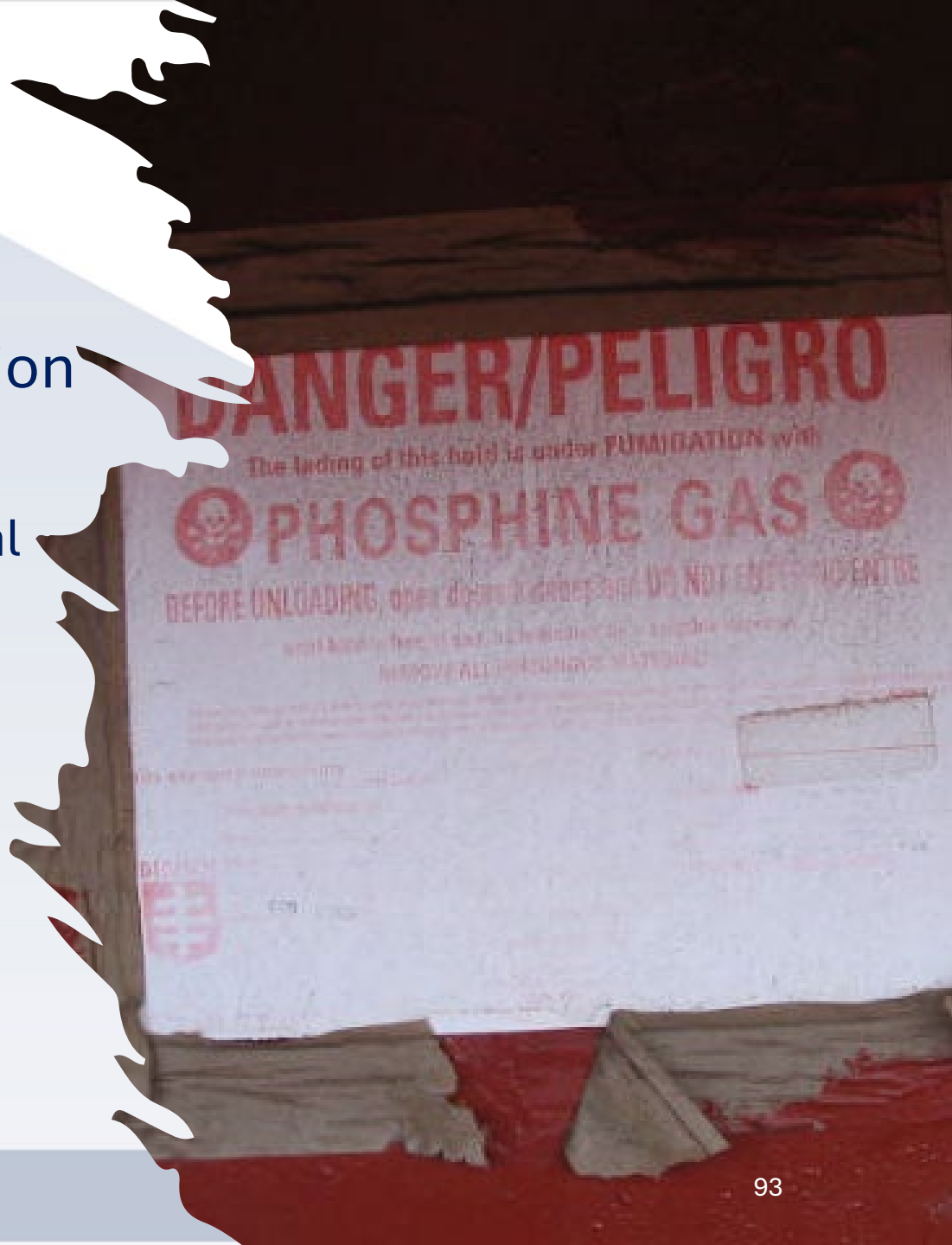
EXTRA SEALANTS

- Use of sealants as extra precaution:
  - Not necessary if hatch covers are well maintained
  - Not unreasonable request but risky in case of water ingress
  - Inspect and test hatch covers before applying sealants
  - Ensure all is OK prior to using sealants
  - Make entry in logbook (state @ Charterer’s request)

EXTRA SEALANTS

Use of extra sealants in case of fumigation

- Prevent leakage of fumigation gas
- Hatch covers to be weathertight (test & visual inspection)
- Then applying sealing tape to make hatch covers gastight
- Sealants are there to improve safety (not as temporary repair)
- Still accidents as result from contact with fumigation gases



EXTRA SEALANTS

- Risks:
  - Sealants can be damaged/washed away (risk of leakage)
  - Removing sealants is time consuming & will cause paint damage
  - When not properly removed there will be evidence that sealants were used in the past and raise suspicion
  - Also remnants can prevent proper closing

EXTRA SEALANTS

- Key takeaways:
  - Sealants are not necessary on well maintained hatch covers
  - No substitute for proper repairs
  - Can be used as evidence of lack of due diligence
  - Only to be used when hatch covers are free of defects/leaks
  - Paint damage to panels after removal
  - Can prevent proper closing/sealing afterwards

PART 10:

Common mistakes:

Common mistakes

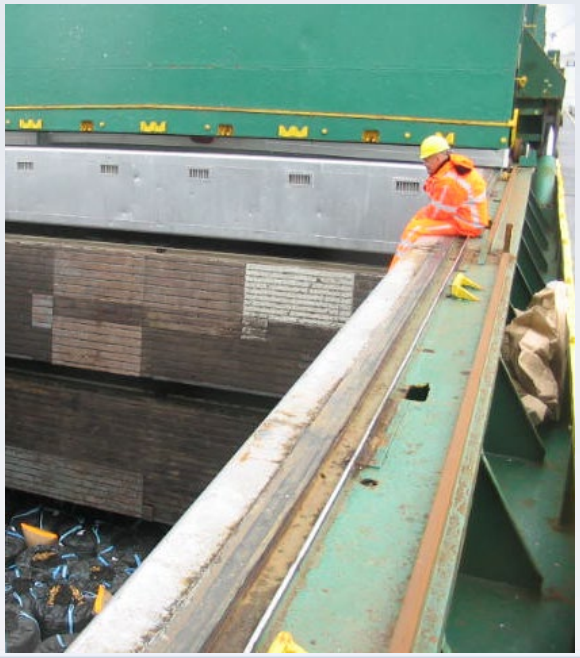
- Insufficient hatch cover knowledge (inspection & reporting)
- Doing everything to pass US test & start loading
- Overestimating the capability of the ship’s crews for repairs
- Manufacturer’s service engineers & spare parts are too expensive
- Not involving class
- Improper temporary repairs by crew (no due diligence)
- Missing manual/drawings
- No on-board instructions for maintenance

Common mistakes

- No maintenance files on board (PMS)
- Hatch covers not included in SMS (critical equipment)
- No understanding of the due diligence principle/issues
- Hatch covers heavy/strong pieces of equipment→ not much attention needed
- Just in DD & ICLL renewed, no claims during last voyages so all ok & no problem
- Leakage = always rubber problems & rubber repairs first = Wrong!!
- No claims last 6 months → all is ok

Common mistakes

- Incorrect spare parts (non-original packing rubber/compression force)
- Improper preparation of the retaining channel before rubber replacement
- Only considering US test results to confirm weathertightness
- **Ramnek & sealing foam (leaks/extra precaution)**
- **Ramnek, sealing foam (fumigation)**
- Use of vaseline
- Switching off US transmitter during test



- Finally, do not forget:
  - Ship safety
  - Crew safety
  - Accidents
  - Pollution

IMCS Hatch Cover Gurus

- Inspections & testing
- Pre-docking & Pre-charter inspections
- Tailor made/ship specific checklists
- Development of tailor made test reports
- Hatch cover training
  - Level 1&2
  - Games (Iphone & Android) & certification
  - CBT
- Consultancy & guidance
- On-line advice on hatch covers

IMCS® TRAINING ACADEMY

IMCS bv

Walter Vervloesem (FNI-Sen. VP)

https://imcs-training.eu/

walter@imcs.be

Noorderlaan 79, bus 6
2030, Antwerp
Belgium