WELCOME!!

1

WELCOME

- Delays
- Stevedores loss of output
- Storage issues (damaged cargo)
- Separating of damaged cargo
- Loss of cargo
- Reconditioning of cargo
- PSC attention
- Legal costs
- Unsatisfied customers
- P&I cover under pressure
- Unscheduled repairs to hatch covers to be carried out

EFFICIENT??

2

WELCOME

- 30% of claims due to wetting damage
- Lack of knowledge
- Improper maintenance and inspections give false sense of security
- Wrong info & no claims give owners/managers the idea that all is ok
- Surveyor = idiot and a pain
- Claims continue

LET'S TALK!!

3

ALANDIA

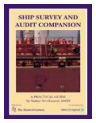
HATCH COVER SEMINAR

HATCH COVER INSPECTIONS, MAINTENANCE AND REPAIRS

Safeguarding the owner's interest

4

AGENDA



W. Vervloesem (FNI)

- Chairman of IMCS Group of Companies Ltd (UK) – 19 offices.
- MD of IMCS Training Academy
- Vice President Nautical Institute
- Chairman NI Belgian Branch
- Ex Chief Officer (reefer, gen. cargo, container & LPG)
- Working as marine surveyor since 1989

Specialist fields:
P&I related surveys, Ship inspections (P&I, H&M, S&P, Flagstate), ISM (lead – auditor), Hatch Cover inspections, Containers, Lashing & Securing of heavy lifts.

Publications: major reference works all published by the Nautical Institute

- Ship Survey and Audit Companion
- Hatch Cover Inspections
- Mooring & Anchoring Ships – Vol 2
- Co-author of "The Nautical Institute on Command"

Training:
Instructor for the SDT-IMCS hatch cover training course since 2001
Manager Marine applications for SDT International (Belgium).

5

AGENDA

Hatch covers and...

- History
- Maintenance
- Need for training
- Claims
- Loadline
- Weathertightness & watertightness
- Design
- Hull distortions
- Cookies
- Safety barriers
- Key parts
- US testing
- Inspection
- Sea/Cargoworthiness
- Rules and regulations
- Due dilligence
- ISM
- Case stories & Common mistakes
- Q&A

6

HATCH COVERS AND...HISTORY

- 75% of the world is covered by water
- People have been sailing since prehistory

7

HATCH COVERS AND...HISTORY

Since prehistory till now:

- Using ships to trade cargo
- From basic designs to high tech ships

8

HATCH COVERS AND...HISTORY

<1850:

Small hatch ways (2x4m),
wooden boards & tarpaulins

1850 – 1900: Different constructions (web beams, longitudinal configuration)

9

HATCH COVERS AND...HISTORY

1929: The first ever steel hatch covers were introduced and patented by the brothers Robert and Joseph MacGregor - MacGregor & Company

1941: Prototype single pull hatch covers & further development

10

HATCH COVERS AND...HISTORY

1965: Many ships fitted with steel/gasketted hatch covers

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HATCH COVERS AND...HISTORY

1965 – 2005:
Further research, fine tuning, development of different designs, closing and securing appliances.

Single pull

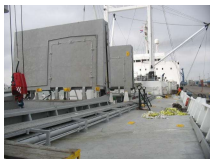
Side rolling

Folding & Multi-Folding

Piggy-back

Stacking type

Lift-away



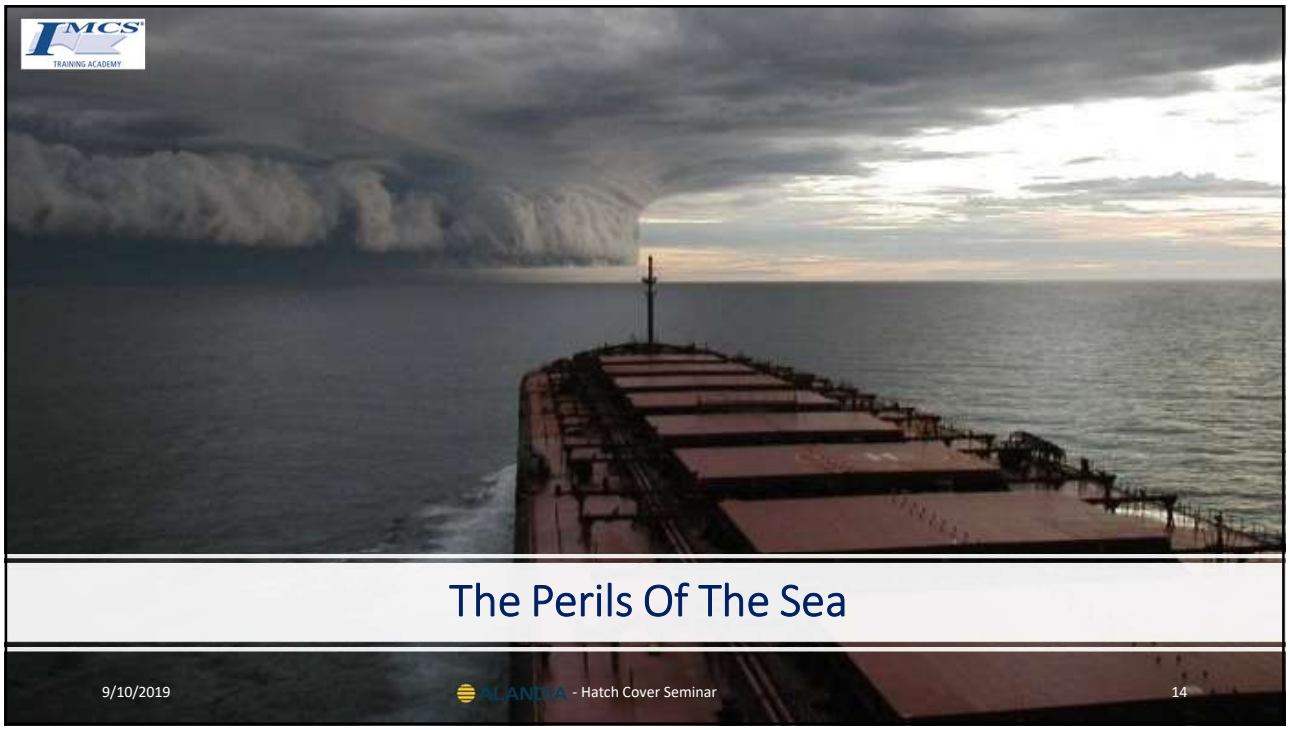
Reefer

Spring-loaded

12

Throughout history, ships had to face …

13



14

HATCH COVERS AND…MAINTENANCE

- Hatch covers can weigh up to 100MT, but their proper operation depends on tolerances and clearances in range of mm

- Whatever type of hatch covers/closing appliances we are dealing with, they all have one thing in common:

When not well designed, properly maintained and operated by trained personnel, they are all vehicles for (commercial) disasters such as:

15

CARGO DAMAGE

9/10/2019

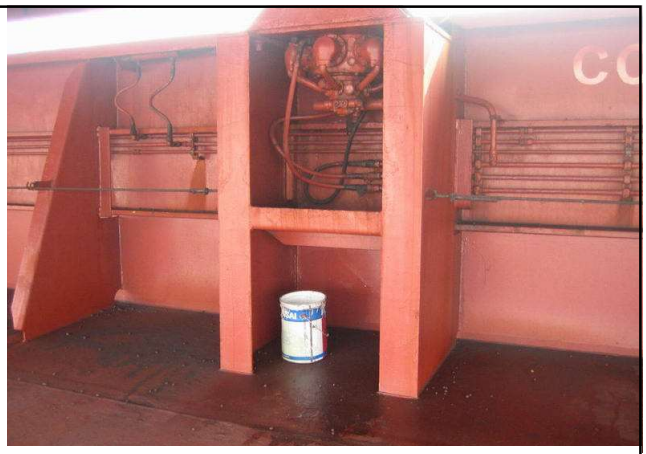
16

But also …

17

ACCIDENTS

18



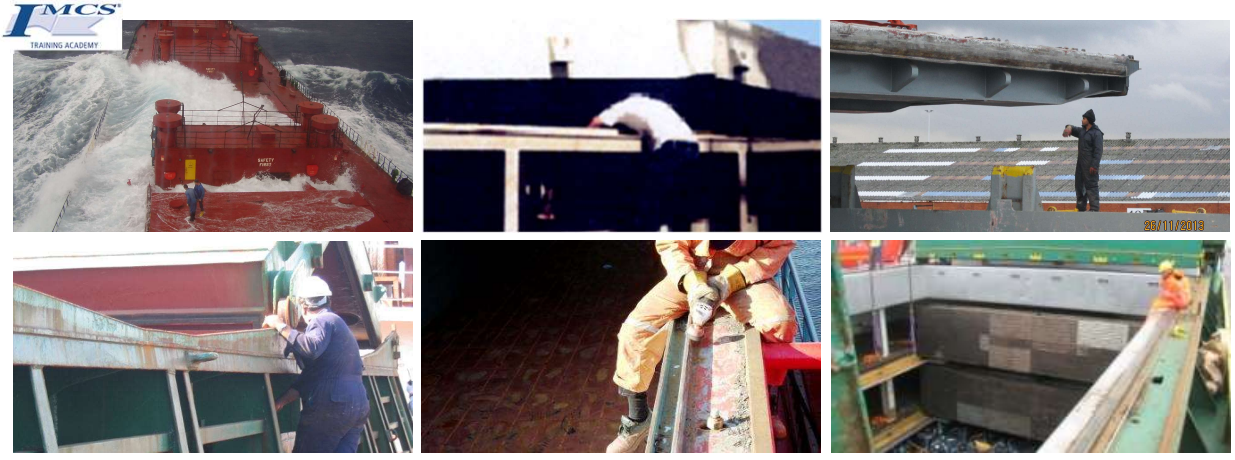
POLLUTION

19

HATCH COVERS &...NEED FOR TRAINING

- Raising awareness and training about:
  - Hatch cover maintenance & repairs
  - Safety issues
  - Good working practice

20



HATCH COVERS &...NEED FOR TRAINING

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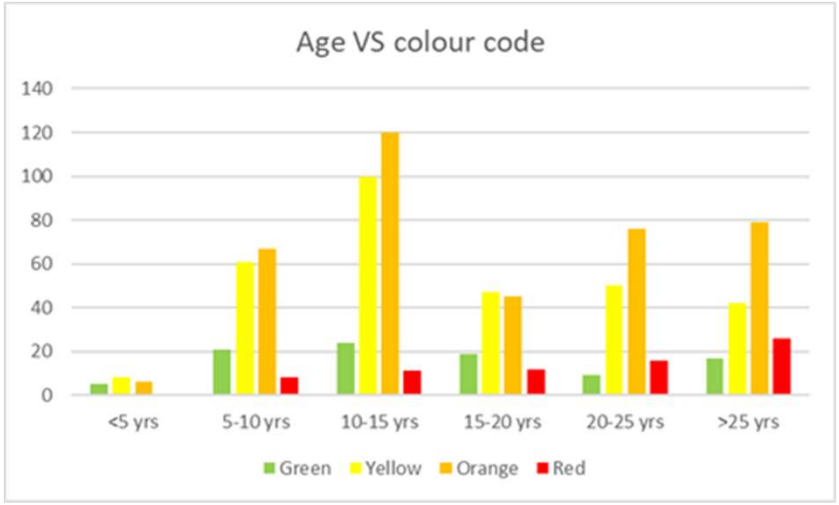
HATCH COVERS AND...CLAIMS



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HATCH COVERS AND...CLAIMS

- 90% of the world trade is done by ships
- There are in total approx. 90,000 merchant ships

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

Ship Type	Small[1]		Medium[2]		Large[3]		Very Large[4]		Total	
General Cargo Ships	4,317	12.8%	11,691	29.9%	238	2.0%			16,246	17.9%
Specialized Cargo Ships	8	0.0%	237	0.6%	68	0.6%	5	0.1%	318	0.4%
Container Ships	19	0.1%	2,256	5.8%	1,527	13.0%	1,400	23.2%	5,202	5.7%
Ro-Ro Cargo Ships	29	0.1%	648	1.7%	581	4.9%	235	3.9%	1,493	1.6%
Bulk Carriers	313	0.9%	3,786	9.7%	5,945	50.5%	1,704	28.2%	11,748	13.0%
Oil and Chemical Tankers	1,904	5.6%	7,043	18.0%	2,642	22.4%	1,842	30.5%	13,431	14.8%
Gas Tankers	36	0.1%	1,128	2.9%	351	3.0%	464	7.7%	1,979	2.2%
Other Tankers	388	1.1%	663	1.7%	11	0.1%			1,062	1.2%
Passenger Ships	3,973	11.8%	2,734	7.0%	271	2.3%	177	2.9%	7,155	7.9%
Offshore Vessels	2,686	8.0%	5,324	13.6%	123	1.0%	205	3.4%	8,338	9.2%
Service Ships	2,599	7.7%	2,601	6.6%	26	0.2%	7	0.1%	5,233	5.8%
Tugs	17,480	51.8%	1,030	2.6%					18,510	20.4%
Total	**33,752**	**100%**	**39,141**	**100%**	**11,783**	**100%**	**6,039**	**100%**	**90,715**	**100%**

Source: Equasis [1] GT<500 - [2] 500≤GT<25.000 - [3] 25.000≤GT<60.000 - [4] GT≥60.000

HATCH COVERS AND...CLAIMS

- ~35% (28,000 ships) of world trade is done by general cargo ships and bulk carriers (= hatch cover ships)
- Many others also rely on tightness of smaller hatches, doors, ports, ...

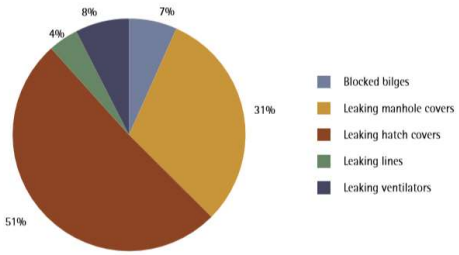
HATCH COVERS AND...CLAIMS

- 9814 : 1 - 4 years old
- 14369: 5 - 14 years old
- 6396 < 15 - 24 years old
- 9814 > 24 years old
- Ships > 15 years (16210) generally have more serious defects and therefore a higher claim potential.

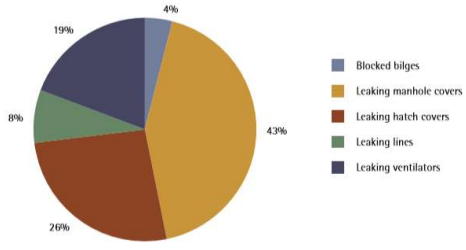
HATCH COVERS AND...CLAIMS

- Approx. 25-30% of the claims for wetting damage to cargo carried on board of dry cargo ships is caused by wetting damage
- Major part of this wetting damage is caused by leaking hatch covers

Graph No 1 - Total number of claims



Graph No 2 - Total cost of all claims (excess of deductible)



HATCH COVERS AND...CLAIMS

- Since 1965, claims as a result of wetting damage remained steady on 20-30% (cost)
- Since then,
- BUT….

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HATCH COVERS AND...CLAIMS

- …we failed to eradicate hatch cover problems!

≠

- $HC=(B + L)^2 + M$
  HC = Hatch Covers
  B = Basics
  L = Logic
  M = Maintenance

BACK TO BASICS!

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HATCH COVERS AND...LOADLINE

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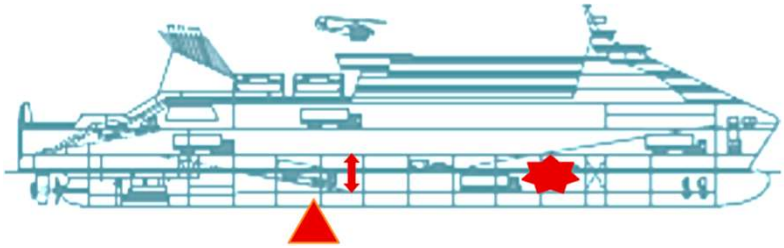
HATCH COVERS &...LOADLINE

- Compliance with ICLL requires hatch covers to be weathertight.
- *"Weathertight means that in any sea condition water will not penetrate into the ship:*

  FROM THE WEATHER SIDE!!!
- *Watertight means that water will not be passing through the sealing arrangements from both directions across the seal" (under a certain head of pressure)*



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HATCH COVERS &...LOADLINE

- Loadline & Weathertight hatch covers:
  - Keep water out in any sea condition
  - Proper securing of hatch covers (Loadline)
  - Strength
  - Tests

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HATCH COVERS &...LOADLINE

- Wateringress via hatch covers, doors, vents, airpipes etc....
- Wateringress into the ship = extra weight
- Extra weight = exceeding the loadline
- Exceeding loadline = reduced freeboard/reserve buoyancy/safety
- Exceeding loadline = breach of statutory requirement
- Exceeding loadline = breach of law

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HATCH COVERS &...LOADLINE

Making hatch covers that comply with ICLL criteria = Challenge!

- "Keeping water out in any sea condition"
- Dealing with elements (wind/sea)
- Ship type & matching hatch covers

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HATCH COVERS AND...DESIGN

Hatch cover design = complex:

- Hatch way dimensions
- Available deck space/stowage height for stowing the panels
- Required coaming height, extent of opening
- Type of operation
- Repair possibilities
- Carriage of cargo on hatch covers
- Required degree of tightness
- Cost
- Required/Max. panel weight
- Construction type & required fittings
- Trading pattern

… and taking into account…

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HATCH COVERS AND...HULL DISTORTION

Hogging & sagging

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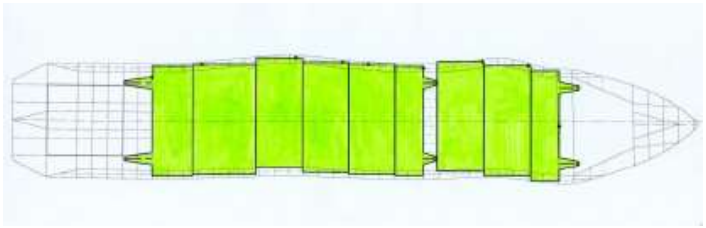
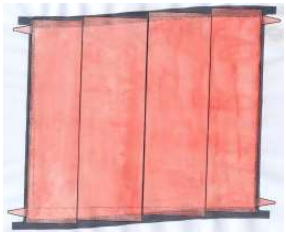
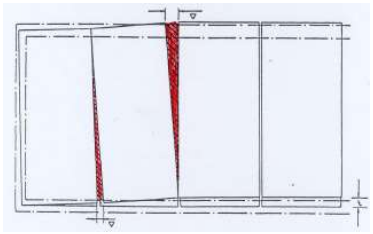
HATCH COVERS AND...HULL DISTORTION



Relative movement between coaming and hatch covers





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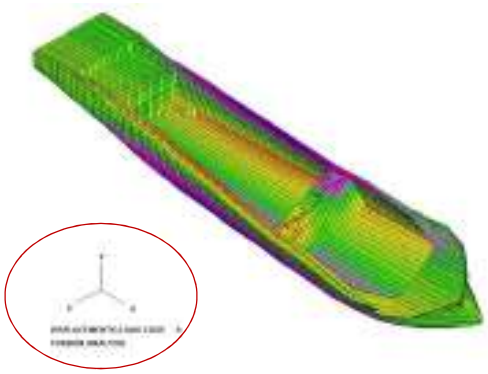
HATCH COVERS AND...HULL DISTORTION

Panel movements in 3 directions (combined):

- Fx: Longitudinal
- Fy: Transversal
- Fz: Vertical



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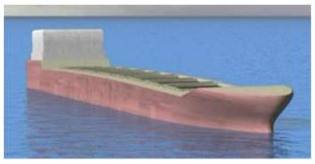
HATCH COVERS AND...COOKIES

- Ship is flexible



- Hatch covers are strong and rigid (opening/closing & cargo on top)
- Hatch covers move, but they do not move in unison with the ship = relative movement
- Need for packing rubbers to compensate for movements
- Meeting ICLL criteria is not possible with packing rubbers alone

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HATCH COVERS AND...SAFETY BARRIERS

- Achieving weathertightness:
  - "Keeping water out in any sea condition"
  - Wind forces and sea state simulations
  - Data for wind force 0-11 available
  - Hurricane: winds 64 kn and over, wave height 14m and over = unreliable data = risk
- Wateringress = risk
- Risk = risk assessment
- Reducing risk to acceptable level
- Need for **safety barriers**

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HATCH COVERS AND...SAFETY BARRIERS

- What is the most important safety barrier against water ingress??

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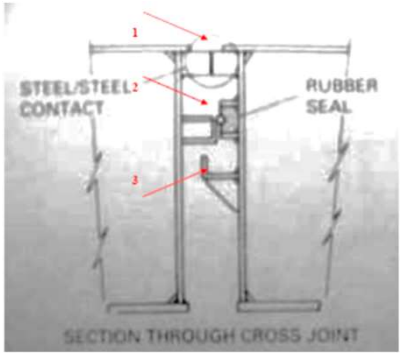
HATCH COVERS AND...SAFETY BARRIERS

3 Safety barriers:



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HATCH COVERS AND...KEY PARTS

Key parts & their function

- Bearing pads (steel to steel contact)
- Locators
- Stoppers
- Packing rubbers
- Operation mechanism
- Drain system
- Hatch panels
- Compression bar
- Securing mechanism

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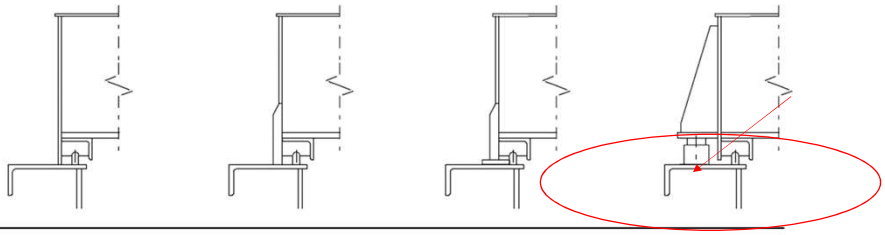
BEARING PADS

Traditional hatch cover supporting methods

1970

1980

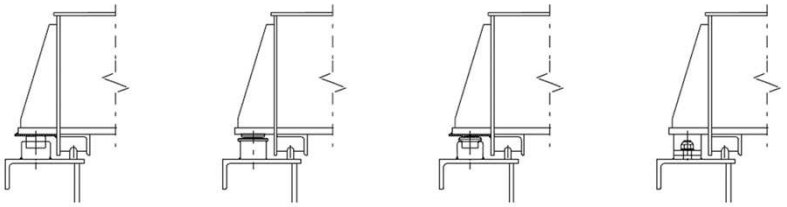
1990



Modern hatch cover supporting methods

1990

2000



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BEARING PADS

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BEARING PADS

45

LOCATORS/STOPPERS

- Locators & stoppers:
- Locators:
  - Positioning of panels
    - Geometry
    - Controlling packing rubber line pressure in cross joints
    - Small clearance (avoid taking up forces from hull girder)
- Stoppers:
  - Limit panel movement as result from rolling & pitching
  - Absorb accelleration forces
- Locators/stoppers: Combined

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LOCATORS/STOPPERS

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PACKING RUBBERS

Packing rubbers:

- Delicate & fine pieces of engineering
- Various types for different purposes
- Specific for ship
- Contact with compression bar + compression
- Straight & moulded pieces
- To be suitable for trading pattern (weather, cargo, loads,...)

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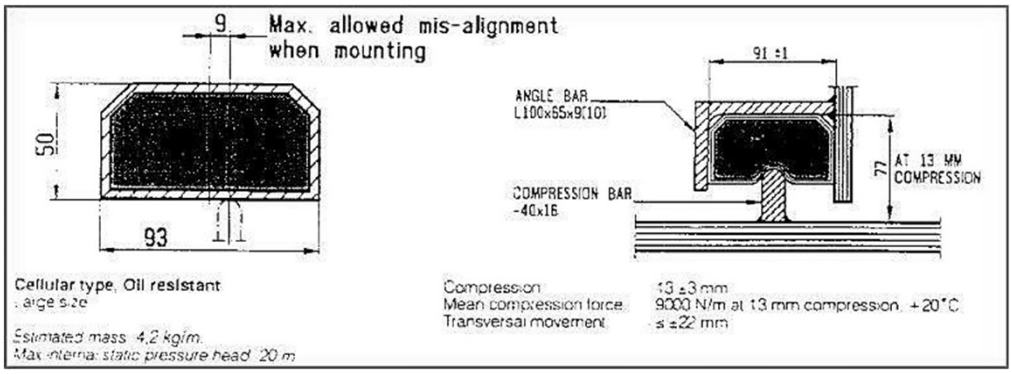
PACKING RUBBERS

- Packing rubber:
  - Design compression
  - Contact ≠ compression
  - Ultrasonic testing = info on compression



PACKING RUBBERS

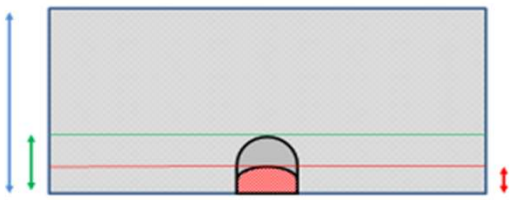
Key parts help in keeping panels in place, correctly aligned, properly secured and weathertight

Remember: it's all about mm!!

Rubber size: 70 x 40

Design compression: 25% of thickness = 10mm

Discard criteria: 50% of design compression = 5mm



COMPRESSION BARS

Compression bars:

- Straight
- Smooth
- Strong
- Mild & stainless steel
- Panel movement restricted
- Contact edge (Square/round)
- Combination compression bar and flat mating surface

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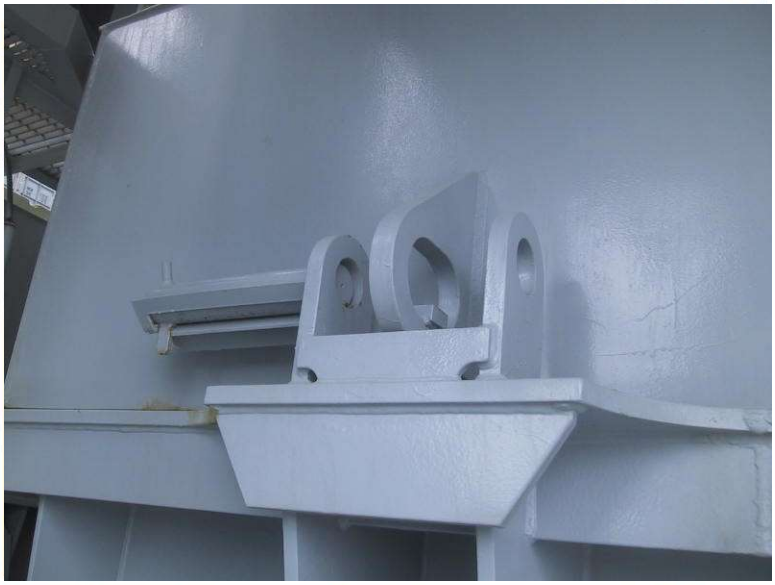
SECURING DEVICES (CLEATS)

Cleats:

- Various types
  - Manual (short – long rod)
  - Automatic (hydraulic, torsion bar, ...)
  - Holding down devices
- Coaming & Cross joint (level)
- Keep panel in place
- Allow limited movement
- Adjustment in case of bearing pad weardown
- Not to provide more compression!

52

SECURING DEVICES (CLEATS)



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DRAIN SYSTEMS

Drain systems:

- Important part of weathertightness (often overlooked)
- Drains = last safety barrier against water entry in hold
- Drain above sealing system
- Drain below sealing system
  - Coaming drain channel
  - Cross joint drain channel
  - Drain pipe
  - Drain valve

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DRAIN SYSTEMS

- Various types
- Free & unobstructed
- Non-return valves (different designs)
- Inboard edge/hatchrim to be high enough (capacity)
- Not to be substituted with fire-hose
- Fire hose = temporary only (length!)
- Fire fighting (fire caps – screwed tight)
- Not required for non-weathertight hatch covers

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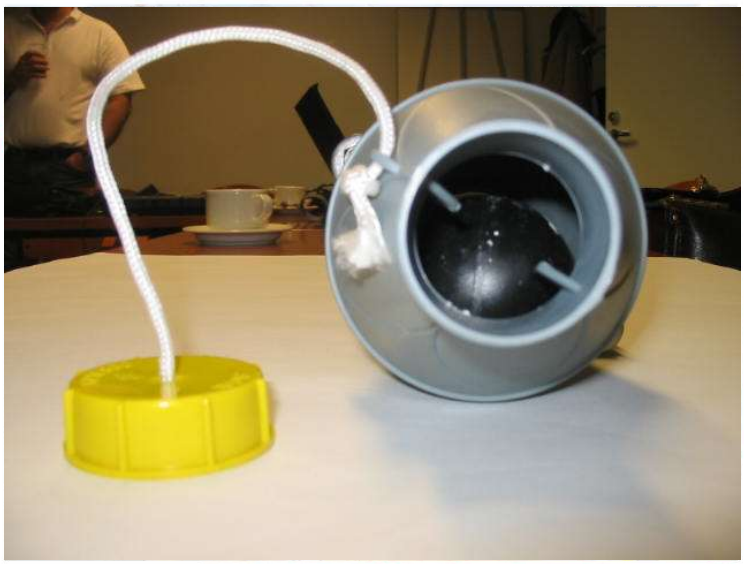
DRAIN SYSTEMS



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PANELS

Panels:

- Keep out most of the water
- First safety barrier
- Strenth & structural integrity

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COAMING

Coaming:

- Structurally sound (no improper repairs, crack, deformations)
  - Coaming plating (adding to longitudinal strength)
  - Coaming table
  - Coaming brackets (rigidity of coaming plating, and transferring loads from hatch covers into ship's structure)
- Fittings
  - Cleats
  - Wheel track
  - Bearing pads – locators – stoppers
  - Compression bar/flat steel mating surface

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COAMING

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OTHER OPENINGS

Other openings:

- As per ICLL (vents, access hatches, openings in coaming for movable bulkheads, windows, doors, ...)
- All openings that would allow water to enter the ship
- Gaskets, no compression seals
- Securing/closing arrangements (hinges, dogs, caps, coamings,...)

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OTHER OPENINGS

HATCH COVERS AND...US TESTING

Ultrasonic testing:

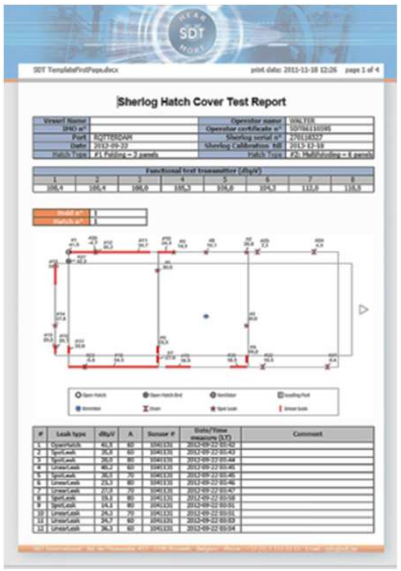
- Transmitter – receiver – piezzo electric crystal.
- Contact (hose test) v/s compression (ultrasonic test)
- Contact ≠ compression, so results can not be compared.
- Ultrasonic test is accepted by IACS and considered as an alternative to hose tests
- With US we have a tool that allows us to make measurements and set safety margins ourselves (10% OHV)
- With U/S in port, we now get an idea of the compensating capacity of the sealing system when the ship will be at sea, which is a quantum leap forward

HATCH COVERS AND...US TESTING

Evaluating Ultrasound tightness test results:

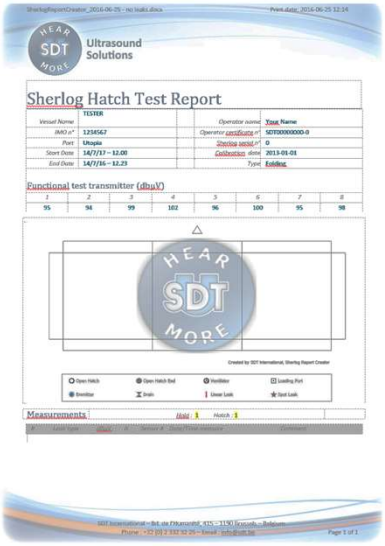
Do the following test reports indicate that hatch covers are weathertight?

ULTRASONIC TIGHTNESS TESTING EXPLAINED


Sherlog Hatch Cover Test Report

Is this hatch weathertight?

ULTRASONIC TIGHTNESS TESTING EXPLAINED


Ultrasound Solutions

Sherlog Hatch Test Report

Vessel Name	TESTER	Operator name	Your Name
IMO n°	1234567	Operator certificate n°	SDT00000000-0
Port	Utopia	Sherlog serial n°	0
Start Date	14/7/17 – 12.00	Calibration date	2013-01-01
End Date	14/7/16 – 12.25	Type	Folding

Functional test transmitter (dbuV)

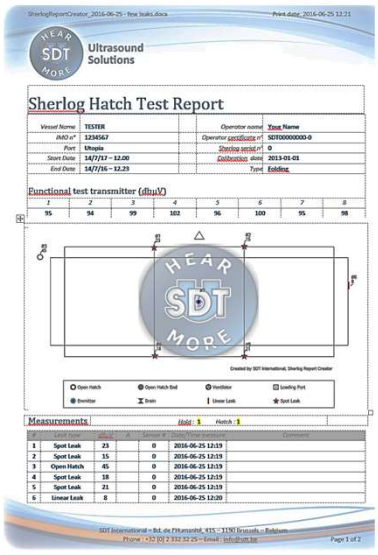
1	2	3	4	5	6	7	8
95	94	99	102	96	100	95	98

Measurements

Is this hatch weathertight?

65

ULTRASONIC TIGHTNESS TESTING EXPLAINED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Functional test transmitter (dbuV)

1	2	3	4	5	6	7	8
95	94	99	102	96	100	95	98

Measurements

1	Spot Leak	23	0	2016-06-25 12:19	
2	Spot Leak	15	0	2016-06-25 12:19	
3	Open Hatch	45	0	2016-06-25 12:19	
4	Spot Leak	18	0	2016-06-25 12:19	
5	Spot Leak	21	0	2016-06-25 12:19	
6	Linear Leak	8	0	2016-06-25 12:20	

Is this hatch weathertight?

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HATCH COVERS AND...US TESTING

The dangers related to ultrasonic testing:

- **Passing ultrasonic inspection does not necessarily mean that the hatch covers are fit for duty. WHY???**
  - Strength/structural issues
  - Securing issues
  - Positioning/alignment of panels
  - Operation...

  ...which can only be checked during a visual inspection

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HATCH COVERS AND...INSPECTION

The need for a visual inspection:

1. Check that hatch covers are ready for testing.

2. Check that no “hidden” sealants are used to pass test.

- All key areas to be inspected against tolerances/limits, wear, alignment,...
- FACTS & FIGURES (avoid terms as “satisfactory”, “generally in order”, “overcompressed” (without stating mm of imprint),...)

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HATCH COVERS AND...INSPECTIONS

Some frequently seen defects

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HATCH COVERS AND...SEA/CARGOWORTHINESS

Seaworthiness:

- Technical:
  - Construction
  - Class & statutory certificates
- Cargo
  - Is vessel suitable for cargo and cargo suitable for ship
  - Cooling – heating - ventilation – cleanliness – hatch cover tightness
  - Cargoworthiness = part of seaworthiness
- Voyage
  - Bunkers – provisions – crew
  - Spare parts

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HATCH COVERS AND...THE RULES

Effect of deficiencies & leakage on:

- SOLAS
- MARPOL
- DOC IMDG
- Exemption FF
- ICLL
- ISM
- Fumigation
- CSWP
- ILO
- MLC
- ....

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HATCH COVERS AND...THE RULES

Class: Seaworthiness

- Technical and strength aspects
- Statutory issues (when appointed by Flag state)
- Class + Statutory requirements = **SAILING**

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HATCH COVERS AND...THE RULES

Industry: Contract for transporting cargo

- Contract of affreightment (charter party)
- Owner to provide seaworthy ship (incl. hatch covers)
- Most claims not for failure to provide a technically fit ship, but for failure to comply with cargoworthiness requirements (diligence) which are part of seaworthiness
- Class+Statutory+Industry requirements = **TRADING** (= $$$$)

- Class and Industry have different priorities and different approach re-hatch cover inspections/testing

HATCH COVERS AND…DUE DILIGENCE

- Previously ship owners were to give guarantee of seaworthiness, which is not possible
- Under Hague rules, owners to prove due diligence to make ship seaworthy
- Due diligence = taking good/reasonable care
- In case of a claim, how to assess if due diligence was exercised?
  - Could a reasonable inspection have revealed the defect?
  - If so, would a diligent ship owner have carried out repairs?

HATCH COVERS AND…DUE DILIGENCE

- In case of cargo claims, hatch covers will be inspected in detail to ensure that they were in good condition at the outset of the voyage & that due diligence was exercised
- P&I mutuality → Due diligence

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HATCH COVERS AND…DUE DILIGENCE

Conclusion:

- In order to avoid that the due diligence aspect can be argued, ensure that hatch covers are able to withstand detailed scrutiny
- Consider inspection by third part at regular intervals
- Easy for qualified surveyor to find evidence of poor maintenance and lack of due diligence
- This evidence may also indicate/prove non-compliance with rules/regulations (statutory/legal issues)
- Provide evidence of regular maintenance.

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HATCH COVERS AND...ISM

ISM:

- ISM mantra = Avoiding:
  - Accidents/Injury
  - Pollution
  - Damage to 3° party property
- Hatch covers = critical equipment?
- Most SMS do not include need/procedures for maintenance, familiarisation, operation.
- Required documents are not on board (34% of ships inspected)
- Despite above, all SMS are approved

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Drydock optimal schedule

- Pre-drydock survey, work plan
- Remove rubber
- Align measurements
- Sandblast paint
- Pad repairs
- Installation of rubber
- Operation repairs
- Testing

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HATCH COVERS AND… MISTAKES

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HATCH COVERS AND… MISTAKES

Common mistakes:

- Insufficient knowledge about hatch covers, inspection & reporting
- Overestimating the capability of the ship's crews for repairs
- Not involving class when hatch cover repairs are carried by crew
- Temporary repairs by crew
- Missing manual/drawings
- No on-board instructions for maintenance
- No maintenance files on board (PMS)
- Hatch covers not included in SMS
- No understanding of the due diligence principle/issues

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Weathertightness mistakes

- Replace rubber and not fix the pads
- Install backstrip rubber everywhere
- Mix new and old rubber
- Use small pieces and fill in gaps
- No paint or Paint lightly the rubber channel
- Using Vaseline

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Mechanical mistakes

- Ignore sounds during operation
- No greasing, greasing plan
- On board repairs instead of on shore

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Hydraulic mistakes

- Clean filter instead of change
- Close covers without pump
- Change pipes without flushing
- Valve position during voyage
- Ignore leaks

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