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Guide to Hatch Cover Surveying
using a CARGO-SAFE™
Ultrasonic Hatch Cover Tester

Agenda

- A guide to the CARGO-SAFE kit
- Pre-Survey Checks
- How to conduct a hatch cover survey using a CARGO-SAFE™
- Top Ten Hatch Cover Defects

The CARGO-SAFE Kit



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The CARGO-SAFE Kit



Transmitter Unit



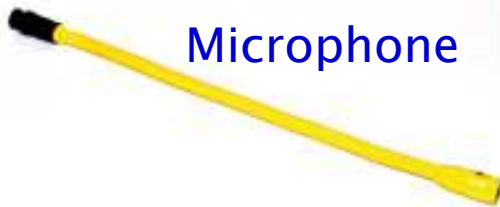
Receiver Unit



Headphones



Extension Arm



Microphone



Spare Microphone and
Emergency Microphone
Lead



Emitter, Microphone
and Extension Arm
Tester



Chalk, Spare
Transmitter Knob,
35mm Headphone
Splitter

Battery Charger
and Spare Batteries



Emergency
Power Lead



Also in the kit

- Hi-Viz Vest
- Straps and Leather Cases

Pre-Survey Checks

Before each time the CARGO-SAFE is used it must be established that the unit is working within the limits of calibration set by the manufacturer.



The Emitter, Microphone and Extension Arm (E.M.EA) Tester is used to confirm compliance.

During these checks, the Transmitter unit is to be turned on and not in 'Standby' mode and emitting a continuous tone.



NEW OR FULLY CHARGED BATTERIES SHOULD BE USED FOR EACH SURVEY

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Testing the Emitters

The E.M.EA Tester held over each emitter in turn.

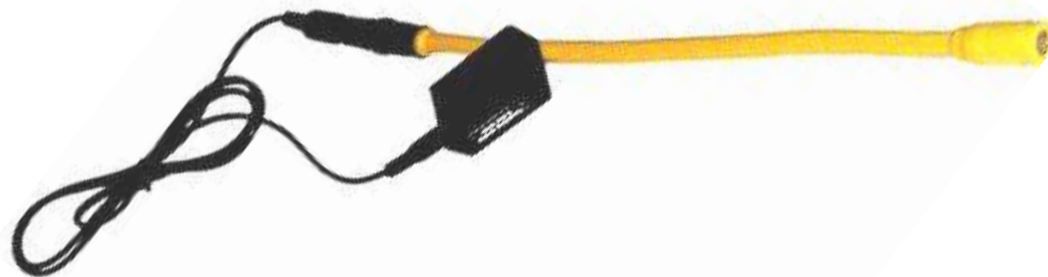
If the emitter is fully functional the green LED will light on the tester.



Testing the Microphone

Using the emergency microphone lead the E.M.EA Tester is plugged into the microphone. The microphone is then held over any one of the emitters on the transmitter unit.

If the microphone is fully functional the green LED will light on the tester.



This procedure is repeated for both microphones

Testing the Extension Arm

The extension arm is attached to a microphone and the E.M.EA tester is plugged in to the other end. The microphone is again held over an emitter on the transmitter unit.

If the extension arm is fully functional the green LED will light on the tester.



Pre-Survey Checks Summary

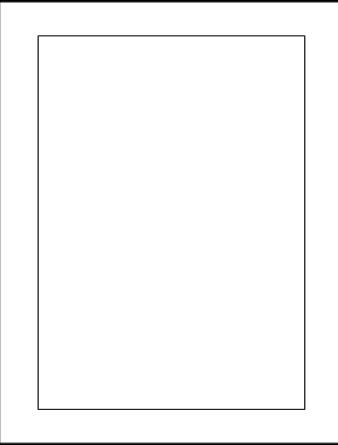
- The E.M.EA tester checks that the
 - Emitters on the Transmitter
 - Inspection Microphones
 - Extension Armare all working correctly.
- The batteries have been charged.
- That all the kit is present.

Fill in the relevant section of the Tightness Test Survey Form as shown.

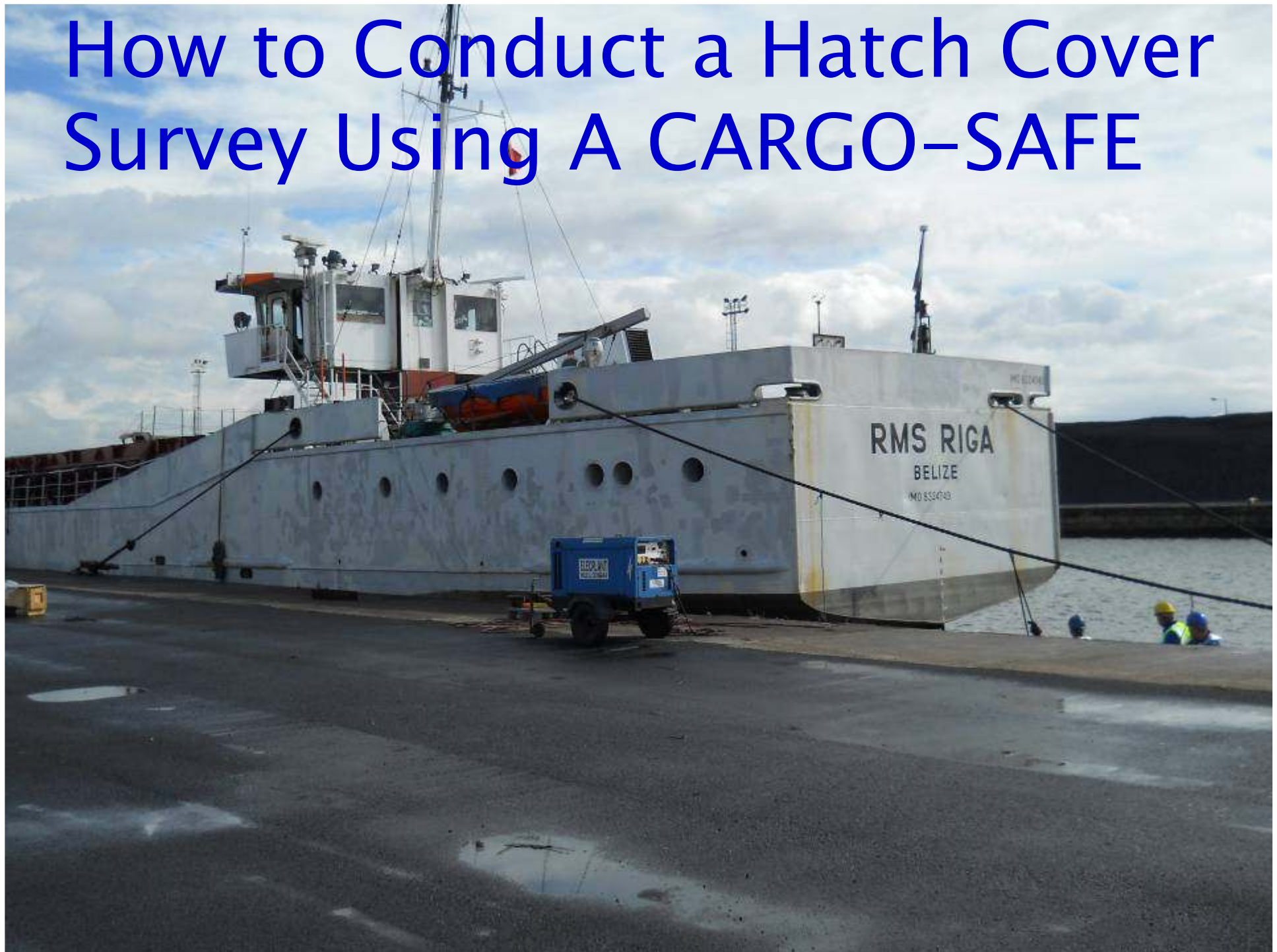
Tightness Test Survey Form

A Tightness Test Survey Form is completed with every hatch cover survey. Photographs are often taken to support the reported findings.

The form shows Section 1 completed after the pre-survey checks have been carried out.

TIGHTNESS TEST OF CARGO HATCH COVERS BY ULTRASONIC EQUIPMENT			
Name of ship:		Job No:	
Hatch No. :		of: (from forward)	
Hatch Type:		Receiver:	
Ultrasonic equipment type:		Transmitter:	
1. Testing of Ultrasonic equipment			
		Before Tightness Test	After Tightness Test
Emitters tested - number of emitters in full working order		13 of 13	of
Microphone tested and in full working order (please tick)		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Extension Arm tested and in full working order (please tick)		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. INITIAL MEASUREMENTS WITH OPEN HATCH			
Open hatch value, OHV		dB	10% of OHV
Method of obtaining OHV			dB
3. FAIL / PASS CRITERION			
read out = 0 dB		⇒ hatch cover is leaktight.	
1 dB < readout < 10% of OHV		⇒ hatch cover considered weathertight, subject to visual inspection and consideration of hatch design.	
readout ≥ 10% of OHV		⇒ hatch cover is not considered weathertight, corrective action to be taken.	
4. MEASUREMENTS WITH CLOSED HATCH OF READINGS OVER 10%			
Position (to be indicated in diagram below)	Readout (dB)	Visual inspection findings and/or corrective action taken	Readout after corrective action (dB)
5. HATCH COVER DIAGRAM FWD		6. REMARKS:	
			
		Name of ultrasonic operator:	
		Name of Master:	
		Place:	
		Time & Date:	
Hatch Cover Diagram Key			
/	1-9 dB %OHV	CJ	Hatch Cross Joint
X	≥10 dB %OHV	O	Areas of physical damage or wear

How to Conduct a Hatch Cover Survey Using A CARGO-SAFE



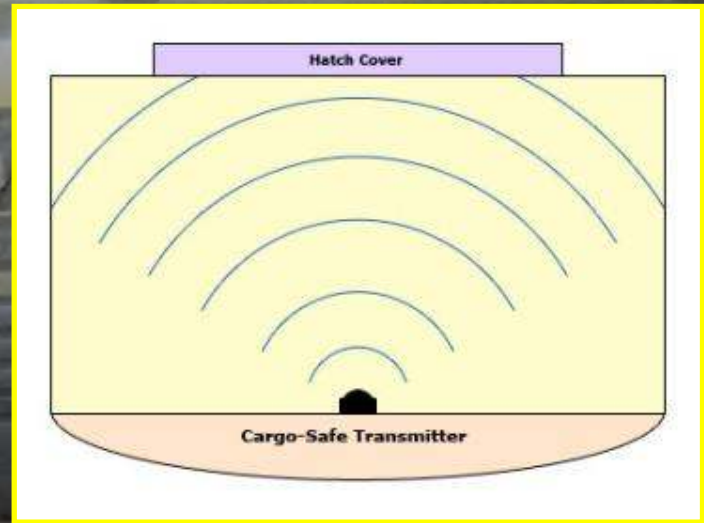
The CARGO-SAFE Transmitter Unit



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Placement of the Transmitter

The CARGO-SAFE can be used if the cargo hold is either empty or full.




If the hold is approximately square the transmitter is placed in the centre.

If the hold is rectangular then the transmitter is placed approximately a $\frac{1}{4}$ of the way along the length of the hold. The survey can be performed on one half of the hatch cover and then the transmitter moved to $\frac{3}{4}$ s of the way along the hold to survey the other half of the hatch cover.



- The leather case is folded back and the emitters exposed.
- The transmitter unit is placed in the cargo hold face upwards and turned on.
- The green LED lights will flash every second and an audible two-tone signal is produced.
- Standby mode is then activated to save battery power.
- The LEDs will now flash only every 15 seconds and the audible tone will change to 3 bleeps, also every 15 seconds.

A photograph of a surveyor wearing a yellow hard hat and a blue long-sleeved shirt. He is looking towards a heavily rusted, grey metal door. The door has a small rectangular window in the center, through which some brown, fibrous material is visible. The door is set into a wall of similar rusted metal. A long, thin metal rod or tool is leaning against the door on the right side. The overall scene is dimly lit, suggesting an interior or enclosed space on a ship.

The Surveyor then returns to the deck of the ship.

The CARGO-SAFE Receiver Unit



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Functions of the Receiver Unit

- Green indicates the power switch.
- Yellow controls the volume of the headphones.
- Blue is the socket for the headphones to be plugged in.
- Red is the socket for the extension arm to be plugged in. The microphone is attached to the end of the extension arm.



The CARGO-SAFE is now ready for use.

Once on deck, the CARGO-SAFE receiver unit is turned on.

The remote control function is then activated, to take the transmitter unit out of standby mode.

A continuous two tone being emitted from the transmitter should now be heard through the headphones.



It is necessary to obtain a reading for the level of ultrasound reaching the underside of the cargo hatches.

This can be done using an access hatch, or by opening the hatches on deck. This value is known as the Open Hatch Value or OHV.

The microphone should be lowered down the access hatch so that it can “see” the transmitter.




Open Hatch Value (OHV)

Once the OHV has been obtained, the hatch cover survey can be conducted with the receiver unit in either decibel mode or OHV% mode.

A value of 10% of the OHV depicts an area of potential water ingress.

In decibel mode, an OHV of 74db would mean any reading over 7.4db (10% of the OHV) indicates an area for potential water ingress.

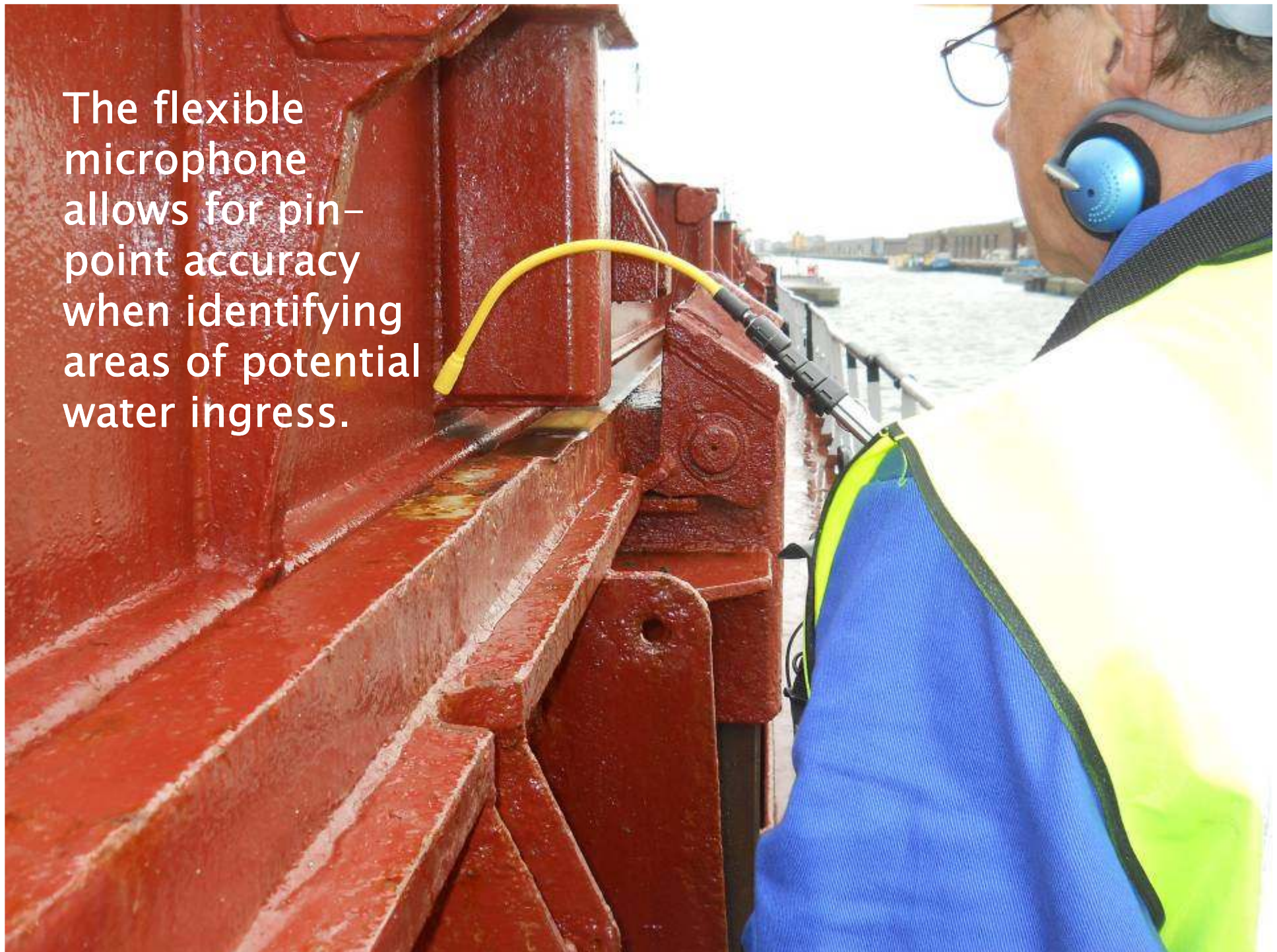
In OHV% mode, the knob on the receiver is turned so that 100 is obtained when taking the OHV reading. A value of 10 or above recorded during the survey indicates an area for potential water ingress.



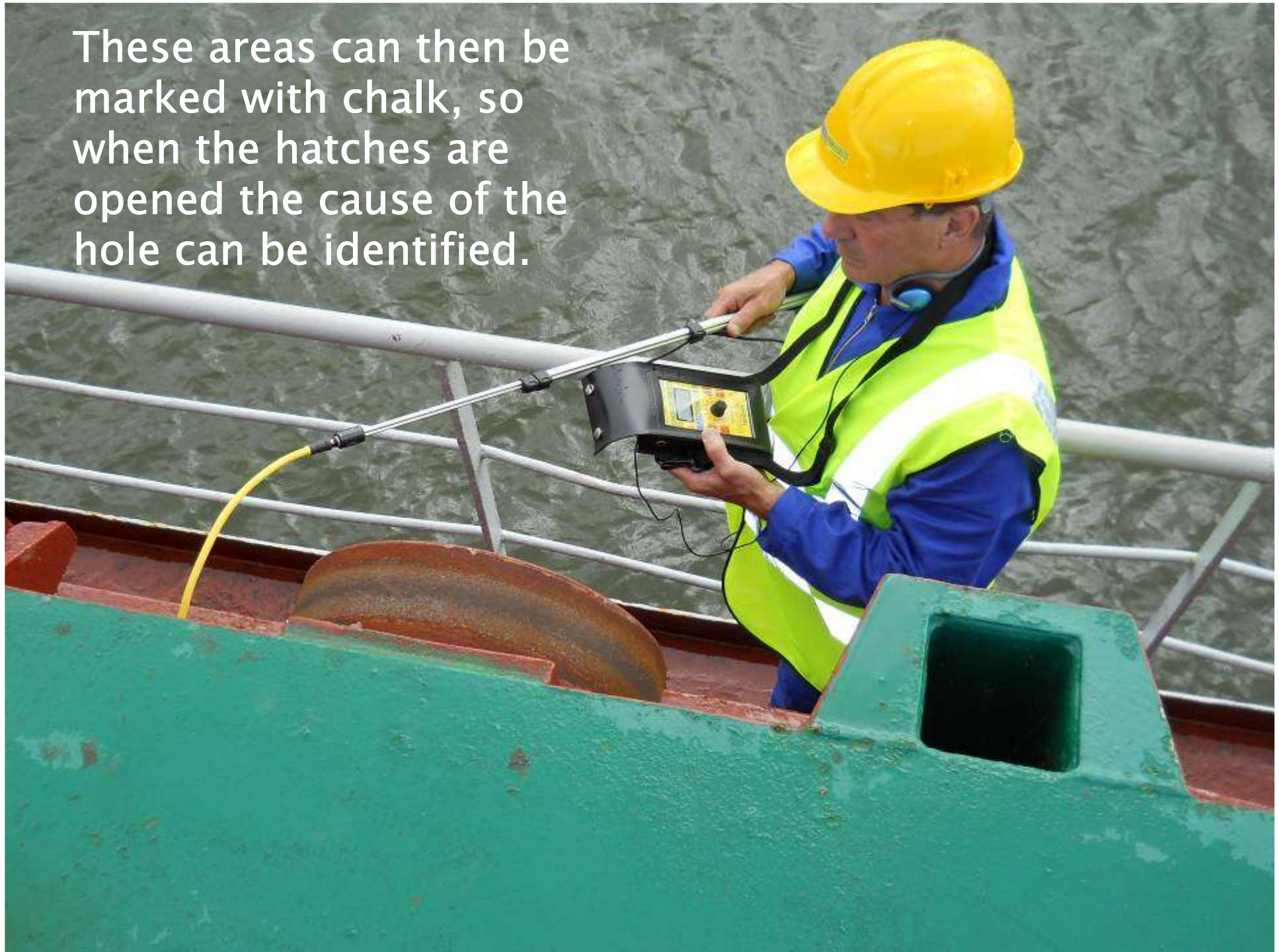
The exterior of the ship is inspected using the receiver unit.

The microphone is used to identify any ultrasonic sound this is then registered as a value on the display and also as an audible noise through the headphones.

The flexible microphone allows for pin-point accuracy when identifying areas of potential water ingress.

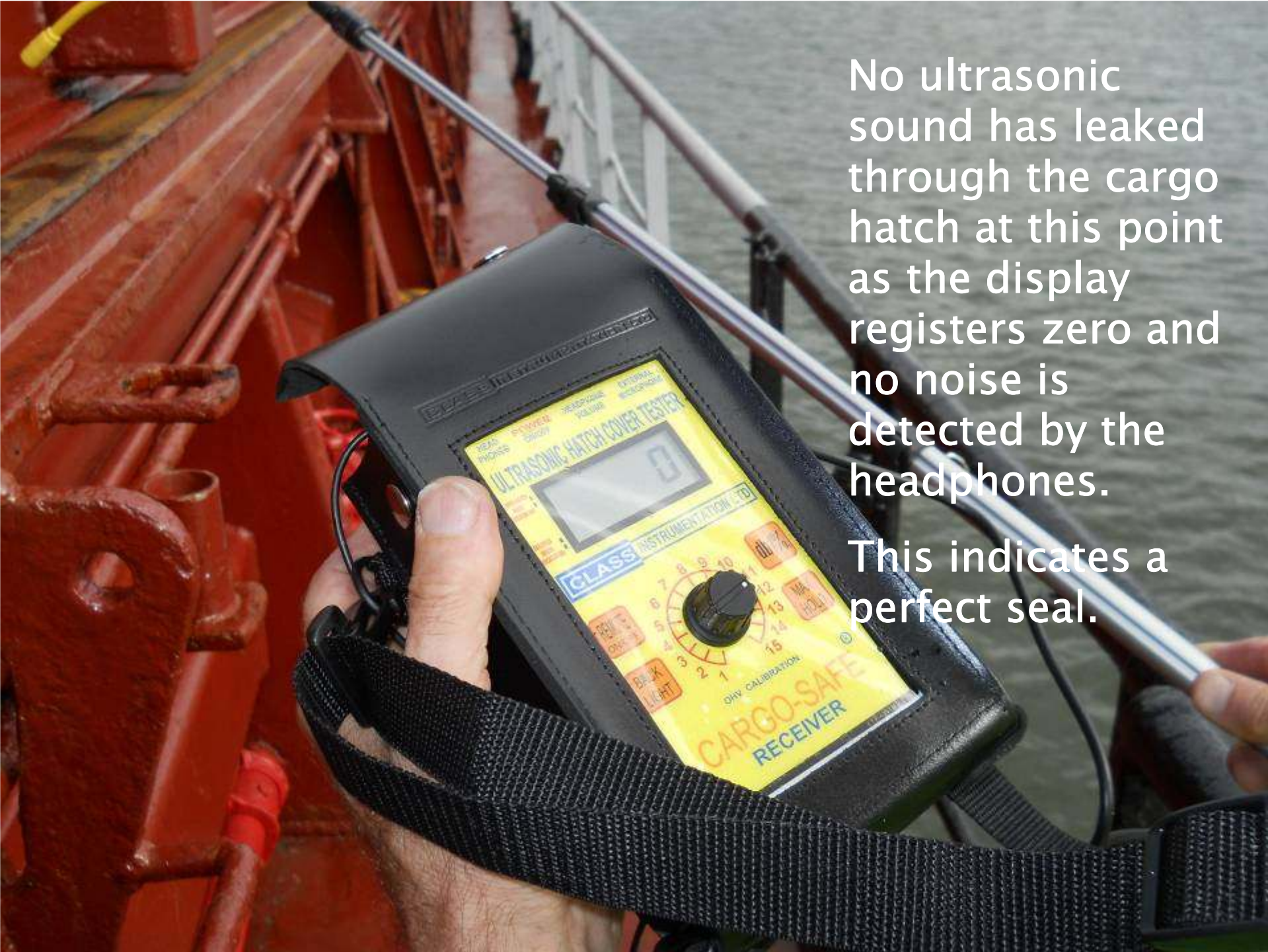


These areas can then be marked with chalk, so when the hatches are opened the cause of the hole can be identified.





The Tightness Test Survey Form is filled in during the inspection and photographs are taken to support any conclusions drawn.



No ultrasonic sound has leaked through the cargo hatch at this point as the display registers zero and no noise is detected by the headphones.

This indicates a perfect seal.

Ultrasound has escaped at this point on the hatch cover. A reading of 3 has been recorded in OHV% mode.

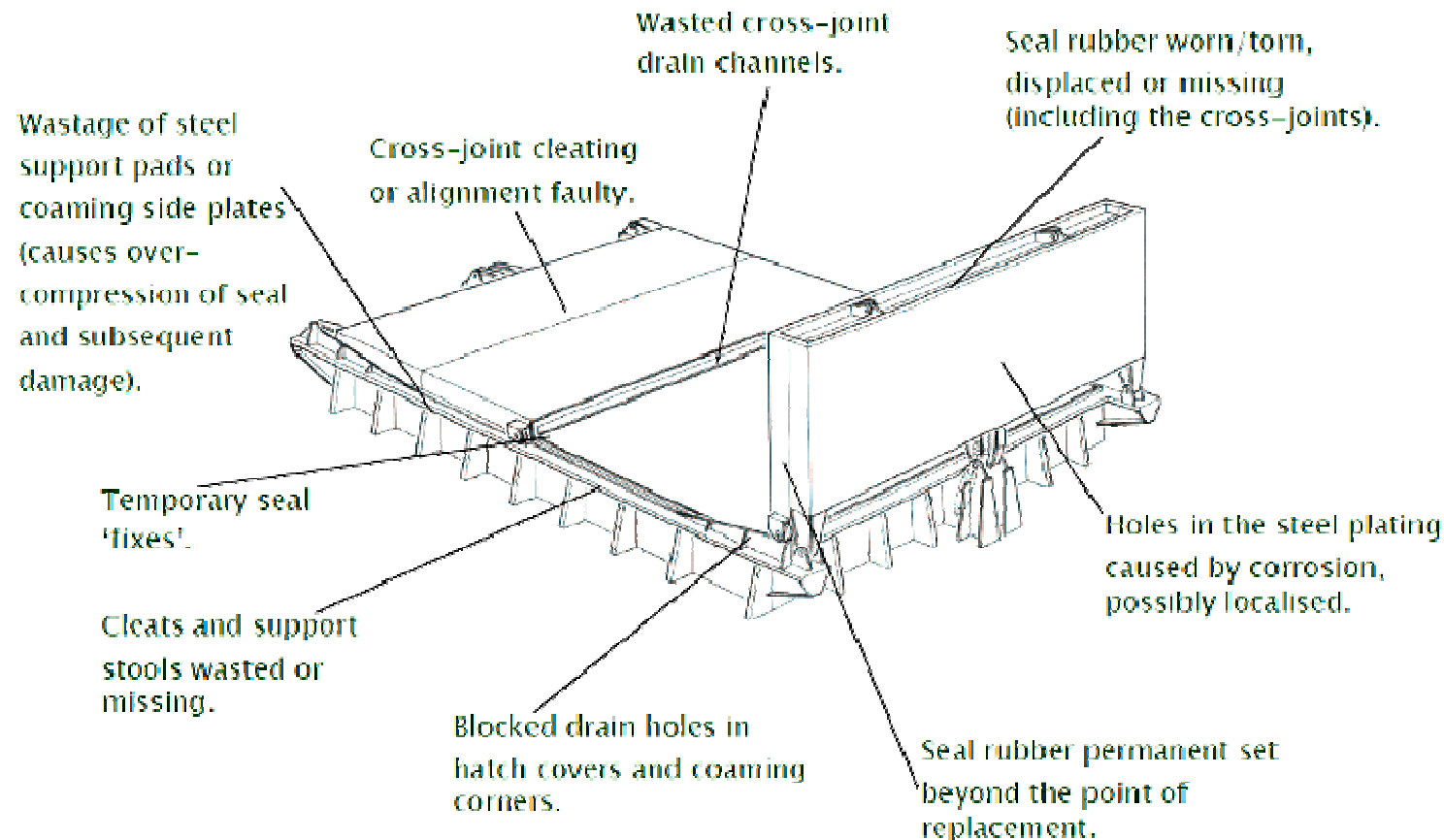
When OHV% mode is used, any reading above 10 indicates an area of potential water ingress.

When a reading above 10% of the OHV is recorded the hatch cover is not water tight.



Top Ten Hatch Cover Defects

This diagram is taken from the North of England P&I Club's January 2005 publication "Hatch Cover Supplement" written by David Byrne



Wear on the centreline wedge devices on side-rolling covers, which causes cross joint to open when the ship is at sea (not illustrated on above diagram).