

WATER-TIGHT DOOR TESTING



Introduction

Cygnus Hatch Sure Mk II is a Class, Type Approved, lightweight, ultrasonic system for rapid & thorough testing of water-tight cargo hatch covers and doors.

The use of ultrasonic testing is a proven way of detecting any damage to the door seal. It can also identify loss of any watertight integrity that may have occurred during the installation phase of the watertight door. Including deformation of the frame or other misalignments.

Aim

Provide information for distributors on how the Hatch Sure Mk II version can now be marketed for new applications

To describe a generic procedure for the ultrasonic testing of water-tight doors on vessels

Change to the Equipment

The Hatch Sure Mk II change is the addition of a variable output switch. This enables the power of the ultrasound output to be reduced - suitable for the testing of doors.



New Applications

- a) WATER-TIGHT DOORS on car carriers, yachts & super yachts, fishing vessels, ferries, cruise liners, offshore support vessels, naval vessels & submarines, offshore platforms & FPSO's (Floating Production, Storage & Offloading)



- b) small water-tight enclosures
- c) small enclosures such as forward rope lockers & refrigeration units
- d) containers



Key Marketing & Selling Points

Reduces testing time compared to the normal chalk or hose test for watertight doors

Does not hold up other ship activities

Speedy re-test if the door is not sealed or not water-tight first time

Testing with water is not necessary

Door Testing: Is it mandatory?

At the **manufacturing** stage, hydrostatic pressure testing to the appropriate door rating must be witnessed by a surveyor for the relevant Classification Society.

Upon **installation** the door must again be tested and witnessed by the Classification Society.

This is the time that ultrasonic testing is most likely to be used.

To date there is no mandatory requirement issued by IMO or under SOLAS to test a door after the **initial installation test**.

P&I Clubs and Classification

The P&I:

The P&I Clubs are interested as to what happens with ultrasonic testing of doors but have issued no conclusive thoughts.

Class

The Classification Societies have also not expressed any other opinion that ultrasound is an accepted method of test (IACS UR Z17)

However, ABS have approved an Ultrasonic Test Procedure for one of the door manufacturers. The product remains Type Approved by ABS.

Procedure

Equipment

Cygnus offers an optional tripod with suitable mounting bracket to suspend the transmitter in the vertical position for door testing.



Transmitter mounted on tripod



The transmitter is kept in it's pouch. The Velcro on the back of the pouch is attached to the Velcro on either side of the vertical part of the bracket

Procedure continued

Distance

Position the transmitter at a distance not less than the largest dimension of the door.

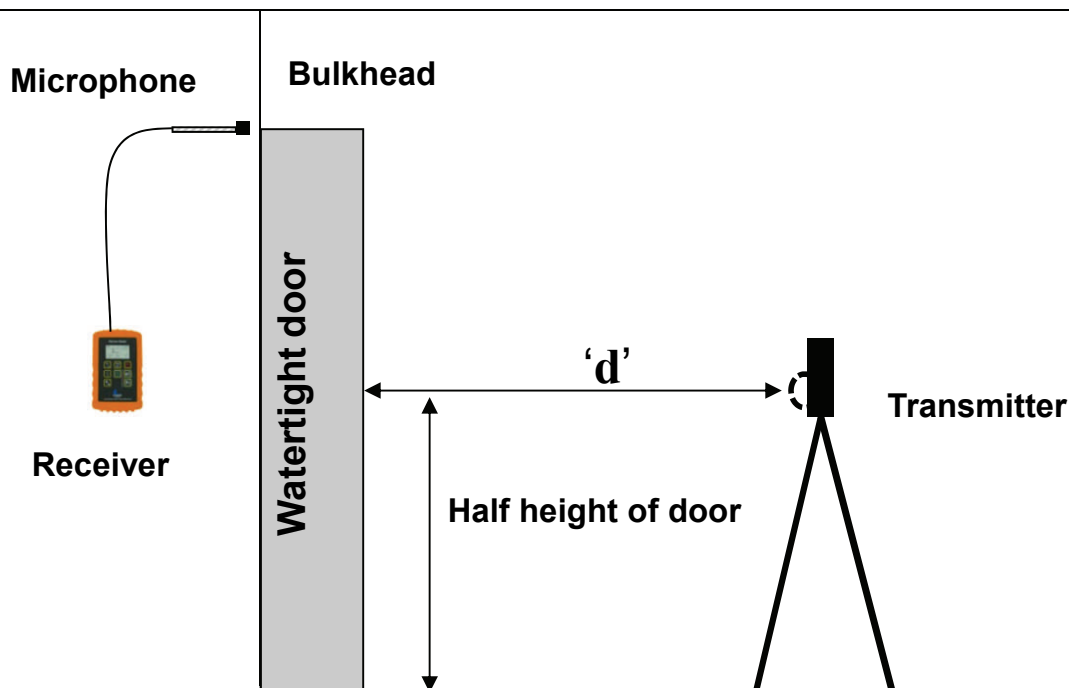
e.g. if the door is 2.2 m in height x 1.1 m in width then the distance from the door is 2.2 m
(see 2 'd' in Fig. 1)

Note: some doors are wider than they are tall and if this is the case, then the width, as the larger of the two dimensions, would be used as the minimum distance ('d') from the door.

Height & Distance

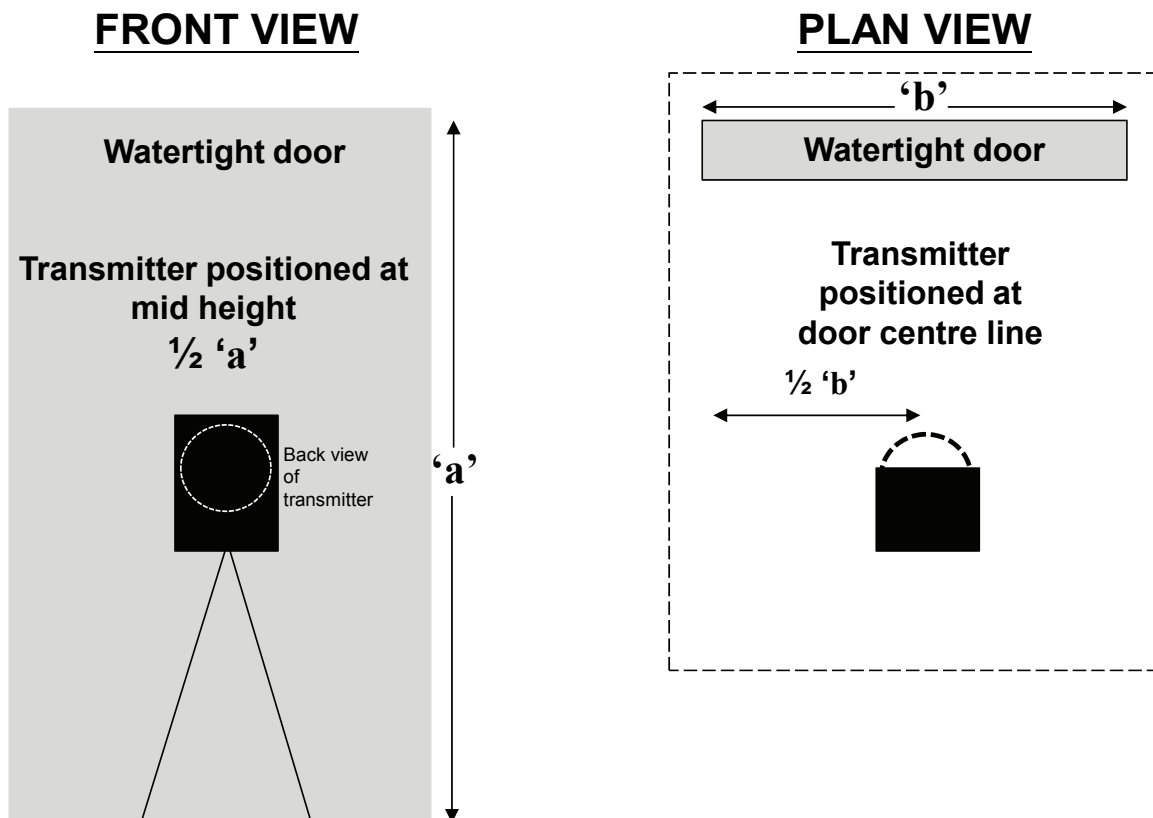
Position the transmitter facing the door. The centre of the emitter array should be at the centre of the door height and the centre of the door width.

Fig. 1



Procedure contin-

Fig. 2



Test

After switching on the equipment a function test of the transmitter emitters should be carried out (see User Manual page 25)

The transmitter power switch must be set at the maximum output setting , number 6 for this.

A reading of over 40% in the receivers LED display along with an "OK" shows that the equipment is working correctly.*

Test

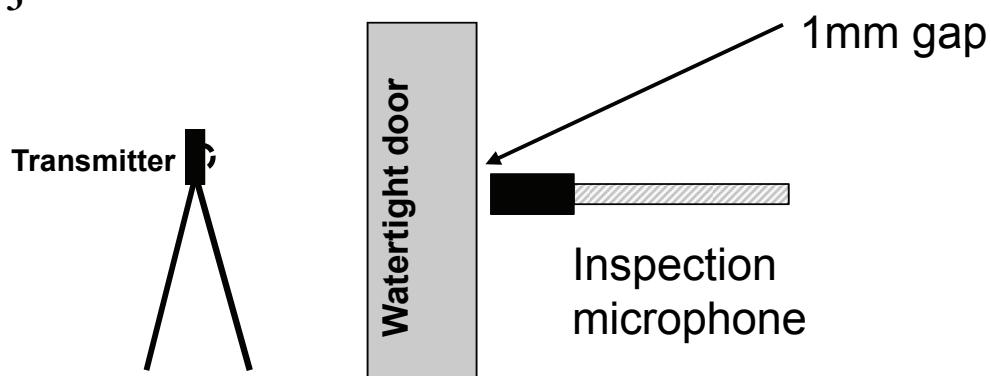
- 1) Set the transmitter on power level 3
- 2) Calibrate the receiver using the 'set OH' key
(see page 31 in the Hatch Sure Mk II operating manual)



- 3) Record the db level (a photo could be included) in the report
- 4) Observing **ALL** relevant safety procedures. close the door. The receiver should now read:

0 dB

Fig. 3



- 5) Check that the sound level does not pass through the steel door

Place the inspection microphone approximately 1mm from the steel door. If the transmitter is set too high you will hear the distinctive triple tone. Open the door, turn the transmitter power setting to the next level down and repeat the test.

- 6) Check the door frame by moving the inspection microphone along the rubber seal. The microphone should be as close as possible to the rubber seal, without making contact.
- 7) If any leaks are found, record, report to the relevant third parties and take appropriate corrective actions.



- 8) When re-tested, ensure steps 1-6 are repeated **exactly** as before.
- 9) Once the power setting for a particular type and size of door has been established then this setting can always be used.

But only if the distance ('d') is constant and the doors tested are of the same size, type and manufacturer.

Safety Note:



The operation of watertight doors must only be carried out by a competent person familiar and trained in the operation of that specific door type and with the permission of the person in charge. Testing of the watertight /weather tight doors must comply with any vessel Permit to Work procedures.

Differing Manufacturers and Designs

In trials, Cygnus has already encountered several different door designs.

The above procedure is therefore a generic one but it will work for almost all watertight doors and windows because it is based on the simple concept of finding leaking ultrasound coupled with the Open Hatch Calibration procedure.

Advantages of Ultrasonic Testing over the Hose Testing method:

Ultrasonic Testing is :

- Repeatable
- Accurate—the actual leak/gap location can be easily pin-pointed. With hose testing it is harder to trace back the exact gap location
- Clean and dry—there is no need to spray water on board
- Easy & quick to set-up and does not involve the ships equipment (e.g. ships hose)

Frequently Asked Questions

Question: How long does it take?

Answer: Approximately 10 minutes per door including set up

Question: How can we prove it works?

Answer: Place a small diameter obstruction (2mm bar e.g. welding rod or plastic cable tie) on the door frame & close the door. The obstruction will allow ultrasound to pass through the seal making it easy to detect.

NOTE: you must have permission to demonstrate this.

Question: When to test?

- Answer:**
- During commissioning
 - After replacement of rubber sealing
 - On request from vessel owner or class society
 - Periodic survey
 - After any event that may involve damage to the door or seal

Question: Why is distance important?

Answer: To allow enough beam spread to cover the door

Question: Why do we set up on power level 3?

Answer: To ensure the test is conducted with sufficient sound energy

Question: How will I know if the transmitter setting is too high?

Answer: You will detect sound at the surface of the steel door.

