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# Report On

Type Approval Testing of the  
Thrane & Thrane A/S  
SAILOR 6390 Navtex Receiver  
In accordance with IEC 60945

Document 75923004 Report 01 Issue 2

November 2013



Product Service

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**REPORT ON**

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**DATED**

06 November 2013

**This report has been up-issued to Issue 2 to include the Operational Checks section.**





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## **SECTION 1**

### **REPORT SUMMARY**

Type Approval Testing of the  
Thrane & Thrane A/S SAILOR 6390 Navtex Receiver



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## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Thrane & Thrane A/S SAILOR 6390 Navtex Receiver to limited requirements of IEC 60945.

Objective	To perform type approval testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Thrane & Thrane A/S
Model Number(s)	SAILOR 6390
Serial Number(s)	192.168.0.111
Number of Samples Tested	One
Test Specification/Issue/Date	IEC 60945: 2002 + Corrigendum 1: 2008
Declared Product Equipment Category	Protected
Date of Receipt of Test Samples	20 June 2013
Order Number	P2620
Date	31 May 2013
Start of Test	20 June 2013
Finish of Test	26 September 2013
Name of Engineer(s)	M Hardy A Guy M Emery C Bowles P Joynson A Hubbard C McKean S Mooney N Forsyth
Related Documents	IEC 61097-6:2005-12 (detailing the performance check requirements)



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## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with IEC 60945 is shown below.

Section	Spec. Clause	Test Description	Result	Comments
2.1	6	Operational Checks	Satisfactory	-
2.2	7	Power Supply	Satisfactory	See also section 2.2 and 2.5
2.3	8.2	Dry Heat Test – Functional	Satisfactory	-
2.4	8.3	Damp Heat Test	Satisfactory	-
2.5	8.4.2.4	Low Temperature Test – Functional	Satisfactory	-
2.6	8.5	Thermal Shock	-	Test not applicable to equipment classed as <i>Protected</i> .
2.7	8.6	Drop	-	Test not applicable to equipment classed as <i>Protected</i> .
2.8	8.7	Vibration	Satisfactory	-
2.9	8.8	Rain and Spray	-	Test not applicable to equipment classed as <i>Protected</i> .
2.10	8.9	Immersion	-	Test not applicable to equipment classed as <i>Protected</i> .
2.11	8.10	Solar Radiation	-	Test not applicable to equipment classed as <i>Protected</i> .
2.12	8.11	Oil Resistance	-	Test not applicable to equipment classed as <i>Protected</i> .
2.13	8.12	Corrosion	-	See Waiver Request in Annex A
2.14	9	Electromagnetic Emission	-	See TUV SUD Product Service document 75923004 Report 03
2.15	10	Immunity to Electromagnetic Emission	-	See TUV SUD Product Service document 75923004 Report 03
2.16	11.1	Acoustic Noise and Signals	-	See Manufacturer documentation
2.17	11.2	Compass Safe Distance	-	See TUV SUD Product Service document 75923004 Report 03
2.18	12.1	Protection Against Accidental Access to Dangerous Voltages	Satisfactory	-
2.19	12.2	Electromagnetic Radio Frequency Radiation	-	EUT does not contain any transmitters.
2.20	12.3	Emissions from Visual Display Unit (VDU)	-	See Manufacturer documentation / Nemko report 218907 SAILOR 6004 –IEC945.
2.21	12.4	X-Radiation	-	EUT does not emit X-radiation.
2.22	13	Maintenance	Satisfactory	-
2.23	14	Equipment Manuals	Satisfactory	-
2.24	15	Marking and Identification	Satisfactory	-



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### 1.3 DECLARATION OF BUILD

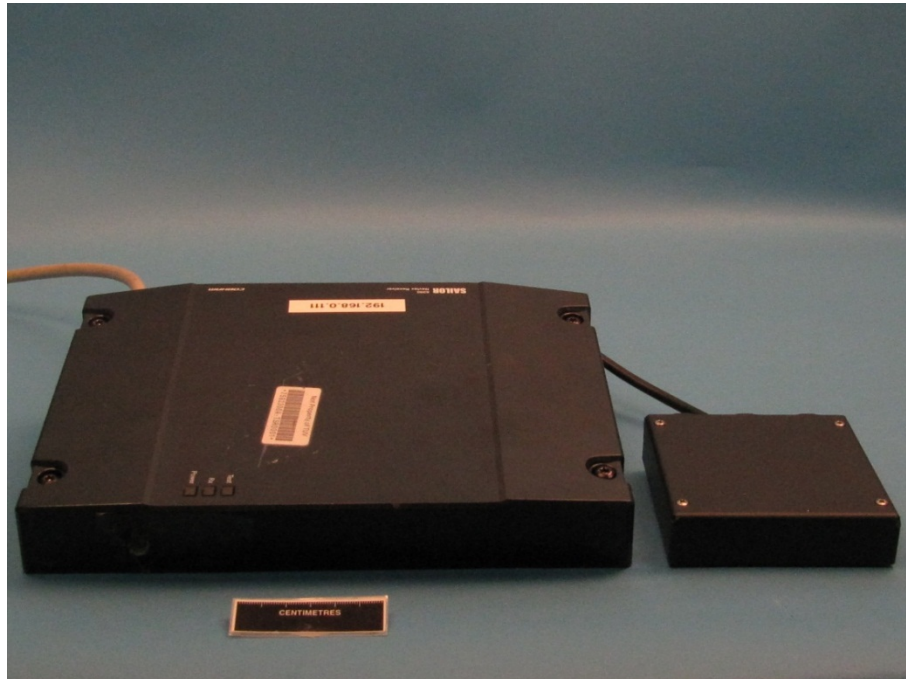
<b>Manufacturer</b>	<u>Thrane &amp; Thrane A/S</u>
<b>Country of origin</b>	<u>Denmark</u>
<b>Technical Description</b>	<u>Navtex Receiver</u>
<b>Model No</b>	<u>TT-6390A</u>
<b>Part No</b>	<u>406390A</u>
<b>Serial No</b>	<u>192.168.0.111</u>
<b>Drawing Number</b>	<u>97-137247-P01 (P: preliminary)</u>
<b>Build Status</b>	<u>Prototype build</u>
<b>Software Issue</b>	<u>0.95</u>
<b>Hardware Issue</b>	<u>Rev. B</u>
<b>FCC ID</b>	<u>ROJ6390</u>
<b>IC ID</b>	<u></u>
<b>Highest Operating Frequency</b>	<u>300MHz (DSP clock)</u>
<b>Signature</b>	<u>Jesper Holst</u>
<b>Date</b>	<u>2013-06-06</u>
<b>D of B S Serial No</b>	<u>1</u>

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a Thrane & Thrane A/S SAILOR 6390 Navtex Receiver as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test

### 1.4.2 Equipment Category

As per IEC 60945 Clause 4.4, all parts of the EUT were declared by the manufacturer as *protected*.

## 1.5 DEVIATIONS

No deviations from the applicable test standard or test plan were made during the testing.

## 1.6 PERFORMANCE MONITORING

Performance Test/Checks were conducted in accordance with IEC 61097-6, Clauses 5.2 and 5.3.





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## 1.7 MODIFICATIONS

No modifications were made during the test program.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
<b>Serial Number: 192.168.0.111</b>			
0	As supplied by manufacturer.	N/A	N/A

## 1.8 REPORT MODIFICATION RECORD

Issue 1 – First Issue



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## **SECTION 2**

### **TEST DETAILS**

Type Approval Testing of the  
Thrane & Thrane A/S SAILOR 6390 Navtex Receiver



## 2.1 OPERATIONAL CHECKS

### 2.1.1 Specification Reference

IEC 60945, Clause 6.0

### 2.1.2 Test Details

	Requirement	Observation	Result
6.1	The EUT shall be checked to ensure compliance with the specific requirements as detailed below. The checks carried out shall be described and the results noted in the test report.	-	-
6.1.1	A check shall be made that all modes of operation required by the equipment standard are available, and that they may be controlled over the required range. Use shall be made of every position of every control provided to ensure that it performs the function for which it is identified and that it operates in the expected manner.	The Sailor 6390 control panel uses Android OS and the base screen has only two applications, 'NAVTEX' and 'System'. 'NAVTEX' only has a single mode of operation. 'System' is a status and general settings application.	Pass
<b>Clause 6.1.2 Arrangement</b>			
a)	Check that the number of operational controls, their design and manner of function, location, arrangement and size provide for simple, quick and effective operation of the EUT. Check that the controls are logically grouped according to their function.	There are 3 different controls, a touch screen, brightness and power. The number of controls on the touch screen is flexible as is the size due to being defined by software. The controls available provided simple, quick and effective operation.	Pass
b)	Check that the shape and size of each control is appropriate to its mode of operation. In the case of trackballs, joysticks and mice check that the controller can produce any combination of x and y axis output values and that controller does not drive the follower off the edge of the screen. In the case of joysticks, check that there is a "home position" with capability for a return to that point.	The size and shape of the touch pads were adequate and appropriate. The power and brightness controls were the appropriate size and shape.	Pass
c)	In the case of touch screens check that the dimension of the response area for a push to activate operation is a minimum of 15 mm height and width and the force required for operation is a maximum of 1,5 N where applicable.	When using a QWERTY keyboard, the size of each 'key' was 15mm x 15mm. The touch screen is capacitive, therefore no pressure is required.	Pass
d)	Check that information presentation is suited to the maximum expected rate of change of information, for example analogue presentation is sometimes more suited to rapid change than digital.	No analogue or rapidly changing data display.	Pass
e)	Check that rotating controls and indicators turn clockwise for increased value or effect.	When turning the brightness control clockwise, the brightness increases.	Pass
f)	Check that linear controls and indicators move upwards or to the right for increased value or effect.	No linear controls.	Pass
g)	Check that where users must rapidly discern directional change, digital displays are provided with indications of directions of change	Not applicable for this equipment.	Pass
h)	Check that equipment elements relating to control, and indicators associated with control, are readily distinguishable from elements provided for other functions, such as equipment set-up.	There are separate menus for set-up and are labelled accordingly.	Pass



<b>Clause 6.1.3 Operation</b>			
Clause	Requirement	Observation	Result
a)	Check that all operational controls permit normal adjustments to be easily performed, and are arranged in a manner which minimizes the chance of inadvertent operation. Check that controls not required for normal operation and which may affect performance are not readily accessible.	A touch screen is used for all operational control and is easy to use. Normal operational controls are only available.	Pass
b)	Check all operational controls and indications for ease of use and correctness, and for general suitability related to their function and environment, for example expected ambient illumination and sound.	Controls are via a touch screen and are easy to use.	Pass
c)	Check that the operation of a control does not cause obscuration of its related indicator where observation of the indicator is necessary for making the adjustment.	Operation of control will partially obscure the screen by a finger or hand as it is a touch screen. But this is temporary and will not be problematic.	Pass
d)	Check that in all operations there is a clearly marked or consistent simple action to recover from a mistaken choice or to leave an unwanted state. Check that it is always possible for a user to start, interrupt, resume and end an operation.	There are always two icons displayed a "↶", which always steps back one stage/menu and a "⏪" icon, which steps back to the android OS base screen.	Pass
<b>Clause 6.1.4 Identification</b>			
Clause	Requirement	Observation	Result
a)	Check that all operational controls and indicators are easy to identify and read from the position where the equipment is normally operated.	All controls are easy to identify and read.	Pass
b)	Check that instrument and indicator character type is simple and clear. The character height (mm) shall be not less than 3,5 times the reading distance in metres, and the nominal character width shall be 0,7 times the character height. Check that instruments meant to be operated, or fitted in connection with controls are readable from a distance of at least 1 m, and that other instruments are readable from a distance of at least 2 m.	Character height of capitals is about 4mm and presents easy reading from the expected viewing distance. As the device is touch screen operated, the expected operating distance is less than 1m. It is not expected that information should be provided for reading at a longer distance.	Pass
c)	Check that the controls and indicators are identified in English, and that the identifications provided in the equipment standard are used.	Language is English and brightness and power controls use the appropriate symbols.	Pass
d)	Check that indicators are satisfactorily positioned relative to the operator's line of sight, and are not obscured when operating associated controls under normal operating conditions.	Operation of control will partially obscure the screen by a finger or hand as it is a touch screen. But this is temporary and will not be problematic.	Pass
<b>Clause 6.1.5 Screen Display and Indicators</b>			
Clause	Requirement	Observation	Result
a)	Check that menus are grouped according to the task environment. Check that hierarchical menu structures have been designed to minimize the number of steps required and that the user has an indication of current position in the menu.	There is one menu selectable from the main operation NAVTEX windows. It is clear to the user which menu position they are currently viewing.	Pass
b)	If menu selections are made of keyed codes, check that each code is the first letter or letters of the displayed option label rather than an arbitrary letter.	No key codes.	-
c)	Check that a menu displays only those options currently available in the current context to the user. Check that menu items are highlighted when the cursor passes over them.	All available options are shown depending on the menu selected. There is no cursor as the interface is a touch screen.	Pass
d)	Check that for menu items that can be in an "On" or "Off" state the "On" state should be indicated by making the item perceptually distinct and that selection of menu items with "On" and "Off" states change their state.	A square filled with a tick indicates on and an empty square indicates off.	Pass



Clause 6.1.5 Screen Display and Indicators			
Clause	Requirement	Observation	Result
e)	Check that items which appear the same behave consistently by, for instance, – checking for consistent display format and selection logic in hierarchical menus, – checking that menus used in different displays are consistent, – checking that menus are displayed in consistent screen locations, – checking for consistent input prompts and checking that labels are consistent.	There is consistency of items throughout all menus.	Pass
f)	Check that the user does not have to remember information from one part of a dialogue to another	User never has to remember information.	Pass
g)	Check that the system employs marine terminology conforming with the SMCPs where appropriate.	No phrases were found that did not comply with Standard Marine Communication Phrases.	Pass
h)	Check that displayed text is easy to understand wherever possible.	All text is easy to understand.	Pass
i)	Check that where additional on-line help is available it is in task dependent form, easy to search and list the steps to be carried out.	No online help.	-
j)	Check that in all operations the system state is observable with essential data displayed.	The system displays essential data.	Pass
k)	Check that all information required by the user to perform an operation is available on the current display.	All applicable information is available to the user.	Pass
l)	Check that feedback timing is consistent with the task requirements. Check that there is a clear feedback from any action within a short time. Check that where a perceptible delay in response occurs, a visible indication is given.	There is no perceptible delay and feedback to the user is clear and prompt.	Pass
m)	Check that it is possible at any step of a screen supported operation to return with one action to the original status before the operation was started.	The “↶” icon returns one step and cancels any input action.	Pass
n)	Check that any mode in use is distinctively identified by the display.	The NAVTEX application displays it's icon in the top left hand side of the screen.	Pass
o)	Check that displays present the simplest information consistent with their function, information irrelevant to the task is not displayed, and extraneous text and graphics are not present.	The screen display and menus are simple, easy to read and contain only functions relevant to their task.	Pass
p)	Check that displayed text is clearly legible to the user. Check that the font and size of alphanumeric characters are consistent. For any font used, check that it is possible to clearly distinguish between the characters: X and K, T and Y, I and L, l and 1, 0, O and Q, S and 5 and U and V.	Text was clearly legible and a sans serif font was used. No confusion between characters was noted.	Pass
q)	Check that the unit of measure is indicated for any data.	Units of measurement are correctly labelled.	Pass
r)	Check that all information is presented on a background of high contrast.	A high contrast picture is displayed.	Pass
s)	Check that highlighting is easily recognizable and is disabled when it is no longer applicable.	No highlighting was noted.	-
t)	Check that flashing is only used to signal an alarm and that only a small percentage of the screen is flashing at any one time. Check that if a user is required to read alarm text a marker symbol shall flash rather than the text. Check that no more than two flash rates are used and that they are then time synchronized.	The only use of flashing is when the alarm symbol is displayed.	Pass



<b>Clause 6.1.6 Voice announcement</b>			
Clause	Requirement	Observation	Result
a)	Check that voice announcements are in plain language, using marine terminology conforming with the SMCPs where appropriate, and in the English language.	No voice announcements are used.	-
b)	Check that it is possible to adjust the volume to extinction and that sudden changes in loudness do not occur.		
c)	Check that voice announcements stop when their associated indication or alarm is acknowledged.		
d)	Check that failure of the voice announcement system by disabling the loudspeaker, does not degrade the operation of the provided indicators and alarms.		
<b>Clause 6.1.7 Safety of Operation</b>			
Clause	Requirement	Observation	Result
a)	Check that the system attempts to prevent ascertainable user-action error from occurring.	Settings and adjustments are limited and there is no great potential for error input. System settings are password protected.	Pass
b)	Check that all actions that may be irreversible require a confirmation before proceeding.	All actions must be accepted.	Pass
c)	Check that when an action causes a detectable error the system gives clear feedback such as by including UNDO and/or REDO options where possible.	No action causes an error and there are no undo or redo options.	Pass
d)	Check that the EUT makes use of any quality indication contained in the input from other systems or sources.	There is no quality indication in use.	Pass
e)	Check that the user has available means to return to a known safe state with a single action.	The “↶” icon cancels an action and/or returns to the previous menu/screen.	Pass
<b>Clause 6.1.8 Distress Alert</b>			
Clause	Requirement	Observation	Result
a)	Check that a distress alert is only activated by means of a dedicated distress button, and that it is not a key of an ITU-T digital input panel, or of an ISO keyboard on the equipment. Check that the button is physically separated from functional buttons/keys used for normal operation. Check that the button is a single button used for no other purpose than to initiate a distress alert.	There is no provision for distress alerting.	-
b)	Check that the dedicated distress button is clearly identified by being red in colour and marked “DISTRESS”. Where a non-transparent protective lid or cover is used check that this is also marked “DISTRESS”.		
c)	Check that the dedicated distress button is protected against inadvertent operation by means of a spring loaded lid. Check that it is not necessary for a user to remove additional seals or to break the lid or cover in order to operate the distress button.		
d)	Check that the distress alert initiation requires at least two independent actions. Lifting the protective lid or cover is considered as the first action. Pressing the distress button is considered as the second independent action.		
e)	Check that the equipment indicates the status of a distress alert transmission. Check that when the distress button is pressed a flashing light and intermittent acoustic signal start immediately & after being pressed for at least 3 s, the distress alert transmission is initiated and the indication steady.		



<b>Clause 6.1.8 Distress Alert</b>			
Clause	Requirement	Observation	Result
f)	<p>Check that it is not possible to interrupt the transmission of a distress alert or distress message which is in progress, but that it is possible to interrupt repetitive transmissions of a distress message.</p> <p>Additional Observations for MF/HF Radio. A facility for user designation of distress calls is available which includes the user selection of single or multi-frequency distress alerting transmissions.</p>	There is no provision for distress alerting.	-
<b>Clause 6.2.1 Hardware General</b>			
Clause	Requirement	Observation	Result
a)	Check that provision has been made for the removal of, or for blocking off, the position of controls of any optional facilities which are not fitted.	Touch screen displays controls, therefore provision not needed.	Pass
b)	Check that operational controls, the inadvertent exercise of which could switch off the equipment, lead to performance degradation, or to false indications not obvious to the operator, are specially protected against unintentional operation.	No control resulted in performance degradation. The power button only turns the unit off when pressed and held for a few seconds.	Pass
c)	Check that the design of the EUT is such that misuse of the controls required for normal operation, and which are accessible to the operator, shall not cause damage to the equipment or injury to personnel.	It is not possible for any control to cause damage.	Pass
d)	Check that where a digital input panel with the digits "0" to "9" is provided, the digits are arranged to conform with ITU-T Recommendation E.161 (4x3 array) or, alternatively, where an alphanumeric keyboard layout, as used on office machinery and data processing equipment, is provided, the digits "0" to "9" are arranged to conform with ISO 3791.	When in the text entry mode a number keypad could be displayed for touch operation, the layout of the keypad conforms to ITU-T E.161. When an alphanumeric keyboard is displayed, it is a standard QWERTY layout and conforms to ISO 3791.	Pass
<b>Clause 6.2.2 Alarms and Indicators</b>			
Clause	Requirement	Observation	Result
a)	Check that the EUT is provided with facilities which permit the testing of all operational indicators (alarm, warning and routine), displays and audible devices. Check audible alarms as described in 11.1.	EUT has a self-test mode, where all aspects of the device can be tested.	Pass
b)	Check that alarm indications are red, or if on displays, red or otherwise highlighted.	Alarm icon colour is red.	Pass
c)	Check that warning and alarm indications show no self-illumination, except to outline the alarm area on CRT or LCD displays, in the "safe" condition, and that any indirect illumination is low enough to avoid false indications.	Display shows no self-illumination and the alarm icon is only present when there is an active alarm.	Pass
<b>Clause 6.2.3 Illumination</b>			
Clause	Requirement	Observation	Result
a)	Check that any illumination provided in the EUT is adequate for operation of the equipment under all expected conditions of ambient illumination. Check that it can be adjusted for night use so that the night vision of the officer of the watch is not harmed by it.	Brightness can be adjusted by a dedicated control and has several adjustment steps.	Pass
b)	Check that means are provided for dimming the output of any light source of the equipment which is capable of interfering with navigation.	No light source is capable of interfering with navigation. The touch screen brightness is adjustable and the power control has a dim backlight.	Pass
c)	Check that any external illumination required is clearly identified in the equipment manual.	No external illumination required.	-



<b>Clause 6.2.3 Illumination</b>			
Clause	Requirement	Observation	Result
d)	Check that warning and alarm indicator lamps cannot be dimmed below reading intensity.	Entire screen is adjusted by brightness control, the alarm indicator symbol intensity cannot be set independently of screen.	Pass
e)	Check that the illumination is dazzle-free and adjustable to extinction, except for those warning and alarm indicators which are illuminated in the warning/alarm condition, and indicators required for equipment reactivation or distress alerting, which are to be clearly visible in all appropriate conditions of ambient illumination.	Illumination is dazzle-free and dimmable.	Pass
f)	Check that controls which are not illuminated, such as tracker balls, are locatable easily and unambiguously by tactile means.	Brightness control not illuminated but can be easily found due its protrusion from the display unit.	Pass
g)	Check that all information is presented with high contrast on a low-reflectance background which emits negligible light at night.	Display is presented with high contrasted and the screen is designed to reduce reflections.	Pass
h)	Check that transparent covers to instruments cannot cause reflections which reduce readability to an unacceptable level.	None present.	Pass
i)	Check that adjustable dimming from full brightness is provided for all lamps which are to be used in conditions of varying ambient illumination.	No external lamps present.	Pass
<b>Clause 6.3 Software</b>			
Clause	Requirement	Observation	Result
6.3.1	Check documentation for compliance with 4.2.3.1. (code of practice employed in the design and testing of the software, modular software and software maintenance & updates)	Thrane & Thrane Manufacturing is noted as ISO 9000 and MED Module D assessed for production quality control which should include design & software elements. So control of these elements is under the control of a European Notified Body and a presumption of conformity applied	Pass
<b>Clause 6.3.2 Safety of Operation</b>			
Clause	Requirement	Observation	Result
a)	Check documentation for compliance with 4.2.3.2.	It is not possible for the user to access or erase Operational software. Password protection controls access to OS.	Pass
b)	Check that software defaults, where applicable, are inserted in all modes of operation and that the default value: <ul style="list-style-type: none"> <li>– facilitates the preferred or expected operation of the equipment in accordance with the applicable equipment standards</li> <li>– does not lead to an unexpected or invalid operation, and</li> <li>– has the effect of minimising the number of inputs or transmissions into the system under which it operates.</li> </ul>	The software defaults are applicable to equipment standards. Upon start up, the same base screen display is displayed.	Pass
c)	Check that the software prevents an operation or warns an operator when attempting an input that leads to an invalid operation of the equipment.	Any settings not part of the normal operation of the system are password protected.	Pass
d)	Check that the operator has the possibility to choose a value other than the default value.	The user can enter their own value, where appropriate.	Pass
e)	Check that operations not required for normal operation, or which may adversely affect system performance, are not readily accessible.	Any settings not part of the normal operation of the system are password protected.	Pass





<b>Clause 6.3.3 Monitoring</b>			
Clause	Requirement	Observation	Result
6.3.3	<p>Check documentation for compliance with 4.2.3.3. The manufacturer shall provide information on how to produce a non-recoverable error. Carry out the non-automatically recoverable error according to the above information. Check that the alarm can be recognized as noted in the manufacturers documentation.</p> <p>NOTE This test can be waived if the manufacturer gives a written explanation of how the equipment watchdog operates and a written declaration is given to the test-house of how this function works and that the behaviour of the watchdog complies with the noted requirements.</p>	The system provides a self-test function, where all aspects of the system are checked. This is performed at start up and can be run at any time during normal operation.	Pass
<b>Clause 6.3.4 Operation</b>			
Clause	Requirement	Observation	Result
6.3.4	Check documentation for compliance with 4.2.3.4. (The system may allow function keys to speed up selection of common sequences.)	No function keys are available.	Pass
<b>Clause 6.4 Inter-unit Connection</b>			
Clause	Requirement	Observation	Result
6.4	Check with the manufacturer of the EUT, using equipment documentation if necessary, that when it is connected to, and operating with, other units of equipment, arrangements have been provided to maintain the performance of the EUT and of the other units.	The Sailor 6004 Control/Display panel has Ethernet, USB and two specialised multipin ports. Normal operational control of the NAVTEX receiver is made by an Ethernet connection.	Pass
a)	Check that the software interfaces between the EUT and other equipment are tested, and that special test software is provided for this purpose if necessary;	The EUT was connected with 1 ethernet cable connected between the 6390 and 6004 display unit. Simulated data was fed to the antenna from a signal generator and GPS serial data fed to the IEC 61162-1 GPS port. Test software was used to send NAVTEX data to the signal generator.	Pass
b)	<p>Ensure that arrangements have been made to achieve electrical separation and isolation between the EUT and the equipment to which it may be connected, if appropriate, such as by checking that:</p> <ol style="list-style-type: none"> <li>1) an exchange of any signals between units is carried out with minimum effect on the signal source;</li> <li>2) there is no loading of circuits or mismatch of transmission lines, particularly on high frequency or fast-rise time signals;</li> <li>3) a capability exists of sustaining a 1 kV isolation between units of equipment.</li> </ol>	This is tested as part of IEC 61162-1 or IEC 61097-6 testing.	Pass



Product Service

## **2.2 POWER SUPPLY**

### **2.2.1 Specification Reference**

IEC 60945, Clause 7.0

### **2.2.2 Equipment Under Test and Modification State**

SAILOR 6390 S/N 192.168.0.111 – Modification State 0

### **2.2.3 Date of Test**

26 September 2013

### **2.2.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.2.5 Test Method**

The following testing is required by the specification:

#### Test Method, Clause 5.2.3 - Main Extract

Excessive current is defined as greater than normal working current.

Excessive voltage is greater than that specified in 5.2.2

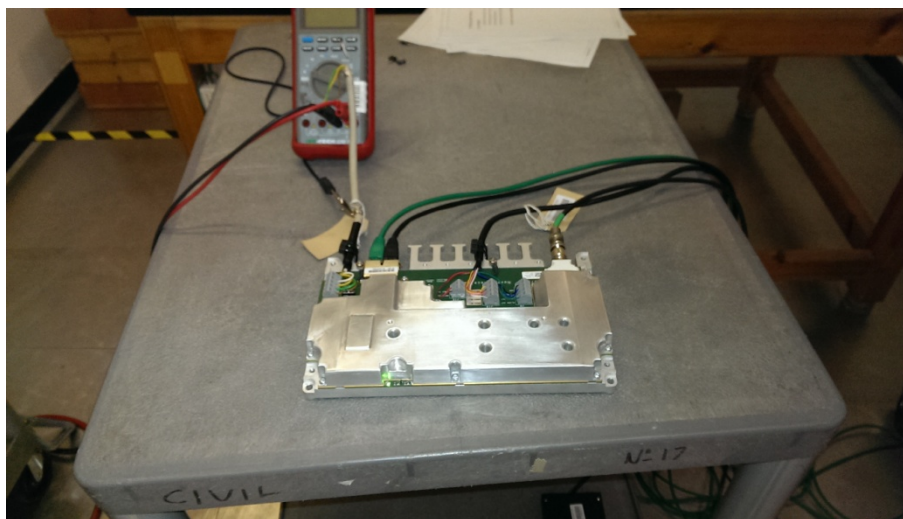
The power supply shall be adjusted to cause activation of the protection and after EUT reset, a performance check under normal test conditions shall be carried out.

Power supply misconnections are also regarded as excessive conditions. Where appropriate, the EUT shall be subjected to an input from a power supply of reversed polarity or improper phase sequence for a period of 5 min.

After completion of the test, and reset of the protection of the EUT, if required, the power supply shall be connected normally and a performance check shall be carried out.

## 2.2.6 Test Setup

A typical laboratory “bench” configuration with adjustable DC power supply was used.



Test Setup

## 2.2.7 Environmental Conditions

Ambient Temperature	23.0 °C
Relative Humidity	55.5 %



### 2.2.8 Test Results

The EUT was subjected to the above test method, test variables were as per the table below. A Performance Check was conducted at the stages stated below; results were as per the tables below.

#### Modification State 0

Test Parameter	Units	Result	Limit
Test Setup Variables - Applied conditions			
Over-voltage - level at which trip occurred	V DC	48*	-
Reverse Polarity - time applied	min	5	5
EUT Responses			
Response to overvoltage	-	1A EUT fuse ruptured *	Protection must activate where appropriate
Response upon removal of overvoltage	-	1A Fuse replaced EUT operated correctly*	Reset allowed
Response to reverse polarity	-	1A EUT fuse ruptured **	Protection must activate where appropriate
Response upon removal of reverse polarity	-	1A Fuse replaced EUT operated correctly**	Reset allowed
Performance Check			
Performance check result	P/F	P	P

\* The over-voltage level was performed using a DC power supply capable of delivering 60 A. As determined after discussion with the customer, the DC supply was set to 48V and turned on.

\*\* The Reverse polarity test was performed at 24Vdc.



Product Service

## **2.3 DRY HEAT TEST – FUNCTIONAL**

### **2.3.1 Specification Reference**

IEC 60945, Clause 8.2

### **2.3.2 Equipment Under Test and Modification State**

SAILOR 6390 S/N 192.168.0.111 – Modification State 0

### **2.3.3 Date of Test**

19 June 2013 – 20 June 2013

### **2.3.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.3.5 Environmental Conditions**

Ambient Temperature 22.9 – 25.9 °C  
Relative Humidity 19.7 – 27.2%

### **2.3.6 Test Method**

#### Functional Test

The EUT was placed in a climatic chamber at laboratory ambient conditions. With the EUT powered on the chamber was raised to and maintained at + 55 °C for a period of 10 to 16 hours. A performance test and check was carried out during this period. On completion of the performance test/check, the chamber was reduced to laboratory ambient conditions.

### 2.3.7 Test Results

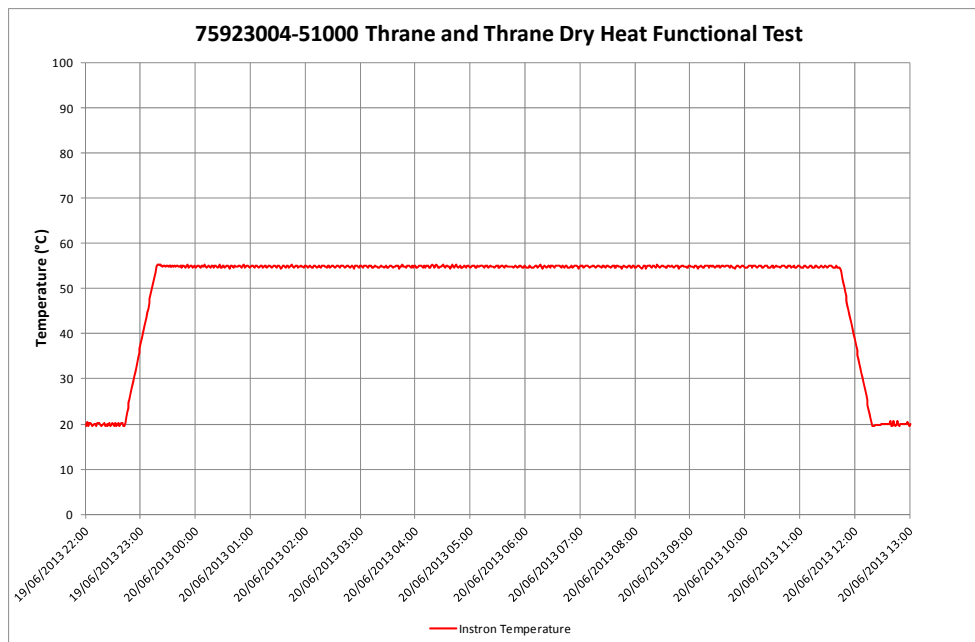
The test was carried out satisfactorily.



Dry Heat Test Set Up



Temperature Plot



Performance Check and Test

The EUT performance check and Test was carried out in accordance with the product specific standard (IEC 61097-6) clauses 5.2 and 5.3. The EUT met the requirements of the aforementioned clause.

	Result:	Limit:
Character Error Ratio	0%	≤4%

An additional performance check was carried out in accordance with (IEC 61097-6) clause 5.4.2, with extreme power supply conditions in accordance where the upper supply voltage was supplied simultaneously with the high temperature. The supply voltages of 31.2 V and 10.8 V were applied whilst at +55 °C. The performance check results were satisfactory.

	Result:	Limit:
Character Error Ratio	0%	≤4%

Mechanical Inspection

Post test no signs of mechanical degradation were witnessed.



Product Service

## **2.4 DAMP HEAT TEST**

### **2.4.1 Specification Reference**

IEC 60945, Clause 8.3

### **2.4.2 Equipment Under Test and Modification State**

SAILOR 6390 S/N 192.168.0.111 – Modification State 0

### **2.4.3 Date of Test**

17 July 2013 – 18 July 2013

### **2.4.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.4.5 Environmental Conditions**

Ambient Temperature 23.8 – 27.5 °C  
Relative Humidity 19.0 – 34.9%



#### 2.4.6 Test Method

The EUT was placed in a climatic chamber at laboratory ambient conditions. With the EUT powered off the temperature was set to increased to +40 °C and the humidity increased to 93% over a 3 hour period. These conditions were retained for 10 to 16 hours, during which time the EUT was powered on for at least 2 hours and subjected to a performance check.



Damp Heat Test Set Up

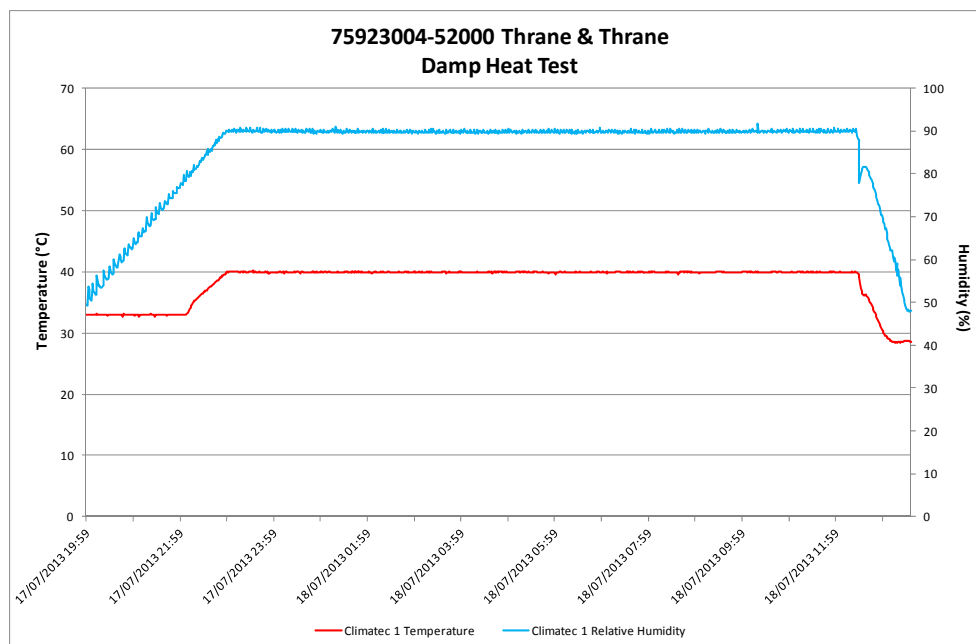
#### 2.4.7 Test Results

The test was carried out satisfactorily.



Product Service

### Temperature Plot



At the required temperature and humidity levels this chamber has a 3% RH off set, such that when indicating 90% RH the chamber's actual level is 93% RH.

### Performance Check

The EUT performance check was carried out in accordance with the product specific standard (IEC 61097-6) clause 5.3. The EUT met the requirements of the aforementioned clause.

	Result:	Limit:
Character Error Ratio	0%	≤4%

### Mechanical Inspection

Post test no signs of mechanical degradation were witnessed.



Product Service

## **2.5 LOW TEMPERATURE TEST – FUNCTIONAL**

### **2.5.1 Specification Reference**

IEC 60945, Clause 8.4.2.4

### **2.5.2 Equipment Under Test and Modification State**

SAILOR 6390 S/N 192.168.0.111 – Modification State 0

### **2.5.3 Date of Test**

24 June 2013 – 24 June 2013

### **2.5.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.5.5 Environmental Conditions**

Ambient Temperature 22.3 – 27.6°C  
Relative Humidity 27.5 – 29.4%

### **2.5.6 Test Method**

#### Functional Test

The EUT (powered off) was placed in a climatic chamber at laboratory ambient conditions. The temperature was then reduced to -15 °C and remained for 10 to 16 hours. During this time the EUT was activated for at least 2 hours and subjected to a performance check.



Product Service



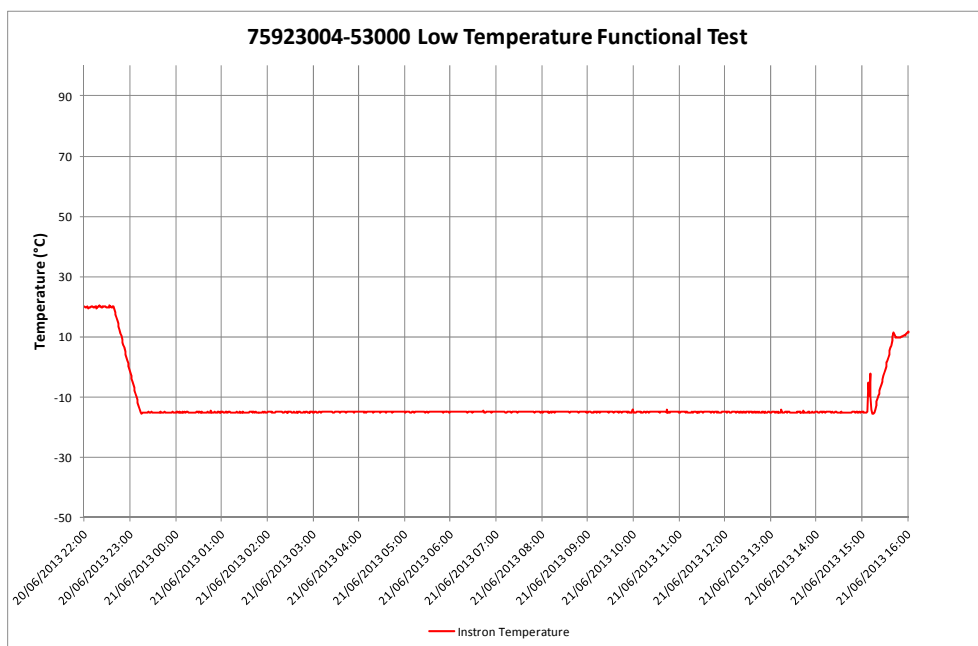
Low Temperature Test Set Up



### 2.5.7 Test Results

The test was carried out satisfactorily.

#### Temperature Plot



#### Performance Check

The EUT performance check was carried out in accordance with the product specific standard (IEC 61097-6) clause 5.3. The EUT met the requirements of the aforementioned clause.

	Result:	Limit:
Character Error Ratio	0%	≤4%

#### Mechanical Inspection

Post test no signs of mechanical degradation were witnessed.



Product Service

## **2.6 THERMAL SHOCK**

### **2.6.1 Specification Reference**

IEC 60945, Clause 8.5

### **2.6.2 Test Details**

This test is only applicable to equipment classed as portable; the SAILOR 6390 Navtex Receiver is classed as protected, hence, this test was not carried out.



Product Service

## **2.7 DROP**

### **2.7.1 Specification Reference**

IEC 60945, Clause 8.6

### **2.7.2 Test Details**

This test is only applicable to equipment classed as portable; the SAILOR 6390 Navtex Receiver is classed as protected, hence, this test was not carried out.



Product Service

## **2.8 VIBRATION TEST**

### **2.8.1 Specification Reference**

IEC 60945, Clause 8.7

### **2.8.2 Equipment Under Test and Modification State**

SAILOR 6390 S/N 192.168.0.111 – Modification State 0

### **2.8.3 Date of Test**

26 June 2013 & 22 July 2013

### **2.8.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.8.5 Environmental Conditions**

Ambient Temperature 23.6 – 27.5 °C  
Relative Humidity 29.4 – 42.9%

### **2.8.6 Test Method**

The EUT was fixed to the vibration table and was subject to the following vibration profiles:

#### Resonance Sweep

- 5 Hz and up to 13.2 Hz with an excursion of  $\pm 1$  mm ( $7 \text{ m/s}^2$  maximum acceleration at 13.2 Hz);
- above 13.2 Hz and up to 100 Hz with a constant maximum acceleration of  $7 \text{ m/s}^2$ .

One sweep was performed at a rate of 0.5 octaves / minute.

Where a resonance was detected the EUT was subjected to a 2 hour endurance test at that resonance. If no resonance was detected the EUT was subjected to a 2 hour endurance run at 30 Hz as required by the relevant standard. The test was repeated in each axis.





Vibration Test Setup

### 2.8.7 Test Results

The test was carried out satisfactorily.

No resonances were detected and therefore the endurance run for each axis was carried out at 30Hz.

#### Performance Check

The EUT performance check was carried out in accordance with the product specific standard (IEC 61097-6) clause 5.3. The EUT met the requirements of the aforementioned clause.

	Result:	Limit:
Character Error Ratio	0%	≤4%

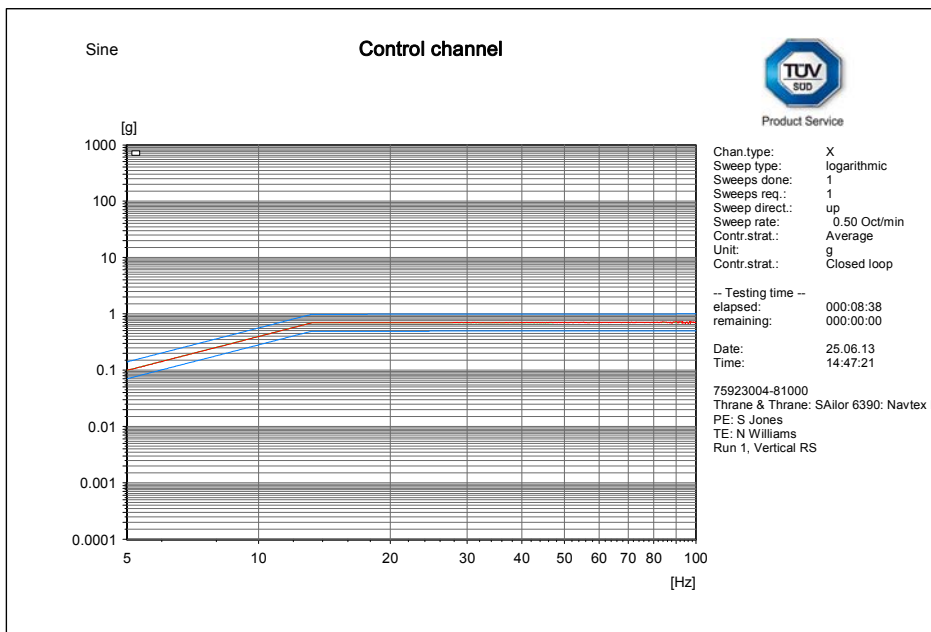
#### Mechanical Inspection

Post test no signs of mechanical degradation were witnessed.

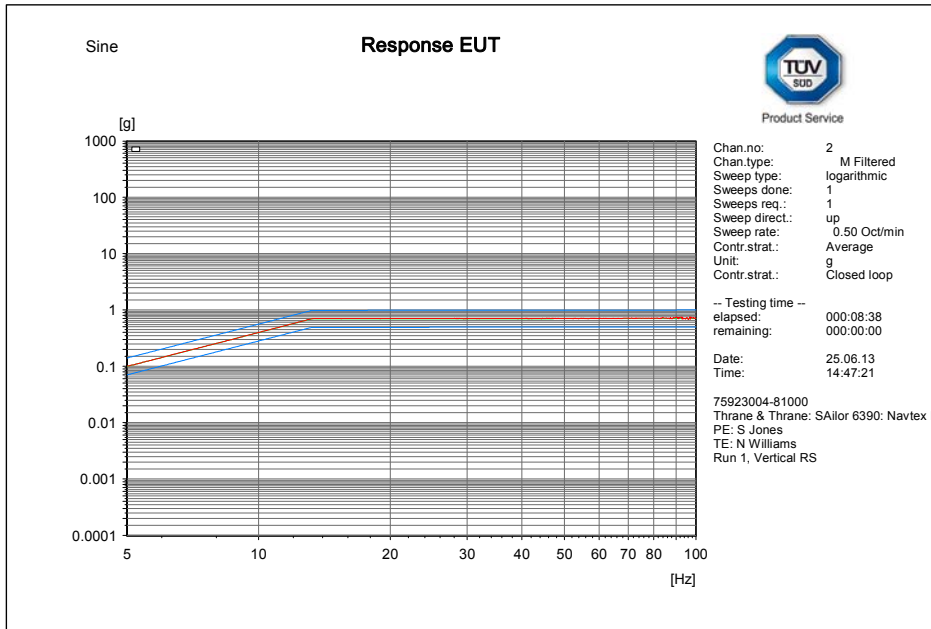


Product Service

### Vertical Axis – Resonance Search



C:\VcpNT\Daten\m+p\Thrane & Thrane\75923004-81000\Resonance Search\_001.rsn

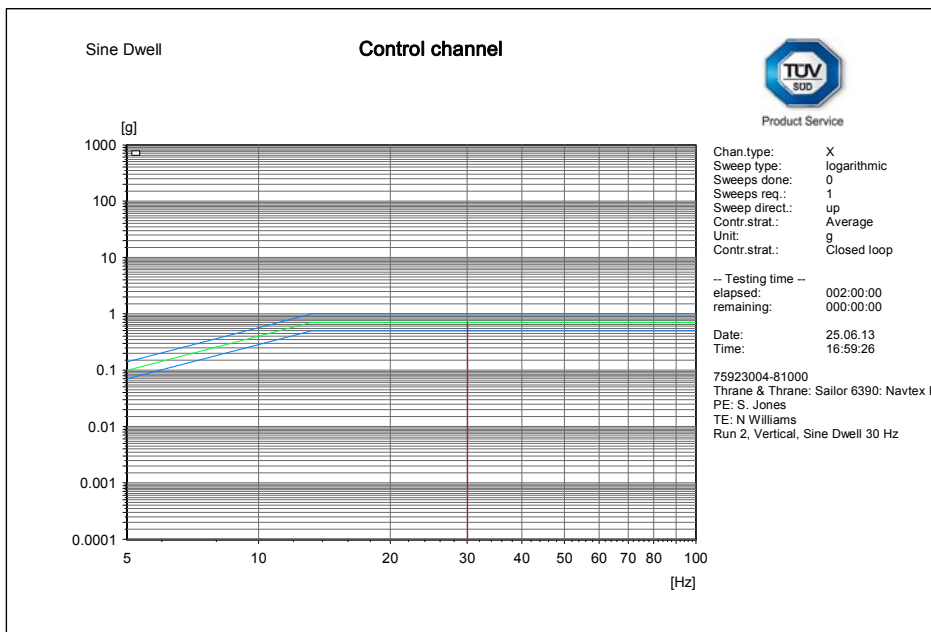


C:\VcpNT\Daten\m+p\Thrane & Thrane\75923004-81000\Resonance Search\_001.rsn

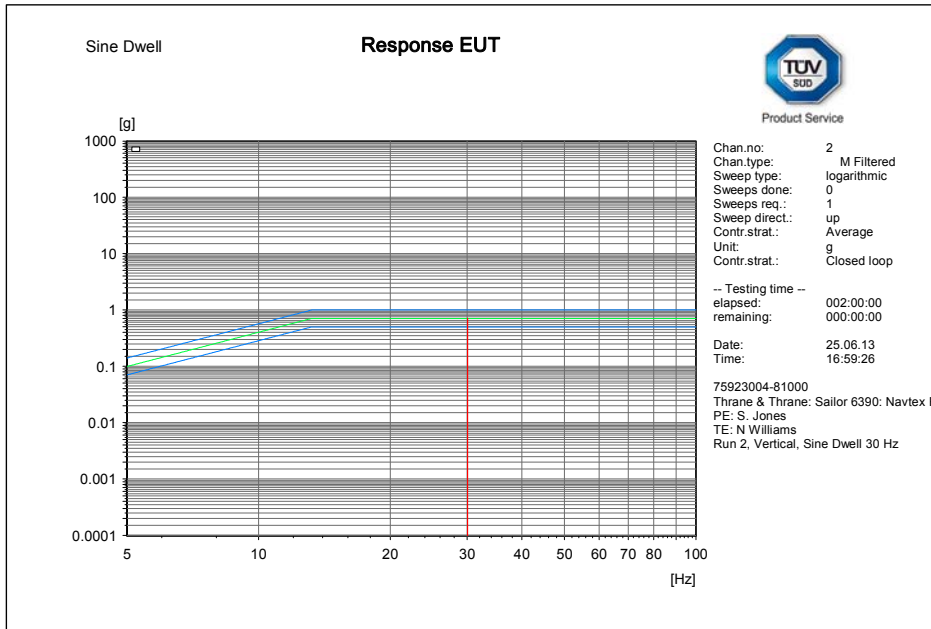


Product Service

### Vertical Axis – Endurance Run



C:\VcpNT\Daten\m+p\Thrane & Thrane\75923004-81000\Dwell at 30 Hz\_002.rsd

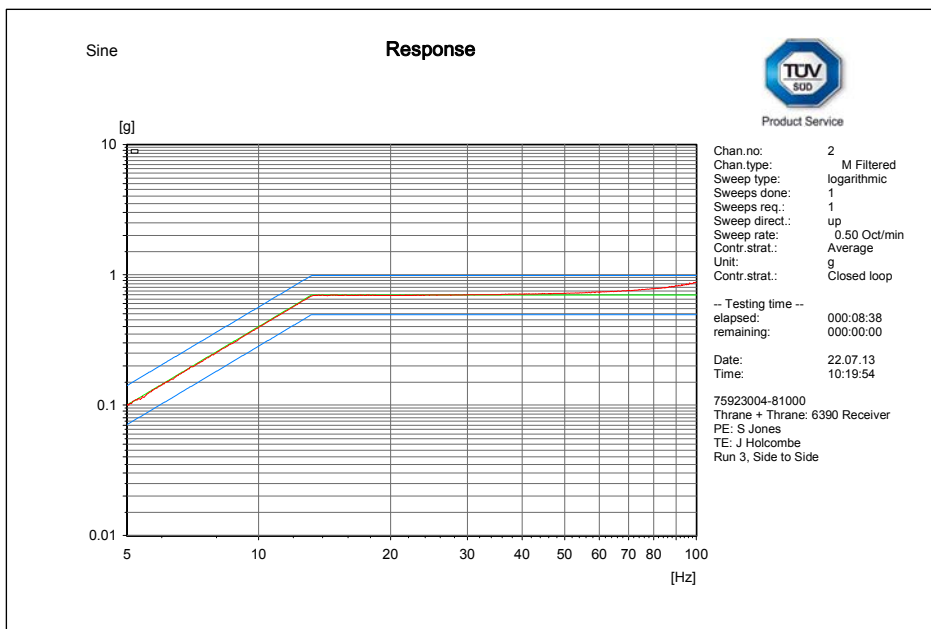
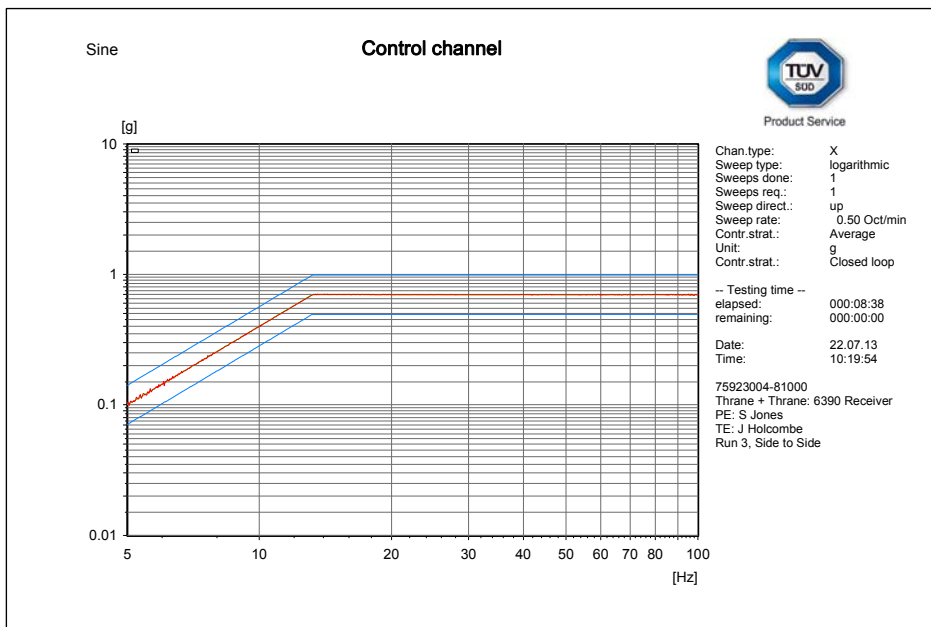


C:\VcpNT\Daten\m+p\Thrane & Thrane\75923004-81000\Dwell at 30 Hz\_002.rsd



Product Service

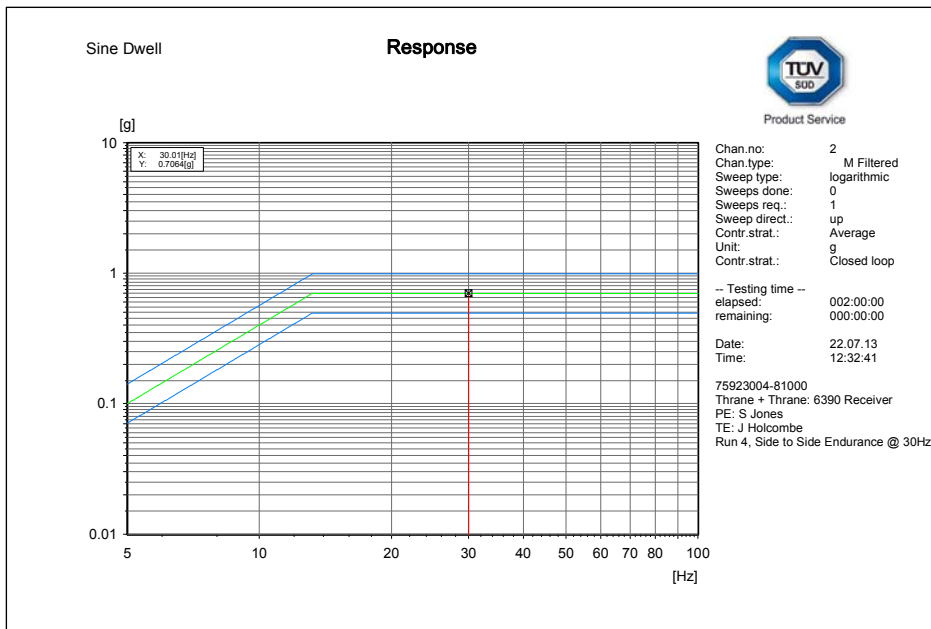
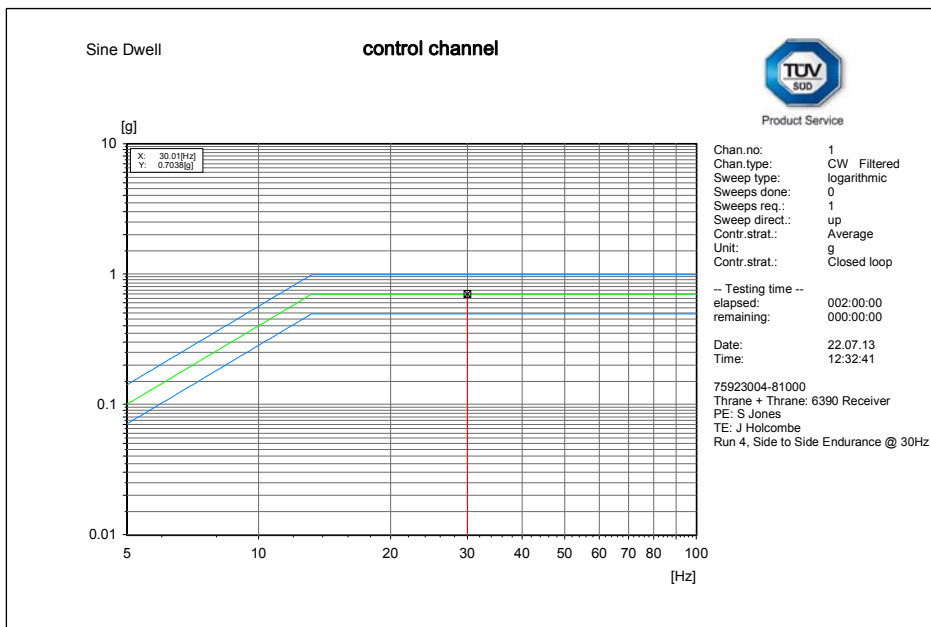
### Lateral Axis – Resonance Search





Product Service

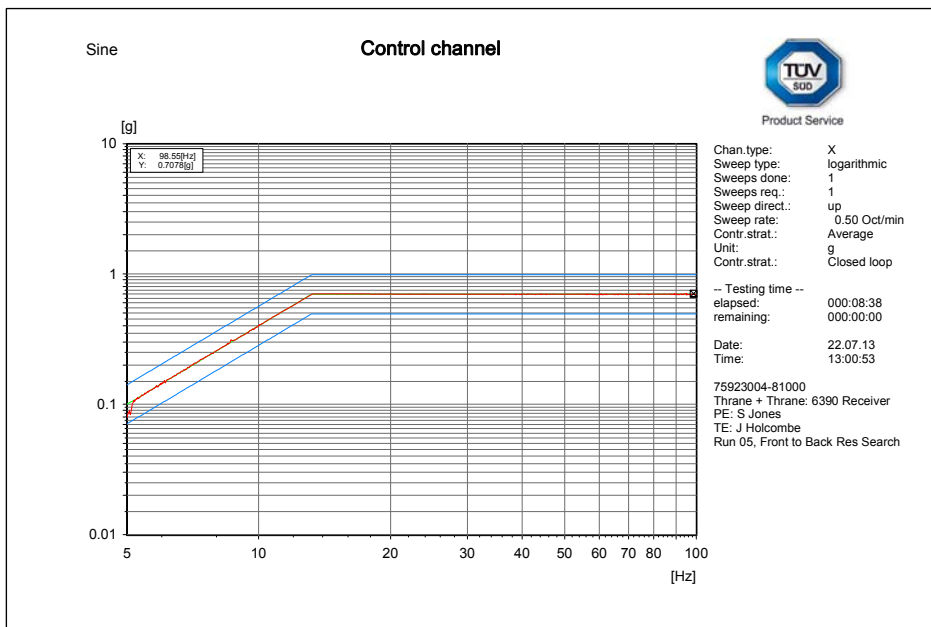
### Lateral Axis – Endurance Run



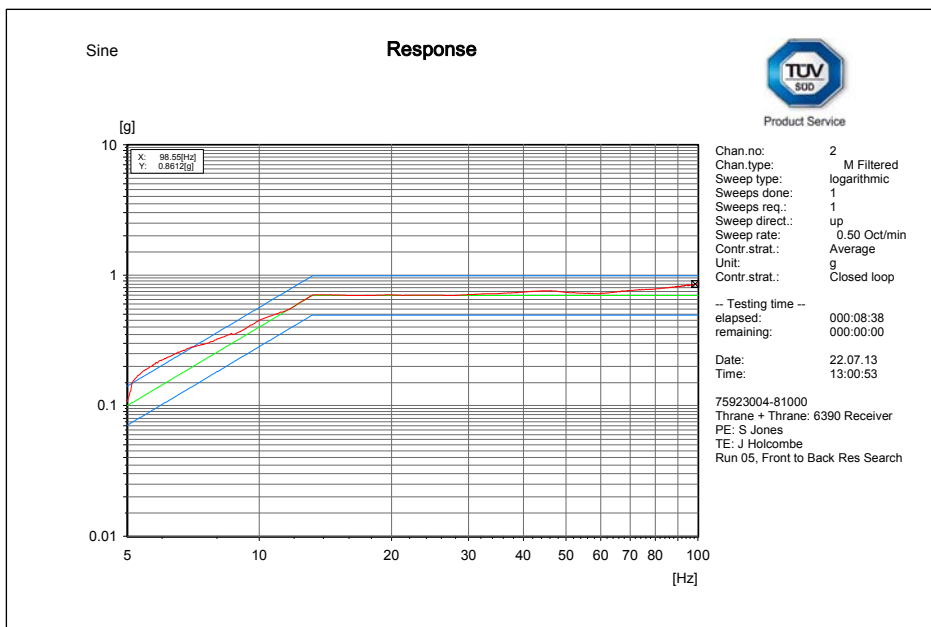


Product Service

### Longitudinal Axis – Resonance Search



C:\VcpNT\Daten\m+p\Thrane and Thrane\_s\_007.rsn

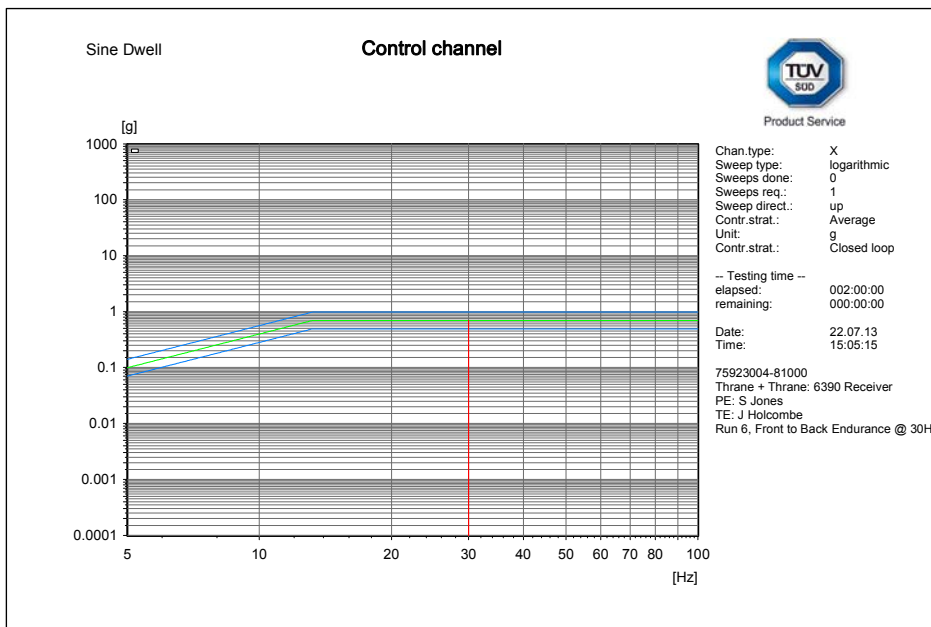


C:\VcpNT\Daten\m+p\Thrane and Thrane\_s\_007.rsn

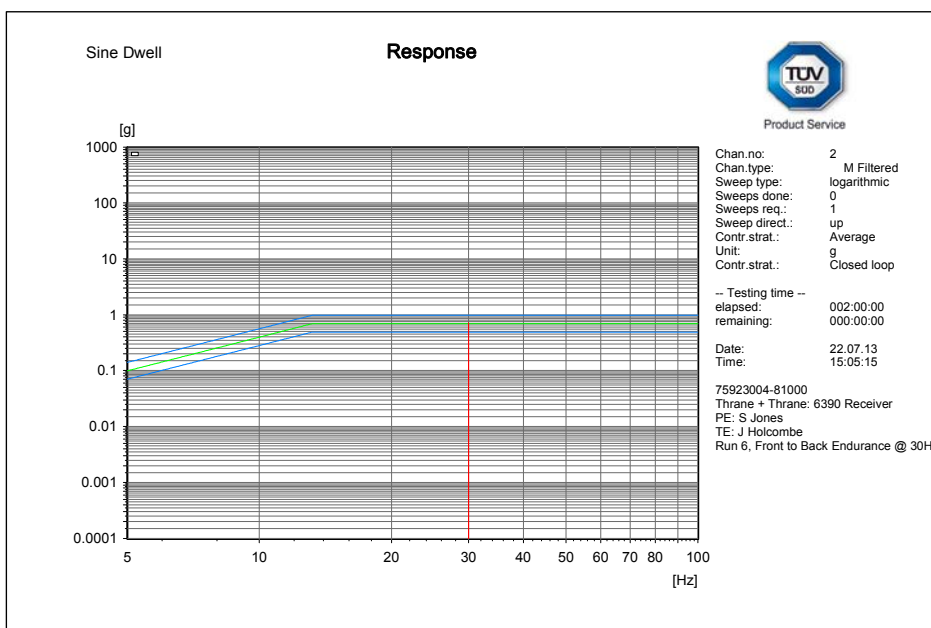


Product Service

### Longitudinal Axis – Endurance Run



C:\VcpNT\Daten\m+p\Thrane and Thrane\30 Hz Sine Dwell\_005.rsd



C:\VcpNT\Daten\m+p\Thrane and Thrane\30 Hz Sine Dwell\_005.rsd



Product Service

## **2.9 RAIN AND SPRAY**

### **2.9.1 Specification Reference**

IEC 60945, Clause 8.8

### **2.9.2 Testing Details**

This test is only applicable to equipment classed as exposed; the SAILOR 6390 Navtex Receiver is classed as protected, hence, this test was not carried out.





Product Service

## **2.10 IMMERSION**

### **2.10.1 Specification Reference**

IEC 60945, Clause 8.9

### **2.10.2 Test Details**

This test is only applicable to equipment classed as portable; the SAILOR 6390 Navtex Receiver is classed as protected, hence, this test was not carried out.



Product Service

## **2.11 SOLAR RADIATION**

### **2.11.1 Specification Reference**

IEC 60945, Clause 8.10

### **2.11.2 Test Details**

This test is only applicable to equipment classed as portable; the SAILOR 6390 Navtex Receiver is classed as protected, hence, this test was not carried out.



Product Service

## **2.12 OIL RESISTANCE**

### **2.12.1 Specification Reference**

IEC 60945, Clause 8.11

### **2.12.2 Test Details**

This test is only applicable to equipment classed as portable; hence, this test was not conducted as per Section 1.4.2.



Product Service

## **2.13 CORROSION**

### **2.13.1 Specification Reference**

IEC 60945, Clause 8.12

### **2.13.2 Test Details**

See Manufacturer Waiver request – see Annex A



Product Service

## **2.14 ELECTROMAGNETIC EMISSION**

### **2.14.1 Specification Reference**

IEC 60945, Clause 9

### **2.14.2 Test Details**

See TÜV SUD Product Service document 75923004 Report 03.



Product Service

## **2.15 IMMUNITY TO ELECTROMAGNETIC EMISSION**

### **2.15.1 Specification Reference**

IEC 60945, Clause 10

### **2.15.2 Test Details**

See TÜV SUD Product Service document 75923004 Report 03.



Product Service

## **2.16 ACOUSTIC NOISE AND SIGNALS**

### **2.16.1 Specification Reference**

IEC 60945, Clause 11.1

### **2.16.2 Test Details**

The Manufacturer has advised that this test is only applicable to the display component of the Navtex Receiver.

The Manufacturer also advised that the Display / Control screen approval details can be found in Nemko report 218907 SAILOR 6004 –IEC945.



Product Service

## **2.17 COMPASS SAFE DISTANCE**

### **2.17.1 Specification Reference**

IEC 60945, Clause 11.2

### **2.17.2 Test Details**

See TÜV SUD Product Service document 75923004 Report 03.





Product Service

## **2.18 PROTECTION AGAINST ACCIDENTAL ACCESS TO DANGEROUS VOLTAGES**

### **2.18.1 Specification Reference**

IEC 60945, Clause 12.1

### **2.18.2 Equipment Under Test and Modification State**

SAILOR 6390 S/N 192.168.0.111 - Modification State 0

### **2.18.3 Date of Test**

23 July 2013

### **2.18.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.18.5 Environmental Conditions**

Ambient Temperature 21.4 °C  
Relative Humidity 57.9%

### **2.18.6 Test Method**

As per Table 1 of IEC 60529:1989+A1:1999, protection degree 2 – protection against access with a finger. Using jointed test finger Ø12mm, 800mm length.

10N were applied as per Table 6 of IEC 60529:1989+A1:1999.

The rear of the unit is open and allows ingress of the test finger. When straight the finger was able to touch the plastic connectors and basic insulation of the wires entering the connectors, however it was not possible to touch the connections themselves as they are within the connector.

A tool is required to remove the enclosure cover of the equipment.

### **2.18.7 Test Results**

The test was carried out satisfactorily: there are no hazardous voltages within the equipment. All voltages are SELV, <42Vac or 60Vdc.



Product Service

## **2.19 ELECTROMAGNETIC RADIO FREQUENCY RADIATION**

### **2.19.1 Specification Reference**

IEC 60945, Clause 12.2

### **2.19.2 Test Details**

The EUT is a Navtex receiver only: the Manufacturer has declared that there are no transmitters within the product and therefore, this clause is not applicable.



Product Service

## **2.20 EMISSION FROM VISUAL DISPLAY UNIT (VDU)**

### **2.20.1 Specification Reference**

IEC 60945, Clause 12.3

### **2.20.2 Test Details**

The Manufacturer advised that the Display / Control screen approval details can be found in Nemko report 218907 SAILOR 6004 –IEC945.



Product Service

## **2.21 X-RADIATION**

### **2.21.1 Specification Reference**

IEC 60945, Clause 12.4

### **2.21.2 Test Details**

This test is only applicable to equipment that may emit X-radiation.



Product Service

## **2.22 MAINTENANCE**

### **2.22.1 Specification Reference**

IEC 60945, Clause 13 (4.7)

### **2.22.2 Test Details**

The Manufacturer has advised that SAILOR 6390 Navtex Receiver does not require any hardware or software maintenance.



Product Service

## **2.23 EQUIPMENT MANUALS**

### **2.23.1 Specification Reference**

IEC 60945, Clause 14 (4.8)

### **2.23.2 Test Details**

The User Manual and Installation Manual are both written in English.

The inspected User Manual was Document number: 98-137261-A, Release date: September 24, 2013.

The inspected Installation Manual was Document number: 98-139768-IM-review-wm, Release date: 8 Oct, 2013.

The IEC 60945 category is clearly stated in the User and Installation Manual (Protected).

No installation information is provided within the User Manual. The User Manual states that the installation must be carried out by skilled service personnel. The installation procedures have not been confirmed.

A troubleshooting guide is provided to help solve some of the most common operational problems.

The Manufacturer has advised that the EUT is not designed to allow for, or contain modules which allow for fault diagnosis or repair at component level.



Product Service

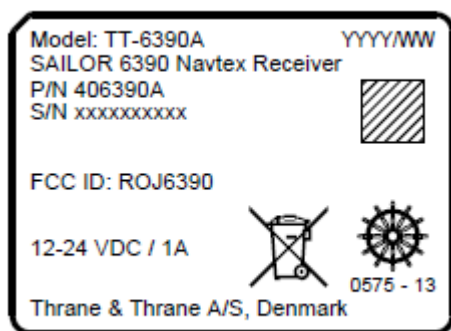
## 2.24 MARKING AND IDENTIFICATION

### 2.24.1 Specification Reference

IEC 60945, Clause 15 (4.9)

### 2.24.2 Test Details

EUT sample labels can be seen below:



The Manufacturer, equipment type, model identification under which it was type tested and serial number of the unit is clearly identified.

The details of the software components (the control panel and the Navtex receiver) can be identified from the root menu (*System, About, Versions*) for the control panel, and (*System, Application, Navtex, Navtex Version*) for the Navtex black box, along with the Navtex Software Version data field displayed on the entry page.

The compass safe distance value is presented in the installation manual.



Product Service

### **SECTION 3**

#### **TEST EQUIPMENT USED**





Product Service

### 3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.2 EMC – Power Supply</b>					
Power Supply Unit	Farnell	H 60/50	1095	-	TU
Multimeter	Iso-tech	IDM101	2422	12	24-Jan-2014
<b>Section 2.3 and 2.5 Climatic – High Temperature and Low Temperature (Functional)</b>					
Temperature Chamber	Instron	906	2128	12	15-Oct-2013
<b>Section 2.4 Climatic - Humidity</b>					
Climatic Chamber	Climatec	Climatec 1	2124	12	29-Nov-2013
<b>Section 2.8 Vibration - Sine</b>					
Vibration System	Ling Dynamic Systems	LDS V964	2515	6	7-Dec-2013
Isotron Accelerometer	Endevco	256-10	3114	6	8-Jul-2013
Vibration System	Ling Dynamic Systems	875	3170	6	8-Jan-2014
Charge Amplifier	Endevco	133	3190	12	15-Aug-2013
Isotron Accelerometer	Endevco	256-10	3381	6	27-Sep-2013
1/0.2mm Thermocouple (200m reel)	Unknown	Type K	3678	24	15-Nov-2013
Vibration Controller	m + p International	Vibpilot 8	3768	12	13-May-2014
Vibration Controller (8 Ch)	m + p International	VibPilot 8	3777	12	11-May-2014
Accelerometer	Endevco	256-10	3993	6	28-Sep-2013
Accelerometer	Meggitt Endevco	256-10	4272	6	26-Sep
<b>Section 2.18 Safety</b>					
Hygrometer	Rotronic	I-1000	2790	12	3-Apr-2014
Digital Force Gauge (500N)	TWL	AFG4	2971	12	17-May-2014
Fig 2 Test Probe B IEC/ EN 61032	Retrac Productions Ltd	Jointed test finger	3632	12	21-Feb-2014

TU – Traceability Unscheduled

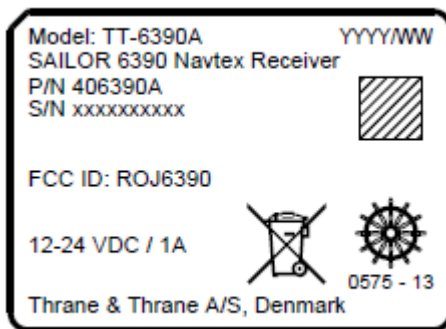


Product Service

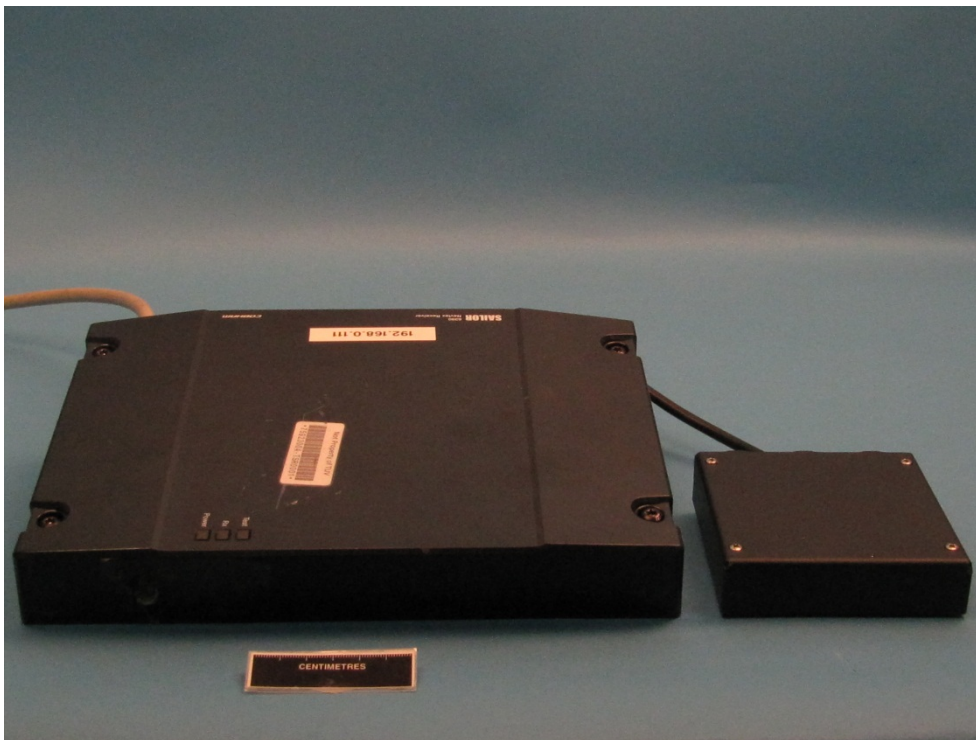
## **SECTION 4**

### **PHOTOGRAPHS**

#### 4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)



Label View



EUT



Product Service

## **SECTION 5**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



Product Service

## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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Product Service

**ANNEX A**

**CUSTOMER SUPPLIED INFORMATION**

**DRAFT**



Product Service

Corrosion Waiver Request



To whom it may concern

**Cobham SATCOM**  
Porsvej 2  
9000 Aalborg  
Denmark

T: +45 39 55 88 00  
F: +45 96 34 63 88

Date: 08-08-2013

STATEMENT

Thrane & Thrane have decades of years of experience of manufacturing radio communication products for enduring operation in harsh maritime environment all over the world.

To ensure this, our products are developed and manufactured with attention focused on the selection and combination of materials to ensure safe performance for a long life. Close contact to technical institutes, updating our knowledge on the latest technology, and our experience gained over the past forty years in maritime busyness, have formed the basis of the mechanical construction where prime factors have been selection of corrosion proof materials, surface preparation and resistance to ultraviolet sun rays.

The materials and surface treatment of the present equipment have been used with good results for several years in similar equipment installed in substantial quantities on board ships sailing all over the world. This is proven by feedback from our service department closing the quality circle.

Selection of materials for SAILOR 6391 Navtex System:

SAILOR 6390 Navtex Receiver

Receiver cover	Plastic, PC/ABS
Chassis	Aluminium, chromated (Chrome 6 free)
Terminals:	Brass, gold plated



Product Service

**COBHAM**

SAILOR 6004 Control Panel

Cabinet	Aluminium, chromated (chrome 6 free), powder painted
Front	Plastic, PC/ABS
Keypads	Silicone rubber, PU coated, UV resistant
Display window	Glass
Terminals	Brass, gold plated, Terminal housing = plastic

This statement covers the Thrane & Thrane Navtex system, which consists of:

SAILOR 6390 Navtex Receiver

SAILOR 6004 Control Panel

The SAILOR Navtex system is developed in accordance with the standards for maritime communication equipment.

We hereby declares that the above-mentioned SAILOR Navtex equipment is in accordance with the standard EN60945 (2002) clause 8.12 regarding Corrosion (Salt mist).

Aalborg

08-08-2013

Date:

Per Christiansen, Mechanical Team Manager