



KONGSBERG

Hull unit Test and alignment procedures

This document presents checks, test and alignment procedures that must be conducted on HiPAP/HPR 400 Hull Unit before it is put into operational service.

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- Rev. C Document updated. Refer to EM 130600C.
- Rev. D Document converted to Word and updated to implement corrections. Refer to 130600D.
- Rev. E Updated the Electrical check section. Minor corrections in the text. Refer to 130600E.
- Rev. F Updated layout. Minor corrections in the text. Refer EM 851-130600F

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INTRODUCTION

Purpose

After the physical installation has been carried out, all the system units must be checked to ensure that the units have been installed correctly.

This document contains the instructions and procedures required for the Hull Unit, before it is put into operation.

Test certificates

Once the testing engineer has performed or witnessed the performance of a test or part of a test, he should sign on the dotted line under each check/test to certify that the unit or system has passed that particular part of the procedure.

The use of these fields is optional, but we recommend that they are properly filled in for future references.

Note !

If the testing engineer is not satisfied with the standard of any part of the installation, he must contact the personnel who performed the installation to have the work rectified and brought up to the required standards.

Visual inspections

After the installation has been carried out, all the system units must be checked visually to ensure the system has been installed correctly. The testing engineer must ensure that the units have been mounted in the correct locations, correctly orientated (that is, the right way up) and are correctly secured to the bulkhead/deck/mounting brackets. The inspection engineer must understand that correct installation of some parts of the Hull Unit is critical to the safety of the vessel.

WARNING !

These checks must be completed before any power is switched onto the system.

Test and alignments

The following related test procedures must also be performed:

- HiPAP/HPR 400 Test and alignment, document no. 130315.
- The HiPAP/HPR Customer Acceptance Test (CAT), document no. 160901.

Test procedures introduction

In all cases the step-by-step instructions must be followed if the tests are to be trustworthy.

In order to verify that the HiPAP/HPR system work properly, the following tests must be carried out:

- Inspection of the Hull Unit
- Inspection of the Hoist Control Unit
- Inspection of the Remote Control Unit
- Cabling installation checks
- Hull Unit raise/lower manual checks
- Electrical check

Follow the procedures and fill in the tables. Once the system has been tested, sign the signature page (last page).

The test results will be:

OK	when the test is done satisfactory.
FAIL	if the test fails.
NA	if the test is non-applicable.

INSPECTION OF THE HULL UNIT

General

After the installation has been completed, all parts of the Hull Unit must be checked to ensure a secure and safe installation. These checks must be performed before the system is switched on for the first time.

WARNING !

The correct installation of the Hull Unit is critical to the safety of the vessel.

Logistics

Safety - Not applicable.

Personnel - Experienced engineer from the shipyard's quality assurance department. Installation supervisor.

Vessel location - Not applicable.

References - Instruction Manual for the hull units.

Special tools - None.

Procedure

Start at the bottom of the unit. Refer to the installation drawings and cable diagrams in the *Drawing file* in the Installation manual, and any relevant drawings and procedures which may have been prepared for the vessel by the shipyard.

- 1 Perform a close visual inspection of the vessel's hull, both internally and externally, in the area around the mounting flange.
- 2 Check that the hull plates have not buckled during the cutting and welding processes. Check that hull-strengthening plates have been fitted as per the drawings, and that all welds are strong and watertight.
- 3 Ensure that all exposed metal surfaces have been properly painted with the appropriate preservation mediums to prevent corrosion.
- 4 Perform a close visual check of the mounting flange installation.

- Ensure that the unit is mounted properly, that all welds are satisfactory and that the unit has been correctly braced to the vessel's hull.

Caution !

If the installation of this part of the Hull Unit is not correctly performed, the safety of the vessel will be compromised.

- 5 Ensure the unit is properly painted, both internally and externally, with the appropriate preservation mediums to prevent corrosion.
- 6 Perform a close visual check of the gate valve installation.
- 7 Ensure the unit is mounted properly using the o-rings provided and the correct type and number of bolts, nuts and washers.
- 8 Ensure all the bolts are correctly tightened.




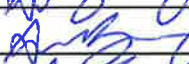



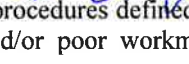

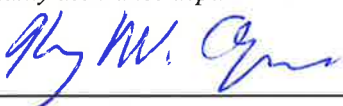
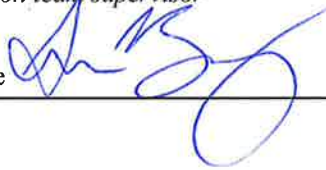
Caution !

If the installation of this part of the Hull Unit is not correctly performed, the safety of the vessel will be compromised.

- 9 Ensure the unit is properly painted with the appropriate preservation mediums to prevent corrosion.
- 10 Check that the Hull Unit assembly is correctly orientated and installed, and that the upper part of the gantry is suitably supported to the hull with reinforcing braces.
- 11 Check that the braces are **BOLTED** into position, **NOT WELDED**.
- 12 Ensure all nuts and bolts used are suitable for the application, and that the appropriate flat and shake-proof washers are used.
- 13 Ensure all nuts and bolts are correctly tightened.
- 14 Ensure all applicable metal surfaces are properly painted with the appropriate preservation mediums to prevent corrosion.
- 15 Ensure the guide rails, sprockets and drive chains within the gantry have sufficient grease to ensure smooth raising and lowering of the shaft.
 - Type shall be ESSO MP grease Beacon EP 2.
- 16 Wipe off any excess grease.

- 17 Check that there is sufficient oil in the shaft sleeve.
 - Type shall be 1 litre oil type ESSO CAZAR K1.
 - When sufficiently filled, a thin film of oil should be noticeable on the transducer shaft as it is raised. Oil filling and level plugs are located on the side of the shaft sleeve. Check that the filler and level screws are tight and not leaking. Clean up any oil spillage.
- 18 Check that the limit switches are properly secured into the gantry.
 - Limit switch operation will be checked during the "Setting to work" phase.
- 19 Check that the self-locking electric motor is correctly mounted, and that all securing bolts are tight.
- 20 Find the hand crank stowed on top of the Hull Unit, and check that the hand crank fits in position on the hoist motor shaft.
- 21 Replace the hand crank into position.
- 22 Check that the motor gearbox is filled with oil, and that there are no oil leaks.
 - Type shall be SAE 30 motor oil.

Test certificate

Inspection of the Hull Unit	
Item to be checked	Checked (sign)
Hull Unit installation and preservation correct	
Mounting flange installation and preservation correct	
Gate valve installation and preservation correct	
Gantry installation and preservation correct	
Guide rail, sprockets and drive chains lubricated	
Sleeve filled, no oil leaks	
Limit switches correct	
Motor and hand crank correct, gearbox full and sealed	
Shaft cleaned after installation / welding	
The installation of the Hull Unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyard's quality assurance department</i>	
Signature 	Date 2/7/16
<i>Installation team supervisor</i>	
Signature 	Date 07 FEB 16

INSPECTION OF THE HOIST CONTROL UNIT

General

The Hoist Control Unit must be located as close as practically possible to the Hull Unit, preferably within the same compartment. For safety reasons there should be a clear line of sight between the two units. The Hoist Control Unit is designed to be bolted to a bulkhead.

Logistics

Safety - Not applicable.

Personnel - Experienced engineer from the shipyard's quality assurance department. Installation supervisor.

Vessel location - Not applicable.

References - Drawings from hull units Instruction Manual


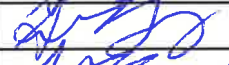

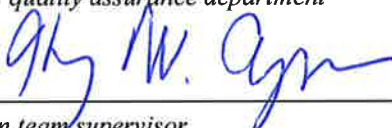
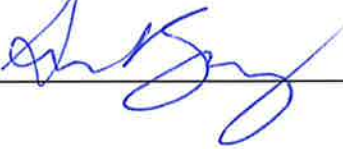
Special tools - None.

Procedure

- 1 Perform a close visual inspection of the cabinet.
- 2 Check that the unit is installed in the correct location, and is suitably orientated to enable easy maintenance.
- 3 Check that the unit is not damaged, and that the paintwork is clean.
- 4 If the unit is secured to mounting brackets, check that the brackets are manufactured correctly and are bolted or welded securely to the bulkhead.
- 5 If bolts have been used, ensure they are of an appropriate size and number to ensure the brackets are secure.
- 6 If the brackets are welded, ensure the welds are satisfactory and strong enough to hold the brackets and unit.
- 7 Check that the cabinet is securely fastened to the bulkhead/mounting brackets using four M8 bolts.
- 8 Check that the correct flat and shake-proof washers have been used, and that all the bolts are tight.

- 9 Check that the braided ground conductor is correctly installed.
- 10 Check that all welds/brackets have been painted with the correct preservation medium to prevent corrosion.

Test certificate

Inspection of the Hoist Control Unit	
Item to be checked	Checked (sign)
Bolted/Welded	
Bolts / ground conductor correct	
Paintwork correct	
The installation of the Hull Unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyard's quality assurance department</i>	
Signature 	Date 2/7/16
<i>Installation team supervisor</i>	
Signature 	Date 07/06/16

INSPECTION OF THE REMOTE CONTROL UNIT

General

The Remote Control Unit will normally be located close to the operator station to allow the operator immediate control of the Hull Unit. The Remote Control Unit is designed to be bolted to a bulkhead.

Logistics

Safety - Not applicable.

Personnel - Experienced engineer from the shipyard's quality assurance department. Installation supervisor.

Vessel location - Not applicable.


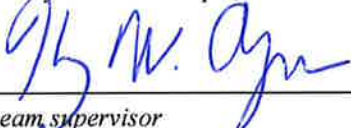

References - Drawings from hull units Instruction Manual

Special tools - None.

Procedure

- 1 Perform a close visual inspection of the unit.
- 2 Check that the unit is installed in the correct location, and is suitably orientated to enable easy operation and maintenance.
- 3 Check that the unit is not damaged, and that the paintwork is clean.
- 4 Check that the unit is securely fastened to the bulkhead/mounting brackets using four M5 screws, nuts and washers.

Test certificate

Inspection of the Remote Control Unit	
Item to be checked	Checked (sign)
Remote Control Unit correct	
The installation of the Hull Unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyard's quality assurance department</i>	
Signature 	Date 2/7/16
<i>Installation team supervisor</i>	
Signature 	Date 07 FEB 16

CABLING INSTALLATION CHECKS

General

This is the test procedures for the system's power and signal interface cables.

WARNING ! **These checks must be completed before any power is switched onto the system.**

Logistics

Safety - Not applicable.

Personnel - Experienced engineer from the shipyard's quality assurance department. Installation supervisor.

Vessel location - Not applicable.

References - Drawings from hull units Instruction Manual

Special tools - None.

Visual inspection of the cabling

Refer to the cable plans and interconnection diagrams, and check all power and inter-connection cables. Any locally fitted plugs and connectors must also be checked to ensure the correct types have been used for the specific locations. (Sealed/spark-proof connectors in areas where flammable gasses may accumulate, etc.)

Ensure all cable connections have been made according to the cable plan, and that all connections are tight and secure. Ensure all cables are correctly laid in conduits, or are otherwise protected according to the regulations and recommendations laid down by the vessel's registering authority. Ensure all protective covers are fastened correctly.

Cable connections and continuity

After the cable connections have been completed and the visual inspection has been carried out, all the cable cores must be checked for correct connection and continuity. Refer to the cable plans and interconnection diagrams, and check all interconnection cables. Any locally fitted plugs and connectors must also be checked for shorts or open circuits. Ensure all cable connections have been made according to the cable plan, and that all connections are tight and secure.

WARNING !

These checks must be completed before any power is switched onto the system.

Procedure

The check procedure will require pairs of engineers, equipped with the appropriate cable plans and wiring diagrams, two-way communication devices and tool kits. The "tester" will require continuity test equipment, the assistant will require a suitable shorting strap.

Note !

The exact resistance values will depend on the type and lengths of the cables and the units to which the cables are connected. If in doubt, check with the manufacturers.

Follow the check procedure below for each cable core:

- 1 The test engineers must position themselves one at each extremity of the cable to be checked.
- 2 Good communications must be established.
- 3 Ensure the cable to be tested is not connected to any power source.

Note !

If a cable terminates in a plug at the unit, the test will be more easily conducted if the plug is disconnected.

- 4 Select one pair of cable cores, and check that the cores are connected to the correct terminals in the unit.
- 5 The tester then connects his continuity tester to the two terminals in question and checks the continuity.

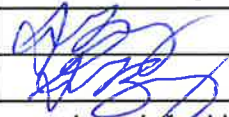
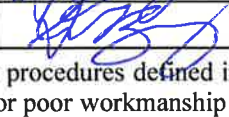
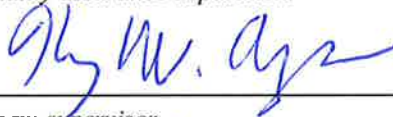

Note !

If a low resistance exists between the two cores, this may indicate the cores are connected to circuits or units with low internal resistance. If this is the case, disconnect the cores from the terminal block and test again. The resistance should be approaching RW. If so:

- 6 The assistant then shorts the two cores together, and the tester repeats the test. The Resistance should be $\approx 0\Omega$.
- 7 The assistant then removes the shorting strap, and the resistance should go up to $\approx \infty \Omega$ again.
- 8 The tester then checks each core's resistance to ground, (this should be $\approx \infty \Omega$), and each core's resistance to all the other cores in the cable, (this should be $\approx \infty \Omega$).
- 9 Assuming the test results are correct, the cores must then be reconnected to the terminal block (if they had been removed), and the terminals checked to ensure they are correct and tight.

On completion, move on to the next pair of cores and repeat the tests till the entire cable has been checked.

Test certificate

Cable connections and continuity	
Item to be checked	Checked (sign)
Connector type	
Cable continuity	
The installation of the Hull Unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyard's quality assurance department</i>	
Signature 	Date 2/7/16
<i>Installation team supervisor</i>	
Signature 	Date 07 FEB 16

HULL UNIT RAISE / LOWER MANUAL CHECKS

General

This procedure is a mechanical test during which the Hull Unit is operated manually. This test checks that the Hull Unit is free to move without striking any obstructions and that the transducer cables are not going to become caught on anything during the lowering and raising operations. This check is to be used before the Hull Unit is powered up for the first time, and after any major maintenance or replacement has been carried out on the unit.

WARNING !

Before lowering the Hull Unit, ensure there is a sufficient depth of water beneath the vessel's hull. If the vessel is in dry dock, check in the Hull Unit compartment and under the vessel to ensure no one is working on the equipment and there are no obstructions. Rope off the area under the hull to ensure no one goes into the area while the Hull Unit is being operated.

Logistics

Safety - Not applicable.

Personnel - Experienced engineer from the shipyard's quality assurance department. Installation supervisor.

Vessel location - Not applicable.

References - Drawings from hull units Instruction Manual

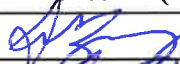



Special tools - None.

Procedure

- 1 Check around the Hull Unit and ensure there are no obstructions liable to hinder the lowering or raising of the unit.
- 2 If the vessel is in a dry dock, check under the vessel to ensure the transducer will not strike an obstruction when it is lowered.
- 3 Remove the hand crank lever from the hoist platform and place it in position on the hoist motor shaft.

- 4 Release the motor brake by tightening the screw on the side of the motor, and lower the transducer approximately 30 cm.
- 5 Reset the brake by slackening the screw.
- 6 Check that the cable is free to follow the transducer shaft as it is lowered, and is not liable to be caught on any obstructions.
 - Remember that the cable may swing some distance from the Hull Unit in rough seas, so check to the full radius of the cable.
- 7 Repeat steps 1 to 6 until the Hull Unit is fully lowered.
- 8 Follow the same procedure to raise the Hull Unit again, paying particular attention to the cable.
- 9 If the vessel is floating, release any air that may be trapped in the mounting flange by cracking open the air vent cock.

Test certificate

Hull Unit raise/lower manual checks	
Item to be checked	Checked (sign)
Manually (by hand crank) lower/rise transducer shaft	
Transducer cable free to move	
The installation of the Hull Unit has been checked according to the procedures defined in the installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyard's quality assurance department</i>	
Signature 	Date 2/7/16
<i>Installation team supervisor</i>	
Signature 	Date 07 FEB 16

ELECTRICAL CHECK

General

This procedure checks the electrical operation of the Hull Unit and sets up the limit switches.

It must be conducted after all inspections, cable connection checks and the manual operation check (paragraph 0) have been performed, but before the Hull Unit is operated under power for the first time.

Logistics

Safety - Not applicable.

Personnel - Experienced engineer from the shipyard's quality assurance department. Installation supervisor.

Note !

When performing the Remote Control Unit test, one engineer must operate the Remote Control Unit, while the other inspects the hull unit and operates the Hoist Control Unit. Communication between the two engineers are essential.

Vessel location - Not applicable.

References - Refer to the interconnection diagrams, drawing no. 824-102993.

Special tools - None.

Procedure

- 1 Open the Gate Valve.
- 2 Lower the transducer manually by using the hand crank, approx. 50 cm down.

Note !

Remember to release the brake.

- 3 Remove the hand crank.
- 4 Switch power on, using breaker F01 on the Hoist Control Unit (HCU).
- 5 Switch S1 in the HCU to **HOIST** and then **STOP** in rapid succession.

- The transducer shaft should move upwards. If the transducer moves downwards interchange two leads of the motor supply.
- 6 Switch to **LOWER**.
- 7 After a few seconds, operate the **lower limit switch** manually.
 - Verify correct function of the switch. Lowering transducer should stop when operating the limit switch.
- 8 Switch to **HOIST**.
- 9 After a few seconds, operate the **upper limit switch** manually.
 - Verify correct function of the switch. Hoisting transducer should stop when operating the limit switch.
- 10 Switch to **HOIST**. Let the transducer move all the way up to the fully raised position.

Caution !

Check the water depth /clearance under the ship/transducer before proceeding!

- 11 Switch to **LOWER**. Let the transducer go all the way down to the fully out position.
- 12 Switch to **HOIST**. Let the transducer go all the way up to the fully raised position.
- 13 Release any air, which may have accumulated in the transducer dock and gate valve using the air vent cock.
- 14 Set switch **S1** to **REMOTE**.
 - This to check remote operation, using the Remote Control Unit (RCU).
 - The **RAISE/UP** and **STOP** lamps on the RCU should light.
- 15 Press **LOWER/DOWN** and monitor the lowering of the transducer.
- 16 After a few seconds, press **STOP**.
 - Lamp **STOP** shall be lit.
- 17 Press **LOWER/DOWN**.
- 18 After a few seconds, press the **Test** button on the protection relay (F02), in the HCU.

- The STOP lamp shall be lit.
- 19 Press the Reset button (blue) on the protection relay (F02), in the HCU.
- 20 Press LOWER/DOWN.
 - Verify that the LOWER/DOWN and STOP lamps are lit when the lower limit is in fully out position.
- 21 Press RAISE/UP, and monitor the raising of the transducer.
 - Verify that the RAISE/UP and STOP lamps are lit when the transducer is in the fully raised position.
- 22 Check that the lamp dimmer operates correctly.

Test certificates

Electrical check	
Item to be checked	Checked (sign)
DOWN/UP function-local	<i>[Signature]</i>
Lower limit switch	<i>[Signature]</i>
Upper limit switch	<i>[Signature]</i>
DOWN function-remote	<i>[Signature]</i>
STOP function-remote	<i>[Signature]</i>
UP function-remote	<i>[Signature]</i>
The installation of the Hull Unit has been checked according to the procedures defined in the Installation manual. Comments concerning inaccuracies, faults and/or poor workmanship have been filed as a separate report.	
<i>Shipyards quality assurance department</i>	
Signature <i>[Signature]</i>	Date <i>2/7/16</i>
<i>Installation team supervisor</i>	
Signature <i>[Signature]</i>	Date <i>07 FEB 16</i>

up light does not work RSL -10

REMARKS AND SIGNATURES

Remarks

Remarks (if any) must be noted here or in a separate report.

Remote Unit up light does not illuminate. Function works OK.

Signatures

Checked by:

_____ 07 FEB 16 

Place Date Signature

Approved by:

_____ DETYENS 2/7/16 

Place Date Signature