

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Wave Monitoring System

with type designation(s)
WaveFinder 2.0

Issued to

OceanRND Co., Ltd.
Busan, Republic of Korea

is found to comply with
DNV GL rules for classification – Ships

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Temperature B

Humidity B

Vibration A

EMC B

Enclosure Required protection according to the Rules to be provided upon installation on board

Issued at **Hamburg** on **2019-10-29**

This Certificate is valid until **2021-10-28**.

for **DNV GL**

DNV GL local station: **Gimhae Station**

Approval Engineer: **Jörg Rebel**

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Arne Schaarmann
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



Product description

The Wave Monitoring System WaveFinder 2.0 consists of following necessary components:

- Personal computer (PC) with following specification:
 - Operating system: Windows 7 or higher, (32 or 64 bit)
 - CPU: 2.0 GHz or higher, Dual-core or higher
 - RAM: 2 GB or higher
 - Serial port: At least two interfaces compliant with IEC 61162-1 for connecting GPS and gyro compass

Note: The PC is not part of this Type Approval
- Radar Scan Converter (RSC) board type ORDRSC to be installed in a PCI slot of the PC with four SMA female connectors for connecting an X-band radar to extract the radar image data:
 - Analog video signal
 - Trigger signal for evaluation of pulse repetition frequency (PRF)
 - Bearing signal, i.e. azimuth change pulses (ACP) with at least 3600 pulses per antenna revolution
 - Heading signal, i.e. azimuth reference pulse with one puls per antenna revolution
- Display with a screen diameter of at least 17 inches

Note: The display is not part of this Type Approval.
- Application software WaveFinder version 2.0x

Following additional equipment is to be connected to the WaveFinder 2.0 system:

- X-band radar antenna with following specification:
 - Installation height of the radar antenna shall be more than 20 m above sea level

Note: If the navigational radar is used, it is to ensure that the connection of the WaveFinder 2.0 system is free of reactive effects on the navigational radar.
- GPS for providing following NMEA sentences with a rate of at least 1 Hz:
 - ZDA for date and time of UTC
 - RMC for GPS status
 - GLL or GGA for latitude and longitude
 - VTG for course over ground (COG) and speed over ground (SOG)
- Gyro compass for providing following NMEA sentences with a rate of at least 1 Hz:
 - THS (or HDT in case of retrofit) for ship's heading

Note: The additional equipment above is not part of this Type Approval.

Approval conditions

The following documentation of the actual application is to be submitted for approval in each case:

- Reference to this Type Approval Certificate
- System block diagram
- Type approval for PC used for the system
- Type approval for display used for the system
- Power supply arrangement (may be part of the System block diagram)
- Test program for certification

This Type Approval covers only the Radar Scan Converter board type ORDRSC and the application software listed under Product description. No further application software is necessary for delivery of an application system.

When the type approved software is revised (affecting all future deliveries) DNV GL is to be informed. If the changes are judged to affect functionality for which rule requirements apply, a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

The PC to be equipped with the Radar Scan Converter (RSC) board is not part of this Type Approval. It shall at least fulfill the requirements according to DNVGL-CG-0339, Sect.3 [14.11 and 14.12] regarding EMC emissions. The serial ports, used for connecting the GPS and the gyro compass, are to comply with the requirements of IEC 61162-1, Clause 5. The GPS and the gyro compass needs to be type-approved.

The display required for the WaveFinder 2.0 system is not part of this Type Approval. It shall at least fulfill the requirements according to DNVGL-CG-0339, Sect.3 [14.11 and 14.12] regarding EMC emissions and according to IEC 62288 (2014), Clause 4.4.1 (Readability under all ambient light conditions) and Clause 7 (Physical requirements).

Manufacturer's installation instructions to be followed.

Product certificate

A product certificate according to Pt.4 Ch.9 Sec.1 will not be required. Correct configuration and set up for each delivery to be tested by the manufacturer during commissioning after installation onboard and witnessed by attending DNV GL surveyor. After the successful testing the clause for software control will be put into force.

Software control

All changes in software are to be recorded as long as the system is in use on board. Documentation of major changes is to be forwarded to DNV GL for evaluation and approval before implemented on board.

Type Approval documentation

DNV GL No	Document ID	Rev.	Description
22	ORD-S04C-2019	2019-10-25	Report: OceanRND, Performance Test – Part3
17	KOMERI-0303-19T3493	2019-08-29	Report: KOMERI, Performance test - Part1
16	KOMERI-0311-18T2789	2019-08-26	Report: KOMERI - Environmental tests (Part 4) acc. to DNVGL-CG-0339, 3 [4, 5 and 14]
15	KOMERI-0314-18T2787	2019-07-16	Report: KOMERI - Environmental tests (Part 2) acc. to DNVGL-CG-0339, 3 [7, 8.3, 9 and 12]
13	KOMERI-0602-18T2790	2019-07-24	Report: KOMERI - Environmental tests (Part 1) acc. to DNVGL-CG-0339, 3 [6.2 and 11]
12	ORD2019-S04B	2019-08-30	Report: OceanRND, Performance Test - Part2
11	KOMERI-0306-18T2788-1	2019-07-16	Report: KOMERI - Environmental tests (Part 3) acc. to DNVGL-CG-0339, 3 [12 and 13]
6	ORD2018-S05	2018-12-07	WaveFinder User Manual
4	ORD2019-S01	2019-09-09	WaveFinder Installation Manual
2	ORD2018-H01	2019-05-06	Hardware Description

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, Edition November 2016.

Marking of product

- Components are marked with product name as listed under Product description.
- Basic software version is displayed in the system graphical user interface.

Job Id: **262.1-027899-1**
Certificate No: **TAA00002G4**

- Each project application configuration is documented in a dedicated version log file which is specific for each vessel.

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed at least at renewal of this certificate.

END OF CERTIFICATE