



CERTIFICATE NUMBER

10-HS620212-PDA

DATE

01 September 2010

ABS TECHNICAL OFFICE

Houston SED - Ship Systems

# CERTIFICATE OF DESIGN ASSESSMENT

This is to Certify that a representative of this Bureau did, at the request of  
**WR SYSTEMS - NORFOLK**

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate. It will remain valid as noted below or until the Rules or specifications used in the assessment are revised (whichever occurs first).

PRODUCT: Monitoring System, Emissions

MODEL: Emsys

ABS RULE: 2010 Steel Vessels Rules 1-1-4/7.7, 4-9-7/Table 9 - Test Nos. 1, 3-9 & 11-16, 4-9-7/Table 10 - Test No. 3.

OTHER STANDARD: Revised MARPOL 73/78 Annex VI Regulation 13, Chapter 6.4 - 'Direct measurement and monitoring method (DMM)'; Resolution MEPC. 184 (59) - Schemes A & B, SO<sub>2</sub>/CO<sub>2</sub> ratio method for measurement of SO<sub>x</sub> emissions; MEPC/Circ.471 - Calculation of the CO<sub>2</sub> emission index from operational data; IACS E10 -Test Nos. 3-11 & 13-18.; Reporting of totalized mass emissions (NO<sub>x</sub>, SO<sub>x</sub>, CO<sub>2</sub> and PM) from marine diesel engines and marine boilers - to Manufacturers Standards utilizing the calculations contained in the NO<sub>x</sub> Technical Code (2008); Measurement of Particulate Matter (PM) from marine diesel engines and marine

AMERICAN BUREAU OF SHIPPING



Tim Kimble

Engineering Type Approval Co-ordinator

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in this certificate becoming null and void. This certificate is governed by the terms and conditions as contained in ABS Rules 1-1-A3/9.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010).

## **WR SYSTEMS**

2500 ALMEDA AVENUE, SUITE 214  
NORFOLK  
23513  
United States  
Telephone: 757-858-600  
Fax: 757-858-6058

---

**Product:** Monitoring System, Emissions

**Model:** Emsys

**Intended Service:**

Marine and Offshore Applications -. Emsys(TM) is a continuous emission monitoring system for the application of monitoring exhaust emissions from maritime vessels and Mobile Offshore Drilling Units (MODU). The system will verify compliance with the Revised MARPOL Annex VI Regulation 13 (NOx), in line with the requirements of the NOx Technical Code (2008). The system is also intended for use to verify SOx emissions from vessels with Exhaust Gas Cleaning Systems installed to meet the requirements of the Revised MARPOL Annex VI Regulation 14 under the guidance of MEPC 184(59). The system also provides the calculation of 'CO2 Index based on operational data' as per the requirements of MEPC.Circ. 471. The system monitors exhaust gases including Sulfur Dioxide (SO2), Nitrogen Oxide (NO), Nitrogen Dioxide (NO2), and Carbon Dioxide (CO2) and provides mass totals of these gases using the calculations contained within the NOx Technical Code (2008). In addition to gas emissions, the system will monitor Particulate Matter (PM). The Emsys(TM) will enable vessel operators the ability to view and provide real-time and/or historical records of their specific emissions or emission inventory.

**Description:**

The Emsys(TM) Continuous Emissions Monitoring System is a laser-driven single enclosure device that can continuously monitor emissions and provide automated analysis and data recordings from multiple smokestacks and boilers for marine applications. W R Systems, Ltd. (WRSystems), developed the new technology to help the maritime industry meet the Revised MARPOL Annex VI Maritime Emissions Regulations and optimize emissions performance in order to reduce vessels' NOx and SOx emissions, and their carbon footprint. Emsys(TM) allows operators of marine-fueled engines to continuously monitor, analyze, and record emissions from all installed engines and boilers. It analyzes and records Nitrogen Oxides (NO), Nitrogen Dioxides (NO2), Sulfur Dioxide (SO2), and Carbon Dioxide (CO2), as well as particulate matter (PM). In addition, Global Positioning System (GPS) interface data tracks and records actual vessel position/time to support regulatory requirements in Emission Control Area (ECA) zones.

**Ratings:**

Power Supply: 230VAC 50/60 Hz 14 A maximum  
Enclosure Rating: IP 52

**Components:**

Emsys(TM) Unit Enclosure, P/N: CEMS-UEA-01  
Particulate Matter (PM) Sensor, P/N: CEMS-SCA-01-03A/04A -  
PM Range: 0-1000 mg/m3  
Quantum Cascade Laser (QCL) Gas Sensor, P/N: CEMS-EV1-01-020  
NO Range 0-2000 ppm  
NO2 Range 0-300 ppm  
CO2 Range 0-10%  
SO2 Range 0-1750 ppm  
Emsys(TM) Heated Line Control Unit (HLCU), P/N: CEMS-HUA-01  
Emsys(TM) Sensor Control Unit (SCU), P/N: CEMS-SCU-01  
Generator Power Sensor VER A, P/N: CEMS-SCU-01-EXT-01  
Generator Power Sensor VER B, P/N: CEMS-SCU-01-EXT-02  
Generator Power Signal VER A, P/N: CEMS-SCU-01-EXT-03  
Generator Power Signal VER B, P/N: CEMS-SCU-01-EXT-04

## **WR SYSTEMS**

2500 ALMEDA AVENUE, SUITE 214  
NORFOLK  
23513  
United States  
Telephone: 757-858-600  
Fax: 757-858-6058

---

Charge Air Pressure Sensor VER A, P/N: CEMS-SCU-01-EXT-05  
Charge Air Pressure Sensor VER B, P/N: CEMS-SCU-01-EXT-06  
Charge Air Temperature Sensor VER A, P/N: CEMS-SCU-01-EXT-07  
Charge Air Temperature Sensor VER B, P/N: CEMS-SCU-01-EXT-08  
E3 Cycle Flywheel Speed Sensor VER A, P/N: CEMS-SCU-01-EXT-09  
E3 Cycle Flywheel Speed Sensor VER B, P/N: CEMS-SCU-01-EXT-10  
Emsys(TM) Server, P/N: CEMS-SVR-01  
Emsys(TM) Auxiliary Unit (EAU), P/N: CEMS-SRV-01-EAU-01.

### **Service Restrictions:**

Unit Certification is not required for this product. If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.

System components not suitable for installation in weather exposed areas.

### **Comments:**

For compliance with IMO Regulations as specified in the Standards section, the following comments are to be resolved by submitting required documents to ABS Houston Technical Office for review.

1. The following items are to be incorporated in the Supplement to the new or existing EIAPP for all monitored engines onboard:
  - 1) Arrangements, data or information required by the specific engine (as given by the corresponding Approved Engine Technical File) which is necessary to apply the Direct Measurement and Monitoring method.
  - 2) Emission species to be measured and ranges
  - 3) Analyzer type
  - 4) Emission data analysis method
  - 5) Information on calibration gases
  - 6) Data capture and retention method
  - 7) Verification procedures for the attending Surveyor
2. For each installation, an Onboard Monitoring Manual (OMM) is to be submitted to the Administration for approval as per Chapter 6.4.17 of the Revised MARPOL Annex VI and NOx Technical Code (2008) and Section 8 of MEPC.184 (59).
3. For installation, the span gases are to be provided in order to comply with the requirements of Chapter 6 of the Revised MARPOL Annex VI and NOx Technical Code (2008).

### **Notes / Drawings / Documentation:**

This Product Design Assessment (PDA) is valid for products intended for use on ABS classed vessels, MODUs or facilities which are in existence or under contract for construction on the date of the ABS Rules used to evaluate the Product. Use in a non-classed vessel, MODU or Facility is to be to the satisfaction of the manufacturer and purchaser.

### **Term of Validity:**

This product/model is covered under Product Design Assessment (PDA) Certificate # 10-HS620212-PDA, dated 01/Sep/2010. This PDA Certificate remains valid until 31/Aug/2015 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

## **STANDARDS**

**WR SYSTEMS**

2500 ALMEDA AVENUE, SUITE 214  
NORFOLK  
23513  
United States  
Telephone: 757-858-600  
Fax: 757-858-6058

---

**ABS Rules:**

2010 Steel Vessels Rules 1-1-4/7.7, 4-9-7/Table 9 - Test Nos. 1, 3-9 & 11-16, 4-9-7/Table 10 - Test No. 3.

**National:**

NA

**International:**

Revised MARPOL 73/78 Annex VI Regulation 13, Chapter 6.4 - 'Direct measurement and monitoring method (DMM)'; Resolution MEPC. 184 (59) - Schemes A & B, SO<sub>2</sub>/CO<sub>2</sub> ratio method for measurement of SO<sub>x</sub> emissions; MEPC/Circ.471 - Calculation of the CO<sub>2</sub> emission index from operational data; IACS E10 -Test Nos. 3-11 & 13-18.

**Government Authority:**

NA

**EUMED:**

NA

**Others:**

Reporting of totalized mass emissions (NO<sub>x</sub>, SO<sub>x</sub>, CO<sub>2</sub> and PM) from marine diesel engines and marine boilers - to Manufacturers Standards utilizing the calculations contained in the NO<sub>x</sub> Technical Code (2008); Measurement of Particulate Matter (PM) from marine diesel engines and marine boilers - to Manufacturers standards.