

**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Emission Monitoring System**with type designation(s)  
**ShipCEMS**

Issued to

**Norsk Analyse AS**  
**Barkåker, Norway**is found to comply with  
**DNV GL rules for classification – Ships, offshore units, and high speed and light craft****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Location classes:**

<b>Temperature</b>	<b>A</b>
<b>Humidity</b>	<b>B</b>
<b>Vibration</b>	<b>A</b>
<b>EMC</b>	<b>A</b>
<b>Enclosure</b>	<b>B (IP44)</b>

Issued at **Høvik** on **2019-03-26**for **DNV GL**This Certificate is valid until **2021-03-25**.DNV GL local station: **Sandefjord**Approval Engineer: **Ingrid Hagen Johansen**.....  
**Jan Tore Grimsrud**  
**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.



Job Id: **262.1-016682-3**  
 Certificate No: **TAA0000107**  
 Revision No: **1**

## Product description

The ShipCEMS is designed to measure low values of carbon dioxide and sulphur dioxide components in wet marine exhaust flue.

The ShipCEMS consist of the following three main components:

Main Component	Subcomponent(s)	SW NO / DNV-GL TAC
Analyser Cabinet (AC)	1. Siemens Ultramat 6 (online process analyser for SO <sub>2</sub> and CO <sub>2</sub> ) 2. Siemens Logo PLC w/display 3. Cabinet Peltier cooler 4. Solenoide valves	Application SW no: 1.2 Current TAC no: TAA00001AS
Sampling Conditioning System (SCS)	1. Dryer 2. Filter 3. Gas pump 4. Junction box	
Sampling Probe (SC-SP)		

Interface to external system:

Parameter	Signal type (ShipCEMS side)	Comment
Select engine #1	DI	CC = Engine X is selected. Only one engine to be seleted at a time.
Select engine #2	DI	
Select engine #3	DI	
Select engine #4	DI	
SO <sub>2</sub> (ppm)	AO	SO <sub>2</sub> , 4-20 mA (ppm)
CO <sub>2</sub> (%)	AO	CO <sub>2</sub> , 4-20 mA (%)
SCS common alarm	DO	OC = Alarm or power off (SCS cabinet) CC = No fault
AC common alarm	DO	OC = Alarm or power off (AC cabinet) CC = No fault
Measurement valid	DO	OC = Not valid measurement or power off CC = Valid measurement
Maintenance in progress	DO	OC = Maintenance not in progress CC = Maintenance in progress

## Place of manufacture

Norsk Analyse AB  
 Nyängsgatan 5, 663 43 Grums, Sweden

## Application/Limitation

The Type Approval covers hardware and software listed under Product description.

DNV GL shall be informed prior to installation of ShipCEMS onboard DNV GL classed vessels. A reference to this Type Approval certificate shall be included.

When the ShipCEMS is used in installations intended to comply with MEPC.259(68), installation and performance as per requirements in MEPC.259(68) Annex 1 section 6,7,8 is required.

Implementation of time-out alarm in the external system to be considered if not receiving "Measurement Valid" after "select engine # #" is activated.

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Application 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.

Software update notification

When the type approved software is revised (affecting all future deliveries) DNV GL is to be informed by forwarding updated software version documentation. 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.

**Type Approval documentation**

<b>Document no.</b>	<b>Title</b>	<b>Rev.</b>	<b>Date</b>
DANAK-19/1368	Test for Marine Type Approval of NA ShipCEMS	-	2013-06-21
NA-E-TST-022	ShipCEMS Continuous Emission Measurement System, Functional Test Program	02	2014-11-20
NA-E-USM-001	ShipCEMS Continuous Emission Measurement System, User Manual	05	2014-05-12
NA-E-INS-014	ShipCEMS Continuous Emission Measurement System, Installation Manual	02	2014-05-12
P300-1001	General Arrangement Drawing, Analyser Cabinet, External View Updated revision during renewal 2017	04 06	2014-03-25 2015-09-29
P300-1002	General Arrangement Drawing, Analyser Cabinet, Interior, Hook-Up Locations Updated revision during renewal 2017	06 08	2014-03-28 2015-09-29
P300-1005	General Arrangement Drawing, Analyser Cabinet, Hook-Up / Wall Mounting, External View Updated revision during renewal 2017	06 08	2014-07-02 2015-09-29
P300-1202	General Arrangement Drawing, Heated Sample Probe, Flange DN65-PN6, 230 VAC Electric Heated Updated revision during renewal 2017	03 04	2014-03-28 2015-03-04
P300-1401	General Arrangement Drawing, Calibration Gas Cylinder, Support Frame, External View Updated revision during renewal 2017	01 02	2014-03-19 2015-03-24
P300-1801	General Arrangement Drawing, Sample Conditioning System, External View, Hook-Up Details Updated revision during renewal 2017	06 07	2014-03-28 2015-04-10
P300-1804	General Arrangement Drawing, Sample Conditioning Cabinet, Hook-Up / Wall Mounting, External View Updated revision during renewal 2017	05 06	2014-04-02 2015-04-10
P300-1805	General Arrangement Drawing, Sample Conditioning System, Junction Box Layout Updated revision during renewal 2017	03 05	2014-03-28 2016-10-31
P300-1901	General Arrangement Drawing, Emergency Stop, External/Interior View Updated revision during renewal 2017	03 04	2014-03-28 2015-03-24
P300-3001	System Diagram, Analyser Cabinet, Stream Switching System Updated revision during renewal 2017	05 06	2014-03-28 2015-04-09
P300-3002	System Diagram, Analyser Cabinet, PLC & Signal Conditioning Updated revision during renewal 2017	04 05	2014-04-28 2015-04-09
P300-3801	System Diagram, Sample Conditioning System Updated revision during renewal 2017	05 07	2014-03-28 2016-06-10
P300-5001	Termination Diagram – Power, Analyser Cabinet – Interface, ShipCEMS, SO2/CO2 Analysis Updated revision during renewal 2017	03 04	2014-03-28 2015-04-09
P300-5002	Termination Diagram, PLC Logo, Analyser Cabinet Updated revision during renewal 2017	03 04	2014-03-28 2015-04-09
P300-5101	Termination Diagram, Sample Conditioning System, Heater & Flow Control Logic, Junction Box Updated revision during renewal 2017	06 07	2014-08-21 2015-04-09

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<b>Document no.</b>	<b>Title</b>	<b>Rev.</b>	<b>Date</b>
P300-5102	Termination Diagram, Sample Conditioning System, Back-Flush Option, Junction Box Updated revision during renewal 2017	06 07	2014-08-21 2015-04-09
P300-5201	Termination Diagram – Signal, Analyser Cabinet – Interface, Emmission Monitoring System Updated revision during renewal 2017	04 05	2014-12-12 2015-04-10
P300-5301	Termination Diagram, Heated Sample Probe, Model 222.15/222.17, Plu Connections Updated revision during renewal 2017	03 04	2014-04-02 2015-04-10
P300-5401	Termination Diagram, Cabinet Cooler System, 194 Watt Peltier Element, Analyser Cabinet Updated revision during renewal 2017	03 04	2014-04-02 2015-03-04
P300-5501	Termination Diagram, Signal SO2/CO2 Analyser, D-Sub Pinout	03	2014-04-02
P300-5502	Termination Diagram, Signal SO2/CO2 Analyser, D-Sub Pinout Updated revision during renewal 2017	03 04	2014-04-02 2015-03-05
P300-5601	Termination Diagram, Emergency Power Switch, SCS/Analyser Cabinet Updated revision during renewal 2017	03 04	2014-04-02 2015-03-05
P300-5701	Termination Diagram, Emergency Power Switch, System Layout – Loop Updated revision during renewal 2017	03 04	2014-04-02 2015-04-10
	Type approval renewal assessment report, DNV GL Sandefjord		2016-11-04
	Type approval renewal assessment report, DNV GL Örebro		2019-03-12

### Tests carried out

Applicable tests according to:

- DNV GL class guideline DNVGL-CG-0339, November 2016
- Type Approval Test

### Marking of product

ShipCEMS  
 Continuous Emission Measurement System

### 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 renewal of this certificate.

END OF CERTIFICATE