

TYPE APPROVAL CERTIFICATE

This is to certify:**That the NOx Selective Catalytic Reduction Control System**

with type designation(s)

Daihatsu SCR Controller:, Master Cabinet / EAT-120, Slave Cabinet / EAT-275

Issued to

**Daihatsu Diesel Mfg. Co., Ltd. Moriyama Division
Moriyama, Shiga Pref, Japan**

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.**

Type Daihatsu SCR Controller:	Temperature	Humidity	Vibration	EMC	Enclosure
Master Cabinet / EAT- 120	A	B	A	A	Enclosure: Required protection according to the Rules to be provided upon installation on board.
Slave Cabinet / EAT-275	A	B	A	A	Enclosure: Required protection according to the Rules to be provided upon installation on board.

Issued at **Høvik** on **2019-07-16**This Certificate is valid until **2021-07-15**.DNV GL local station: **Kobe**for **DNV GL**Approval Engineer: **Thorbjørn Hansen****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

This type approval certificate covers the "**Daihatsu SCR Controller**", a control and monitoring system for NOx reduction through Daihatsu SCR System.

The Daihatsu SCR Controller is built up by one Master Cabinet and one or more Slave Cabinets. The No. of Slave Cabinets depends on the No. of engines the system serves.

The Daihatsu SCR Controller injects UREA upstream the SCR chamber based on engine load, intake air temperature and humidity.

The SCR chamber comprise the reactor and a built-in bypass duct. Two exhaust gas dampers are provided, one in the bypass path and one in the reactor path. The dampers are pneumatically operated, mechanically linked together and operated through one common control signal. Upon loss of electrical control signal or control air, the bypass damper opens and the inlet damper close (fail-to-safe).

An HMI for process monitoring and operation is normally installed in the Master Cabinet (EAT-120). Alternative locations may be accepted (see Annex 1).

Separate potential free contacts for SCR alarm and shutdown are provided. These shall be wired to the vessels main alarm system.

The system can cover up to totally 5 engines.

Automatic soot blowing is included.

Table 1: SCR C&M System, Type Approved cabinets and software

Cabinet / Type Designation	HW	Firmware	Application SW
Master Cabinet / EAT-120	PLC	01/442	9.*.*
	HMI	1.53 B226	9.*.*
Slave Cabinet / EAT-275	PLC	01/442	N/A

Place of manufacturer

This Daihatsu SCR Controller is manufactured by Chugoku Electric Service Co. Ltd.

Application/Limitation

This Type Approval covers the cabinets and software as listed in Table 1.

The maker shall inform DNV GL in writing whenever the system is scheduled for installation on-board a DNV GL classed vessel. The letter to DNV GL shall include a signed copy of Annex 1 and the following project specific drawings:

- System diagram (Makers reference document no. SAT-392-03B & SAT-392-04B)
- List of alarms (Makers reference document no. SAT-393-10B)
- P&ID (Makers reference document no. SAT-392-01C & SAT-392-02C)

Any change compared to the reference documents shall be clearly identified on the project specific drawings. Changes compared to the Type Approved drawings are subject to case-by-case approval and certification may be required at the makers premises prior to shipment and installation on board.

As long as the system is covered by the Type Approval, a product certificate according to Pt.4 Ch.9 Sec.1 [1.4] will not be required. Correct configuration and set up for each delivery to be tested during commissioning after installation, hereunder verification of alarms in the project specific parameter list as well as system alarms relayed to the vessels main alarm system.

The sensors used in the SCR system are not covered by this type approval certificate.

Type Approval documentation

Tests carried out

Environmental tests as per DNV CG 339.

Type Approval function tests as per document SAT-466, Rev E.

Inclination Test: Ok

Acoustic noise: Ok

Compass safe distance:

- Master Cabinet EAT-120: 3.30/2.15m (standard/steering)
- Slave Cabinet EAT-275: 3.70/2.40m (standard/steering)

Marking of product

Master Cabinet, Serial no, Date

Slave Cabinet, Serial no, Date

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

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE

Job Id: **262.1-023561-1**
Certificate No: **TAA00001VY**

Annex 1 / Makers project specific declaration

In each delivery project and in due time prior to installation on-board, Daihatsu Diesel Mfg. Co, Ltd shall fill in and submit a signed copy of Annex 1 to DNV GL for approval, together with project specific drawings as listed under "Application / Limitations".

1	Production place	
1.1	This SCR C&M system is manufactured by Cyugoku El. Service Co. Ltd (YES / NO)	
2	Vessels class notations	
2.1	Do the vessel hold additional class notation DP and / or RP? (YES / NO) Note 1	
3	Propulsion machinery	
3.1	The No. of propulsion engines this SCR C&M system serves are (X / NA)	
4	Auxiliary machinery	
4.1	The No. of auxiliary engines this SCR C&M system serves are (X / NA)	
5	HW and SW	
5.1	The No. of installed Master cabinets (X)	
5.2	The No. of installed Slave cabinets (X)	
5.3	HMI installed in Master Cabinet / MC or Engine Control Room/ECR (MC / ECR)	
5.4	The installed SW is according to table 1 (YES / NO)	
6	Miscellaneous	
6.1	Soot cleaning enabled (YES / NO) Note 2	
6.2	UREA temp- and level monitoring is provided for by the yard/owner (YES / NO) Note 3	
6.3	Any alarm- and SHD are relayed to the vessels main alarm system (YES / NO)	
6.4	Internal testing as per document PAP000690 has been performed (YES / NO)	
6.5	I/O and parameters are implemented as per document SAT-393-10, Rev A, (YES / NO)	
6.6	Heat traced piping between UREA tank and UREA injection point (YES / NO) Note 4	
6.7	Exhaust gas temp after T/C monitored in ECR for HA and IR (YES / NO) Note 5	
The preferred choice is shown in BOLD text inside the brackets. If the actual configuration deviates from the preferred choice, additional documentation and tests may be required. Note 1: Installation of the subject SCR C&M system on-board vessels holding additional class notation "DP" and / or "RP" shall follow the design requirements as specified in the DNV GL DP- and RP rules concerning redundancy classes and physical separation for damper control arrangements. Note 2: Automatic soot cleaning required for machinery operating on HFO. Note 3: UREA tank monitoring as required by the rules is not included in the subject TAC / system. Compliance with the applicable rules to be verified by the attending surveyor on-board. Note 4: Alarm for low treatment fluid supply temperature is required in case of heat traced piping. Note 5: Accepted as alternative to monitor exhaust gas temperature before reactor for the subject SCR system.		
Comments by Daihatsu Diesel Mfg. Co, Ltd:		

Date / Signature / Stamp