DNV·GL

Certificate No:
TAP000021U

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Exhaust gas cleaning systems for the reduction of NOx

with type designation(s)
SZ01Y, SZ02Y, SZ03Y, SZ04Y, SZ05Y, SZ06Y, SZ07Y, SZ08Y, SZ09Y, SZ10Y, SZ11Y, SZ12Y, SZ13Y, SZ14Y, SZ15Y, SZ16Y, SZ17Y, SZ18Y, SZ19Y, SZ20Y, SZ21Y, SZ22Y, SZ23Y, SZ24Y, SZ25Y, SZ009Y, SZ010Y,

SZ01, SZ02, SZ03, SZ04, SZ05, SZ06, SZ07, SZ08, SZ09, SZ10, SZ11, SZ12, SZ13, SZ14, SZ15, SZ16, SZ17, SZ18, SZ19, SZ20, SZ21, SZ22, SZ23, SZ24, SZ25, SZ018, SZ014DF

Issued to
Shanghai Marine Diesel Engine Research Institute
Shanghai, 020, China

is found to comply with
DNV GL class programme DNVGL-CP-0353 – Type Approval - Selective catalytic reduction systems
DNV GL rules for classification – Ships Pt.6 Ch.7 Environmental protection and pollution control

Application :

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

Design pressure (urea solution):	Pressure drop (exh. gas):	Design temperature (exh. gas):
5 bar	**≤ 1500 Pa**	**min.250 °C, max. 450 °C**

Issued at **Hamburg** on **2021-02-09**
This Certificate is valid until **2026-02-08**.
DNV GL local station: **Shanghai**

for **DNV GL**

Approval Engineer: **Jan Sell**

Olaf Drews
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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Product description

The system is designed for reduction of NOx emissions from marine diesel engine exhaust gas.
The system includes (a) reactor, (b) pumping station, (c) metering unit, (d) mixing pipe, (e) spray gun, (f) urea storage unit and (g) exhaust valves (if applicable) for reactor bypass and SCR inlet. Treatment fluid is urea solution.

(a) Reactor: Catalyst, soot blower (by compressed air), sensors, with internal bypass (Table 1) or without internal bypass (Table 2),
(b) Pump unit: Centrifugal pump with dual power input (outlet pressure ~4 bar), filter, pressure sensor, valves
(c) Metering unit: Filter, pressure reducing valve, pressure sensor, valves, flow meter
(d) Mixing pipe: Mixer, straight pipe
(e) Spray gun: Spray gun
(f) Urea storage unit: Tank, sensor
(g) Exhaust valves: Pneumatic butterfly valve, position feedback sensor

SCR types, with internal bypass	(a) Reactors	Max. exhaust gas flow (kg/h)	(d) Mixing pipes	(b) Pump unit	(c)Metering unit	(f) Urea storage units
SZ01Y	SZ01RY	2700	SZ001M SZ002M SZ003M SZ004M SZ005M SZ006M SZ007M SZ008M SZ009M SZ010M SZ011M SZ012M SZ013M SZ014M SZ015M SZ016M SZ017M SZ018M SZ019M SZ020M	STG900A	STM900A	SR024 SR045 SR073 SR165
SZ02Y	SZ02RY	5400				
SZ03Y	SZ03RY	8300				
SZ04Y	SZ04RY	12300				
SZ05Y	SZ05RY	16400				
SZ06Y	SZ06RY	21900				
SZ07Y	SZ07RY	27300				
SZ08Y	SZ08RY	34200				
SZ09Y	SZ09RY	40900				
SZ10Y	SZ10RY	49100				
SZ11Y	SZ11RY	57200				
SZ12Y	SZ12RY	66800				
SZ13Y	SZ13RY	76400				
SZ14Y	SZ14RY	87100				
SZ15Y	SZ15RY	98000				
SZ16Y	SZ16RY	110300				
SZ17Y	SZ17RY	122600				
SZ18Y	SZ18RY	136200				
SZ19Y	SZ19RY	149800				
SZ20Y	SZ20RY	164800				
SZ21Y	SZ21RY	179700				
SZ22Y	SZ22RY	196000				
SZ23Y	SZ23RY	212500				
SZ24Y	SZ24RY	230200				
SZ25Y	SZ25RY	247800				
SZ010Y	SZ010RY	8800				
SZ009Y	SZ009RY	8600				

Table 1: SCR types with internal bypass

SCR types, without internal bypass	(a) Reactors	Max. exhaust gas flow (kg/h)	(d) Mixing pipes	(b) Pump unit	(c)Metering unit	(f) Urea storage units
SZ01	SZ01R	2700	SZ001M SZ002M SZ003M SZ004M SZ005M SZ006M	STG900A	STM900A	SR024 SR045 SR073 SR165
SZ02	SZ02R	5400				
SZ03	SZ03R	8300				
SZ04	SZ04R	12300				
SZ05	SZ05R	16400				
SZ06	SZ06R	21900				

SZ07	SZ07R	27300
SZ08	SZ08R	34200
SZ09	SZ09R	40900
SZ10	SZ10R	49100
SZ11	SZ11R	57200
SZ12	SZ12R	66800
SZ13	SZ13R	76400
SZ14	SZ14R	87100
SZ15	SZ15R	98000
SZ16	SZ16R	110300
SZ17	SZ17R	122600
SZ18	SZ18R	136200
SZ19	SZ19R	149800
SZ20	SZ20R	164800
SZ21	SZ21R	179700
SZ22	SZ22R	196000
SZ23	SZ23R	212500
SZ24	SZ24R	230200
SZ25	SZ25R	247800
SZ018	SZ018R	18600
SZ014DF	SZ014DFR	11000

Table 2: SCR types without internal bypass

Application/Limitation

NOx emission at inlet: Tier II (Revised MARPOL Annex VI, regulation 13)
NOx emission at outlet: Tier III (Revised MARPOL Annex VI, regulation 13)
Urea consumption ≤ 21 g/kWh (40 % urea solution)
Fuel oil for diesel engine: Diesel oil (S ≤ 0.1 %)

The emission reduction performance of the tested SCR system SZ010Y complies with the requirements of MEPC.291(71).
This certificate does not replace the Engine International Air Pollution Prevention (EIAPP) certificate and cannot be converted into an EIAPP certificate.

SCR types without internal bypass (Table 2), installed without additional external bypass, may not be used in installations where failure may cause loss of power generation or propulsion for the ship.

Type Approval documentation

Tests carried out

Type approval test including emission test
Date: 2020-07-15
Place: CSSC Marine Power Co., Ltd
SCR system: SZ010Y (reactor SZ010RY, mixing pipe SZ010M, pump unit STG900A, metering unit STM900A, urea storage unit SR165)
Test engine: CSSC Marine Power Co., Ltd, 7L23/30H, 1120 kW, 900 rpm, S/N 20067
Test cycle: D2 (NOx Technical Code 2008)
NOx reduction rate at test cycle: 64 – 82 % (except 10 % load point, which is in line with Revised MARPOL Annex VI and NTC2008)
Test report(s): Type Approval Test Report TA-SCR-SZ02-10 V5
Emission Test Report JMU-7L23/30H-20067

Marking of product

The products to be marked with manufacturer's name or trademark and type number identification.

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform an assessment after 2 years and after 3.5 years to verify that the conditions of the Type Approval are complied with.
A renewal assessment will be performed at renewal of the certificate.
The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval Certificate was issued. The main scope of the Periodical Assessment will normally include:
- Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the Type Approval documentation and that this is still used as basis for the production.
- Review of possible changes to the design, the material and the performance of the product.
- Verification of the product marking.

Refer to the Class Programme DNVGL-CP-0338, Sec.4.

Other Conditions

1. If this SCR System is to be included within the EIAPP certification, it must be recognized as a component of the engine, and its presence shall be recorded in the engine's Technical File.
2. Dip trays shall be provided for components of the urea solution system which are often opened or where leakages are possible; DNV GL Rules Ships Pt.6 Ch.7 Sec.7 [4.1.6].
3. Drain pots shall be provided in the exhaust system to prevent ingress of urea solution into a stopped engine; DNV GL Rules Ships Pt.6 Ch.7 Sec.7 [4.1.6].
4. Urea injection rate shall be adjusted depending on engine load to prevent excessive ammonia slip; DNV GL Rules Ships Pt.6 Ch.7 Sec.7 [5.2.12].
5. SCR control and monitoring system, sensors, control of exhaust dampers, etc., is not covered by this certificate. Documentation for the control and monitoring system shall be submitted for approval according to DNV GL Rules Ships Pt.6 Ch.7 Sec.7 Tab.3 and Pt.4 Ch.9 Sec.1 Tab.5 and/or as listed in relevant Type Approval certificates.
6. The following documentation shall be submitted for each installation:
   - SCR type used and reference to this Type Approval Certificate
   - Information about engine type and intended use (propulsion, auxiliary, etc.)
   - Information of all pipes and hoses to be delivered by the yard as referenced in the installation manual and P&ID
   - P&ID showing all connections of the SCR system to other ship systems
   - Pressure drop calculation for the complete exhaust line
7. SCR types without internal bypass shall be fitted with additional external bypass valve and SCR inlet valve, except failure of the SCR system can not cause loss of power generation or propulsion for the ship.

END OF CERTIFICATE