Guidance for Exhaust gas Emission Abatement System

(Development Review : For external opinion inquiry)

2019. 8.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 July 2020(Date of which the contract for construction is signed and applicable retroactively)

◉ Section 1 SCR

- Ventilation requirement for enclosed space adjacent to the NaOH tanks has been admended.

◉ Section 2 EGR

- Class notation, test and survey items has been amended.
- Requirement for essential services has been deleted.
- Monitoring & safety system items has been amended.
- Submission of FMEA plan has been deleted.

◉ Section 3 EGCS

- Chemical treatment system has been amended.
- Monitoring & safety system items has been amended.
- Test and survey items has been amended.

Present	Amendments	Remark
Section 1 Selective Catalytic Reduction system Using Ammonia Solutions or Urea Solutions as the Reductant Agents(SCR) [omitted]	**Section 1 Selective Catalytic Reduction system Using Ammonia Solutions or Urea Solutions as the Reductant Agents(SCR)** [same as present]	
105. Special requirements in cases where the urea solution is used as reductant agent [omitted]	**105. Special requirements in cases where the urea solution is used as reductant agent** [same as present]	(Revision) - It has been amended that mechanical ventilation may be required if urea piping passes through a closed area normally accessed by a person or if there is a possibility of urea leaking into an enclosed area adjacent to a urea tank and normally accessible by a person.
2. Ventilation [omitted]	**2. Ventilation** [same as present]	
(2) In cases where urea solution is transferred to a tank which forms part of the ship's hull, the enclosed spaces(excluding water tanks and oil tanks) adjacent to the urea solution tanks are to be provided with the mechanical ventilation which can be operated from outside the spaces. [omitted]	(2) In the follow case, the closed compartments normally entered by persons are to be served by an effective mechanical ventilation system of extraction type providing not less than 6 air changes per hour which is independent from the ventilation system of accommodation, service spaces, or control stations. The ventilation system is to be capable of being controlled from outside the compartment. A warning notice requiring the use of such ventilation before entering the compartment is to be provided outside the compartment adjacent to each point of entry : (A) When the urea piping systems pass through these com artments, unless the piping system is made of steel or other equivalent material with melting point above 925 ℃ and with fully welded joints.; or (B) When they are adjacent to the urea integral tanks and there are possible leak points (e.g. manhole, fittings) from these tanks. [same as present]	

Present	Amendments	Remark
Section 2 Exhaust Gas Recirculation system(EGR)	**Section 2 Exhaust Gas Recirculation system(EGR)**	
201. General	**201. General**	(Revision) - It has been amended as like EGCS.
[omitted]	[same as present]	
3. Where a ship designed for the reduction of NOx emissions by the use of Exhaust Gas Recirculation system is designed, constructed and tested in accordance with this Guidance, the EEAS-EGR notation is to be assigned. Where a ship provided EGR systems that incorporate engine systems that are designed for the purposes of removing the sulfur by-products from the exhaust gases that originate from the fuel and incorporate, for example, water scrubbing and water cleaning systems, the **EEAS-EGR** is to be assigned. Where a water treatment system is incorporated in the EGR system, the washwater discharge criteria is to meet the requirements of **IMO Res. MEPC.259(68)**.	**3.** Where a ship designed for the reduction of NOx emissions by the use of Exhaust Gas Recirculation system is designed, constructed and tested in accordance with this Guidance, the EEAS-EGR notation of Table 1 is to be assigned. In addition to EEAS-EGR, EEAS-EGR(R) and/or (S) may be additionally assigned if the relevant requirements are met. Where a ship provided EGR systems that incorporate engine systems that are designed for the purposes of removing the sulfur by-products from the exhaust gases that originate from the fuel and incorporate, for example, water scrubbing and water cleaning systems, the **EEAS-EGR** is to be assigned. Where a water treatment system is incorporated in the EGR system, the washwater discharge criteria is to meet the requirements of **IMO Res. MEPC.259(68)**.	
[omitted]	**Table 1. Class Notation of EGR**	
	No. | Notation | relevant requirements 1 | **EEAS-EGR** | All requirements of **Section 2 EGR** Excluding the relevant requirements of paragraphs **2** and **3** of **Table 1** 2 | **EEAS-EGR(R)** | In addition to relevant requirements of **EEAS-EGR**, provisions of **204. 3**(redundancy requirements) 3 | **EEAS-EGR(S)** | In addition to relevant requirements of **EEAS-EGR**, paragraphs **1~6** of **Table 3**(Type approval or test/survey requirements)	
	[same as present]	
204. EGR System Configuration	**204. EGR System Configuration**	
[omitted]	[same as present]	
3. Redundancy	**3. Redundancy** *(applicable when only the "EEAS-EGR(R)" class notation of Table 1)*	
(1) Redundancy of equipment is to be provided for those rotating and reciprocating components that form part of the EGR essential supplementary systems, such as pumps, fans, blowers, etc.	(1) Redundancy of equipment is to be provided for those rotating and reciprocating components that form part of the EGR essential supplementary systems, such as pumps, fans, blowers, etc.	
(2) Consideration will be given to alternative means of compliance or operation to meet above (A) on a case-by-case basis. As applicable, documentation is to be submitted demonstrating that the reliability of the system or component provides continued serviceability of the exhaust emission abatement system or the alternative means of operation provides continued compliance with the statutory environmental requirements, without compromising the vessel propulsion and maneuvering capability.	(2) Consideration will be given to alternative means of compliance or operation to meet above (1) on a case-by-case basis. As applicable, documentation is to be submitted demonstrating that the reliability of the system or component provides continued serviceability of the exhaust emission abatement system or the alternative means of operation provides continued compliance with the statutory environmental requirements, without compromising the vessel propulsion and maneuvering capability.	

Present	Amendments	Remark
[added]	(3) Unless alternative means of compliance in accordance with above (2) are applicable, redundant washwater pumps, dosing pumps, discharge pumps, etc., essential for the continual operation of the EGR water systems, are to be provided. There are to be at least each two of these essential pumps, the capacity of the pumps, with any one pump out of service, is to be sufficient for continuous operation of the exhaust emission abatement system at full rating. (4) Where ships fitted with two or more identical exhaust emission abatement systems, the provision of a common standby pump(for each essential system) capable of serving all EGR units will suffice rather than providing individual standby pumps for each EGR unit. (5) Unless alternative means of compliance in accordance with above (2) are applicable and where exhaust fans or blowers form part of the EGR system and are essential for continual operation of the exhaust emission abatement system at full rating, such fans or blowers are to be installed in a redundant arrangement. The number and power of the fans or blowers should be such that if one unit, or group of units, is out of service the capacity of the remaining units is not to be less than 100% of the total required. (6) If the Society considers that the redundancy of the pump and blower (including the exhaust fan) required above is acceptable to the Society, the provision of spare parts made up of rotating parts, including motors and bearings may be permitted.	(Revision) - It has been amended as like EGCS.
4. Essential Services (1) For the purposes of design, construction, testing, and survey, EGR units and associated components and systems are considered secondary essential services in accordance with the requirements specified in **Pt 6, Ch 1, 101. 4** (13) of the Rules.	~~**4. Essential Services**~~ ~~(1) For the purposes of design, construction, testing, and survey, EGR units and associated components and systems are considered secondary essential services in accordance with the requirements specified in **Pt 6, Ch 1, 101. 4** (13) of the Rules.~~	
5. Prevention of Flooding (1) For EGR systems that incorporate a wet washwater scrubbing process, arrangements are to be provided to prevent the ingress of scrubber washwater into the engine under any circumstance. (2) Monitoring, alarm, and shutdown arrangements are to be provided to prevent an abnormal rise of washwater level in the EGR scrubber unit.	**4. Prevention of Flooding** (1) For EGR systems that incorporate a wet washwater scrubbing process, arrangements are to be provided to prevent the ingress of scrubber washwater into the engine under any circumstance. (2) Monitoring, alarm, and shutdown arrangements are to be provided to prevent an abnormal rise of washwater level in the EGR scrubber unit.	
6. EGR is to be designed for proper operation at the inclination requirements specified in **Pt 5, Ch 1, 103. Table 5.1.2** of the Rules.	**5.** EGR is to be designed for proper operation at the inclination requirements specified in **Pt 5, Ch 1, 103. Table 5.1.2** of the Rules.	
[omitted]	[same as present]	

Present	Amendments	Remark
205. EGR System Equipment	**205. EGR System Equipment**	
1. Pumps/Blowers	**1. Pumps/Blowers**	
(1) Where provided, blowers and pumps used in EGR SOx scrubber washwater, dosing, discharge, etc., systems, essential for the continual operation of the EGR exhaust emission abatement system, are to be tested and certified in accordance with the relevant requirements of **Pt 5, Ch 1, 210 & Ch 6.**	(1) Where provided, blowers and pumps used in EGR SOx scrubber washwater, dosing, discharge, etc., systems, essential for the continual operation of the EGR exhaust emission abatement system, are to be tested and certified in accordance with the relevant requirements of **Pt 5, Ch 1, 210 & Ch 6.**	(Revision) - It has been amended as like EGCS.
(2) Unless alternative means of compliance in accordance with **4.** (3) (B) of this Guidance are applicable, redundant washwater, dosing, discharge, etc., pumps, essential for the continual operation of the EGR water systems, are to be provided. There are to be at least two of these essential pumps, the capacity of the pumps, with any one pump out of service, is to be sufficient for continuous operation of the exhaust emission abatement system at full rating.		
(3) Where ships fitted with two or more identical exhaust emission abatement systems, the provision of a common standby pump (for each essential system) capable of serving all EGR units will suffice rather than providing individual standby pumps for each EGR unit.		
(4) Unless alternative means of compliance in accordance with **204** (3) (B) of this Guidance are applicable and where exhaust fans or blowers form part of the EGR system and are essential for continual operation of the exhaust emission abatement system at full rating, such fans or blowers are to be installed in a redundant arrangement. The number and power of the fans or blowers should be such that if one unit, or group of units, is out of service the capacity of the remaining units is not to be less than 100% of the total required.		
[omitted]	[same as present]	
3. Electrical System	**3. Electrical System**	
For items not specified in this Guidance, the relevant requirements specified in **Pt 6** of the Rules apply.	For items not specified in this Guidance, the relevant requirements specified in **Pt 6** of the Rules apply.	
(1) Electrical Motors and Controllers Motors and motor controllers are to be ceritified in accordnace with the relevant requirements specified in **Pt 6** of the Rules.	(1) Electrical Motors and Controllers Motors and motor controllers, where class notation EEAS-EGR(S) is applied, are to be ceritified in accordnace with the relevant requirements specified in **Pt 6** of the Rules.	
(2) Standby Pump/Fan In the event of failure of the essential exhaust emission abatement system pumps or fans/blowers, the standby pump or fan/blower, where provided, is to be automatically started and put into service. This failure is to be alarmed at the local and remote control stations.	(2) Standby Pump/Fan Where redundancy is provided according to the 204.3.(1), In the event of failure of the essential exhaust emission abatement system pumps or fans/blowers, the standby pump or fan/blower is to be automatically started and put into service. This failure is to be alarmed at the local and remote control stations.	
[omitted]	[same as present]	

Present	Amendments	Remark
206. EGR System Piping [omitted] **3. Chemical Treatment Piping Systems** [omitted] (1) Material (A) The material of the NaOH related piping systems, NaOH storage tank, EGR residue/NaOH overflow tanks, drip trays, and any other components which may come into contact with the NaOH solution or sludge is to be of a suitable grade of stainless steel or other corrosion-resistant material established to be suitable for the application. Aluminum, zinc, brass, or galvanized steel components are not to be used. [omitted]	**206. EGR System Piping** [same as present] **3. Chemical Treatment Piping Systems** [same as present] (1) Material (A) The material of the NaOH related piping systems, NaOH storage tank, EGR residue/NaOH overflow tanks, drip trays, and any other components which may come into contact with the NaOH solution or sludge is to be of a suitable grade of stainless steel or products coated with corrosion-resistant materials established to be suitable for the application. Aluminum, zinc, brass, or galvanized steel components are not to be used. [same as present]	(Revision) - It has been amended as like EGCS.

Present	Amendments	Remark
206. EGR System Piping [omitted] **2. Washwater Piping** [omitted] (3) Overboard Discharges [omitted] (C) The distance piece between the outboard discharge valve and the shell plating is not to be less than the thickness of the shell plating. However, it is to be at least 15mm. [omitted]	**206. EGR System Piping** [same as present] **2. Washwater Piping** [same as present] (3) Overboard Discharges [same as present] (C) The distance piece between the outboard discharge valve and the shell plating is not to be less than Sch.160 or 15mm, whichever is smaller and it is to be coated with corrosion-resistant materials established to be suitable for the application. However, if the material is of a suitable grade of stainless steel, the thickness may be reduced. [same as present]	(Revision) - 15mm is practically impossible for a small size piece.

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208. Survey and Test

1. General

(1) These requirements apply to shop test and onboard test of EGR systems and associated systems. Following tests may be incorporated with the tests required by **Pt 5, Ch 2, 211.** of the Rules.

[Added]

2. Test

[omitted]

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208. Survey and Test

1. General

(1) These requirements apply to shop test and onboard test of EGR systems and associated systems. Following tests may be incorporated with the tests required by **Pt 5, Ch 2, 211.** of the Rules.

(2) The components of the EGR are to be tested and inspected in accordance with **Table 3** below in accordance with the applicable class notation in **Table 1**.

Table 3. Test and Survey for components of EGR

No.	Components	Approval of Administration or Class Type approval	Class Type approval	Test and Survey
1	Control panel/power panel(4)			●
2	Pumps(incl.motor)(1)			●
3	Blowers(incl.motor)(1)			●
4	Scrubber body(2)			●
5	Heat exchanger(2)			●
6	Storage vessels for washwater treatment medium(3)			●

Note.
(1) Components for the continual operation of the EGR are to be tested in accordance with the requirements specified in **Pt 5, Ch 6 & Pt 6** of the Rules.
(2) Non-destructive testing is to be carried out on the welded parts of the equipment constituting the following exhaust gas cleaning system, and the hydrostatic test is to be carried out at a pressure 1.5 times the design pressure.
(3) Storage vessels that do not form part of the hull are to be subjected to a hydraulic test at a head pressure of 2.5 m on the tank top plate, together with the attachment after manufacture.
(4) Where equipment specified in Guidance 6, Ch 1 and Ch 2, 301.1 is installed, Regardless of class notation, the type approval product is to be installed in the control panel/power panel. (See Guidance Pt 6, Ch 1 and Ch 2, 301.1)

2. Onboard tests

[Same as present]

</td>
<td>(Revision)
- In accordance with Part 6, the regulations have been amended so that products with type approval can be provided regardless of the classification code.</td>
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Present	Amendments	Remark
207. Control, Alarm, and Monitoring System **1. General** (1) The EGR control system is to be integrated with, or in direct communication with, the engine control system. Control systems for associated systems, such as water treatment plants, may be connected to an integrated control system or may be a stand-alone system. (2) The system is to be designed such that a single fault of a component will not lead to a potentially dangerous situation for human safety and the vessel. An FMEA or equivalent demonstrating the safety system design basis is to be submitted. **2. Control and Monitoring System** [omitted] (C) Indications of parameters necessary for the safe and effective operation of the exhaust emission abatement process are to be provided at the local and, as applicable, remote control stations, as per **Table 1 of this Guidance and are to include the following parameters:** (a) EGR system pump/fan/blower/motor operational status (b) Status of any EGR system valves showing whether they are open or shut (c) EGR system parameters for operational safety (d) Level indication of EGR system tanks (e) Status of any EGR system alarms, shutdowns and Emergency Stop [omitted]	**207. Control, Alarm, and Monitoring System** **1. General** (1) The EGR control system is to be integrated with, or in direct communication with, the engine control system. Control systems for associated systems, such as water treatment plants, may be connected to an integrated control system or may be a standalone system. (2) The system is to be designed such that a single fault of a component will not lead to a potentially dangerous situation for human safety and the vessel. Data describing the identification of hazards associated with the design and operation of the exhaust gas recirculation system and the means of safeguard or control is to be submitted. **2. Control and Monitoring System** [Same as present] (C) Indications of parameters necessary for the safe and effective operation of the exhaust emission abatement process are to be provided at the local and, as applicable, remote control stations, as per **Table 1 of this Guidance and are to include the following parameters:** (a) EGR system pump/fan/blower/motor operational status (b) EGR system parameters for operational safety (c) Level indication of EGR system tanks (d) Status of any EGR system alarms, shutdowns and Emergency Stop [Same as present]	(Revision) - Submission of FMEA plan has been amended. - Monitoring & safety system function for EGR has been amended as like EGCS.

Present

Table 1 Monitoring and Safety System Functions for EGR Systems

Parameters	Display	Alarm Activated	Automatic EGR Shutdown
EGR exhaust fan/blower motors	Run	Stop	
EGR exhaust bypass, isolation, mixing valves, where provided	Position		
Control-actuating medium of the EGR exhaust bypass or isolation valves	Run	Fail	
Exhaust gas temperature before/after EGR unit	●	H	O(HH)
Engine air intake O2 concentration(or EGR rate)	●	L/H	●(HH/LL)
Differential pressure across EGR scrubber unit or EGR circuit, as applicable	●	H	●(HH)
EGR washwater pumps, alkali system pumps	Run	Stop	
EGR washwater or alkali system valves	Position		
Control-actuating medium of the EGR washwater and alkali system valves, where provided	Run	Fail	
EGR washwater and alkali system supply pressure	●	Low	●(LL)
EGR washwater and alkali system supply temperature	●	H	●(HH)
Water level in EGR scrubber	●	H	●(HH)
Alkali storage tank temperature	●	L/H	●(HH)
Alkali storage tank level	●	L/H	●(LL)
Alkali system drip tray level	●	H	●(HH)
EGC residue tank level	●	H	●(HH)
Control power supply	Run	Stop	
Emergency shutdown	●	●	●

Amendments

Table 2 Monitoring and Safety System Functions for EGR Systems

Parameters	Display	Alarm Activated	Automatic EGR Shutdown
EGR exhaust fan/blower motors	Run	Stop	
EGR exhaust bypass, isolation, mixing valves, where provided	Position		
Exhaust gas temperature after EGR unit(except if dry running can be used)	●	H	●(HH)
Differential pressure across EGR scrubber unit or EGR circuit or pressure before EGR unit(except if dry running can be used)	●	H	●(HH)
EGR washwater pumps, alkali system pumps or dry system supply device	Run	Stop	
EGR washwater and alkali system supply pressure	●	L	
EGR washwater system supply temperature(Closed/Hybrid type)	●	H	
EGR alkali system supply temperature	●	L/H	
Water level in EGR scrubber	●	H	●(HH)
Alkali storage tank temperature	●	L/H	
Alkali storage tank level	●	L/H	
Alkali system drip tray level	●	H	
EGR residue tank level	●	H	
EGR residue tank temperature	●		
power supply fail of control, alarm, monit oring or safety device	-	Fail	

Remark

(Revision)
- Monitoring & safety sys-tem function for EGR has been amend-ed as like EGCS.

Present

Section 3 Exhaust Gas Cleaning system(EGC)

[omitted]

Table 1. Class Notation of EGC

No.	Notation	relevant requirements
1	**EEAS-EGC**	All requirements of **Section 3 EGC** Excluding the relevant requirements of paragraphs **2** and **3** of **Table 1**
2	**EEAS-EGC(R)**	In addition to relevant requirements of **EEAS-EGC**, provisions of **304. 3**(redundancy requirements)
3	**EEAS-EGC(S)**	In addition to relevant requirements of **EEAS-EGC**, paragraphs **3~8** of **Table 4**(Type approval or test/survey requirements)

[omitted]

Remark

(Revision)
- In the case of the control panel/power panel, the equip-ment team is guiding and pro-ceeding with approval of draw-ings for ships and inspection of parts. So, it is removed from the additional class notation requirements.

Amendments

Section 3 Exhaust Gas Cleaning system(EGC)

[Same as present]

Table 1. Class Notation of EGC

No.	Notation	relevant requirements
1	**EEAS-EGC**	All requirements of **Section 3 EGC** Excluding the relevant requirements of paragraphs **2** and **3** of **Table 1**
2	**EEAS-EGC(R)**	In addition to relevant requirements of **EEAS-EGC**, provisions of **304. 3**(redundancy requirements)
3	**EEAS-EGC(S)**	In addition to relevant requirements of **EEAS-EGC**, paragraphs 4~**8** of **Table 4**(Type approval or test/survey requirements)

[Same as present]

Remark

(Revision)
- In the case of the control panel/power panel, the equip-ment team is guiding and pro-ceeding with approval of draw-ings for ships and inspection of parts. So, it is removed from the additional class notation requirements.

Present	Amendments	Remark
304. EGC System Configuration [omitted] **3. Redundancy** *(Applicable when only the "**EEAS-EGC(R)**" class notation of* **Table 1***)* (1) Redundancy of equipment is to be provided for those rotating and reciprocating components that form part of the EGC essential supplementary systems, such as pumps, fans, blowers, etc. (2) Consideration will be given to alternative means of compliance or operation to meet above (A) on a case-by-case basis. As applicable, documentation is to be submitted demonstrating that the reliability of the system or component provides continued serviceability of the exhaust gas cleaning system or the alternative means of operation provides continued compliance with the statutory environmental requirements, without compromising the vessel propulsion and maneuvering capability. [Added] [omitted]	**304. EGC System Configuration** [Same as present] **3. Redundancy** *(Applicable when only the "**EEAS-EGC(R)**" class notation of* **Table 1***)* (1) Redundancy of equipment is to be provided for those rotating and reciprocating components that form part of the EGC essential supplementary systems, such as pumps, fans, blowers, etc. (2) Consideration will be given to alternative means of compliance or operation to meet above (A) on a case-by-case basis. As applicable, documentation is to be submitted demonstrating that the reliability of the system or component provides continued serviceability of the exhaust gas cleaning system or the alternative means of operation provides continued compliance with the statutory environmental requirements, without compromising the vessel propulsion and maneuvering capability. (3) Unless alternative means of compliance in accordance with above **(2)** are applicable, redundant washwater, dosing, discharge, etc., pumps, blowers, essential for the continual operation of the EGC water systems, are to be provided. There are to be at least two of these essential pumps, the capacity of the pumps, with any one pump out of service, is to be sufficient for continuous operation of the exhaust emission abatement system at full rating. (4) Where ships fitted with two or more identical exhaust emission abatement systems, the provision of a common standby pump (for each essential system) capable of serving all EGC units will suffice rather than providing individual standby pumps for each EGC unit. (5) Unless alternative means of compliance in accordance with above (2) are applicable and where exhaust fans or blowers form part of the EGC system and are essential for continual operation of the exhaust emission abatement system at full rating, such fans or blowers are to be installed in a redundant arrangement. The number and power of the fans or blowers should be such that if one unit, or group of units, is out of service the capacity of the remaining units is not to be less than 100% of the total required. (6) If the Society considers that the redundancy of the pump and blower (including the exhaust fan) required above is acceptable to the Society, the provision of spare parts made up of rotating parts, including motors and bearings may be permitted. [Same as present]	(Revision) - The provisions for redundant redundancy have been revised. - If class notation is applied, additional phrases shall be added so that the regulations apply.
305. EGC System Equipment **1. Pumps/Blowers** (1) Equipment required for continuous operation of the EGC, such as rinse water pumps, circulation pumps, exhaust pumps and blowers are certified in accordance with the relevant requirements of **Pt 5, Ch 1, 210 & Ch 6.** (2) Unless alternative means of compliance in accordance with **304. 3. (2)** of this Guidance are applicable, redundant washwater, dosing, discharge, etc., pumps, blowers, essential for the continual operation of the EGC water systems, are to be provided. There are to be at least two of these essential pumps, the capacity of the pumps, with any one pump out of service, is to be sufficient for continuous operation of the exhaust emission abatement system at full rating. (3) Where ships fitted with two or more identical exhaust emission abatement systems, the provision of a common standby pump (for each essential system) capable of serving all EGC units will suffice rather than providing individual standby pumps for each EGC unit. (4) Unless alternative means of compliance in accordance with **304. 3.** (2) of this Guidance are applicable and where exhaust fans or blowers form part of the EGC system and are essential for continual operation of the exhaust emission abatement system at full rating, such fans or blowers are to be installed in a redundant arrangement. The number and power of the fans or blowers should be such that if one unit, or group of units, is out of service the capacity of the remaining units is not to be less than 100% of the total required. (5) If the Society considers that the redundancy of the pump and blower (including the exhaust fan) required above is acceptable to the Society, the provision of spare parts made up of rotating parts, including motors and bearings may be permitted. [omitted]	**305. EGC System Equipment** **1. Pumps/Blowers (***Applicable when only the "**EEAS-EGC(S)**" class notation of* **Table 1***)* (1) Equipment required for continuous operation of the EGC, such as rinse water pumps, circulation pumps, exhaust pumps and blowers are certified in accordance with the relevant requirements of **Pt 5, Ch 1, 210 & Ch 6.** [Same as present]	

Present	Amendments	Remark
305. EGC System Equipment [omitted] **4. Electrical Systems** For items not specified in this Guidance, the relevant requirements specified in **Pt 6** of the Rules apply. (1) Electrical Motors and Controllers Motors and motor controllers are to be ceritified in accordnace with the relevant requirements specified in **Pt 6** of the Rules. (2) Standby Pump/Fan The standby pumps and blowers, where redundancy is provided according to the **304. 3.** (1), are to be automatically started and put into service. This failure is to be alarmed at the local and remote control stations. [omitted]	**305. EGC System Equipment** [same as present] **4. Electrical Systems** For items not specified in this Guidance, the relevant requirements specified in **Pt 6** of the Rules apply. (1) Electrical Motors and Controllers (*Applicable when only the "**EEAS-EGC(S)**" class notation of* **Table 1**) Motors and motor controllers are to be ceritified in accordnace with the relevant requirements specified in **Pt 6** of the Rules. (2) Standby Pump/Fan The standby pumps and blowers, where redundancy is provided according to the **304. 3.** (1), are to be automatically started and put into service. This failure is to be alarmed at the local and remote control stations. [same as present]	(Revision)\ - If class notation is applied, additional phrases shall be added so that the regulations apply.

Present	Amendments	Remark
306. EGC System Piping [omitted] **3. Chemical Treatment Piping Systems** [omitted] (6) Miscellaneous Piping (A) The NaOH piping systems are to be independent of other ship service piping and systems. (B) Piping systems for NaOH systems are not to be located in accommodation, service, or control spaces. (C) Every pipe emanating from a tank containing NaOH, which, if damaged, would allow NaOH to escape from the tank, is to be provided with a positive closing valve located directly on the tank. The positive closing valve is to be provided with means of closure both locally and from a readily accessible and safe position outside of the space. [omitted]	**306. EGC System Piping** [same as present] **3. Chemical Treatment Piping Systems** [same as present] (6) Miscellaneous Piping (A) The NaOH piping systems are to be independent of other ship service piping and systems. (B) Piping systems for NaOH systems are not to be located in accommodation, service, or control spaces. (C) Every pipe emanating from a tank containing NaOH, which, if damaged, would allow NaOH to escape from the tank, is to be provided with a positive closing valve that can be closed remotely. [same as present]	(Revision)\ - Environmental piping team requirements (ENP4800-1926-19) (Due to the nature of sodium hydroxide, there is no flammability. Therefore, the regulations for valve operating sites required from the point of view of non-combustible fire have been revised.

Present	Amendments	Remark
306. EGC System Piping [omitted] **2. Washwater piping** [omitted] (3) Overboard Discharges [omitted] (C) The distance piece between the outboard discharge valve and the shell plating is to be at least 15mm.	**306. EGC System Piping** [same as present] **2. Washwater piping** [same as present] (3) Overboard Discharges [same as present] (C) The distance piece between the outboard discharge valve and the shell plating is not to be less than Sch.160 or 15mm, whichever is smaller and it is to be coated with corrosion-resistant materials established to be suitable for the application. However, if the material is of a suitable grade of stainless steel, the thickness may be reduced.	(Revision) - At the request of the Electrici & Automation/ Environmental Piping Team, the items on monitoring and safety devices of the EGCS were amended.

Present	Amendments	Remark
307. Control, Alarm, and Monitoring System [omitted] **2. Control and Monitoring System** [omitted] (2) The temperatures, pressures and flows in the EGC system and associated systems are to be controlled and monitored as follows: [omitted] (C) Indications of parameters necessary for the safe and effective operation of the exhaust gas cleaning process are to be provided at the local and, as applicable, remote control stations, as per **Table 1 of this Guidance and are to include the following parameters:** (a) EGC system pump/fan/blower/motor operational status (b) Status of any EGC system valves showing whether they are open or shut (c) EGC system parameters for operational safety (d) Level indication of EGC system tanks (e) Status of any EGC system alarms, shutdowns and Emergency Stop [omitted]	**307. Control, Alarm, and Monitoring System** [same as present] **2. Control and Monitoring System** [same as present] (2) The temperatures, pressures and flows in the EGC system and associated systems are to be controlled and monitored as follows: [same as present] (C) Indications of parameters necessary for the safe and effective operation of the exhaust gas cleaning process are to be provided at the local and, as applicable, remote control stations, as per **Table 3 of this Guidance and are to include the following parameters:** (a) EGC system pump/fan/blower/motor operational status (b) EGC system parameters for operational safety (c) Level indication of EGC system tanks (d) Status of any EGC system alarms, shutdowns and Emergency Stop [same as present]	(Revision) - At the request of the Electricity Automation / Environmental Piping Team, the items on monitoring and safety devices of the EGCS were amended.

Present

Table 3 Monitoring and Safety System Functions for EGC Systems

Parameters	Display	Alarm Activated	Automatic EGC Shutdown
EGC exhaust fan/blower motors	Run	Stop	
EGC exhaust bypass, isolation, mixing valves, where provided	Position		
Normal condition of control-actuating medium of the EGC exhaust bypass or isolation valves	Normal	abnormal	
Exhaust gas temperature before/after EGC unit	●	H	●(HH)
Differential pressure across EGC scrubber unit	●	H	●(HH)
EGC washwater pumps, alkali system pumps or supply system of dry system	Run	Stop	
EGC washwater or alkali system valves	Position		
Normal condition of control-actuating medium of the EGC washwater and alkali system valves, where provided	Normal	abnormal	
EGC washwater and alkali system supply pressure	●	Low	●(LL)
EGC washwater supply temperature(Closed/Hybrid type)	●	H	
EGC alkali system supply temperature	●	L/H	
Water level in EGC scrubber	●	H	●(HH)
Alkali storage tank temperature	●	L/H	●(HH)
Alkali storage tank level	●	L/H	●(LL)
Alkali system drip tray level	●	H	●(HH)
EGC residue tank level	●	H	●(HH)
Control power supply	Run	Stop	
Emergency shutdown	●	●	●

Amendments

Table 3 Monitoring and Safety System Functions for EGC Systems

Parameters	Display	Alarm Activated	Automatic EGR Shutdown
EGC exhaust fan/blower motors	Run	Stop	
EGC exhaust bypass, isolation, mixing valves, where provided	Position		
Exhaust gas temperature after EGC unit(except if dry running can be used)	●	H	●(HH)
Differential pressure across EGC scrubber unit or EGC circuit or pressure before EGC unit(except if dry running can be used)	●	H	●(HH)
EGC washwater pumps, alkali system pumps or dry system supply device	Run	Stop	
EGC washwater and alkali system supply pressure	●	L	
EGC washwater system supply temperature(Closed/Hybrid type)	●	H	
EGC alkali system supply temperature	●	L/H	
Water level in EGC scrubber	●	H	●(HH)
Alkali storage tank temperature	●	L/H	
Alkali storage tank level	●	L/H	
Alkali system drip tray level	●	H	
EGC residue tank level	●	H	
EGC residue tank temperature	●		
power supply fail of control, alarm, monitoring or safety device	-	Fail	

Remark

(Revision)
- At the request of the Electricity Automation / Environmental Piping Team, the items on monitoring and safety devices of the EGCS were amended.

Present

308. Survey and Test

1. General

(1) These requirements apply to shop test and onboard test of EGC systems and associated systems. Following tests may be incorporated with the tests required by **Pt 5, Ch 2, 211.** of the Rules.

(2) SECC(SOx Emission Compliance Certificate) may be issued after inspection by the Administration or the Society.

(3) The components of the EGC are to be tested and inspected in accordance with **Table 4** below in accordance with the applicable class notation in **Table 1**.

Table 4. Test and Survey for components of EGC

No.	Components	Approval of Administration or Class Type approval	Class Type approva l	Test and Survey
1	Exhaust gas emission monitoring system	●		
2	Washwater emission monitoring system		●	
3	Control panel/power panel			●
4	Pumps(incl.motor)(1)			●
5	Blowers(incl.motor)(1)			●
6	Scrubber body(2)			●
7	Heat exchanger(2)			●
8	Storage vessels for washwater treatment medium(3)			●

Note.
(1) Components for the continual operation of the EGC are to be tested in accordance with the requirements specified in **Pt 5, Ch 6 & Pt 6** of the Rules.
(2) Non-destructive testing is to be carried out on the welded parts of the equipment constituting the following exhaust gas cleaning system, and the hydrostatic test is to be carried out at a pressure 1.5 times the design pressure.
(3) Storage vessels that do not form part of the hull are to be subjected to a hydraulic test at a head pressure of 2.5 m on the tank top plate, together with the attachment after manufacture.

Amendments

308. Survey and Test

1. General

(1) These requirements apply to shop test and onboard test of EGC systems and associated systems. Following tests may be incorporated with the tests required by **Pt 5, Ch 2, 211.** of the Rules.

(2) SECC(SOx Emission Compliance Certificate) may be issued after inspection by the Administration or the Society.

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2	Washwater emission monitoring system		●	
3	Control panel/power panel			●
4	Pumps(incl.motor)(1)			●
5	Blowers(incl.motor)(1)			●
6	Scrubber body(2)			●
7	Heat exchanger(2)			●
8	Storage vessels for washwater treatment medium(3)			●

Note.
(1) Components for the continual operation of the EGC are to be tested in accordance with the requirements specified in **Pt 5, Ch 6 & Pt 6** of the Rules.
(2) Non-destructive testing is to be carried out on the welded parts of the equipment constituting the following exhaust gas cleaning system, and the hydrostatic test is to be carried out at a pressure 1.5 times the design pressure.
(3) Storage vessels that do not form part of the hull are to be subjected to a hydraulic test at a head pressure of 2.5 m on the tank top plate, together with the attachment after manufacture.
(4) Where equipment specified in Guidance 6, Ch 1 and Ch 2, 301.1 is installed, Regardless of class notation, the type approval product is to be installed in the control panel/power panel. (See Guidance Pt 6, Ch 1 and Ch 2, 301.1)

Remark

(Revision)
- In accordance with Part 6, the regulations have been amended so that products with type approval can be provided regardless of the classification code.

Guidance for Exhaust gas Emission Abatement System

(Development Review : For internal opinion inquiry)

2019. 12.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 July 2020(Date of which the application for Classification Survey is submitted to the Society and applicable retroactively)

◉ Section 1 SCR

- Requirement for Periodical survey has been added.

◉ Section 2 EGR

- Requirement for Periodical survey has been added.

◉ Section 3 EGCS

- Requirement for Periodical survey has been added.

Present	Amendments	Remark
[Added]	**108. Periodical Surveys** **1. General** For items not specified in this Guidance, the relevant requirements specified in **Pt 1** of the Rules apply. **2. Annual Survey** Annual surveys are to be included. (1) External examination of all components, including SCR reaction chamber, injectors, chemical store/supply, heating, tanks, pumps, valves, piping, etc.. (2) Performance test of the instrumentation, control, monitoring, and safety equipment including indicators and alarms. (3) Performance test of Changeover devices of exhaust gas pipes and the corresponding indicator (4) Operation test of Remote shut-off devices for reductant agent storage tank valves (5) General examinations of safety and protective equipment (6) Performance test of Safety showers Eyewash (7) Instruction and operation manual, the location of the applicable warning notices **3. Inermediate Survey** Requirements as required by the Annual Survey in paragraph **2** above are to be surveyed. **4. Special Survey** In addition to all the requirements for Annual Survey, the following items are to be surveyed. (1) The opening of pumps, exhaust fans and blowers (2) Internal examination of reductant agent storage tanks and SCR reaction chamber (3) Operation test of control valves	(Revision) - Periodical surveys has been added.

Present	Amendments	Remark
[Added]	**209. Periodical Surveys** **1. General** For items not specified in this Guidance, the relevant requirements specified in **Pt 1** of the Rules apply. **2. Annual Survey** Annual surveys are to be included. (1) External examination of all components, including scrubber unit, chemical treatment piping/supply unit, washwater, tanks, pumps, valves and piping, etc.. (2) Performance test of the instrumentation, control, monitoring, and safety equipment including indicators and alarms. (3) Performance test of Changeover devices of exhaust gas pipes and the corresponding indicator (4) Operation test of Remote shut-off devices for reductant agent storage tank valves if installed (5) General examinations of safety and protective equipment(refer to **206.3.(8)**) (6) Performance test of Safety showers Eyewash if installed (7) Instruction and operation manual, the location of the applicable warning notices(refer to **203**) **3. Inermediate Survey** Requirements as required by the Annual Survey in paragraph **2** above are to be surveyed. **4. Special Survey** In addition to all the requirements for Annual Survey, the following items are to be surveyed. (1) The opening of pumps, exhaust fans and blowers (2) Internal examination of chemical storage tank & residue tank if stalled (3) Internal examination of scrubber (4) Operation test of control valves	(Revision) - Periodical surveys has been added.

Present	Amendments	Remark
[Added]	**309. Periodical Surveys** **1. General** For items not specified in this Guidance, the relevant requirements specified in **Pt 1** of the Rules apply. **2. Annual Survey** Annual surveys are to be included. (1) External examination of all components, including scrubber unit, chemical treatment piping/supply unit, washwater, tanks, pumps, valves and piping, etc.. (2) Performance test of the instrumentation, control, monitoring, and safety equipment including indicators and alarms. (3) Performance test of Changeover devices of exhaust gas pipes and the corresponding indicator (4) Operation test of Remote shut-off devices for reductant agent storage tank valves if installed (5) General examinations of safety and protective equipment(refer to 3**06.3.(8)**) (6) Performance test of Safety showers Eyewash if installed (7) Instruction and operation manual, the location of the applicable warning notices(refer to **303**) (8) Confirmation that the documents required by IMO Res. MEPC.259 (68) are well maintained (see Section **302.2**). **3. Inermediate Survey** Requirements as required by the Annual Survey in paragraph **2** above are to be surveyed. **4. Special Survey** In addition to all the requirements for Annual Survey, the following items are to be surveyed. (1) The opening of pumps, exhaust fans and blowers (2) Internal examination of chemical storage tank & residue tank if stalled (3) Internal examination of scrubber (4) Operation test of control valves	(Revision) - Periodical surveys has been added.