

# **Selective Catalytic Reduction Systems, Exhaust Gas Recirculation Systems and Exhaust Gas Cleaning Systems**

## **Amended Rules and Guidance**

- Rules for the Survey and Construction of Steel Ships Parts B and D
- Rules for Marine Pollution Prevention Systems
- Rules for High Speed Craft
- Rules for the Survey and Construction of Inland Waterway Ships
- Guidance for the Classification and Registry of Ships
- Guidance for the Survey and Construction of Steel Ships Parts B and D
- Guidance for High Speed Craft
- Guidance for the Survey and Construction of Inland Waterway Ships

## **Reason for Amendment**

Regulations 13 and 14 of MARPOL Annex VI specify the maximum allowable NO<sub>x</sub> emission limits from reciprocating internal combustion engines and the maximum allowable sulphur content limits (% by mass) of fuel oil used on board ships for the prevention of air pollution.

In recent years, the adoption of plans for selective catalytic reduction (SCR) systems and exhaust gas recirculation (EGR) systems, both of which are intended to reduce NO<sub>x</sub> emissions, and exhaust gas cleaning systems (EGCS), which are at least as effective in the reduction of sulphur content (% by mass) of fuel oil, has increased in order to comply with the gradual tightening of the aforementioned MARPOL regulations.

Considering that chemical agents such as aqueous urea solutions or aqueous ammonia for SCR systems and sodium hydroxide solutions for EGCS are used in these systems, ClassNK conducted a study about the safety of their installation on board ships, and then established the “Guidelines for SCR Systems and Reductant Agent Supply Systems” in October 2011 and “Guidelines for Exhaust Gas Cleaning Systems” in October 2014.

ClassNK continued its study of the safety requirements for SCR systems and EGCS after the establishment of the aforementioned guidelines, and also looked into the development of safety requirements for EGR systems which are assumed to use chemical agents similar to those used by SCR systems and EGCS. Around the same time, IACS adopted IACS UR M77 related to storage and use of reductant agents used in SCR systems in September 2016. This UR specifies that SCR systems are, in principle, not to use aqueous ammonia, but are to use aqueous urea solutions as reductant agents instead.

Accordingly, all relevant requirements were amended based upon applicable requirements for aqueous urea solutions in the “Guidelines for SCR Systems and Reductant Agent Supply Systems”, IACS UR M77 and the results of the ClassNK study. In a similar manner, all relevant requirements for EGR systems and EGCS were amended based upon requirements specified in the “Guidelines for Exhaust Gas Cleaning Systems” and the results of the ClassNK study.

## **Outline of Amendment**

The main contents of this amendment are as follows:

- (1) Specified requirements related to SCR system surveys.
  - Items of Classification Surveys during Construction (tests at facilities and on board, etc.) and periodical surveys such as Annual Surveys
- (2) Specified requirements related to the construction and arrangement, etc. of SCR systems.
  - Monitoring of the amount of reductant agent injected during SCR system use
  - Arrangement of storage tanks and piping systems for reductant agents
  - Ventilation systems for compartments installed with equipment for using or handling reductant agents
  - Exhaust gas heating devices
  - Alarm systems and monitoring systems
  - Safety and protective equipment such as safety showers
- (3) Specified requirements related to EGCS surveys.
  - Items of Classification Surveys during Construction (tests at facilities and on board, etc.) and periodical surveys such as Annual Surveys
- (4) Specified requirements related to the construction and arrangement, etc. of EGCS.
  - Considerations for exhaust gas heating
  - Arrangement of storage tanks and piping systems for sodium hydroxide solutions
  - Ventilation systems for compartments installed with equipment for using or handling sodium hydroxide solutions
  - Discharge of residues
  - Alarm systems and monitoring systems
  - Safety and protective equipment such as safety showers
- (5) Specified requirements related to EGC system surveys.
  - Items of Classification Survey during Construction (tests at facilities and on board, etc.) and periodical surveys such as Annual Surveys
- (6) Specified requirements related to the construction and arrangement, etc. of EGR systems.
  - Application of the requirements for EGCS related exhaust gas cleaning systems fitted onto EGR systems
  - Consideration of the temperatures of intake air/scavenging air introduced into cylinders
- (7) Specified requirements related to the class notations for ships installed with SCR systems, EGR systems and EGCS, etc.

## **Amended Requirements**

Rules for the Survey and Construction of Steel Ships

Part B: 1.2.4

Part D: 1.3.1, 2.1.1, 13.16.1

Rules for Marine Pollution Prevention Systems Part 1 1.1.4

Rules for High Speed Craft Part 9 1.2.1, 2.1.1

Rules for the Survey and Construction of Inland Waterway Ships Part 7 1.3.1, 2.1.1, 11.15.1

Guidance for the Classification and Registry of Ships 2.1.3, 2.2

Guidance for the Survey and Construction of Steel Ships

Part B: B1.2.4

Part D: D1.3.1, D2.1.1, D13.16, Annex D1.3.1-5(1), Annex D1.3.1-5(2), Annex D2.1.1-5  
Guidance for High Speed Craft Part 9 1.2.1, 2.1.1  
Guidance for the Survey and Construction of Inland Waterway Ships Part 7 1.3.1, 2.1.1,  
11.15