Amendments of Classification Technical Rules (Guidance for Autonomous Ships)

2023. 12.

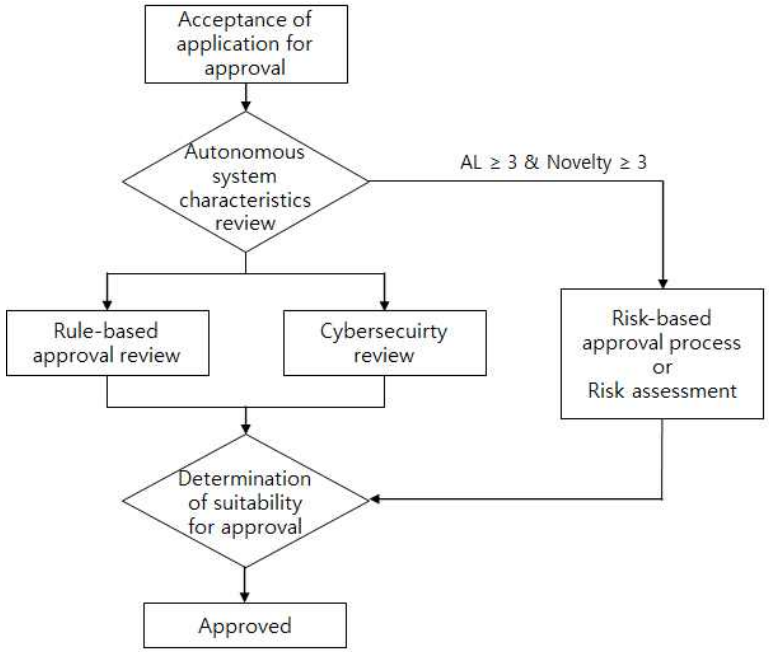
Effective Date : 1 January 2024

(The contract date for ship construction)

◉ Amended the application requirements for Class notation of autonomous ships.

◉ Newly added the requirements for Class survey.

Present	Amendment
# CHAPTER 1 GENERAL ## Section 1 General 101. - 102. 〈same as the present Rules〉 103. Application 〈Newly added〉 〈Newly added〉 1. - 8. 〈same as the present Rules〉 104. - 108. 〈same as the present Rules〉 ## Section 2 - 3 〈same as the previous Rules〉	# CHAPTER 1 GENERAL ## Section 1 General 101. - 102. 〈same as the present Rules〉 103. Application 1. This Gguidance applies to the ships classed with or intended to be registered under the Society by applying for the class notation for the level of autonomy. *(2024)* 2. If an autonomous navigation system of AL3 or higher, which can directly affect the safety of the ship, is permanently installed, an additional notation shall be assigned. *(2024)* ~~1. - 8.~~ 3. - 10. 〈same as the present Rules〉 104. - 108. 〈same as the present Rules〉 ## Section 2 - 3 〈same as the previous Rules〉

Present	Amendment
CHAPTER 2 **〈Newly added〉**	**CHAPTER 2 CLASS SURVEY *(2024)*** **Section 1 General** **101. Approval procedure of autonomous ships** **1.** The general approval procedure of autonomous ships is shown in **Fig 2.1**.  **Fig 2.1 The general approval procedure for autonomous ships** **2.** Autonomous level **AL1** or **AL2** ships whose decision-making and execution is performed by the onboard operator are to comply with the existing classification approval procedure. **3.** The risk-based ship design approval procedure or risk assessment may be accepted for new concept designs that are difficult to apply the Classification Technical Rules, such as ships with an autonomous level of **AL3** or higher, where decision-making and execution are performed by the system.

Present	Amendment
	4. General approval process (1) Review of characteristics of autonomous system (A) The design data of the autonomous system installed on the target ship is to be submitted for approval. (B) Based on the submitted design data, the target ship's autonomous system is specifically identified. (C) Review the adequacy of the requested autonomous level for the autonomous system. (D) In the case of autonomous level **AL3** or higher, identify the degree of novelty in **Table 3.1** of the **Guidance for Approval of Risk-based Ship Design** corresponding to the identified autonomous system. (2) Identification of applicable rules for autonomous systems Identify the rules applicable to the target ship's autonomous system. (3) Review of approval for autonomous system (A) Review the suitability of approval for the target ship's autonomous system according to the identified rules. (B) Review cyber security approval for the target ship's autonomous system. (C) If the autonomous level is **AL3** or higher and the degree of novelty is 3 or higher, the risk-based approval procedure or risk assessment is carried out for the target ship's autonomous system. (4) Approval decision for the autonomous system As a result of the approval review for each field, if it is deemed appropriate, the approval of the autonomous system is completed. If it is judged to be inappropriate, the approval is rejected and the design is requested to be supplemented. **102. Drawings and data to be submitted** The target vessel shall submit the drawings and data below to the Society. Additionally, if the Society deems it necessary, the Society may request the submission of additional drawings and data other than those specified below. **1. For approval** (1) Electrical wiring diagram and arrangement (2) On-board test procedure (3) Sea trial procedure **2. For reference** (1) Detailed explanation data on the autonomous navigation system (2) Equipment operation manual (3) Safety management procedures (including emergency response manual)

Present	Amendment
	(4) Software quality management data (5) Cyber security data (6) Data explaining that even if the autonomous navigation system is stopped, the operation of existing navigation equipment (conventional equipment) is not affected. (7) Risk assessment report (AL3 or higher) (8) Matters identified in the risk assessment that need to be confirmed on board the ship (if necessary) **Section 2 Classification Survey** **201. Classification Survey during Construction** **1. General** (1) Inspection of the installation and operation of the relevant systems shall be carried out on board the ship. (2) During installation and operational inspection, the functionality of the system shall be verified in the presence of an surveyor. (3) Upon completion of installation and operational inspection, the ship and associated systems may be assigned the applicable class notation. (4) An autonomous systems composed of several devices are to be tested for effectiveness by performing an integration test after completion of the configuration. For example, in the case of a data acquisition and analysis system that is integrated with various sensors, it is necessary to verify that the entire system is working properly by performing a completion test on the integrated system as well as individual tests on each sensor. **2. Installation survey** It is to be confirmed that it is working as close to actual as possible after installation on board. And it is to be confirmed that a predefined safety system is working effectively in case of system failure or danger. (1) Check sensor failure alarms and status for data collection and analysis. (2) For AL3 or higher, check the interface between the data collection and analysis system and the autonomous navigation system. (A) Hardware and software interface (B) Individual failure alarm and status monitoring (3) For AL3 or higher, check the inspection items according to the risk assessment report. (4) For AL3 or higher, check whether the operation manual is provided at the installation location of the autonomous navigation system. (5) For AL3 or higher, through the interworking test between the autonomous systems installed in the ship, it is to be check whether the data transfer between the systems and the performance of the functions are correct. This test may be included in the sea trial.

Present	Amendment
	3. Sea trial For AL3 or higher, it is to verify that the system is operating effectively for the autonomous ships operating within the operation scope and risk presented in the operation plan through the sea trial. (1) Check route designation and route following function. (2) Check collision avoidance function. (A) Check whether the collision avoidance function is performed to suit the collision avoidance (Head-on/Crossing) scenario. (3) Check how to respond in an emergency situation (A) When an abnormal condition affecting navigation is identified, alarms and related information are communicated to the navigator and control is transferred to the navigator. (B) Provides redundant emergency switching means considering single failure of emergency switching means. (C) Check whether the means and procedures for emergency switching are reflected in the safety management procedures. (D) Check that even if the autonomous navigation system is stopped, the operation of existing navigation equipment is not affected. (E) In accordance with the safety management procedures(emergency response manual), check that the autonomous navigation system is effectively stopped and that existing navigation equipment, excluding the autonomous navigation system, operates normally. (4) Check the inspection items according to the risk assessment report. **Section 3 Periodical Survey for Maintaining Registration** **301. Annual Survey** **1.** Check sensor failure alarms and status for data collection and analysis. **2.** For AL3 or higher, check the interface between the data collection and analysis system and the autonomous navigation system. **3.** For AL3 or higher, check whether the operation manual is provided at the installation location. **302. Special Survey** In addition to all the requirements for Annual Survey, the following items are to be surveyed: **1.** For AL3 or higher, check the following items by checking the ship's operation records. However, if the surveyor deems it necessary, check may be requested through actual operation of the ship. (1) Check route designation and route following function (2) Check collision avoidance function (3) Check emergency response

Present	Amendment
# CHAPTER 2 AUTONOMOUS SYSTEMS AND AUTONOMOUS SHIPS	# CHAPTER ~~2~~ 3 AUTONOMOUS SYSTEMS AND AUTONOMOUS SHIPS
## Section 1 Configuration and Function of Autonomous Systems	## Section 1 Configuration and Function of Autonomous Systems
101. Configuration of autonomous systems	**101. Configuration of autonomous systems**
1. The configuration of autonomous system presented in this guidance is shown in **Fig** 2.1.	1. The configuration of autonomous system presented in this guidance is shown in **Fig** ~~2.1~~ 3.1.
Fig 2.1 **General configuration of autonomous system**	**Fig** ~~2.1~~ 3.1 **General configuration of autonomous system**
102. Function of autonomous systems	**102. Function of autonomous systems**
1. Data acquisition and analysis system	**1. Data acquisition and analysis system**
(1) It is a system for recognizing the external situation of ships related to marine objects/ships and marine environment and the internal situation related to ship navigation/motion. It collects data from a number of data sources and integrates / analyzes them to provide operator or autonomous navigation system with results that can aid operational decision-making. The main functions of this system are as follows, but not limited to: *(2021)*	(1) It is a system for recognizing the external situation of ships related to marine objects/ships and marine environment and the internal situation related to ship navigation/motion. It collects data from a number of data sources and integrates / analyzes them to provide operator or autonomous navigation system with results that can aid operational decision-making. The main functions of this system are as follows, but not limited to: *~~(2021)~~ (2024)*
(A) After integrating and analyzing the external situation data collected through the marine objects/ships detection sensor module, it confirms the avoidance point, identifies the marine object or ship, and transmits the object identification result to the autonomous navigation system. If the object is not identified, alert the operator and deliver relevant information.	(A) After integrating and analyzing the external situation data collected through the marine objects/ships detection sensor module, it confirms the avoidance point, identifies the marine object or ship, ~~and~~ and then transmits the object identification result to the autonomous navigation system~~.~~, ~~If the object is not identified, alert the operator and deliver relevant information.~~ deliver the warning notification and relevant information to the operator.
(B) It measures ship's navigation and movement information such as ship's position, direction, speed, inertia, etc., and analyzes the operation/motion status of the ship and delivers the sorted information to the autonomous navigation system (If the system is equipped with an economic ship routing system, the information is transmitted to the autonomous navigation system and the economic navigation system).	(B) It measures ship's navigation and movement information such as ship's position, direction, speed, ~~inertia,~~ etc., and analyzes the operation/motion status of the ship and delivers the sorted information to the autonomous navigation system (If the system is equipped with an economic ship routing system, the information is transmitted to the autonomous navigation system and the economic navigation system).

Present	Amendment
(C) It integrates and analyzes marine environmental (weather, wave height, etc.) data collected through the marine environment detection sensor module and delivers the analysis results to the economic navigation system.	(C) It integrates and analyzes marine environmental (weather, wave height, etc.) data collected through the marine environment detection sensor module or external communication means and delivers the analysis results to the economic navigation system.
(2) The subsystems of the data acquisition and analysis system are as follows. (A) – (G) 〈same as the present Rules〉	(2) The subsystems of the data acquisition and analysis system ~~are~~ can be composed as follows. *(2024)* (A) – (G) 〈same as the present Rules〉
2. Autonomous navigation system	**2. Autonomous navigation system**
(1) It is a system that establishes route plan and steering plan for economical navigation and collision/grounding prevention considering the internal and external situation of the ship, and controls the propulsion device and steering device of the ship in accordance with the established route plan and steering plan and performs the following functions. (A) – (C) 〈same as the present Rules〉 (D) Alert the operator if the avoidance object is not identified in the data analysis system and avoid risk within the ship's operation scope if there is no response from the operator to the collision avoidance threshold according to the maritime regulations when related information is transmitted (E) – (G) 〈same as the present Rules〉	(1) It is a system that establishes route plan and steering plan for economical navigation and collision/grounding prevention considering the internal and external situation of the ship, and controls the propulsion device and steering device of the ship in accordance with the established route plan and steering plan and performs the following functions. (A) – (C) 〈same as the present Rules〉 (D) For AL4 or higher, alert ~~Alert~~ the operator if the avoidance object is not identified in the data analysis system and avoid risk within the ship's operation scope if there is no response from the operator to the collision avoidance threshold according to the maritime regulations when related information is transmitted *(2024)* (E) – (G) 〈same as the present Rules〉
(2) The subsystems of the autonomous navigation system are as follows. (A) – (D) 〈same as the present Rules〉	(2) The subsystems of the autonomous navigation system ~~are~~ can be composed as follows. *(2024)* (A) – (D) 〈same as the present Rules〉
3. 〈same as the present Rules〉	**3. 〈same as the present Rules〉**
4. Off-board support system	**4. Off-board support system**
(1) 〈same as the present Rules〉 (2) The subsystems of the off-board support system are as follows. (A) – (C) 〈same as the present Rules〉	(1) 〈same as the present Rules〉 (2) The subsystems of the off-board support system ~~are~~ can be composed as follows. *(2024)* (A) – (C) 〈same as the present Rules〉
103. 〈same as the present Rules〉	**103. 〈same as the present Rules〉**
Fig 2.2 – 2.6	**Fig ~~2.2 – 2.6~~ 3.2 – 3.6**

Present	Amendment
Section 2 Requirements for Autonomous Systems and Autonomous Ships	**Section 2 Requirements for Autonomous Systems and Autonomous Ships**
201. 〈same as the present Rules〉	**201. 〈same as the present Rules〉**
202. Basic requirements for autonomous systems Each autonomous system shall perform the functions described in **102.**, and the following basic requirements shall be satisfied when performing the functions. **1. Data acquisition and analysis system** (1) The external conditions related to collision and environment and the internal conditions related to the operation and motion of the ship shall be properly recognized for safe operation of the autonomous ship, and the analyzed results should be communicated to the autonomous navigation system or operator with sufficient time to be safely processed. (A) Data collected from the sensors shall be appropriately converged / analyzed and presented to the operator to avoid overloading the information that could degrade the accuracy of the ship's condition / situational awareness. (B) 〈same as the present Rules〉 (2) The marine objects/ships detection sensor module shall be able to identify obstacles and track moving or stationary objects. (A) 〈same as the present Rules〉 (B) When using the information collected by the AIS, operational limits such as 'Uncertainty of ship information by user input method', 'Restrictions on radio wave transmission range and visible path', and 'update frequency of AIS ship information' shall be considered. (3) 〈same as the present Rules〉 (4) Marine objects/ships detection sensors with autonomy level 3 (AL3) or higher, where the system-initiated action is performed, shall be able to detect all limits of the operating range such as reduced visibility. (5) - (6) 〈same as the present Rules〉	**202. Basic requirements for autonomous systems** Each autonomous system shall perform the functions described in **102.**, and the following basic requirements shall be satisfied when performing the functions. **1. Data acquisition and analysis system** (1) The external conditions related to collision and environment and the internal conditions related to the operation and motion of the ship shall be properly recognized for safe operation of the autonomous ship, and the analyzed results should be communicated to the autonomous navigation system or operator. ~~with sufficient time to be safely processed.~~ *(2024)* (A) Data collected from the sensors on the ship's status/situation awareness shall be ~~appropriately converged / analyzed and presented~~ communicated to the operator. ~~to avoid overloading the information that could degrade the accuracy of the ship's condition / situational awareness.~~ (B) 〈same as the present Rules〉 (2) The marine objects/ships detection sensor module shall be able to identify obstacles and track moving or stationary objects. (A) 〈same as the present Rules〉 (B) When using ~~the~~ only information collected by the AIS, operational limits such as 'Uncertainty of ship information by user input method', 'Restrictions on radio wave transmission range and visible path', and 'update frequency of AIS ship information' shall be considered. *(2024)* (3) 〈same as the present Rules〉 (4) Marine objects/ships detection sensors with autonomy level 3 (AL3) or higher, where the system-initiated action is performed, shall be able to detect ~~all~~ limits of the operating range such as reduced visibility. *(2024)* (5) - (6) 〈same as the present Rules〉

Present	Amendment
(7) Ships equipped with an economic navigation system shall independently collect marine environmental data from their own sensors. Accumulated data such as wind speed and wave frequencies are provided to the off-board support system and can be used to support the future economic operations.	(7) For AL4 or higher, ships ~~Ships~~ equipped with an economic navigation system shall independently collect marine environmental data from their own sensors. If a ship with AL3 or lower notation is equipped with an economic navigation system, marine environmental data can be collected from its own sensors or external communication means. Accumulated data such as wind speed and wave frequencies are provided to the off-board support system and can be used to support the future economic operations. *(2024)*
2. Autonomous navigation system (2024)	**2. Autonomous navigation system (2024)**
(1) The autonomous navigation system shall properly control ship and equipment in accordance with the software embedded in the off-board support system and/or the commands of the off-board support system.	~~(1) The autonomous navigation system shall properly control ship and equipment in accordance with the software embedded in the off-board support system and/or the commands of the off-board support system.~~
(2) – (3) 〈same as the present Rules〉	~~(2) – (3)~~ (1) – (2) 〈same as the present Rules〉
(4) If the ship is equipped with a track control system, it shall notify the operator of any departure from the planned route, and an alarm shall be issued when the deviation exceeds the specified limits. The tolerance of deviation shall be set according to the navigational situation (navigation the open sea, marine traffic volume, etc.) to avoid the risk of information overload to the operator.	~~(4)~~ (3) If the ship is equipped with a track control system, it shall notify the operator of any departure from the planned route, and an alarm shall be issued when the deviation exceeds the specified limits. ~~The tolerance of deviation shall be set according to the navigational situation (navigation the open sea, marine traffic volume, etc.) to avoid the risk of information overload to the operator.~~
(5) – (6) 〈same as the present Rules〉	~~(5) – (6)~~ (4) – (5) 〈same as the present Rules〉
(7) Automatic avoidance technique, based on navigational regulations (COLREG, etc.) applicable to existing ships for all identified ships in the vicinity and appropriate ship maneuvering, shall be applied to autonomous navigation systems equipped with collision avoidance module based on maritime regulations.	~~(7)~~ (6) Automatic avoidance technique, based on navigational regulations (COLREG, etc.) applicable to existing ships for all identified ships in the vicinity and appropriate ship maneuvering, shall be applied to autonomous navigation systems equipped with collision avoidance module based on maritime regulations. In addition, it shall be clearly indicated whether automatic avoidance is being implemented in compliance with COLREG.
(8) – (10) 〈same as the present Rules〉	~~(8) – (10)~~ (7) – (9) 〈same as the present Rules〉

Present	Amendment
(11) Ships equipped with an economic navigation system shall be capable of performing the following functions. (A) Comparing and evaluating the weather data collected by the ship with the received weather forecast (B) Estimation of current and future weather conditions according to the ship's voyage plan through the above data combination (C) Perform route optimization according to route optimization criteria, taking into account the estimated weather conditions and the stability and maneuverability of the ship	~~(11)~~ (10) Ships equipped with an economic navigation system shall be capable of performing the following functions. ~~(A) Comparing and evaluating the weather data collected by the ship with the received weather forecast~~ ~~(B)~~ (A) ~~Estimation of current and future weather conditions~~ Displays weather information according to the ship's voyage plan ~~through the above data combination~~ ~~(C)~~ (B) Perform route optimization ~~according to route optimization criteria,~~ taking into account the estimated weather conditions and the stability and maneuverability of the ship (C) For AL4 or higher, comparing and evaluating the weather data collected by the ship with the received weather forecast
(12) – (14) 〈same as the present Rules〉	~~(12) – (14)~~ (11) – (13) 〈same as the present Rules〉
	(14) For AL5 or higher, the autonomous navigation system shall properly control ship and equipment in accordance with the software embedded in the off-board support system and/or the commands of the off-board support system.
3. – 4. 〈same as the present Rules〉	**3. – 4. 〈same as the present Rules〉**
203. 〈same as the present Rules〉	**203. 〈same as the present Rules〉**

Present	Amendment
Section 3 Approval procedure of autonomous ships	~~**Section 3 Approval procedure of autonomous ships**~~
301. General *(2021)*	~~**301. General** *(2021)*~~
1. The general approval procedure is shown in **Fig 2.8**.	~~1. The general approval procedure is shown in **Fig 2.8**.~~

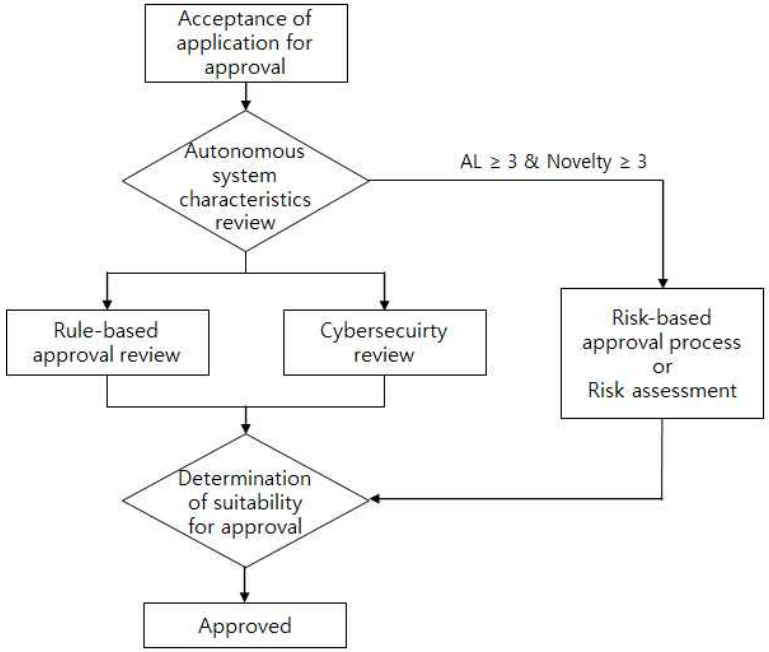
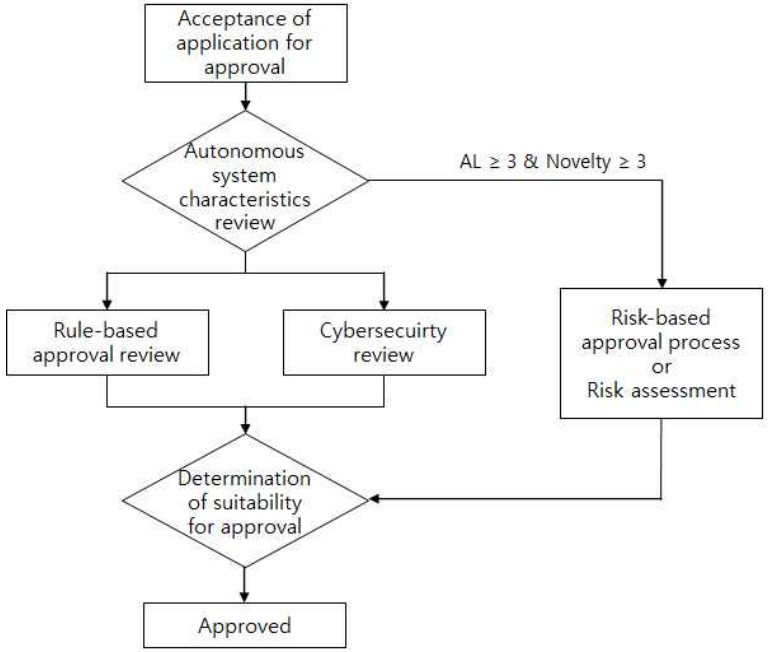

	

Fig 2.8 The general approval procedure for autonomous ships *(2023)*	~~**Fig 2.8 The general approval procedure for autonomous ships** *(2023)*~~
2. Autonomous level **AL1** or **AL2** ships whose decision-making and execution is performed by the onboard operator are to comply with the existing classification approval procedure.	~~2. Autonomous level **AL1** or **AL2** ships whose decision-making and execution is performed by the onboard operator are to comply with the existing classification approval procedure.~~
3. The risk-based ship design approval procedure or risk assessment may be accepted for new concept designs that are difficult to apply the Classification Technical Rules, such as ships with an autonomous level of **AL3** or higher, where decision-making and execution are performed by the system. *(2023)*	~~3. The risk-based ship design approval procedure or risk assessment may be accepted for new concept designs that are difficult to apply the Classification Technical Rules, such as ships with an autonomous level of **AL3** or higher, where decision-making and execution are performed by the system. *(2023)*~~

Present	Amendment
4. General approval process (1) Review of characteristics of autonomous system (A) The design data of the autonomous system installed on the target ship is to be submitted for approval. (B) Based on the submitted design data, the target ship's autonomous system is specifically identified. (C) Review the adequacy of the requested autonomous level for the autonomous system. (D) In the case of autonomous level **AL3** or higher, identify the degree of novelty in **Table 3.1** of the **Guidance for Approval of Risk-based Ship Design** corresponding to the identified autonomous system. (2) Identification of applicable rules for autonomous systems Identify the rules applicable to the target ship's autonomous system. (3) Review of approval for autonomous system (A) Review the suitability of approval for the target ship's autonomous system according to the identified rules. (B) Review cyber security approval for the target ship's autonomous system. (C) If the autonomous level is **AL3** or higher and the degree of novelty is 3 or higher, the risk-based approval procedure or risk assessment is carried out for the target ship's autonomous system. *(2023)* (4) Approval decision for the autonomous system As a result of the approval review for each field, if it is deemed appropriate, the approval of the autonomous system is completed. If it is judged to be inappropriate, the approval is rejected and the design is requested to be supplemented. **302. Relevant test** The tests required for autonomous systems and autonomous ships are to be in accordance with the safety management procedure for the ships in question. In general, the following tests may be required and repeated tests may be required to verify the consistency of the test results. **1. Software test** The software constituting the autonomous systems are to be approved according to the standards deemed appropriate by the Society. The relevant test procedures and maintenance procedures are to be reviewed during the risk assessment of the generic design and detailed design, and it is to be included in the survey requirements and safety management procedure for the ships in question.	~~**4. General approval process**~~ ~~(1) Review of characteristics of autonomous system~~ ~~(A) The design data of the autonomous system installed on the target ship is to be submitted for approval.~~ ~~(B) Based on the submitted design data, the target ship's autonomous system is specifically identified.~~ ~~(C) Review the adequacy of the requested autonomous level for the autonomous system.~~ ~~(D) In the case of autonomous level **AL3** or higher, identify the degree of novelty in **Table 3.1** of the **Guidance for Approval of Risk-based Ship Design** corresponding to the identified autonomous system.~~ ~~(2) Identification of applicable rules for autonomous systems~~ ~~Identify the rules applicable to the target ship's autonomous system.~~ ~~(3) Review of approval for autonomous system~~ ~~(A) Review the suitability of approval for the target ship's autonomous system according to the identified rules.~~ ~~(B) Review cyber security approval for the target ship's autonomous system.~~ ~~(C) If the autonomous level is **AL3** or higher and the degree of novelty is 3 or higher, the risk-based approval procedure or risk assessment is carried out for the target ship's autonomous system. *(2023)*~~ ~~(4) Approval decision for the autonomous system~~ ~~As a result of the approval review for each field, if it is deemed appropriate, the approval of the autonomous system is completed. If it is judged to be inappropriate, the approval is rejected and the design is requested to be supplemented.~~ ~~**302. Relevant test**~~ ~~The tests required for autonomous systems and autonomous ships are to be in accordance with the safety management procedure for the ships in question. In general, the following tests may be required and repeated tests may be required to verify the consistency of the test results.~~ ~~**1. Software test**~~ ~~The software constituting the autonomous systems are to be approved according to the standards deemed appropriate by the Society. The relevant test procedures and maintenance procedures are to be reviewed during the risk assessment of the generic design and detailed design, and it is to be included in the survey requirements and safety management procedure for the ships in question.~~

Present	Amendment
(1) It is to be confirmed that the software development work has been performed according to the procedures defined by the software manufacturer and agreed upon in the approval team. (2) The software modules of the application software are to be tested individually and then integration test is to be carried out. **2. Completion test of autonomous systems** An autonomous systems composed of several devices are to be tested for effectiveness by performing an integration test after completion of the configuration. For example, in the case of a data acquisition and analysis system that is integrated with various sensors, it is necessary to verify that the entire system is working properly by performing a completion test on the integrated system as well as individual tests on each sensor. (1) The roles and responsibilities for integrating systems, equipment and components, the integration procedures, and the point at which verification is performed is to be defined in the safety management procedure. **3. Onboard test** It is to be confirmed that it is working as close to actual as possible after installation on board. And it is to be confirmed that a predefined safety system is working effectively in case of system failure or danger. **4. Interworking test for autonomous systems** Through the interworking test between the autonomous systems installed in the ship, it is to be check whether the data transfer between the systems and the performance of the functions are correct. This test may be included in the sea trial. **5. Sea trial** It is to verify that the system is operating effectively for the autonomous ships operating within the operation scope and risk presented in the operation plan through the sea trial. **CHAPTER 3 〈same as the present Rules〉**	~~(1) It is to be confirmed that the software development work has been performed according to the procedures defined by the software manufacturer and agreed upon in the approval team.~~ ~~(2) The software modules of the application software are to be tested individually and then integration test is to be carried out.~~ **~~2. Completion test of autonomous systems~~** ~~An autonomous systems composed of several devices are to be tested for effectiveness by performing an integration test after completion of the configuration. For example, in the case of a data acquisition and analysis system that is integrated with various sensors, it is necessary to verify that the entire system is working properly by performing a completion test on the integrated system as well as individual tests on each sensor.~~ ~~(1) The roles and responsibilities for integrating systems, equipment and components, the integration procedures, and the point at which verification is performed is to be defined in the safety management procedure.~~ **~~3. Onboard test~~** ~~It is to be confirmed that it is working as close to actual as possible after installation on board. And it is to be confirmed that a predefined safety system is working effectively in case of system failure or danger.~~ **~~4. Interworking test for autonomous systems~~** ~~Through the interworking test between the autonomous systems installed in the ship, it is to be check whether the data transfer between the systems and the performance of the functions are correct. This test may be included in the sea trial.~~ **~~5. Sea trial~~** ~~It is to verify that the system is operating effectively for the autonomous ships operating within the operation scope and risk presented in the operation plan through the sea trial.~~ **CHAPTER 3 4 〈same as the present Rules〉**