RULES

PUBLICATION 14/P

PRINCIPLES OF APPROVAL OF COMPUTER PROGRAMS

January
2021

Publications P (Additional Rule Requirements) issued by Polski Rejestr Statków complete or extend the Rules and are mandatory where applicable.

GDAŃSK

Publication 14/P – Principles of Approval of Computer Programs – January 2021 is an extension of the requirements contained in *Part I – Classification Regulations* of the *Rules for the Classification and Construction of Sea-Going Shi*ps.

This *Publication* was approved by PRS Board on 21 December 2020 and enters into force on 1 January 2021.

This *Publication* also applies to other PRS regulations if it is mentioned there.

PRS/RP,12/2020

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1 GENERAL

1.1 The following regulations apply to approval, by PRS, of computer software used for:
- technical calculations made by designers and constructors while preparing technical documentation submitted for approval,
- managing ship's operation and also used by ship-owner's technical services and ship's crew to evaluate ship's operation safety or to collect data on maintenance of ship, its appliances and equipment in scope defined by PRS Rules requirements

1.2 Technical calculations being a result of an approved program will be accepted by PRS, if it has been confirmed that input data were entered correctly. PRS reserves the right to verify calculations made with the use of an approved program prior to its final acceptance.

1.3 Data collected with the use of an approved program, concerning maintenance of ship, its appliances and equipment, after being analysed, may constitute the grounds for narrowing the scope of survey by PRS or, in justified cases, for enhancing its scope.

1.4 Approved program for evaluation of strength and stability of ship in operation may be used as a loading instrument program required according to PRS *Publication No 16/P* or a program for appliances required by other rules or conventions.

1.5 Programs concerning planned machinery maintenance should comply with the requirements specified in PRS *Publication No. 2/P*.

1.6 To obtain program approval, the following documents are to be submitted to PRS:
- request for program approval including the name of the program;
- information on: the author, program language, hardware requirements, scope and application of calculations made with the use of the program, used calculation methods, data collection method – if applicable;
- the program manual containing description of program's possibilities and limitations, explanation of terms and symbols applied, determining idealization of a task, degree of accuracy, algorithm and description of the calculation method and in the case of technical calculations – test calculations;
- program on disc or other data medium;
- flow chart and its description;
- information on program approval ty other classification societies, if any.

1.7 The scope of the program documentation may be changed upon special agreement with PRS.

1.8 PRS guarantees abiding the copyright.

2 APPROVAL OF COMPUTER PROGRAMS

2.1 General regulations

2.1.1 Approval of the computer program is carried out on the basis of documentation referred to in 1.6, evaluation criteria in 2.2, and tests according to 2.3.

2.1.2 Program approved by other classification society may be approved by PRS according to simplified procedure. For this purpose, the following documents are to be submitted at PRS:
- copy of other classification society's approval certificate,
- the program manual with tests printouts.

2.1.3 Upon PRS agreement, program concerning calculations in accordance with PRS Rules, aiming at collecting comparative data, may be applied prior to PRS approval. If any mistakes are found in calculations obtained with the use of the program, PRS will define further proceedings on a case by case basis.

2.2 Criteria of evaluation

2.2.1 The documentation of the program submitted for PRS approval is verified according to the following criteria:
- admissibility of the proposed scope of application of the program;
- suitability of the calculation method used to solve the assumed task;
- completeness of the text, form and range of input data and results;
- completeness and correctness of applying PRS requirements in the program;
- suitability of content and form of the program manual for actual use;
- compliance of test results as defined in 2.3 and 2.4 respectively.

2.3 Approval of program for technical calculations

2.3.1 PRS can approve program for technical calculations, if the program test results comply with the results obtained with the programs actually used by PRS to the degree considered satisfactory by PRS.

2.3.2 In special cases the basis for the program evaluation may be calculation results carried out manually.

2.3.3 After the approval of documents referred to in 1.6, PRS indicates the applicant the test object or the test issue.

2.3.4 Number of tests and permissible divergence in the results of performed tests are specified by PRS.

2.4 Approval of program for ship operation safety

2.4.1 PRS can approve program for ship operation safety, if the test results comply, to the degree considered satisfactory by PRS, with relevant values in ship's documentation, particularly with those given in *Information on Stability for the Captain*, *Loading Instructions* or in *Information on Ship's Longitudinal Strength* as well as with the test calculations carried out in accordance with 2.4.2.

2.4.2 After the approval of documents referred to in 1.6, PRS indicates the loading conditions to be the test calculations basis. The test calculations are carried out independently by the applicant and PRS. PRS performs also comparative analysis with the use of other actually implemented programs.

2.4.3 Generally, divergence between test calculations results obtained with the use of the program submitted for approval and the documentation earlier approved by PRS is impermissible. Each such case should be considered separately.

2.4.4 PRS may waive test calculations.

2.4.5 Only a program intended for a given ship or series of ships and prepared in accordance with the documentation earlier approved by PRS may be approved in this way.

2.5 Approval of program for collecting data on maintenance of ships, its appliances and equipment

2.5.1 PRS may approve program for collecting data on the basis of its compliance with the requirements specified in this publication and with the relevant requirements included in other PRS Rules.

2.5.2 Program is evaluated from the viewpoint of the purpose for which it is intended.

2.5.3 Electronic record books ~~in scope~~ required under MARPOL Convention as well as IMO Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NOx Technical Code): are also in scope of assessment by PRS (see Chapter 4).

2.6 Document of approval

The verified and approved program obtains the PRS *Program Approval Certificate*, which includes the following:
- name of the program,
- program identification mark,
- owner, author of the program,
- hardware requirements,
- date of approval,
- certificate validity period,
- short description of the program
- scope of application,
- remarks.

2.7 Periodical program functioning check

2.7.1 The user of PRS-approved program is obliged to perform periodical program functioning check and for this purpose a proper procedure is to be included in the program manual.

2.7.2 The check records should be kept and presented at PRS' request upon renewal of P*rogram Approval Certificate*.

2.7.3 As far as programs being loading instruments' software are concerned the regulations given in PRS *Publication No. 16/P* apply.

2.8 Cancellation of approval

2.8.1 The program approval is cancelled if:
- modifications have been made in the approved program without PRS' agreement;
- the approved program is installed in a computer not complying with the hardware requirements defined in *Program Approval Certificate* without contacting PRS;
- some incorrectness indicating errors in the approved program has been revealed;
- there is divergence between periodical check results and the test calculations results which were the basis for the program approval.

2.8.2 The proceedings for retrieving the approval are agreed with PRS.

2.9 Suspension of approval

2.9.1 PRS reserves the right to suspend program approval validity if new PRS' provisions different from those applied in the approved program have been implemented.

2.9.2 PRS informs the owner on suspension of the program approval and the necessary proceedings to regain the ability to use the program.

3 VERIFICATION OF CALCULATIONS PERFORMED WITH APPROVED PROGRAMS

3.1 The required data on submitting results

3.1.1 If the results of calculations obtained from approved programs are included in the technical documentation submitted to PRS for approval, the following data are to be supplied:
- name of the program,
- number of the *Program Approval Certificate*,
- date of calculations,
- the performer's data enabling his/her identification.

3.2 Verification of the faultlessness of calculation

3.2.1 Verification of the proper application of the program is based on the following data recorded in *Program Approval Certificate*:
– validity date,
– scope of application,
– hardware requirements,
– restrictions given in the program description, if any.

3.2.2 PRS evaluates the faultlessness and completeness of input data to the program which were the basis of calculation results.

3.2.3 Values defined by the Rules are checked at random on the basis of manually performed calculations or obtained with the use of an approved program. It is a rule that all values in computer results are explicity defined by the printout without referring to other documents.

4 ELECTRONIC RECORD BOOKS ASSESSMENT

4.1 Introduction

4.1.1 This document is intended for use as an assessment of ability of the electronic record book to meet regulations under MARPOL Convention. The assessment criteria are aimed at establishing that the software, has been developed and tested according to acceptable standards of software engineering practice.

4.1.2 Fulfillment of the assessment procedure shall be granted by:

.1 demonstration to the PRS of the completed software operating in a demonstration environment representative of the shipboard installation. This demonstration will be inspected to ensure that the system and functional requirements of the software have been satisfied.

.2 submission of documentation by the software developer's. This submission will be inspected to ensure that the criteria given in this assessment procedure has been assessed as satisfactory.

4.1.3 The assessment criteria are given below in procedure paragraphs. The subsequent sections contain criteria for each of the inspections performed during software conformity assessment.

4.2 Informative references

4.2.1 ISO 9001:2015, Quality management systems – Requirements.

4.2.2 ISO/IEC 90003:2018, Software engineering – Guidelines for the application of ISO 9001:2015 to computer software.

4.2.3 ISO/IEC 25051:2014 Software engineering – Systems and Software Quality Requirements and Evaluation (SQuaRE) – Requirements for quality of Ready to Use Software Product (RUSP) and instructions for testing.

4.2.4 ISO 10007:2017 Quality management systems – Guidelines for configuration management.

4.2.5 ISO/IEC 27033-2:2012 Information technology – Security techniques – Network security Part 2: Guidelines for the design and implementation of network security.

4.2.6 IEC 60092-504:2016 Electrical installations in Ships – Part 504: Automation, control, and instrumentation.

4.2.7 ISO 19847:2018 Ships and marine technology – Shipboard data servers to share field data at sea.

4.2.8 ISO 19848:2018 Ships and marine technology – Standard data for shipboard machinery and equipment.

4.2.9 ISO 7498-2:1989 Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 2: Security Architecture.

4.2.10 ISO 32000-2:2017 Document management – Portable document format – Part 2: PDF 2.0.

4.2.11 ISO/IEC 27033-2:2012 Information technology – Security techniques – Network security – Part 2: Guidelines for the design and implementation of network security.

4.2.12 IMO Resolution MEPC.312(74) adopted on 17 May 2019.

4.3 Information for submission

4.3.1 The applicant is to submit the following information for assessment:

.1 the software description,
.2 the software user manual,
.3 the system architecture diagram,
.4 the system operating environment certification details,
.5 the software developer's system test plan and completed system test records,
.6 the software developer’s quality management system certification and configuration management documentation,
.7 copies of the software configuration, protection, and maintenance records at the time of assessment.

4.4 Definitions

Audit Logging means logs recording user activities, exceptions, and information security events, where logs are kept for an agreed period to assist in future investigations and access control monitoring (ISO/IEC 27001:2006). The time and date for the log is to be Universal Co-ordinated Time (UTC) derived from.

Backup means to make a duplicate copy of a file, program, etc. as a safeguard against loss or corruption of the original. The specific properties of the backup such as its format, frequency, storage location, retention period, are unique to each business organization and should be defined in accordance with a Business Continuity Plan.

Business Continuity Plan means a collection of procedures and information that is developed, compiled and maintained in readiness for use in the event of an emergency or disaster.

Cryptography means the discipline which embodies principles, means and methods for the transformation of data in order to hide its information content, prevent its undetected modification and/or prevent its unauthorized use (ISO 7498-2).

Data means a re-interpretable representation of information in a formalized manner suitable for communication, interpretation or processing (ISO/IEC 2382-1).

Digital signature means data appended to, or a cryptographic transformation (see "cryptography") of, a data unit that allows a recipient of the data unit to prove the source and integrity of the data unit and protect against forgery e.g. by the recipient (ISO 7498-2).

Document means books, manuals, plans, instructions and similar media that are not certificates and are used to convey a ship's information.

Electronic record book means a device or system used to electronically record the entries for discharges, transfers and other operations as required under MARPOL Annexes and the NO_X Technical Code.

Offline means usage #1. Pertaining to the operation of a functional unit when not under the direct control of the system with which it is associated. Offline units are not available for immediate use on

demand by the system. Offline units may be independently operated. Usage #2. Pertaining to equipment that is disconnected from a system, is not in operation, and usually has its main power source disconnected or turned off.

Role Based Access Control means a control mechanism that provides different access levels to guarantee that individuals and devices can only gain access to and perform operations on network elements, stored information, and information flows for which they are authorized (ISO/IEC 27033-2:2012).

Portable Document Format (PDF) means a digital form for representing documents that enables users to exchange and view electronic documents easily and reliably, independent of the environment in which they were created and the environment in which they are viewed or printed (ISO 32000).

Signature means the handwritten means of identifying the signer of a document or an electronic equivalent which is uniquely and securely linked to an individual.

Storage (device) means a functional unit into which data can be placed, in which they can be retained, and from which they can be retrieved (ISO/IEC 2382-1:1993 Information technology – Vocabulary – Part 1: #;Fundamental terms).

4.5 Documentation

4.5.1 Principle

Documentation, files, and other records submitted for assession by PRS are to provide objective evidence that the criteria for the assessment have been satisfied.

4.5.2 Criteria

4.5.2.1 Any terms, acronyms, abbreviations, and notations are to be defined have the same meaning throughout the document.

4.5.2.2 All documents are to be free from internal inconsistencies, inconsistencies with other documents, free from ambiguities and be up to date.

4.5.2.3 Statements made in documentation are to be correct with reference to an authoritative source and testable or verifiable.

4.5.2.4 History of changes should be included in documentation or in attachments.

4.5.2.5 All documents and files are to be uniquely identified including version and or date.

4.5.2.6 All documents, files and records are to be clearly approved, signifying review and acceptance with the approval mechanism for computer files being made clear.

4.6 Software specification

4.6.1 Principle

The software and its operating environment is to:
– satisfy functional requirements specified herein,
– provide full description of the product, its functionality, limitations, and its installation,

The user documentation is to provide all information required for the installation and use of the software.

4.6.2 Application of the software

The software specified herein is intended to support the recording of operations and to satisfy the recording requirements specified in the following MARPOL Annexes and the IMO Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NOx Technical Code):

.1 Oil Record Book, parts I and II (MARPOL Annex I, regulations 17.1 and 36.1);
.2 Cargo Record Book (MARPOL Annex II, regulation 15.1);
.3 Garbage Record Book, parts I and II (MARPOL Annex V, regulation 10.3);
.4 Ozone-depleting Substances Record Book (MARPOL Annex VI, regulation 12.6);
.5 Recording of the tier and on/off status of marine diesel engines (MARPOL Annex VI, regulation 13.5.3);
.6 Record of Fuel Oil Changeover (MARPOL Annex VI, regulation 14.6);
.7 Record Book of Engine Parameters (NOx Technical Code, paragraph 6.2.2.7).

4.6.2.1 A software may be designed to satisfy any of the aforementioned MARPOL Annexes and the NOx Technical Code. Where a software is not designed to satisfy all the afore mentioned requirements, the software documentation is to clearly define the intended limitations of its application.

4.6.2.2 Electronic record books are to be presented in the form specified in the relevant MARPOL Annexes, and the IMO Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines.

4.6.2.3 The electronic record book should have the capability to retain all records made for the minimum period as specified in the relevant MARPOL Annexes.

4.6.3 Ability of the Electronic Record Book to meet Regulations under the IMO MARPOL Convention

4.6.3.1 The electronic record book should only allow the Master a complete entry to be saved for verification by. Where practicable, means are to be included for the system to automatically record and populate the records. In the event of equipment failure, means are to be provided to manually input this information and to record the change of source data.

4.6.3.2 The automatic data value inputs are to be protected by means aimed at preventing attempts of manipulation or falsification. The electronic record book is to automatically record any attempts to manipulate or falsify any data.

4.6.3.3 To assist with consistent recording of data such as dates and positions, the electronic record book is to display entry fields and request data formats that are as consistent as possible with other IMO required electronic reporting and other shipboard recording systems.

4.6.3.4 The software is to possess the capability to produce a hard copy of the verified records for the Master to certify as a true printout copy, upon request from relevant authorities.

4.6.3.5 Any updates to the electronic record book hardware or software components are not to cause the loss of existing records, nor make them unreadable, and the system should continue to present all records in the form specified in the relevant MARPOL Annexes, and the NOx Technical Code.

4.6.4 Security and accountability of the electronic record book

4.6.4.1 To ensure the security of an electronic record book, the software is to implement Role Based Access Control. As a minimum, all access to the application is to use a unique personal login identifier and password for each user. The level of security provided is to ensure that the user making entries into the application is accountable for any false entries or omissions.

4.6.4.2 The electronic record book is to implement Audit Logging, to meet requirements of needed signature of the relevant officer entering a record. As such, Audit Logging is to record a user code, identifying symbol, such as a graphic character, or an equivalent identifier against each entry to uniquely identify the user and whether the user provided accessed or amended an entry. The arrangements for audit logging are to include biometric identity-proofing to authenticate all persons making or modifying entries.

4.6.4.3 Electronic signatures applied to an electronic record book should meet authentication standards.

4.6.4.4 Records and entries to the electronic log book are to cryptographically bind the content of the event being recorded with the person making the entry in order to preclude it from being revised without a trace. After an entry is saved by the user, the system is to secure the information against unauthorized or untraceable changes. Any change(s) to the entry by any user is to be automatically recorded and made visible both in the system and in any output presentation or printed versions of the electronic record book. The entry is to appear in the list of entries in a format that makes it clear that the entry has been amended. The system is to be designed to retain both the original entry and any amendment(s).

4.6.4.5 If an entry requires amendment, the reason and user identifier, for the officer making the amendment, is to be recorded for verification by the Master. The original entries and all amendments are to be retained and are to visible within the system.

4.6.4.6 The information in the electronic record book is to be verified by the Master. For verification of a single or series of saved entries by the Master, the electronic record book is to have an additional authentication factor to allow verification. This additional authentication factor is to be in the form of additional credentials supplied by the Master at the time of verification.

4.6.4.7 The electronic record book is also be able to log and identify the entries made, amended, or verified by time and date. The time information is to be derived and input to the system automatically from the ship's time source. In the event of equipment failure, means are to be provided to manually input this information and to record the change of source data.

4.6.4.8 The electronic record book is to provide a status field for each entry that clearly determines the verification stage of the entry. When an entry has been saved in the system by the user, the entry is to reflect a term such as "pending" or "awaiting verification". Once the Master has verified an entry, a term such as "verified" is to be automatically reflected.

4.6.4.9 In the event that an entry is amended after the Master has verified it, the electronic record book is to automatically return the entry to the status of "pending" or "re-verification" notifying the Master that the entry requires re-verification.

4.6.4.10 To ensure that entries are verified in a timely manner, the system is to provide a reminder that verification by the Master is required. Means are to be provided to ensure that, where possible, verifications are completed prior to arrival in port. Entries not verified are to be accompanied by comments advising of the reason for non-verification.

4.6.4.11 The system is to provide the applicability to correlate a recorded entry with associated hard copy documents, including but not limited to receipts for services and endorsements of record books during surveys and inspections. The electronic record book is to allow a scanned copy of the documents in PDF format or similar electronic form to be identified and attached to the relevant entry in the system. Alternatively, the hard copy documents associated with a recorded entry may be referenced in the system with the hard copy documents retained for review when required.

4.6.5 Storage of recorded data in the electronic record book

4.6.5.1 The electronic record book should include an appropriate method for backing up and data recovery if the system will fail or not be available from the ships' network.

4.6.5.2 The system is to provide the capability for the entire electronic record book entries, including all metadata, and linked files/records to be printed out in its entirety on board.

4.6.5.3 The electronic record book should have the capability of automatic data backup held in the system to offline storage. System should be able to ensure automatically updates the offline record in the event when changes are made to the entries of the electronic record book.

4.6.5.4 The recorded data stored in the offline space should be:
- developed using cryptography so that unauthorized access to the information is not possible;
- saved in a read-only format with ability to made amendments only by a user with the appropriate level of authorization;
- keep in a format that can be transferred from the place of record to another storage location, such as a removable storage peripheral device, or local and remote network storage;
- storage in a format that ensures the longevity and integrity of the record;
- format of storage should allow output presentation and printing of the record.

4.6.5.5 This offline record has to be provided in PDF format and is to be digitally signed by the Master. The properties of the digital signature are to appear on the offline record, including the title; full name of the signer; date and time of signing. Alternative formats may be used provided that the format allows the exchange and view of electronic documents independent of the environment in which they were created and the environment in which they are viewed or printed.

4.6.5.6 An electronic record book and infrastructure related to the system including computers and peripherals, should be installed in compliance with IEC 60092 and IEC 60533, where applicable.

4.6.6 Operating Environment

4.6.6.1 The operating environment dedicated for the electronic record book software may be either a standalone computer or be part of the ship's computerised network infrastructure. In both cases the operating environment and infrastructure related to the electronic record book including computers and peripheral devices, is to be suitable for operation in the marine environment demonstrating compliance with International Electrotechnical Commission Standard 60092 part 504, or equivalent. These certification and testing requirements are to include all necessary peripheral devices such as printers.

4.6.6.2 Both, physical and logical security measures of operating environment to ensure safeguard from the corruption of storage data within the system, whether access is undertaken at the physical system or achieved via a remote connection. The system test plan should include functionality testing of the technical security controls adopted with test case scenarios created for its evidence. The utility to adjust the technical controls is to be provided to permit the system to respond to new cyber security threats as they emerge.

4.6.6.3 The electronic record book is to be provided with alternate power supplies to ensure consistent access to the system in the event of power outages.

4.7 Software description

The product description is to:

- clearly identify the software described by its name, version, and a date;
- contain the name and address (postal or web) of the supplier and at least one distributor if applicable;
- describe the intended functionality stated in the requirements specification including any limitations of the software;
- define the hardware and software operating environment for executing the software;
- state the provisions made for supporting the operation and maintenance of the software;
- include information on data saving, restoring and back-up procedures;
- specify the type of user interface;
- provide information on the installation procedure;
- include information of maintenance and updating procedure.

4.8 Software user documentation

The user documentation is to:
- contain all information necessary for the proper use of the software;
- describe all the functions stated in the product description and all functions that the user can use;

– gve guidance to back-up and off-line storage of the electronic record book data;
– state all limitations given in the product description;
– define the minimum and maximum required disk space for installation and it's type (i.e. mechanical, SSD);
– be understandable by the Master, Chief Engineer, and ships staff by using accepted marine industry terminology;
– provide the information necessary to learn how to use the software;
– include information on obtaining a printed copy when the user documentation is not provided in the printed form.

4.9 System tests

4.9.1 Principle

The system tests are to demonstrate that the system and functional requirements are meet satisfactory.

4.9.2 Testing details

Tests shall check that a system in its final environment, integrated with all other systems with which it interacts is:

– performing functions it was designed for;
– reacting safely in case of failures originated internally or by devices external to the system;
– interacting safely with other systems implemented on board vessel.

4.9.3 Criteria of test planning and specification

.1 All functions and features described in the product description and user documentation are to be tested.

.2 Each function and feature are to testes at least once.

.3 Test cases are to demonstrate conformity of the software with the statements made in the product description and the user documentation.

.4 The installation procedures and operational limits indicated in the product description and user documentation are to be the subject of test cases.

.5 Criteria of test cases completion are to be specified and used for evaluating the conformity with the software and the product description and user documentation.

.6 The test plan is to specify the hardware and software configuration in which the tests are to be executed. Any tools required to test the software are to be specified.

.7 Test cases are to be documented to include the test objective, input data, expected results and the pass or fail criteria.

.8 Test procedures are to be documented to include the necessary preparation actions required to execute the test and record the results and are to be sufficiently detailed to permit the test to be repeated.

.9 There is to be a procedure for re-testing of the functions or features concerned in case when corrections are needed.

.10 The test plan is to include criteria for determining whether testing as a whole, passes or fails.

.11 The software tested is to be identical to the software under assessment.

4.9.4 Criteria of Test Reports and Results

4.9.4.1 An execution report is to be compiled that is to include:

.1 an overall summary of the results of the test cases;

.2 demonstration that all test cases have been executed according to the test plan;

.3 a report for each test case that identifies the date of execution, the name and function of the tester(s), a list of found non-conformities and references to the corresponding non-conformity report(s).

4.9.4.2 A non-conformities reports, where required, are to be compiled and should include:

.1 summary of found non-conformities and, if any, the corrections, and verifications made by re-testing;

.2 the report should describe non-conformities, the point in the test case at which the non-conformities occurred it's nature;

.3 a correction section that is to demonstrate that all found non-conformities have been satisfactory corrected and is to include for each correction:

- the identifier of the correction,
- correction date,
- name of the corrector,
- identifier of the modification corresponding to the correction,
- the possible impact of the correction,
- comments of the corrector, if any.

.4 A verification section that is to demonstrate that all corrected functions have the behavior defined in the product description and user manual and is to include for all verifications:

- the identifier of the verification,
- verification date,
- name of the verifier,
- the test cases used for the verification,
- results of the verification.

4.9.4.3 The assessment of the execution report and anomaly report is to demonstrate that the functions and features of the software were successfully obtained.

4.10 Replication, delivery and maintenance

4.10.1 Principle

The software is to be replicated, delivered, and maintained within the scope of an acceptable Quality Management System. Effective configuration management and a systematic and proper approach to the maintenance of the software is to be demonstrated.

4.10.2 Quality Management System

4.10.2.1 Adopted quality management system is to ensure that the provisions of ISO/IEC 90003:2018, *Software engineering - Guidelines for the application of ISO 9001:2015 to computer software*, or equivalent are properly incorporated.

4.10.2.2 The quality management plan for the software is to identify and describe responsibilities and authorities related to the implementation and verification of the configuration management process at all stages in the software life cycle. The interfaces between differing activities involved in the configuration management process and the identification of the responsible authority for verifying implementation activities are to be defined.

4.10.3 Configuration and management

The configuration of the software is to be planned and controlled with configuration records maintained, which:

4.10.3.1 Identify the versions of each software item.

4.10.3.2 Identify the current build status of the software.

4.10.3.3 Identify the modified parts of software items resulting from a change request.

4.10.3.4 Include an evaluation of the impact of a change request on the remaining configuration items and details of how the change is to be approved.

4.10.3.5 Include summary reports on the status of change requests and the implementation and verification of approved changes.

4.10.4 Replication and delivery

Replication records for the software should identify:

.1 the master and copies, including format, variant and version,

.2 the type of media used and associated labelling,

.3 the associated software description and software user manual, licenses, and release notes, including identification and packaging (if applicable),

.4 the verification of the correctness and completeness of delivered copies of the software,

.5 measures taken to protect the software from damage or corruption during delivery (if shipped, not delivered by network).

4.10.5 Maintenance

Maintenance of the software is to be planned and controlled with maintenance records maintained that are to include:

.1 the list of problem reports received and their current status,

.2 the authority responsible for implementing corrective action,

.3 the priorities assigned to corrective actions,

.4 the results of corrective actions,

.5 the methods used to advise purchasers of the software of planned future changes,

.6 means taken to confirm that changes implemented will not introduce other problems.

4.10.6 System security

Prior to installation, all artefacts, software code, executables and the physical medium used for installation on the vessel are to be scanned for viruses and malicious software. Results of the scan are to be documented and kept with the Software Registry.

List of amendments effective as of 1 January 2021

Item	*Title/Subject*	*Source*
2.5.3	General information about electronic record books	---
Chapter 4	Requirements for electronic record books programs	MEPC.312(74); MEPC.314(74)