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## Ships and marine technology — Guidelines for software based planned maintenance system

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electro-technical Commission (IEC) on all matters of electro-technical standardization.

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

ISO/CD 23323 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 11, *Intermodal and short sea shipping*.

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## Introduction

International Maritime Organization defined a mandatory regulation on PMS of ships in the International Safety Management Codes for the purpose of promoting efficiency of maintenance and safe operation. Although PMS is regulated to be operated using paper or software, software-based PMS is preferred due to systematization and computerization of the shipping industry. Software based PMS has been used to help implementation of ISM 2018 Part A/10. Even though shipping company already developed and equipped their own PMS software by themselves, standardized software PMS is needed for further requirement such as era of e-Navigation or Autonomous ship(MASS).

Even though large sized shipping company has been widely used and developed their own PMS software by themselves, medium-small sized shipping companies have been suffered from poor conditions to develop their own system. This guideline is useful for shipping company when developing the software program of PMS by providing the method of inputting, planning, reporting and managing the data of maintenance item and spare part.

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# Ships and marine technology — Guidelines for software based planned maintenance system

## 1 Scope

This document provides the minimum functions and requirements of software based planned maintenance system (SPMS) covering specific requirements for planning and implementing the maintenance schedule, recording, reporting, analysis and optimization to maintain onboard equipment and systems in support of ISM 2018 Part A /10.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISM, 2018 Part A, International Safety Management Code

ISO/IEC 12207, *Systems and software engineering - Software life cycle processes*

ISO 9001:2008, *Quality Management Systems - Requirements*

ISO/IEC 90003, *Software engineering - Guidelines for the application of ISO 9001:2008 to computer software*

ISO/IEC 25000, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE*

ISO/IEC 25041, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Evaluation guide for developers, acquirers and independent evaluators*

IEC 61511, *Functional safety - Safety instrumented systems for the process industry sector*

IACS E22 *On Board Use and Application of Computer based systems*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **Planned maintenance system**

a system which supports efficient maintenance such as planning, scheduling, implementing, recording and reporting of action taken for onboard equipment and systems

### 3.2

#### **Software-based Planned Maintenance System (SPMS)**

a planned maintenance system that fulfills functionalities required in this standard via software

## 4 PMS Function

### 4.1 General

#### 4.1.1 Language

The SPMS should be implemented in English, and other languages may also be used at the meantime.

#### 4.1.2 Backup Capability

SPMS shall provide methods for software and data backup, so that the user may repair or re-install the software and the data stored in the software may be recovered.

#### 4.1.3 Ship-Shore Communication

SPMS shall facilitate the user to send and receive data on maintenance and spare parts to and from the shore-based database via digital transfer. The data includes but not limited to:

- a) New Maintenance Item and spare parts code
- b) Implementation of maintenance plan
- c) Stock transaction
- d) Requisition for purchase

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#### 4.1.4 PMS Code

SPMS shall facilitate the user to create a code structure complying with the requirements of ISM code.

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#### 4.1.5 Database

- a) Database shall be timely updated.
- b) SPMS shall be capable of self-checking normal errors in database and guarantee the validity of data.
- c) Downward (backward) compatibility of database and software updates shall be ensured so that the change of database and software will not affect data access and system availability.

#### 4.1.6 Authentication and Authorization

- a) The setup and login of a user account shall be achievable through SPMS.
- b) Access rights shall be identified and restricted by designated accounts.
- c) Logs of user's activities shall be kept and may be queried when necessary.

#### 4.1.7 Update

The system shall be updated to the latest version through version management covering specific procedures and protective measures, including mechanisms for validating updates before deployment and reverting to earlier revisions in the case of corruption.

#### 4.1.8 Failure recovery

In the event of a failure, the system should be able to be recovered to a previous state in which the system was stable and related data may be restored intact.

SPMS should make the user alert to any expected adverse influences or risks resulting from the failure recovery.

#### 4.1.9 Cyber Security

The transmissions of data, which are critical to the safety of the ship, should be protected against unauthorized access.

Cyber security measures shall be implemented to protect against cyber threats and to ensure data integrity.

#### 4.1.10 Notification

- a) SPMS shall facilitate the user ability to set pre-notification date for maintenance.
- b) SPMS shall notify the user when the advance notification date is due.
- c) SPMS shall notify the user when the planned maintenance date is due.
- d) SPMS shall facilitate the user to check all overdue or failed tasks according to the maintenance plan within a user-defined time window
- e) SPMS shall notify the user when the tasks have been overdue and propose a maintenance date for overdue task based on the existing maintenance plan.
- f) SPMS shall facilitate the user to provide description of related reason for overdue or failed tasks.
- g) For the stock items marked as perishable, SPMS shall notify the user when the stock item is beyond the warranty period.
- h) SPMS shall notify the user he user in the case of self-malfunction such as disk full, exceptional error, network malfunction, DBMS failure etc.

#### 4.1.11 Query and Printout

History management function, such as querying (filtered searching) and printing out records, is to be provided by SPMS.

## 4.2 Initialization Function

### 4.2.1 Registration of machinery and parts

When first installed, SPMS shall at least include particulars of equipment and systems of ships

- a) machinery Number
- b) name
- c) manufacturer
- d) type
- e) spare parts

At least the following particulars of spares shall be registered through SPMS:

- a) machinery number
- b) parts number
- c) name