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Authority:	Operations Director	Revision:	6
Custodian/Owner:	Designated Person Ashore	Issue Date:	11 Sep 2026
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Chapter 10 – Maintenance of Ships and Equipment

References: [ISM Code] *International Safety Management Code* (2018)

1. Introduction

1.1 Regulatory Backdrop:

The ISM Code intends that our SMS include procedures to ensure that each ship and its equipment is maintained in conformity with relevant rules and regulations, as well as with requirements of our own policies. Our procedures should also ensure that:

- inspections are held at appropriate intervals,
- non-conformities are addressed according to **Chapter 9**, and
- maintenance is documented and these records are kept accessible.

We are to also identify key vessel operation components, the sudden failure of which may result in hazardous situations and implement measures to promote reliability, including regular testing of critical components and systems that are not in continuous use. These preventative and corrective measures are to be integrated into each vessel's operational management routine.

1.2 Our Objective:

Our objective is to specify, conduct, record, and continually improve a planned maintenance program for all vessel equipment to ensure that each vessel is properly maintained for safe and reliable operation. Our over-arching goal is to keep our vessels fit-for-purpose and ready for work.

1.3 Definitions:

Corrective Maintenance: unplanned repair or replacement performed when equipment fails.

Critical Equipment: identified key vessel operation components that are in continuous use, the sudden failure of which may result in a hazardous situation.

Hazardous Situation: a situation that could endanger or threaten the integrity of the vessel, the safety or health of the crew, or the environment. Such situations may lead to serious consequences such as the loss of the vessel, life or limb, equipment, or ecosystem balance.

Preventative Maintenance: regularly scheduled maintenance or replacement to inhibit or prevent component failures and to minimize the frequency of corrective maintenance.

Standby Critical Equipment: identified key equipment components that are not in continuous use but must always be in readiness because their failure to reliably function when needed may result in a hazardous situation.

Standard Job: recurring procedure required to maintain equipment in good operating condition. Standard Jobs are identified by manuals, regulations, best practices, and our personnel.

VMS: Vessel Management System - integrated software program used for our document repository, maintenance system, compliance and safety documentation, personnel management, vessel logs, and reports. Our VMS is named *Helm Connect*.

Work Order: a formalized document authorizing one or more specific tasks necessary to properly maintain our equipment. This order triggers action by detailing what needs to be done with which parts and tools, who will do it, and when it will be done.

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2. Policies

2.1 Maintenance System:

We shall implement and maintain a system of planned maintenance to specify, record, and track preventative and corrective maintenance tasks defined by an on-going series of work orders. This system shall electronically link our home office with each vessel to ensure the availability of the same information to all key positions. All equipment maintenance shall be recorded and tracked in the VMS.

2.2 Work Orders:

Maintenance tasks shall be authorized as work orders that are linked to equipment records, thus becoming part of the maintenance history of that component. Standard Jobs shall be issued for preventative maintenance. The Chief Engineer shall be responsible for ensuring that proper work orders are created. A work order that is generated in the system shall remain open and progress tracked until maintenance is fully complete, the component is repaired or replaced, or the work order is otherwise closed by the Port Engineer.

2.3 Critical & Standby-Critical Equipment:

We shall maintain for each vessel an SOP that lists specific items of that vessel's critical- and standby-critical equipment, as well as critical spare parts. Corrective maintenance that requires the purchase of new critical equipment or components, scheduling of contractors, or shipyard work shall be reported immediately to the Port Engineer for approval.

2.4 Standard Jobs:

Any requests for the addition, modification, or removal of a Standard Job shall be directed in writing to the Port Engineer, who shall then modify the job in the system after approval.

2.5 Effectiveness:

We shall regularly monitor the effectiveness of our planned maintenance system using occurrence of timely vs. overdue work orders, time to closure, and frequency of completion of preventative vs. corrective maintenance work orders. We shall make improvements if the incidence of corrective maintenance increases over time.

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3. Responsibilities

3.1 Master:

The Master ensures that the vessel equipment and technical systems are properly and reliably inspected and maintained. The Master is also responsible for ensuring that the planned maintenance system is kept up to date with the latest preventative and corrective maintenance activity.

3.2 Chief Engineer:

The Chief Engineer of each vessel ensures that all inspections, tests, and maintenance are conducted according to manufacturer guidelines, best practices, and in compliance with this chapter and its SOPs. The Chief Engineer is also responsible for regularly reviewing the planned maintenance system to ensure that all work orders are properly created in the system, resulting maintenance activities are properly documented, and that the work orders are closed in a timely manner.

3.3 Port Engineer:

The Port Engineer reviews the input to the planned maintenance system frequently for each vessel to ensure that the vessels are being properly maintained, vessel crews are entering all maintenance activity correctly, and work orders are being closed in a timely manner. In the absence of a bridge crew (such as at the dock in standby mode or in a shipyard), the Port Engineer is responsible for documenting all maintenance into the system. The Port Engineer is also responsible for reviewing completed quarterly inspections and ensuring resulting actions are tracked to timely closure.

3.4 Port Captain:

The Port Captain works with the Port Engineer, the vessel Masters, and other personnel as needed to set up the inspection and maintenance tasks in the system. He records all maintenance items (except for selected daily jobs) in the planned maintenance system.

3.5 Systems Manager:

The Systems Manager is responsible for the configuration, integrity, and availability of the VMS. This includes maintaining accurate equipment records, Standard Jobs, work-order templates, and reporting functions, controlling system changes that affect maintenance tracking, and ensuring both shore and vessel personnel have appropriate access.

3.6 Operations Director:

The Operations Director provides overall authority for the planned maintenance system, ensures adequate shore-side resources are available to support it, periodically reviews system effectiveness, and approves significant changes to critical equipment lists or maintenance policies.

3.7 Senior Management:

Senior Management reviews the effectiveness of the planned maintenance system as part of the Management Review, provides the necessary resources (personnel, budget, spares, and dry-dock support), and ensures our ongoing commitment to maintaining vessels ready for work in a fit-for-purpose condition.

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4. Maintenance Program

4.1 Inspections:

Recurring inspections are to be conducted onboard each vessel using a series of departmental inspection checklists. Their purpose is to confirm that the vessel's critical equipment, structure, and lifesaving appliances remain seaworthy and compliant with Class, Load Line, Port State, and flag requirements. Each consists of the completion of the defined departmental inspection checklists by the vessel crew. Findings from each inspection are to be recorded in the VMS and any non-conformities processed in accordance with **Chapter 9**.

4.2 Critical Equipment:

We will maintain a list of Critical Equipment for each vessel. Each vessel is to follow the set of procedures we have developed for regular maintenance of its equipment. This set of SOPs is aimed at promoting the reliability of our critical equipment. The equipment for each vessel is to be listed in the following order as Critical:

- Ship's hull, including internal tank bulkheads.
- Electrical generation plant, including main switchboard panel and components.
- Main engines, including gearbox and clutches.
- Steering Gear.
- Specific Critical Equipment unique to that vessel.

4.3 Standby Critical Equipment:

We will also maintain a list for each vessel of key equipment that is not in continuous use. These equipment components are to be maintained as Standby-Critical Equipment. Each vessel is to follow the set of procedures we have developed for regular maintenance of this equipment, including regular testing per manufacturer, class, and SOP-specified intervals.

- Air Compressors.
- Emergency/standby electrical generator.
- Lifesaving appliances and equipment, including the rescue boat davit.
- Firefighting apparatus, including fire pumps.
- Fire detection and alarm system.
- Communications systems.
- Navigational equipment.
- Bilge system.
- Ship Security Alert System.
- Ship Security Surveillance and Warning System.
- Anchor windlass.
- Bow thruster.
- Specific Standby Critical Equipment unique to that vessel.

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