



**BUREAU
VERITAS**

Guidance for the Lay-Up and Reactivation of DP Vessels

February 2018

**Guidance Note
NI 649 DT R00 E**

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**BUREAU
VERITAS**

MARINE & OFFSHORE - GENERAL CONDITIONS

1. INDEPENDENCY OF THE SOCIETY AND APPLICABLE TERMS

- 1.1. The Society shall remain at all times an independent contractor and neither the Society nor any of its officers, employees, servants, agents or subcontractors shall be or act as an employee, servant or agent of any other party hereto in the performance of the Services.
- 1.2. The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not, in any circumstances, involve monitoring or exhaustive verification.
- 1.3. The Society acts as a services provider. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty. The Society is not and may not be considered as an underwriter, broker in Unit's sale or chartering, expert in Unit's valuation, consulting engineer, controller, naval architect, manufacturer, shipbuilder, repair or conversion yard, charterer or shipowner; none of them above listed being relieved of any of their expressed or implied obligations as a result of the interventions of the Society.
- 1.4. The Services are carried out by the Society according to the applicable Rules and to the Bureau Veritas' Code of Ethics. The Society only is qualified to apply and interpret its Rules.
- 1.5. The Client acknowledges the latest versions of the Conditions and of the applicable Rules applying to the Services' performance.
- 1.6. Unless an express written agreement is made between the Parties on the applicable Rules, the applicable Rules shall be the rules applicable at the time of the Services' performance and contract's execution.
- 1.7. The Services' performance is solely based on the Conditions. No other terms shall apply whether express or implied.

2. DEFINITIONS

- 2.1. "**Certificate(s)**" means class certificates, attestations and reports following the Society's intervention. The Certificates are an appraisal given by the Society to the Client, at a certain date, following surveys by its surveyors on the level of compliance of the Unit to the Society's Rules or to the documents of reference for the Services provided. They cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.
- 2.2. "**Certification**" means the activity of certification in application of national and international regulations or standards, in particular by delegation from different governments that can result in the issuance of a certificate.
- 2.3. "**Classification**" means the classification of a Unit that can result or not in the issuance of a class certificate with reference to the Rules.
- 2.4. "**Client**" means the Party and/or its representative requesting the Services.
- 2.5. "**Conditions**" means the terms and conditions set out in the present document.
- 2.6. "**Industry Practice**" means International Maritime and/or Offshore industry practices.
- 2.7. "**Intellectual Property**" means all patents, rights to inventions, utility models, copyright and related rights, trade marks, logos, service marks, trade dress, business and domain names, rights in trade dress or get-up, rights in goodwill or to sue for passing off, unfair competition rights, rights in designs, rights in computer software, database rights, topography rights, moral rights, rights in confidential information (including know-how and trade secrets), methods and protocols for Services, and any other intellectual property rights, in each case whether capable of registration, registered or unregistered and including all applications for and renewals, reversions or extensions of such rights, and all similar or equivalent rights or forms of protection in any part of the world.
- 2.8. "**Parties**" means the Society and Client together.
- 2.9. "**Party**" means the Society or the Client.
- 2.10. "**Register**" means the register published annually by the Society.
- 2.11. "**Rules**" means the Society's classification rules, guidance notes and other documents. The Rules, procedures and instructions of the Society take into account at the date of their preparation the state of currently available and proven technical minimum requirements but are not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.
- 2.12. "**Services**" means the services set out in clauses 2.2 and 2.3 but also other services related to Classification and Certification such as, but not limited to: ship and company safety management certification, ship and port security certification, training activities, all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board.
- 2.13. "**Society**" means the classification society "**Bureau Veritas Marine & Offshore SAS**", a company organized and existing under the laws of France, registered in Nanterre under the number 821 131 844, or any other legal entity of Bureau Veritas Group as may be specified in the relevant contract, and whose main activities are Classification and Certification of ships or offshore units.
- 2.14. "**Unit**" means any ship or vessel or offshore unit or structure of any type or part of it or system whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

3. SCOPE AND PERFORMANCE

- 3.1. The Society shall perform the Services according to the applicable national and international standards and Industry Practice and always on the assumption that the Client is aware of such standards and Industry Practice.

- 3.2. Subject to the Services performance and always by reference to the Rules, the Society shall:

- review the construction arrangements of the Unit as shown on the documents provided by the Client;
- conduct the Unit surveys at the place of the Unit construction;
- class the Unit and enters the Unit's class in the Society's Register;
- survey the Unit periodically in service to note that the requirements for the maintenance of class are met. The Client shall inform the Society without delay of any circumstances which may cause any changes on the conducted surveys or Services.

The Society will not:

- declare the acceptance or commissioning of a Unit, nor its construction in conformity with its design, such activities remaining under the exclusive responsibility of the Unit's owner or builder;
- engage in any work relating to the design, construction, production or repair checks, neither in the operation of the Unit or the Unit's trade, neither in any advisory services, and cannot be held liable on those accounts.

4. RESERVATION CLAUSE

- 4.1. The Client shall always: (i) maintain the Unit in good condition after surveys; (ii) present the Unit after surveys; (iii) present the Unit for surveys; and (iv) inform the Society in due course of any circumstances that may affect the given appraisal of the Unit or cause to modify the scope of the Services.
- 4.2. Certificates referring to the Society's Rules are only valid if issued by the Society.
- 4.3. The Society has entire control over the Certificates issued and may at any time withdraw a Certificate at its entire discretion including, but not limited to, in the following situations: where the Client fails to comply in due time with instructions of the Society or where the Client fails to pay in accordance with clause 6.2 hereunder.

5. ACCESS AND SAFETY

- 5.1. The Client shall give to the Society all access and information necessary for the efficient performance of the requested Services. The Client shall be the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out. Any information, drawings, etc. required for the performance of the Services must be made available in due time.
- 5.2. The Client shall notify the Society of any relevant safety issue and shall take all necessary safety-related measures to ensure a safe work environment for the Society or any of its officers, employees, servants, agents or subcontractors and shall comply with all applicable safety regulations.

6. PAYMENT OF INVOICES

- 6.1. The provision of the Services by the Society, whether complete or not, involve, for the part carried out, the payment of fees thirty (30) days upon issuance of the invoice.
- 6.2. Without prejudice to any other rights hereunder, in case of Client's payment default, the Society shall be entitled to charge, in addition to the amount not properly paid, interests equal to twelve (12) months LIBOR plus two (2) per cent as of due date calculated on the number of days such payment is delinquent. The Society shall also have the right to withhold certificates and other documents and/or to suspend or revoke the validity of certificates.
- 6.3. In case of dispute on the invoice amount, the undisputed portion of the invoice shall be paid and an explanation on the dispute shall accompany payment so that action can be taken to solve the dispute.

7. LIABILITY

- 7.1. The Society bears no liability for consequential loss. For the purpose of this clause consequential loss shall include, without limitation:
 - Indirect or consequential loss;
 - Any loss and/or deferral of production, loss of product, loss of use, loss of bargain, loss of revenue, loss of profit or anticipated profit, loss of business and business interruption, in each case whether direct or indirect.

The Client shall save, indemnify, defend and hold harmless the Society from the Client's own consequential loss regardless of cause.

- 7.2. In any case, the Society's maximum liability towards the Client is limited to one hundred and fifty per-cents (150%) of the price paid by the Client to the Society for the performance of the Services. This limit applies regardless of fault by the Society, including breach of contract, breach of warranty, tort, strict liability, breach of statute.
- 7.3. All claims shall be presented to the Society in writing within three (3) months of the Services' performance or (if later) the date when the events which are relied on were first discovered by the Client. Any claim not so presented as defined above shall be deemed waived and absolutely time barred.

8. INDEMNITY CLAUSE

- 8.1. The Client agrees to release, indemnify and hold harmless the Society from and against any and all claims, demands, lawsuits or actions for damages, including legal fees, for harm or loss to persons and/or property tangible, intangible or otherwise which may be brought against the Society, incidental to, arising out of or in connection with the performance of the Services except for those claims caused solely and completely by the negligence of the Society, its officers, employees, servants, agents or subcontractors.

9. TERMINATION

- 9.1. The Parties shall have the right to terminate the Services (and the relevant contract) for convenience after giving the other Party thirty (30) days' written notice, and without prejudice to clause 6 above.

- 9.2. In such a case, the class granted to the concerned Unit and the previously issued certificates shall remain valid until the date of effect of the termination notice issued, subject to compliance with clause 4.1 and 6 above.

10. FORCE MAJEURE

- 10.1. Neither Party shall be responsible for any failure to fulfil any term or provision of the Conditions if and to the extent that fulfilment has been delayed or temporarily prevented by a force majeure occurrence without the fault or negligence of the Party affected and which, by the exercise of reasonable diligence, the said Party is unable to provide against.
- 10.2. For the purpose of this clause, force majeure shall mean any circumstance not being within a Party's reasonable control including, but not limited to: acts of God, natural disasters, epidemics or pandemics, wars, terrorist attacks, riots, sabotages, impositions of sanctions, embargoes, nuclear, chemical or biological contaminations, laws or action taken by a government or public authority, quotas or prohibition, expropriations, destructions of the worksite, explosions, fires, accidents, any labour or trade disputes, strikes or lockouts

11. CONFIDENTIALITY

- 11.1. The documents and data provided to or prepared by the Society in performing the Services, and the information made available to the Society, are treated as confidential except where the information:
 - is already known by the receiving Party from another source and is properly and lawfully in the possession of the receiving Party prior to the date that it is disclosed;
 - is already in possession of the public or has entered the public domain, otherwise than through a breach of this obligation;
 - is acquired independently from a third party that has the right to disseminate such information;
 - is required to be disclosed under applicable law or by a governmental order, decree, regulation or rule or by a stock exchange authority (provided that the receiving Party shall make all reasonable efforts to give prompt written notice to the disclosing Party prior to such disclosure).

- 11.2. The Society and the Client shall use the confidential information exclusively within the framework of their activity underlying these Conditions.

- 11.3. Confidential information shall only be provided to third parties with the prior written consent of the other Party. However, such prior consent shall not be required when the Society provides the confidential information to a subsidiary.

- 11.4. The Society shall have the right to disclose the confidential information if required to do so under regulations of the International Association of Classifications Societies (IACS) or any statutory obligations.

12. INTELLECTUAL PROPERTY

- 12.1. Each Party exclusively owns all rights to its Intellectual Property created before or after the commencement date of the Conditions and whether or not associated with any contract between the Parties.
- 12.2. The Intellectual Property developed for the performance of the Services including, but not limited to drawings, calculations, and reports shall remain exclusive property of the Society.

13. ASSIGNMENT

- 13.1. The contract resulting from these Conditions cannot be assigned or transferred by any means by a Party to a third party without the prior written consent of the other Party.
- 13.2. The Society shall however have the right to assign or transfer by any means the said contract to a subsidiary of the Bureau Veritas Group.

14. SEVERABILITY

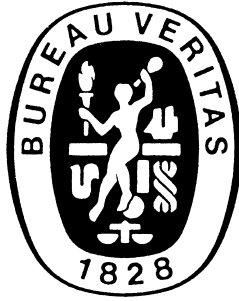
- 14.1. Invalidity of one or more provisions does not affect the remaining provisions.
- 14.2. Definitions herein take precedence over other definitions which may appear in other documents issued by the Society.
- 14.3. In case of doubt as to the interpretation of the Conditions, the English text shall prevail.

15. GOVERNING LAW AND DISPUTE RESOLUTION

- 15.1. The Conditions shall be construed and governed by the laws of England and Wales.
- 15.2. The Society and the Client shall make every effort to settle any dispute amicably and in good faith by way of negotiation within thirty (30) days from the date of receipt by either one of the Parties of a written notice of such a dispute.
- 15.3. Failing that, the dispute shall finally be settled by arbitration under the LCIA rules, which rules are deemed to be incorporated by reference into this clause. The number of arbitrators shall be three (3). The place of arbitration shall be London (UK).

16. PROFESSIONAL ETHICS

- 16.1. Each Party shall conduct all activities in compliance with all laws, statutes, rules, and regulations applicable to such Party including but not limited to: child labour, forced labour, collective bargaining, discrimination, abuse, working hours and minimum wages, anti-bribery, anti-corruption. Each of the Parties warrants that neither it, nor its affiliates, has made or will make, with respect to the matters provided for hereunder, any offer, payment, gift or authorization of the payment of any money directly or indirectly, to or for the use or benefit of any official or employee of the government, political party, official, or candidate.
- 16.2. In addition, the Client shall act consistently with the Society's Code of Ethics of Bureau Veritas. <http://www.bureauveritas.com/home/about-us/ethics+and+compliance/>



GUIDANCE NOTE NI 649

Guidance for the Lay-Up and Reactivation of DP Vessels

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SECTION 1

GENERAL

1 Overview

1.1 Introduction

1.1.1 This Guidance Note is specific to the equipment relating to the dynamic positioning (DP) system on DP vessels.

1.1.2 This Guidance Note is to be read in conjunction with:

- NI 545 Guidance for the lay-up and reactivation of ships
- additional requirements of the applicable Classification Rules of the Society (e.g. Rules for the Classification of Steel Ships, NR467, Pt A, Ch 2, Sec 2 and NR467, Pt A, Ch 3, App 1).

1.2 Objective

1.2.1 The objective of this Guidance Note is to provide the Owner of DP vessels with:

- guidelines for the preservation and maintenance of DP equipment (see Sec 2 and Sec 3)
- guidelines on reactivation measures, including testing considerations (see Sec 4 and Sec 5).

These guidelines, will enable the Owner to have a “lay-up attestation” issued by the Society as defined in NI 545.

Note 1: For non-DP vessels and equipment not related to DP systems, reference is made to NI 545.

1.2.2 This Guidance Note is only intended to provide guidance for lay-up and reactivation of DP vessels and is not classification requirements. The guidelines contained within this document are of a general nature due to the wide variety of vessel equipment manufacturers, DP system configurations and degree of maintenance performed during lay-up. All lay-up, maintenance and reactivation procedures should be specific to the vessel and following equipment manufacturer guidance, as well as to the satisfaction of the Society.

1.3 Scope

1.3.1 This Guidance Note considers the DP system to consist of the complete installation necessary for dynamically positioning a vessel, comprising the following typical sub-systems:

- Power system: All components and systems necessary to supply the DP system with power, including, but not limited to:
 - prime movers with necessary auxiliary systems
 - generators

- switchboards
- distribution systems
- UPS and battery systems
- power management systems.
- Thruster system: All components and systems necessary to supply the DP system with thrust force and direction, including, but not limited to:
 - thrusters with drive units and necessary auxiliary systems
 - main propellers and rudders
 - thruster control systems
 - manual thruster controls
 - associated cabling and cable routing.
- DP control system: All control components and systems, hardware and software necessary to dynamically position the vessel, consisting of:
 - computer system/joystick system
 - sensor system(s)
 - control stations and display system (operator panels)
 - position reference system(s)
 - associated cabling and cable routing
 - networks.

This list is not exhaustive and DP related equipment should be considered on a vessel specific basis.

1.4 Definitions

1.4.1

AVR	: Automatic Voltage Regulator
DP	: Dynamic Positioning
FMEA	: Failure Modes and Effects Analysis
FW	: Fresh Water
HV	: High Voltage
HVAC	: Heating, Ventilation & Air Conditioning
IMO	: International Maritime Organisation
LV	: Low Voltage
OEM	: Original Equipment Manufacturer
PMS	: Power Management System
UPS	: Uninterruptible Power Supply
SW	: Sea Water
VMS	: Vessel Management System
WCDFI	: Worst Case Failure Design Intent.

SECTION 2

TYPES OF LAY-UP

1 Overview

1.1 “Hot” lay-up / “Cold” lay-up

1.1.1 For information regarding the choice of the type and extent of lay-up and descriptions of “hot” and “cold” lay-up conditions, refer to NI 545, Sec 2.

1.2 Green lay-up label

1.2.1 For information regarding the requirements for assignment of the Green Lay-up Label to the BV “lay-up attestation, refer to NI 545, Sec 4.

SECTION 3

PRESERVATION AND MAINTENANCE

1 Introduction

1.1 Overview

1.1.1 For vessels entering lay-up, the extent of the preservation measures will depend on the length of time the vessel is anticipated to be idle. Details of preservation and maintenance will be presented in the lay-up maintenance programme which is to be submitted by the Owner to the Society.

1.1.2 The Owner should consider conducting an obsolescence survey as the vessel enters lay-up to determine if DP equipment will be supported by the OEM after the planned lay-up period.

1.1.3 This section is specific for equipment relating to the dynamic positioning system and discusses the typical preservation actions for hot and cold lay-up scenarios. For guidance on all other aspects of vessel preservation (hull, safety systems, deck equipment etc.) refer to NI 545.

2 Engines and marine auxiliary systems

2.1 Associated DP equipment

2.1.1 The typical equipment relevant to the DP system in this category includes:

- main engines and diesel generators
- fuel oil systems
- lubricating oil systems
- SW cooling systems
- FW cooling systems
- compressed air systems
- HVAC systems.

2.2 Hot Lay-up

2.2.1 During hot lay-up of a DP vessel, all marine auxiliary equipment will likely be running. All engines will likely be available but a minimum number of diesel generators will be running and connected to the power system as the system load will be low as heavy consumers such as thrusters and mission equipment will not be in use.

2.2.2 Although the vessel may have reduced crew during hot lay-up period, preservation of engines and marine auxiliary equipment will be by way of normal planned maintenance schedules.

2.3 Cold Lay-up

2.3.1 Cold lay-up of a DP vessel will involve shutting down all engines and marine auxiliary equipment. As cold lay-up periods can last for 12 months to several years it is important that the marine equipment is preserved such that they can be put back into operation when required upon reactivation of the vessel. Preservation methods will aim to protect these systems from corrosion and seizing of movable parts and will therefore focus on cleaning, controlling temperature and moisture levels and lubricating movable parts.

2.3.2 Preservation of engines and marine auxiliary equipment during a cold lay-up period should be in accordance with the procedures stated by the OEM.

2.3.3 To prevent corrosion of metallic materials, it is important that all main machinery spaces are provided with dehumidifiers to reduce humidity to acceptable levels.

2.3.4 Additionally, depending on the location of the vessel lay-up site, it is possible that the equipment may be subjected to extreme temperatures which can cause damage to equipment. This is particularly important for engines which may have fluids such as FW or lubricating oil and freezing of these fluids could cause internal engine damage. The use of space heaters/coolers can maintain the marine equipment at acceptable levels.

2.3.5 For diesel engines, it is important that the preservation measures specific to the engine type as stated by the OEM is consulted and followed. Typical preservation measures for engines include running the engine on high quality, moisture-free diesel prior to shutting down for cold lay-up. The engines should be thoroughly cleaned and air inlets and exhaust gas outlets should be sealed. Engine fresh water cooling circuits should be treated with corrosion inhibitor. Engines should be turned regularly.

2.3.6 Fuel oil system pipework should be drained and fuel oil should be stored in as few tanks as possible.

2.3.7 Lubricating oil should be stored in as few tanks as possible.

2.3.8 Sea water cooling system pipework should be drained, flushed with fresh water and corrosion inhibitor, dried and left open to a dehumidified atmosphere. Sea water overboard and inlet valves should be locked closed. Sea water heat exchangers should be thoroughly cleaned and left open to a dehumidified atmosphere.

2.3.9 External dampers for HVAC systems should be closed.

3 Electrical systems

3.1 Associated DP equipment

3.1.1 The typical equipment relevant to the DP system in this category includes:

- HV switchboards
- LV switchboards
- UPS units and battery systems.

3.2 Hot Lay-up

3.2.1 During hot lay-up of a DP vessel, all power generation and distribution equipment will likely be running. The load on the power system will be low as heavy consumers such as thrusters and mission equipment will not be in use. The power system will be configured such that a minimum number of diesel generators require to be running and connected. Mission equipment may be shut down or removed from the vessel.

3.2.2 Although the vessel may have reduced crew during hot lay-up period, preservation of electrical equipment will be by way of normal planned maintenance schedules.

3.2.3 Electrical systems require protection against the effects of harmful temperatures and high humidity and during hot lay-up, the HVAC system will be operational and will control the environment in electrical equipment spaces.

3.2.4 Battery systems and UPS units will remain on trickle charge and regularly inspected as part of normal planned maintenance schedules.

3.3 Cold Lay-up

3.3.1 Cold lay-up of a DP vessel will involve shutting down all electrical equipment, with the exception of critical safety systems (for example, navigation lights and fire and gas systems). As cold lay-up periods can last for 12 months to several years it is important that the electrical equipment is preserved such that it can be put back into operation when required upon reactivation of the vessel. Preservation methods will aim to protect these systems from corrosion and will therefore focus on cleaning and controlling temperature and moisture levels in electrical equipment spaces.

3.3.2 Preservation of electrical equipment during a cold lay-up period should be in accordance with the procedures stated by the OEM.

3.3.3 Vessels in cold lay-up will typically require an external power source to power critical safety equipment and preservation equipment such as dehumidifiers. This may be by way of a portable diesel generator or shore power connection. If a portable diesel generator is used, it should be suitably protected, both electrically and environmentally.

3.3.4 Prior to cold lay-up an insulation resistance test of all power and lighting circuits, generators, motors and switch-gear should be carried out. The results should be recorded and any faults rectified.

3.3.5 All circuit breakers should remain open.

3.3.6 All electrical equipment spaces should be cleaned and fitted with dehumidifiers and heaters or coolers to maintain ambient temperatures and humidity levels. Electrical equipment located outside the dehumidified spaces should be covered by plastic sheets and have desiccant inside.

3.3.7 Space heaters within generators, transformers and large motors should be used.

3.3.8 Generator brushes should be lifted off their commutators.

3.3.9 Diesel generator turning should be carried out at regular intervals.

3.3.10 Software for electrical equipment such as digital protection relays, digital AVR's etc. should be backed up and stored securely ashore.

3.3.11 Batteries for UPS units and battery systems should be isolated or removed.

4 Propulsion and thrusters

4.1 Associated DP equipment

4.1.1 The typical equipment relevant to the DP system in this category includes:

- main propulsion propellers
- steering gear
- tunnel thrusters
- azimuth thrusters
- all associated electrical, control, cooling and hydraulic systems.

4.2 Hot Lay-up

4.2.1 During hot lay-up of a DP vessel, the propulsion and thrusters will be stopped but all supporting equipment such as control, cooling and hydraulic systems will likely be fully functional such that the vessel can mobilise when required.

4.2.2 Although the vessel may have reduced crew during hot lay-up period, preservation of propulsion and thrusters will be by way of normal planned maintenance schedules.

4.2.3 Propulsion and thrusters require protection against the effects of harmful temperatures and high humidity and during hot lay-up, the HVAC system will be operational and will control the environment in thruster spaces.

4.2.4 Battery systems and UPS units which provide power to thruster equipment will remain on trickle charge and regularly inspected as part of normal planned maintenance schedules.

4.3 Cold Lay-up

4.3.1 Cold lay-up of a DP vessel will involve shutting down all propulsion, thrusters and steering gear systems and all associated equipment. As cold lay-up periods can last for 12 months to several years it is important that this equipment is preserved such that it can be put back into operation when required upon reactivation of the vessel. Preservation methods will aim to protect these systems from corrosion and seizing of movable parts and will therefore focus on cleaning, controlling temperature and moisture levels and lubricating movable parts.

4.3.2 For main propulsion, thrusters and steering gear, it is important that the preservation measures specific to the equipment type as stated by the OEM is consulted and followed. Typical preservation measures are likely to include cleaning the equipment prior to lay-up and treating the system with anti-corrosion oils. This should be performed at regular intervals during lay-up.

4.3.3 Main propulsion and thrusters should be turned at regular intervals.

4.3.4 Steering gear should be operated at regular intervals.

4.3.5 Oil lubricated stern tubes oil level should be verified regularly.

4.3.6 Software for electrical equipment such as control systems and variable speed drives controllers should be backed up and stored securely ashore.

4.3.7 Batteries for UPS units and battery systems which provide power to propulsion and thruster equipment should be isolated or removed.

4.3.8 It may also be a possibility that thrusters are removed from the vessel prior to cold lay-up. In this instance, the thruster space will be sealed and the thruster stored appropriately ashore.

5 Vessel control systems including dynamic positioning

5.1 Associated DP equipment

5.1.1 The typical equipment relevant to the DP system in this category includes:

- dynamic positioning control system (DP)
- power management system (PMS)
- vessel alarm and monitoring system (VMS).

5.2 Hot Lay-up

5.2.1 During hot lay-up of a DP vessel, the vessel control systems will likely remain fully operational.

5.2.2 Although the vessel may have reduced crew during hot lay-up period, preservation of vessel control systems will be by way of normal planned maintenance schedules.

5.2.3 Vessel control systems require protection against the effects of harmful temperatures and high humidity and during hot lay-up, the HVAC system will be operational and will control the environment in electrical equipment spaces.

5.2.4 Battery systems and UPS units which provide power to the vessel control systems will remain on trickle charge and regularly inspected as part of normal planned maintenance schedules.

5.3 Cold Lay-up

5.3.1 Cold lay-up of a DP vessel will involve shutting down all vessel control system equipment (although some critical safety equipment such as fire and gas systems may remain powered). As cold lay-up periods can last for 12 months to several years it is important that vessel control system equipment is preserved such that it can be put back into operation when required upon reactivation of the vessel. Preservation methods will aim to protect these systems from corrosion and will therefore focus on cleaning and controlling temperature and moisture levels.

5.3.2 Preservation of control system equipment during a cold lay-up period should be in accordance with the procedures stated by the OEM.

5.3.3 All electrical equipment spaces should be cleaned and fitted with dehumidifiers and heaters or coolers to maintain normal temperatures and humidity levels. Some control system equipment may be protected by a suitable temporary cover.

5.3.4 Any electrical equipment located outside the dehumidified spaces should be covered by plastic sheets and have desiccant inside.

5.3.5 Position reference systems and environmental sensors located exterior to the vessel should be suitably protected or removed and stored.

5.3.6 Any rented position reference systems should be removed and returned to the supplier.

5.3.7 Software for control system equipment such as operator stations, controllers and remote I/O units should be backed up and stored securely ashore.

5.3.8 Batteries for UPS units and battery systems should be isolated or removed.

SECTION 4 REACTIVATION

1 Introduction

1.1 Overview

1.1.1 The extent of the reactivation measures required for DP equipment will differ greatly depending on the length of time that the vessel was in lay-up and the degree of preservation measures applied. The typical reactivation measures are discussed for hot and cold lay-up in Articles [2] to [5].

In addition, requirements for DP system testing upon reactivation from lay-up are described in Sec 5.

1.1.2 This Section is specific for equipment relating to the dynamic positioning system and discusses the typical reactivation actions following hot and cold lay-up scenarios. For guidance on all general vessel equipment reactivation (hull, safety systems, personnel etc.) refer to NI 545.

2 Engines and marine auxiliary systems

2.1 Hot lay-up

2.1.1 During hot lay-up, all engines and marine auxiliary systems will typically be functional and they will have been preserved by routine maintenance, checklists and procedures. Therefore, reactivating these systems should consist of a general check and function test to ensure they are fully ready for operation.

2.1.2 Additional checks may be required after a long period of hot lay-up.

2.2 Cold lay-up

2.2.1 During cold lay-up, the engines would have been preserved by sealing the air intakes and exhaust outlets, lubricating moving parts and regular turning.

2.2.2 Pipework and heat exchangers for marine auxiliary systems would have been preserved by draining, cleaning and leaving open to dehumidified air.

2.2.3 Reactivation of the vessel involves removal of all preservation equipment, such as temporary protective covers, heaters/coolers and dehumidifiers/desiccants. The equipment should then be thoroughly cleaned and inspected, with particular attention given to corrosion, damage or general wear and seizing of mechanical components.

2.2.4 For diesel engines and marine auxiliary systems, it is important that the reactivation measures specific to the engine type as stated by the OEM is consulted and followed.

2.2.5 Engine alarms and shutdowns should be tested.

2.2.6 Engine lubricating oil should be sampled before use.

2.2.7 Valves for marine auxiliary systems should be tested, lubricated and configured according to operational checklists. The systems should be checked for leaks.

2.2.8 The HVAC system will require to be running and external dampers opened.

2.2.9 Any flexible hoses for fuel and cooling systems should be inspected and replaced if required.

3 Electrical systems

3.1 Hot lay-up

3.1.1 During hot lay-up, all electrical systems will typically be functional and they will have been preserved by routine maintenance, checklists and procedures. Therefore, reactivating these systems should consist of a general check and function test to ensure they are fully ready for operation.

3.1.2 Additional checks may be required after a long period of hot lay-up.

3.2 Cold lay-up

3.2.1 During cold lay-up, the vessel electrical systems would be powered down and they would have been preserved by temporary covers, heaters/coolers and dehumidifiers/desiccants.

3.2.2 Reactivation of the vessel involves removal of all preservation equipment, such as deck diesel generators and all associated cabling, temporary protective covers, heaters/coolers and dehumidifiers/desiccants. The electrical equipment should then be thoroughly cleaned and inspected, with particular attention given to corrosion, damage, general wear and loose connections.

3.2.3 Reactivation of electrical equipment following a cold lay-up period should be in accordance with the procedures stated by the OEM.

3.2.4 An insulation resistance test of all power and lighting circuits, motors and switchgear should be performed. The results should be recorded and any faults rectified.

3.2.5 Switchgear should be cleaned and moving parts lubricated.

3.2.6 Switchgear opening/closing should be function tested (remotely and locally).

3.2.7 Synchronising of generators and bus ties should be function tested (remotely and locally).

3.2.8 UPS units and battery systems whose batteries were removed or isolated for cold lay-up should have batteries connected and charged.

3.2.9 Electrical protection settings should be verified.

4 Propulsion and thrusters

4.1 Hot lay-up

4.1.1 During hot lay-up, all propulsion, thrusters and steering gear systems will typically be functional and they will have been preserved by routine maintenance, checklists and procedures. Therefore, reactivating these systems should consist of a general check and function test to ensure they are fully ready for operation.

4.1.2 Additional checks may be required after a long period of hot lay-up.

4.2 Cold lay-up

4.2.1 During cold lay-up, the propulsion, thrusters and steering gear systems would be preserved by cleaning, heaters/coolers, dehumidifiers/desiccants and lubricating movable parts.

4.2.2 Reactivation of the vessel involves removal of all preservation equipment, such as temporary protective covers, heaters/coolers and dehumidifiers/desiccants. The equipment should then be thoroughly cleaned and inspected, with particular attention given to corrosion, damage, general wear, loose connections and seizing of mechanical components.

4.2.3 It is important that the reactivation measures specific to the propulsion/thruster/steering gear type as stated by the OEM is consulted and followed.

4.2.4 The lubricating oil for reduction gears, bearings and stern tubes should be analysed before use.

4.2.5 The propulsion/thruster/steering gear control systems software versions should be reviewed for any potential safety critical software updates issued by the OEM.

4.2.6 Any thrusters which have been removed prior to cold lay-up will require to be re-installed and fully commissioned according to OEM procedures.

4.2.7 For thruster lubrication, cooling and compressed air systems, reactivation measures will generally be covered by the guidance given for marine systems in [2.2].

4.2.8 For transformers, variable speed drives and thruster motors, reactivation measures will generally be covered by the guidance given for electrical systems in [3.2].

5 Vessel control systems including dynamic positioning

5.1 Hot lay-up

5.1.1 During hot lay-up, all vessel control systems will typically be functional and they will have been preserved by routine maintenance, checklists and procedures. Therefore, reactivating these systems should consist of a general check and function test to ensure they are fully ready for operation.

5.1.2 Additional checks may be required after a long period of hot lay-up.

5.2 Cold lay-up

5.2.1 During cold lay-up, the vessel control systems would be powered down and they would have been preserved by temporary covers, heaters/coolers and dehumidifiers/desiccants.

5.2.2 Reactivation of control system equipment following a cold lay-up period should be in accordance with the procedures stated by the OEM.

5.2.3 Reactivation of the vessel involves removal of all preservation equipment, such as temporary protective covers, heaters/coolers and dehumidifiers/desiccants. The vessel control systems equipment should then be thoroughly cleaned and inspected, with particular attention given to corrosion, damage, general wear and loose connections.

5.2.4 UPS units and battery systems which supply the DP/PMS/VMS control system equipment whose batteries were removed or isolated for cold lay-up should have batteries connected and charged.

5.2.5 When the DP/PMS/VMS operator stations are powered up, the time and date displayed on each station should be verified. If the time and date is not correct it is likely that the battery on the motherboard requires replacing.

5.2.6 Any DP equipment, such as position reference systems or environmental sensors, which were removed from the vessel prior to cold lay-up will likely require to be re-installed. Care should be taken to install them at the same locations, in the same orientation, and the offsets in the DP software verified before use.

5.2.7 The DP/PMS/VMS software versions should be reviewed for any potential safety critical software updates issued by the OEM.

5.2.8 Once DP environmental sensors and position reference systems are inspected and powered up, their readings should be verified.

SECTION 5 REACTIVATION TESTING AND DP FMEA MANAGEMENT

1 Introduction

1.1

1.1.1 The extent of DP system testing upon reactivation from lay-up will vary depending on the length of time the vessel has been idle.

1.1.2 The testing should aim to confirm that the performance of the vessel has not deteriorated during lay-up and the DP redundancy concept maintains intact.

1.1.3 Testing should consist of:

- re-commissioning survey
- DP system testing
- other testing considerations.

2 Re-commissioning survey

2.1 Description

2.1.1 Details of the re-commissioning survey is described in NR467, Pt A, Ch 3, App 1.

3 DP systems testing

3.1 Overview

3.1.1 The survey and testing requirements of DP vessels are given in IMO MSC/Circ. 645 for vessels constructed on or after 1st July 1994 and IMO MSC/Circ. 1580 for vessels constructed on or after June 9, 2017.

3.1.2 If the vessel has been in hot lay-up for less than a year, it is possible that the vessel's annual survey is still valid and therefore testing upon reactivation of the vessel will be minimal.

3.1.3 If during the lay-up period, the vessel's annual survey has expired, it will be due its annual survey or periodical survey, depending on the time since the vessel's initial survey.

3.1.4 For any vessel whose annual survey has expired, consideration should be given to performing the following tests upon reactivation. These tests may be included in the annual or periodic testing scope:

- full load tests of all diesel generators
- full load test of all thrusters

- 30 minutes battery endurance tests of all DP-related UPS units and battery systems
- demonstration of position keeping capability following the vessels Worst Case Failure
- function test of DP operator stations
- position reference system accuracy testing
- rotation test to verify position reference system offsets
- thruster emergency stop functionality
- testing of any protective functions on which the WCFDI is dependent
- verify thruster control from manual levers, independent joystick (if required by the applicable DP notation) and back-up DP control system (if required by the applicable DP notation)
- test of communication systems between important DP areas
- engine alarms and shut-downs.

4 Other testing considerations

4.1

4.1.1 Other testing considerations include:

- any modifications to DP related equipment during the lay-up period should be tested and their failure effects included in the DP FMEA
- any thrusters removed from the vessel for the lay-up period should be fully retested when they are re-installed. Such tests would include, thruster full load tests, command and feedback signal wire breaks, emergency stop circuit functionality and line monitoring (if required by the applicable DP notation). Failure effects should be in accordance with the DP FMEA.

5 DP FMEA

5.1 Introduction

5.1.1 The DP FMEA is a live document and should be kept up to date and reviewed every five years in accordance with industry best practice.

5.1.2 Following hot or cold lay-up, the DP FMEA should be reviewed if:

- modifications have been performed on any equipment relating to the DP system
- the five-yearly review period has elapsed.



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