BSI Standards Publication

Service personnel for the maintenance, thorough examination, operational testing, overhaul and repair of lifeboats (including free-fall lifeboats) and rescue boats (including fast rescue boats), launching appliances and release gear

Part 4: Level 2 in-field competence

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National foreword

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Part 4:
Level 2 in-field competence

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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 Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, SC 1, *Maritime safety.*

A list of all parts in the ISO 23678 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The industry recognises that a major objective is to prevent accidents and incidents from occurring. A global network of competent personnel employed by authorized service providers is vital for lifesaving appliances to remain fit for purpose, sustaining crew confidence and contributing to the prevention of incidents and accidents.

It has been recognized from the new requirements in IMO Resolution MSC.402 (96) for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats (including free-fall lifeboats) and rescue boats (including fast rescue boats), launching appliances, and release gear (henceforth referred to as "the IMO Requirements") adopted 19th May 2016 and entering into force 1st January 2020, that it is necessary to develop an International Standard. This necessity is based on the requirement in paragraph 7.1.1 of the IMO Requirements:

"*Employment and documentation of personnel certified in accordance with a recognized national, international or industry standards as applicable, or a manufacturer's established certification programme. In either case, the certification programme shall comply with section 8 for each make and type of equipment for which service is to be provided;*"

This document and the associated ISO/PAS 23678-1, ISO/PAS 23678-2 and ISO/PAS 23678-3 have been developed to achieve three key objectives.

1. The first objective was to develop training documents that would support the IMO Requirements, section 7, paragraph 7.1.1.

2. The second objective was to develop training documents that would provide a consistent, reliable, and standardised approach to training and provide a clear auditable trail for interested parties to grant authorisation supporting the IMO Requirements, section 3, to approved service providers.

3. The third objective was to develop training documents that would enable personnel certified by authorized service providers to develop and maintain competencies identified by industry experts to a level that enables them to competently work unsupervised on equipment covered by this document.

This document has been developed by identifying common design features in relation to survival craft, davits, winches and release gear makes and types for which service is to be provided. This has been achieved by conducting professional discussions with disciplined experts, to obtain the appropriate information to develop a training programme that is fit for purpose. Successfully completing ISO/PAS 23678-2, ISO/PAS 23678-3 and ISO/PAS 23678-4 enables personnel certified by an authorized service provider to meet the IMO Requirements, section 7, paragraph 7.1.1, and section 8.

The ISO/PAS 23678-series on service technician training consist of:

— Part 1: Guidance to training providers; describes the competence route of the candidate and the resources that the training provider needs to deliver the training.

— Part 2: Initial training; describes the training programme for initial familiarisation and induction training that is classroom education. The training programme focuses on introducing individuals to the complex terminology, rules and regulations, organisations, health and safety that a service technician needs to understand in order to carry out their role.

— Part 3: Level 1 training; describes the controlled environment education and training delivered at a training school. The training programme focuses on the technical training for type specific lifesaving appliances.

— Part 4: Level 2 in-field competence; describes the requirements for initial in-field and ongoing competence assessments.

NOTE ISO/PAS 23678-1, ISO/PAS 23678-2 and ISO/PAS 23678-3 are referencing typical in-house/training school training programmes. ISO/PAS 23678-4 is typical in-field performance of the personnel trained and recording of their competence

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Service personnel for the maintenance, thorough examination, operational testing, overhaul and repair of lifeboats (including free-fall lifeboats) and rescue boats (including fast rescue boats), launching appliances and release gear —

Part 4: Level 2 in-field competence

1 Scope

This document establishes a uniform, safe and consistent approach to the in-field competence assessment of personnel for the maintenance, thorough examination, operational testing, overhaul and repair of lifeboats (including free-fall lifeboats) and rescue boats (including fast rescue boats), launching appliances and release gear.

It also provides the necessary information for interested parties to grant authorization, effectively evaluate and audit training, supporting the IMO Requirements, Section 3.

It specifies the Level 2 in-field initial and ongoing competence assessment for personnel certified by a manufacturer or an authorized service provider to carry out maintenance, thorough examination, operational testing, overhaul and repair of lifeboats (including free-fall lifeboats) and rescue boats (including fast rescue boats), launching appliances and release gear.

The training an individual receives whilst following a development process is covered in ISO/PAS 23678-2 and ISO/PAS 23678-3.

The competence requirements contained in this document provide a clear description of performance in-field in respect to:

a) what practitioners are expected to do;

b) the underpinning knowledge and skills they require to enable them to do what is expected;

c) how they can demonstrate what is expected of them;

d) how their performance can be assessed.

This document is intended to be used in conjunction with ISO/PAS 23678-1, ISO/PAS 23678-2 and ISO/PAS 23678-4.

This document is applicable to the following types of lifeboats (including free-fall lifeboats), rescue boats (including fast rescue boats), launching appliances and release gear.

Survival craft types:

a) single fall totally enclosed lifeboats with sprinkler and air systems;

b) twin fall totally enclosed lifeboats with sprinkler and air systems;

c) partially enclosed lifeboats;

d) tender lifeboats;

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e) freefall lifeboats;

f) open lifeboat;

g) inflatable rescue boats;

h) rigid rescue boats;

i) semi ridged inflatable rescue boats;

j) rigid fast rescue boats;

k) rigid inflatable fast rescue boats.

Survival craft propulsion system types:

a) inboard diesel engines;

b) outboard engines;

c) propeller drives;

d) jet drives.

Davit types:

a) gravity single and twin fall outrigger;

b) hydraulic single pivoting/luffing;

c) hydraulic multi pivot/luffing;

d) telescopic;

e) gravity roller track;

f) gravity free fall primary;

g) free fall hydraulic secondary;

h) A-frame hydraulic;

i) single arm slewing (manual, electric);

j) davits with stored power systems.

Winch types:

a) twin drum;

b) single drum;

c) gravity-lowering, electric hoisting;

d) gravity-lowering hydraulic hoisting;

e) hydraulic hoisting and lowering.

Hook release system types:

a) on-load/off load(load not over centre);

b) on-load/offload (load over centre);

c) off load;

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d) freefall hydraulic;

e) automatic.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the terms, definitions and abbreviated terms given in ISO/PAS 23678-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Level 2 in-field competence

4.1 General

This competence document is designed to meet the in-field and ongoing competence assessment for Level 2 Service Technicians.

Any inspection, maintenance, thorough examination, operational testing, overhaul, and repair shall be carried out according to the maintenance service manuals and associated technical documentation developed by the manufacturer.

See Annex B for examples of certificates.

See Annex C for checklists to assess Level 2 service personnel competence.

4.2 Candidate pre-requisites for Level 2 Service Technician in-field assessment

To be assessed against the competence statements, candidates shall either have appropriate evidence of experience in-field, or be deemed competent in relation to ISO/PAS 23678-2 and ISO/PAS 23678-3. They shall either:

a) have successfully completed Level 1 Service Technician controlled environment technical education and training; or

b) provide evidence to verify a satisfactory level of previous experience (see ISO/PAS 23678-1:2020, 4.7.6, for acceptable evidence requirements).

4.3 Competence unit/element titles

4.3.1 Unit 1 — Work, health, and safety issues while conduction activities on board

a) element 1.1: the people that need to be informed, and consulted with, prior to and during the scope of work;

b) element 1.2: the documentation that needs to be raised, checked, verified interpreted and completed prior to and during interventions;

c) element 1.3: safety checks that need to be carried out prior to commencing work;

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d) element 1.4: the equipment that needs to be examined and attached to safely carry out the work scope.

4.3.2 Unit 2 — Annual inspection, maintenance, thorough examination, repair and operational test for lifeboats, rescue boats fast rescue boats their launching appliances and release gear

a) element 2.1: davit annual thorough examination;

b) element 2.2: davit annual maintenance;

c) element 2.3: winch thorough examination;

d) element 2.4: winch annual maintenance;

e) element 2.5: launching appliance annual operational test;

e) element 2.6: lifeboat annual thorough examination;

f) element 2.7: rescue boat (including fast rescue boat) annual thorough examination, additional competence requirements;

g) element 2.8: lifeboat, rescue boat (including fast rescue boats) annual maintenance;

h) element 2.9: release gear annual thorough examination;

i) element 2.10: release gear annual maintenance;

j) element 2.11: release gear annual operational function test.

4.3.3 Unit 3 — 5-year thorough examination overhaul and operational overload test for lifeboats, rescue boats fast rescue boats their launching appliances and release gear

a) element 3.1: launching appliance overhaul;

b) element 3.2: lifeboat, rescue boat (including fast rescue boat) overhaul;

c) element 3.3: release gear overhaul;

d) element 3.4: launching appliance and release gear 5-year operational overload test.

5 Level 2 Service Technician in-field competence units

5.1 Unit 1 — Work, health and safety issues while conducting activities on-board

Upon satisfactory completion of this unit, candidates shall have demonstrated they can interface effectively with the applicable personnel involved with the intervention; review, complete and evaluate the relevant documentation required for the work scope; implement safety and operating procedures to ensure the intervention is carried out in a safe and responsible manner.

5.1.1 Element 1.1 — The people that need to be informed, and consulted with prior to and during the scope of work

5.1.1.1 Element scope: this element is about being able to interface effectively with relevant personnel to ensure the scope of the intervention is understood and carried out in effective and safe manner.

5.1.1.2 Competence requirements: in achieving this element, candidates shall have:

a) informed the person in charge the scope of the intervention;

b) conducted a tool box talk with all personnel involved;

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c) ensured there are no conflicting work scopes;

d) supplied valid and reliable information relevant to the nature and scope of the intervention at appropriate times to applicable personnel (PIC, superintendent, RO, safety officer);

e) liaised with applicable personnel in a professional manner at appropriate times to resolve problems which may occur (PIC, superintendent, RO, safety officer, company operations manager); and

f) carried out comprehensive debrief with applicable personnel to identify the outcomes of the intervention.

5.1.1.3 Underpinning knowledge requirements are as follows:

a) understand and convey the scope of the intervention to relevant personnel;

b) know the information required to conduct a tool box talk;

c) understand maintenance routines and plans;

d) familiarity with workplace reporting procedures;

e) understand statutory health and safety requirements.

5.1.2 Element 1.2 — The documentation that needs to be raised, checked, verified, interpreted and completed prior to and during interventions

5.1.2.1 Element scope: this element is about ensuring the correct documentation has been raised, checked and verified before commencing work; interpreting the appropriate documents for the scope of work; and completing the documentation so a statement of fitness can be issued.

5.1.2.2 Competence requirements: in achieving this element, candidates shall have:

a) completed the appropriate documentation prior to commencing the work scope; permits to work, toolbox talks, risk assessments, method statements;

b) identified situations relating to the work scope that requires a risk assessment to be undertaken;

c) reviewed and verified that all items listed in checklists for the weekly/monthly inspections supporting SOLAS regulations III/20.6 and III/20.7 have been completed;

d) checked and verified that records of inspections and routine on-board maintenance have been carried out by the ship's crew;

e) ensured that relevant technical documentation is available for the work scope;

f) identified which items of equipment require certification and ensure it is current and corresponds to the applicable equipment;

g) interpreted and applied the relevant technical information in relation to the work scope, manufacturer's manuals and associated technical documentation, job specific procedures; and

h) completed reports and checklists that accurately identify the outcome of the intervention, remedial work scope and replacement parts if required.

5.1.2.3 Underpinning knowledge requirements for this element are as follows:

a) understand how to interpret and apply risk assessments applicable to the scope of work;

b) understand the technical documentation requirements for the work scopes;

c) identify equipment that requires certification;

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d) identify, interpret and verify the requirements of SOLAS Regulations III/20.6 and III/20.7;

e) identify and interpret the requirements of SOLAS Regulations III/20.4;

f) identify and understand the information required to complete reports and check lists;

g) understand maintenance routines and plans;

h) understand statutory health and safety requirements;

i) familiarity with workplace reporting procedures.

5.1.3 Element 1.3 — Safety checks that need to be carried out prior to commencing work

5.1.3.1 Element scope: this element is about implementing safety and operating procedures prior to commencing work to ensure accidents and incidents do not occur.

5.1.3.2 Competence required: in achieving this element, candidates shall have:

a) selected and donned appropriate personal protective equipment;

b) undertaken the required exterior visual safety checks to confirm decks, gratings and handrails are secure and free from excessive corrosion, slip and trip hazards;

c) undertaken the required visual safety checks of launching appliances for lifeboats (including freefall lifeboats), rescue boats (including fast rescue boats), mechanical restraints, winch brake status, davit structure, sheaves, fall wires, foundations;

d) undertaken the checks to confirm the release gear is locked and safe prior to turning out; and

e) undertaken the checks and confirm by visual inspection that the launching appliance is operating correctly whilst the survival craft is being turned out.

5.1.3.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of distinct types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand how to interpret and apply the manufacturer's documentation, company and customer operational procedures in relation to the work scope;

f) understand how to evaluate the condition of wire ropes;

g) understand how to evaluate corrosion levels;

h) understand how to evaluate alignment, deformation;

i) understand, interpret and being able to apply IMO Resolution MSC.48 (66), paragraph 4.4.7.6.14.

5.1.4 Element 1.4 — The equipment that needs be examined and attached to safely carry out the work scope

5.1.4.1 Element scope: this element is about thorough examination and evaluation of the condition of mechanical restraints and the actions required to safely attach them to lifeboats (including freefall lifeboats) and rescue boats (including fast rescue boats).

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5.1.4.2 Competence required: in achieving this element, candidates shall have:

a) carried out a thorough visual examination of mechanical restraints to confirm they are safe to use, gripe wires, bowsing in tackle, tricing pendants, hanging off/maintenance pendants;

b) carried out a thorough visual examination to evaluate the condition of the load path pad eyes, maintenance hangar beams, release gear hanging off attachment point, hook assembly legs, keel pins, keel shoes and bolts;

c) identified, interpret and apply manufacturers, customer and company procedures in relation to fitting mechanical restraints, maintenance pendants, secondary safety devices, bowsing in tackle; and

d) confirmed the survival craft is safe to board.

5.1.4.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of distinct types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand how to interpret and apply the manufacturer's documentation, company and customer operational procedures in relation to the work scope;

f) understand how to evaluate the condition of wire ropes;

g) understand how to evaluate corrosion levels;

h) understand how to evaluate alignment, deformation;

i) understand, interpret and being able to apply IMO Resolution MSC.48 (66), paragraph 4.4.7.6.14.

5.2 Unit 2 — Annual maintenance, thorough examination, and operational test for lifeboats (including free fall lifeboats) rescue boats (including fast rescue), launching appliances and release gear

Upon satisfactory completion of this unit, candidates shall have demonstrated they can carry out the annual maintenance through examination and operational tests effectively supporting the IMO Requirements, section 6, and manufacturer's technical documentation, in a responsible and safe manner.

5.2.1 Element 2.1 — Davit annual thorough examination.

5.2.1.1 Element scope: this element is about carrying out the annual thorough examination supporting the IMO Requirements, paragraphs 6.2.9.1 to 6.2.9.4, in accordance with manufacturer's service manuals and associated technical information for specific types of davits (see Table A.1) to confirm they operate correctly and are in a satisfactory condition.

5.2.1.2 Competence required: in achieving this element, candidates shall have:

a) undertaken a thorough visual and where applicable physical examination of the davit foundation to evaluate corrosion; welds, bolts;

b) undertaken a thorough visual examination of the davit structure to evaluate, corrosion, alignment, deformation; frames, pedestals, columns, tracks, ramps;

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c) undertaken a thorough visual examination of davit arms to evaluate, corrosion, alignment, deformation, freedom of movement, excessive free play;

d) undertaken a thorough visual and physical examination of rollers and sheaves to evaluate freedom of movement, excessive free play and lubrication;

e) carried out a thorough visual inspection of the fall wire to evaluate damage, corrosion, lubrication;

f) carried out a thorough visual inspection of floating blocks, master links, shackles, turnbuckles or other connections to evaluate corrosion, freedom of movement, excessive free play, deformation;

g) undertaken a thorough visual and where applicable intrusive examination of slewing and worm gearing to evaluate freedom of movement, excessive free play, damage, lubrication levels;

h) undertaken a thorough visual examination of hydraulic system components; reservoirs, filters, hoses, ferrules, valves, gauges, rams to evaluate corrosion, damage, fluid levels;

i) undertaken a thorough visual examination of stored power system components; accumulators, pipework, hose, connections gauges, to evaluate corrosion, damage, pre-charge and final pressures; and;

j) undertake the required checks to confirm electrical systems, starter box, limit switches, wiring and motors operate correctly and are in a satisfactory condition.

5.2.1.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of distinct types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand the hazards of working with high voltage systems;

e) understand statutory health and safety requirements;

f) understand safety protocols in relation to pressure systems;

g) basic understanding of hydraulic systems;

h) understand basic electrical circuitry;

i) understand how to evaluate levels of corrosion;

j) understand wire rope construction, inspection and discard criteria;

k) understand how to evaluate acceptable levels of free play in relation to davit components;

l) understand how to evaluate alignment, deformation;

m) understand the design and construction characteristics of specific designs of davits;

n) understand how interpret and apply manufacturers information to safely operate specific designs of davits;

o) understand how to interpret and apply the manufacturer's manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

p) understand which tools and equipment to use and how to use them safely.

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5.2.2 Element 2.2 — Davit annual maintenance

5.2.2.1 Element scope: this element is about carrying out the annual thorough maintenance in accordance with the manufacturer's service manuals and associated technical information for specific types of davits (see Table A.1) to confirm they operate correctly and are in a satisfactory condition.

5.2.2.2 Competence required: in achieving this element, candidates shall have:

a) applied the correct lubricants to greasing points, bearings, internal worm gear, sheave bearings, luffing cylinders;

b) applied the correct lubricants to wire ropes;

c) changed gearing oil in; external slewing gear, reduction gearing;

d) changed oil in hydraulic reservoir; and

e) tested stored power accumulator pre-charge pressures and replenish where required.

5.2.2.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of different types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand safety protocols in relation to pressure systems;

f) basic understanding of hydraulic systems;

g) understand the various type of lubricants and suitability for use on specific components;

h) understand the design and construction characteristics of specific designs of davits;

i) understand how to interpret and apply the manufacturer’s manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

j) understand which tools and equipment to use and how to use them safely.

5.2.3 Element 2.3 — Winch thorough examination

5.2.3.1 Element scope: this element is about carrying out the annual thorough examination supporting the IMO Requirements, paragraph 6.2.9.5, in accordance with manufacturer’s service manuals and associated technical information for specific types of winches (see Table A.1) to ensure they operate correctly and remain in a satisfactory condition.

5.2.3.2 Competence required: in achieving this element, candidates shall have:

a) undertaken a thorough visual and where applicable physical examination of the winch foundation, bolts or welds to evaluate corrosion and torque settings where applicable;

b) undertaken a thorough visual examination of the winch assembly to evaluate corrosion, leaks, damage;

c) dismantled the brake assembly to undertake a thorough examination of a static brake with friction pads to evaluate wear using a measuring device;

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d) dismantled the brake assembly to undertake a thorough examination of a static brake that is mechanically operated and has multiple disks with friction pads, to evaluate wear using a measuring device;

e) dismantled the brake assembly [if required], to undertake a thorough examination of a static brake that is hydraulically operated and has multiple disks with friction pads, to evaluate wear using a measuring device;

f) dismantled the brake assembly to undertake a thorough examination of a centrifugal brake with friction pads to evaluate wear using a measuring device;

g) undertake a thorough examination of a lowering brake with a hydraulic pump to evaluate corrosion, satisfactory operation;

h) ensure the static brake arm lever is adjusted to the correct position;

i) undertaken the checks to establish the hand crank is operating correctly;

j) undertaken a thorough visual examination of remote-control systems and confirm they operate correctly;

k) undertaken a thorough examination of a clutch to evaluate condition, operation, lubrication;

l) undertake the checks required to confirm gearing operates correctly and is in a satisfactory condition; pinions, spur gears, reduction gearing, chains, planetary gearing;

m) undertaken a thorough examination of hydraulic system components; operating levers, hand pumps, reservoirs, filters, hoses, connections, valves, gauges, accumulators to evaluate corrosion, damage, fluid levels, pressures;

n) carried out the checks required to establish the electrical system is in a satisfactory condition;

o) carried out the checks required to establish the electric motor operates correctly and is in a satisfactory condition; and

p) operated distinct types of winches (see Table A.1) to ensure they are operating correctly.

5.2.3.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care, and limitations of distinct types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand the hazards of working with high voltage systems;

e) understand statutory health and safety requirements;

f) understand safety protocols in relation to pressure systems;

g) basic understanding of hydraulic systems;

h) basic understanding of electrical systems;

i) understand how to evaluate levels of corrosion;

j) understand how to evaluate wear of brake components and acceptable levels of free play in relation to winch components;

k) understand how to evaluate alignment, deformation;

l) understand the design and construction characteristics of specific designs of winch;

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m) understand how interpret and apply manufacturers information to safely operate specific designs of winch;

n) understand how to interpret and apply the manufacturer's manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

o) understand which tools and equipment to use and how to use them safely.

5.2.4 Element 2.4 — Winch annual maintenance

5.2.4.1 Element scope: this element is about carrying out the annual maintenance in accordance with the manufacturer's service manuals and associated technical information for specific types of winches (see Table A.1) to confirm they operate correctly and are in a satisfactory condition.

5.2.4.2 Competence required: in achieving this element, candidates shall have:

a) changed oil in primary and secondary gearing;

b) applied the correct lubricants to greasing points, bearings, shafts, bearings;

c) carried out the action required to change oil for distinct types of clutch;

d) carried out the actions to test stored power accumulator pressures and replenish; and

e) carried out the actions required to adjust gear chains to stay within specific tolerances.

5.2.4.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of different types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand safety protocols in relation to pressure systems;

f) basic understanding of hydraulic systems;

g) understand the various type of lubricants and suitability for use on specific components;

h) understand the design and construction characteristics of specific designs of winch;

i) understand how to interpret and apply the manufacturer's manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

j) understand which tools and equipment to use and how to use them safely.

5.2.5 Element 2.5 — Winch of launching appliance annual operational test

5.2.5.1 Element scope: this element is about carrying out the annual operational test supporting the IMO Requirements, in accordance with manufacturer's service manuals and associated technical information for specific types of winches (see Table A.1) to confirm they operate correctly.

5.2.5.2 Competence required: in achieving this element, candidates shall have:

a) undertaken the actions required to carry out a dynamic load test of the winch by lowering the boat or equivalent load until it reaches its maximum lowering speed and before it hits the water apply the brake; and

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b) following the test, the stressed structural parts applicable to the type of winch shall be re-inspected where the structure permits the re-inspection.

5.2.5.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of different types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand the design and construction characteristics of specific designs of launching appliance;

f) understand how to interpret and apply the manufacturer's manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

g) understand which tools and equipment to use and how to use them safely;

h) IMO Requirements, paragraph 6.2.10;

i) understand how to calculate loads;

j) understand how to carry out the operational test of a winch using a simulated survival craft load.

5.2.6 Element 2.6 — Lifeboat annual thorough examination

5.2.6.1 Element scope: this element is about carrying out the annual thorough examination in accordance with the manufacturer's service manuals and associated technical information for specific types of lifeboats (see Table A.1) to confirm they operate correctly and are in a satisfactory condition.

5.2.6.2 Competence required: in achieving this element, candidates shall have undertaken:

a) a thorough visual examination of the boats structure to confirm it is free from damage, cracks, osmosis;

b) the required checks regarding the loose equipment to confirm the requirements of the LSA Code are being met;

c) a through visual examination of access hatches to confirm they operate correctly and in satisfactory condition; hinges, seals;

d) a through visual examination of non-access hatches to confirm they operate correctly and are in a satisfactory condition; windows, seals, vents;

e) a thorough visual examination of external fittings to confirm they operate in a satisfactory condition; to include handrails, lifelines, skates and lashings;

f) a through visual examination of the external boundaries as far as practicable of the void spaces to evaluate their condition;

g) a visual examination of the bilge drain plug and hull fitting to confirm it operates correctly and is in a satisfactory condition;

h) a through visual examination of the engine to confirm it is in satisfactory condition and running correctly; throttle/gear box controls and cables, gauges, primary and secondary starting systems;

i) the required checks to evaluate the engine and gear box lubrication levels;

j) the required checks to confirm the engine coolant system is in a satisfactory condition and operating correctly; belts, pipes, pumps, keel cooler, expansion tanks, cap seals, coolant levels;

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k) the required checks of the fuel system to confirm it is in a satisfactory condition and operating correctly; tanks, lines, valves, filters;

l) a thorough visual examination of the exhaust system to confirm it is free of corrosion and leaks (drain valves if fitted are operating correctly);

m) a thorough visual examination of the engine bed to confirm it is in a satisfactory condition; mounts, fixings;

n) the required checks of the electrical system to confirm the components are operating correctly and are in a satisfactory condition; alternator, belts, external charging systems, battery, isolators, wiring loom, internal and external lights;

o) the required checks of the propulsion system to confirm it operates correctly and is in a satisfactory condition; stern tube, stuffing box, shafts, couplings, propeller, bearings;

p) the required checks of the maneuvering system to confirm it operates correctly and is in a satisfactory condition; control cables, rudder, pintles, skeg, emergency tiller, hydraulics;

q) the required checks of the bailing system to confirm it operates correctly and is in a satisfactory condition; pumps, seals, pipework, diaphragms;

r) the required checks of the sprinkler system to confirm it operates correctly and is in a satisfactory condition; pumps, belts, valves, pipework, nozzles;

s) the required checks of the air system to confirm it operates correctly and is in a satisfactory condition; cylinders, hoses, connection, valves, gauges;

t) the required checks to confirm the self-righting/anti entrapments system to confirm it operates correctly and is in a satisfactory condition; cylinders, gauges, valves, hoses, bag;

u) a thorough examination of the internal fittings to confirm they operate correctly and are in a satisfactory condition; seatbelts, lighting; and

v) a thorough examination of all operating instructions to confirm they are in a satisfactory condition.

5.2.6.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of different types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand the design and construction characteristics of specific designs lifeboats;

f) basic understanding of hydraulic systems;

g) basic understanding of electrical systems;

h) have an awareness of the risks related to working with pressure systems;

i) understand marine diesel engine maintenance;

j) understand how to interpret and apply the manufacturer's manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

k) understand which tools and equipment to use and how to use them safely;

l) IMO Requirements, paragraph 6.2.3;

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m) IMO Resolution MSC.48 (66), paragraph 4.4.8.

5.2.7 Element 2.7 — Rescue boats (including fast rescue boats) annual thorough examination, additional competence requirements

5.2.7.1 Element scope: this element is about carrying out the annual thorough examination in accordance with the manufacturers service manuals and associated technical information for specific types of rescue boats (including fast rescue boats) (see Table A.1) to confirm they operate correctly and are in a satisfactory condition.

5.2.7.2 Competence required: in achieving this element, candidates shall have:

a) carried out a thorough visual examination of lifting equipment and attachment points to confirm they are in a satisfactory condition and their certification is current;

b) undertaken a thorough examination of a lifting yoke including foundation bolts to confirm it is in a satisfactory condition;

c) carried out a through visual examination of fenders/inflatable sponson to confirm they operate correctly and are in a satisfactory condition; non-return valves, air pressure;

d) carried out a through visual examination of an onboard engine to confirm it is in a satisfactory condition and running correctly; spark plugs, throttle/gear box controls and cables, primary and secondary starting systems;

e) undertaken the required checks to confirm an outboard engine coolant system is in a satisfactory condition and operating correctly; intake, outlet, impellor;

f) undertaken the required checks to evaluate the engine and gear box lubrication levels;

e) undertaken the required checks of a jet drive propulsion system to confirm it operates correctly and is in a satisfactory condition; housing, bucket, impellor;

f) undertaken the required checks to confirm the self-righting system operates correctly and is in a satisfactory condition; frame foundation, cylinders, activating mechanisms, hoses, connections, bag;

g) undertaken the required checks to confirm the self-bailing system operates correctly and is in a satisfactory condition; and

h) carried out the actions required to verify the weight of the craft.

5.2.7.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of different types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand the design and construction characteristics of specific designs lifeboats;

f) basic understanding of hydraulic systems;

g) basic understanding of electrical systems;

h) have an awareness of the risks related to working with pressure systems;

i) understand outboard engine maintenance;

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j) understand how to interpret and apply the manufacturer's manuals and associated technical documentation, company and customer operational procedures in relation to the work scope;

k) understand which tools and equipment to use and how to use them safely;

l) understand how to calculate loads;

m) IMO Requirements, paragraph 6.2.3;

n) IMO Resolution MSC.48 (66), paragraphs 5.1.2 and 5.1.3.

5.2.8 Element 2.8 — Lifeboat, rescue boat (including fast rescue boats) annual maintenance

5.2.8.1 Element scope: this element is about carrying out the annual maintenance in accordance with the manufacturers service manuals and associated technical information for specific types of lifeboats, rescue boat (including fast rescue boat) (see Table A.1) to confirm they operate correctly and are in a satisfactory condition.

5.2.8.2 Competence required: in achieving this element, candidates shall have:

a) replaced the engine oil and filter for an inboard diesel engine in accordance with specific specifications;

b) replaced the engine oil and filter for an outboard engine in accordance with specific specifications;

c) replaced the gearbox oil an inboard diesel engine in accordance with specific specifications;

d) replaced the gearbox oil for an outboard engine in accordance with specific specifications;

e) carried out the actions required to replace the fuel filter and ensure any air is removed from the fuel system;

f) removed and replaced a fuel lift pump for an inboard diesel engine;

g) carried out the actions required to replace spark plugs including setting the gap to specific specifications;

h) replenished hydraulic starting and steering system fluid in accordance with specifications;

i) carried out the actions required to remove and replace an impellor for a coolant pump, replace cooling water in accordance with the requirements to ensure the cooling system is working effectively and free from air;

j) carried out the actions to replenish breathing air in cylinders in accordance with specifications; and

k) applied specified lubricants to specific greasing points.

5.2.8.3 Underpinning knowledge requirements for this element are as follows:

a) uses, care and limitations of distinct types of personal protective clothing and equipment;

b) understand how to interpret and apply risk assessments applicable to the scope of work;

c) understand company and customer policies and operational procedures related to health and safety;

d) understand statutory health and safety requirements;

e) understand safety protocols in relation to pressure systems;

f) basic understanding of hydraulic systems;

g) basic understanding of electrical systems;

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