GUIDANCE NOTES
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CHINA CLASSIFICATION SOCIETY

GUIDELINES FOR MANAGEMENT OF APPROVAL OF SUPPLIERS AND PERSONNEL QUALIFICATION

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CONTENTS

PREFACE

1 As a refinement to CCS rules, the Guidelines specify principles to be followed during the approval or assessment of qualification of service suppliers (hereinafter referred to as "suppliers")/personnel providing testing services specified in the rules and extended testing services to ships and offshore installations surveyed by CCS, and minimum requirements for initial approval/assessment and maintenance of validity.

2 The Guidelines consist of three parts, including: supplier approval, assessment of examination organizations, qualification approval of external personnel.

2.1 Part One applies to approval of firms providing service to ships (including ocean-going fishing vessels) or offshore installation owners, the results of which will be used as survey basis by the surveyor, as well as the maintenance of validity.

2.2 Part Two applies to assessment of examination organizations.

2.3 Part Three applies to qualification approval of external personnel (welders).

Note: For assessment of the examination center of certification of non-destructive testing personnel and qualification and certification of non-destructive testing personnel, see CCS Rules for Qualification and Certification of Non-Destructive Testing Personnel.

PART ONE SUPPLIER APPROVAL

Chapter 1 General

1.1 Application

PART ONE applies to suppliers of the following categories, including suppliers providing service for ocean-going fishing vessels:

(1) Suppliers engaged in thickness measurements of ships or metal structures on offshore units above water (TM)

Items: thickness measurements of CCS-classed ships; thickness measurements of metal structures of offshore units above water; thickness measurements of hulls of non CCS-classed Chinese ships engaged on domestic voyages; thickness measurements of hulls of ocean-going fishing vessels.

(2) Suppliers carrying out an in-water survey on ships and mobile offshore units (UW)

Including diver operation, Remotely Operated Vehicle (ROV);

Items: underwater visual testing (UWVT); underwater magnetic particle testing (UWMT); underwater ultrasonic testing (UWUT); underwater AC field measurement (UWACFM); underwater thickness measurement (UWTM).

(3) Suppliers engaged in inspections and maintenance of fire extinguishing equipment and systems, including inspections and maintenance of self-contained breathing apparatus (EE)

Items:

Testing, maintenance and filling of marine portable/wheeled CO_2, dry powder, foam, halohydrocarbon, heptafluoropropane and aerosol fire extinguishers; (A)

Weighing, testing, maintenance, filling, pipe blowing tests, tightness tests and hydraulic tests of marine CO_2, dry powder, foam, halohydrocarbon, heptafluoropropane and aerosol fixed firefighting systems; (B)

Testing and maintenance of marine fire fighter equipment and EEBDs or hydraulic testing and filling of air cylinders; (C)

Hydraulic testing, testing and maintenance of marine cylinders with working pressure not more than 30 MPa (including hydraulic testing and filling of CO_2 cylinders for rafts with working pressure not more than 32 MPa); (D)

Testing and maintenance of fixed fire detection and fire alarm devices onboard; (E)

Testing and maintenance of fixed sprinkler and water mist fire-fighting systems onboard; (F) Testing and maintenance of immersion suits and inflatable lifejackets. (G)

(4) Suppliers engaged in maintaining and servicing inflatable liferafts, inflatable lifejackets, immersion suits, hydrostatic release units, inflatable rescue boats and marine evacuation systems (IL)

Items: liferafts; hydrostatic release units; marine evacuation systems; inflatable rescue boats; inflatable lifejackets; immersion suits; hydraulic testing and filling of CO_2 cylinders for liferafts.

(5) Suppliers engaged in inspections and testing of radio communication equipment; inspection, performance testing and maintenance of Automatic Identification Systems (AIS); inspection, performance testing and maintenance of Ship Security Alert System (SSAS)(SR)

Items: testing of radio communication equipment; annual performance testing of shipboard Automatic Identification Systems (AIS); testing of Ship Security Alert System (SSAS).

(6) Suppliers engaged in annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR) (VDR)

(7) Suppliers engaged in shore-based maintenance of equipment of Global Maritime Distress and Safety System (GMDSS)

(8) Suppliers engaged in the servicing and maintenance of lifeboats/rescue boats, launching appliances for boats/rafts, release mechanisms for boats/rafts (LS)

Items: maintenance, thorough examination, operational testing, overhaul and repair of the following equipment: lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats; launching appliances and on-load and off-load release gear for lifeboats (including primary and secondary means of launching appliances for free-fall lifeboats), rescue boats, fast rescue boats and davit-launched liferafts.

(9) Suppliers engaged in non-destructive testing of ships, marine products, metal structures of offshore units above water (NDT)

Items: including but not limited to radiographic testing (RT), ultrasonic testing (UT), magnetic particle testing (MT), penetration testing (PT), digital radiography (RT-D, including CR or DR), visual testing (VT), time of flight diffraction (TOFD) and phased array ultrasonic testing (PAUT),

electromagnetic testing (including eddy current testing (ET) and/or AC field measurement (ACFM)).

(10) Suppliers engaged in measurements of noise level on board ships, underwater radiated noise and vibration on board ships (NM)

Items: measurements of noise level on board ships, underwater radiated noise and vibration on board ships.

(11) Suppliers engaged in tank testing of Energy Efficiency Design Index (EEDI) (TT)

Items: ship model testing carried out for early verification of ship's energy efficiency design index (EEDI).

(12) Suppliers engaged in speed measurement for sea trials (SSM)

Items: providing speed measurement for sea trials.

(13) Suppliers engaged in condition monitoring of machinery installations (CM)

Items: suppliers providing condition monitoring of machinery installations. Suppliers can provide condition monitoring and health assessment of machinery installations according to the actual operation conditions of machinery installations, assistant decision-making[1] and/or condition-based maintenance[2].

(14) Suppliers engaged in lubricating oil analysis of propeller shafts, diesel engines and condition monitoring of machinery installations (LO)

Items: lubricating oil analysis of propeller shafts, diesel engines and condition monitoring of machinery installations.

(15) Suppliers engaged in survey using Remote Inspection Techniques (RIT) as an alternative means for Close-up Survey of the structure of ships and mobile offshore units (RIT)

Items: Close-up Survey of ships' structure and mobile offshore units' structure by remote inspection techniques; in-water close-up survey of the internal compartments by Remotely Operated Vehicle (ROV); thickness measurement using RIT.

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[1] Assistant decision-making: refer to Chapter 4 of Rules for Intelligent Ships. The analysis and assessment results and operation recommendations provided by suppliers are not bases for CCS to open equipment and carry out survey.

[2] Condition-based maintenance: refer to Chapter 4 of Rules for Intelligent Ships. The condition-based maintenance plan provided by suppliers can be basis for CCS to open equipment and carry out survey.

(16) Suppliers engaged in ultrasonic leak detection for ships (UD)

Items: leak detection is carried out by ultrasonic wave on closing devices of the ship such as cargo hold hatch covers, small hatch covers, watertight/weathertight doors, windows, ramp doors, bow and stern doors, etc.

(17) Suppliers engaged in Cable Transit Seal Systems inspection on ships and mobile offshore units (CTS)

Items: inspection of CTS systems on ships and mobile offshore units.

1.2 Definitions

1.2.1 Unless specified otherwise by each Chapter, terms related to PART ONE are defined as follows:

(1) Service Supplier (here after referred to as “supplier”): A person or company, not employed by an IACS Member, who at the request of an equipment manufacturer, shipyard, vessel's owner or other client acts in connection with inspection work and provides services for a ship or a mobile offshore unit such as measurements, tests or maintenance of safety systems and equipment, the results of which are used by surveyors in making decisions affecting classification or statutory certification and services.

(2) Manufacturer: A company that manufactures equipment required to be periodically serviced and/or maintained.

(3) Agent: A Person or Company authorised to act for or to represent a Manufacturer or approved/recognized supplier.

(4) Subsidiary*: A physical organization partly or wholly owned by a Manufacturer or approved/recognized supplier. "Subsidiary" means an organization invested and established by a supplier enterprise legal person and carries out servicing and testing activities externally within the quality control scope of the supplier’s head office. The supplier's subsidiary is to have corresponding office space, working place and equipment, and to employ fixed staff. A subsidiary of a supplier in China may be registered with a business license by an independent legal person, or registered with a local business license (with a separate unified social credit code) by a person in charge authorized by an independent legal person.

*Note: This definition of "subsidiary" only applies to CCS approval and management of qualification of suppliers, which is not the same as the definition of Regulations of the People's Republic of China on the registration and management of enterprise legal person.

(5) Subcontractor: A Person or Company providing services to a Manufacturer or approved/recognized supplier, with a formal contract defining the assumption of the obligations of the supplier.

(6) Initial approval: the approval project accepted at the first time or application newly included in the scope of the supplier for approval of CCS or applying for approval of CCS for the first time.

(7) Renewal audit: the audit applied by a CCS-approved supplier within 3 months before the expiry date of the certificate to maintain the validity of the approval and obtain the full-term approval certificate of the next certificate cycle.

(8) Additional audit: non-periodical audit required to be carried out within the validity of the approval due to various reasons. After the satisfactory audit, CCS endorses the approval certificate or changes the certificate.

(9) Operator: personnel of the supplier who carries out the inspection and maintenance service of the ship, mobile offshore unit and their equipment, and is responsible for on-site inspection, testing, maintenance, operation, data and result recording, as well as report preparation. Operators are to have adequate experience and be familiar with the operation of any necessary equipment. Operators are to have had a minimum of one year tutored on-the-job training/internship. Where it is not possible to perform internal training/internship, a program of external training/internship may be considered as acceptable.

(10) Supervisor[3]: personnel of the supplier who supervises all services provided. Supervisors are to have at least two years of experience as an operator within the activity for which the supplier is approved in similar businesses and be responsible for monitoring, record and report auditing of services provided by the supplier. In actual service, the supervisor may perform the job of an operator (in the same project, the supervisor may perform only one of the jobs).

(11) Technical director: for the supplier in China, the supplier is to appoint a technical director to

[3] It is acceptable for the supplier to use the name of "Quality inspector" in the position setting, whose responsibility is equivalent to that of supervisor.

guide, supervise and manage the service of the supplier, and issue servicing and testing certificates/records/reports. The technical director is to have working experience as a supervisor and is to work for no less than 6 months. In actual service, the technical director may perform the job of a supervisor or an operator (in the same project, the supervisor may perform only one of the jobs).

(12) Servicing and maintenance personnel: the general term for operators, supervisors and technical persons in charge above.

(13) Anniversary date: the month and day of each year on which the certificate expires.

1.3 General requirements

1.3.1 The supplier is to satisfy the requirements of relevant chapters and sections in accordance with service category, in addition to the requirements of Chapter 1.

1.3.2 If the State where the supplier is located and/or the flag State has special requirements, these requirements are to be complied with.

1.3.3 After the supplier is approved in accordance with the requirements of the Guidelines, the services provided and the reports or certificates issued can only be accepted by CCS after the services are performed by servicing and maintenance personnel within the approval scope using the approved equipment in the approved premises (where applicable) according to regulations of the Administration, international conventions, CCS rules, etc.

1.3.4 The supplier has the responsibility and obligation to guarantee the authenticity and accuracy of the service data provided by it, and is to bear the corresponding legal and economic liabilities.

1.3.5 The supplier is to be registered in accordance with the laws and regulations of the country or region where it is located. The supplier in China is to be a legal person. If the applicant is a subsidiary or department of an independent legal person institution and does not have the legal person status itself, it is to provide the letter of authorization of the legal person representative. When the investor or subordinate institution of the applicant is the ship owner, management company, ship designer/research institute, shipyard or its subsidiary company, institutions of higher learning, the subordination and interest relationship of the applicant is to be explained, and

a written statement that the supplier is to provide service in an independent and impartial manner is to be made.

1.3.6 The supplier is to assign servicing and maintenance personnel with training certificates issued or accepted by CCS to perform the corresponding services provided by the supplier, and is obliged to keep confidential the information of the inspected units involved. The supplier is to have fixed servicing and maintenance personnel who can only work for one supplier during one period. If the supplier has subsidiaries, its servicing and maintenance personnel can only work in one of the subsidiaries during one period. CCS does not accept supplier's hiring of personnel from other organizations in the form of hiring, temporary hiring, etc., to meet the human resource requirements of the Guidelines (unless specifically required in Chapter 10, PART ONE of the Guidelines, i.e. Suppliers Engaged in Non-destructive Testing for Ships, Marine Products and Metal Structures of Offshore Units above Water).

The supplier in China is to sign a fixed employment contract conforming to national laws and regulations with the servicing and maintenance personnel, take necessary safety precautions to ensure the personal safety of the service personnel, such as records of paying social insurance, and providing employees with compensation insurance in case of accidental injury or providing proof of remitting individual income tax as evidence of employing fixed employees. In areas outside China, the supplier is to provide CCS auditors with proof of employment in accordance with local laws[4].

1.3.7 The supplier is to be equipped with work place and working environment conforming to the requirements of each chapter of the Guidelines.

1.3.8 The supplier is to be equipped with the equipment, facilities, tools and instruments conforming to the requirements of each chapter of the Guidelines. CCS does not accept leasing equipment of other institutions to meet the equipment requirements of the Guidelines (unless specifically required in each chapter of PART ONE of the Guidelines).

1.3.9 The supplier is to establish a documented Quality system complying with the most current

[4] The supplier is to be careful to employ persons of advanced age (above the local legal working age), and to legally employ such persons if necessary, and to submit documents of health certificate and measures for ensuring safety at work.

version of ISO 9000 series; if the supplier has subsidiaries, the supplier's quality management system is to include all subsidiaries and obtain a third-party quality management system certificate. If there are special requirements for quality management system certification in each chapter of the Guidelines, such requirements are to be complied with. If the subsidiary has established an independent quality management system, the supplier is to demonstrate its complete quality control capability over the subsidiary. The other system certificates obtained are at least to cover the system contents required by UR Z17 of IACS and be agreed by CCS.

1.3.10 If the supplier includes a subsidiary, the workplace, working environment, servicing and maintenance personnel and equipment of the subsidiary are to meet the requirements of each chapter.

1.3.11 The quality manual, procedure document, operation instruction, operation manual and other management documents and operation instruction documents of the supplier are to be prepared in a language that can be easily read and understood by relevant personnel when performing their duties. International conventions, rules, circulars, guidelines, special requirements of flag States, technical standards, equipment specifications, manufacturers' maintenance manuals (where applicable) and other relevant technical documents are to be in a language that can be easily read and understood by the company's servicing and maintenance personnel.

1.3.12 Testing and maintenance activities and internal management files are to be established, and the relevant records are to be kept properly for at least 5 years. Video data and equivalent materials (where applicable) of the maintenance and testing operations required by each chapter are to be properly stored in accordance with the provisions of each Chapter.

1.3.13 Certificates, reports and record formats of repair, inspection and maintenance issued by the supplier are to comply with relevant conventions, regulations of flag States, requirements of CCS rules and meet the needs of CCS survey.

1.4 Online Application of CCS Supplier Approval

1.4.1 Clients of the suppliers can log on to CCS supplier system module by either of the two following means:

(1) keying in https://www.ccs-service.net/loginNew.jsp in the INTERNET browser to log on to the online client service system (or seek guidance from CCS and register first);

(2) logging on to CCS website www.ccs.org.cn, on the front page selecting:

"online service" → "online client service center" to enter the login page (or seek guidance from CCS and register first).

1.4.2 In principle, the applicant is to submit approval application in the supplier approval module. If the application cannot be submitted online or the required documents and materials cannot be uploaded due to the internet environment and other factors of the location of the applicant, the application may also be submitted to a CCS branch whose location/business area covers the applicant by fax, E-mail or mail. For details of the application format, see CCS website www.ccs.org.cn "information center" → "downloading survey application forms and agreements" – "training and suppliers" – "application form for supplier approval" or inquire a CCS branch whose location/business area covers the applicant. After the supplier makes the initial application in the supplier system of CCS, if CCS accepts the application, the applicant will get the account number and password to log into the system for application review, supplier service registration and other matters.

1.4.3 Upon completion of each CCS approved service, the supplier approved by CCS is to register the service information through the supplier approval module in a timely manner if the CCS surveyor is on the site to witness or monitor the service process, and the CCS surveyor will evaluate the service.

1.4.4 The supplier is to maintain the data in the system in a timely manner to ensure that the contact information is valid.

1.5 Initial approval

1.5.1 The followings must be completed and selected for initial approval application (applicants outside China may complete the followings in English):

(1) name of the applicant, in Chinese and English;

(2) registration address of the applicant, in Chinese and English;

(3) office/operation/servicing location address of the applicant, in Chinese and English;

(4) contact person and contact information of the applicant (telephone, fax, mobile phone, email address, etc.);

(5) category of the supplier and service items intended to be applied for approval by the applicant;

(6) Chinese and English name and address of the subsidiaries intended to be applied for approval;

(7) list of the servicing and maintenance personnel intended to be applied for approval (according to the requirements of the form);

(8) for suppliers in China, the manufacturer's technical support information (when the service category is applicable, it refers to personnel training, overhaul and maintenance manuals, special maintenance tools, materials and spare parts provided or designated by the manufacturer); suppliers outside China are to submit the manufacturer's authorization and training information when the service category is applicable.

1.5.2 The followings must be uploaded together with initial approval application:

(1) brief introduction of the supplier (company name, registration/operation/office/maintenance address, contact person and contact information, service business scope, company history, etc.);

(2) legitimate and valid business license/registration certificate (legal person authorization document[5]);

(3) service experience (table) of the supplier in the category intended for approval (if applicable);

(4) evidence that the supplier has established a quality system and has been running the system effectively (such as quality management system certificate, system audit report (where applicable), quality management manual, content of the system documents);

(5) evidence of approval/endorsement by the Administration or other third-parties, if any;

(6) fixed service site floor plan (plane dimension, area and height of the space are to be marked if required by the service category);

(7) list of servicing and maintenance personnel documenting training and experience within the relevant service area, and qualifications according to recognised national, international or industry standards, as relevant, including list of personnel, servicing and maintenance personnel qualifications/training certificates, personal experience in relevant service categories and posts,

[5] It refers to the document of the legal entity authorizing the supplier to carry out the service.

labor contract and necessary evidence (e.g. such as the social security/personal tax record paid by the supplier for the individual, commercial insurance for accidental injury for suppliers in China; suppliers outside China are to abide by local laws and submit proof of hiring the employee lawfully);

(8) list of equipment, facilities, tools required by the service and list of verification and calibration documents of instruments and measuring equipment;

(9) list of nominated agents, subsidiaries and subcontractors (if any).

1.5.3 When the supplier's application for initial approval has been accepted, the followings are to be submitted to the auditors for document audit in addition to the documents mentioned above:

(1) organisation chart (including subsidiaries to be covered by the approval);

(2) for suppliers in China that require technical support from manufacturers, evidences to prove that the supplier can service the particular makes and models of equipment for which approval is sought, including: manufacturer's maintenance training certificate on certain types of equipment, list of manufacturer's maintenance manuals (the version number and scope of application are to be specified), list of manufacturer's special tools, list of manufacturer's specific equipment, materials or spare parts. For suppliers outside China, where authorization from manufacturers is required according to different service category requirements (or flag State government requirements), manufacturer's documentary evidence that the Service Supplier has been authorized or licensed to service the particular makes and models of equipment for which approval is sought is to be provided;

(3) list of equipment, facilities, tools and instruments required by the service (including list of verification and calibration documents of measuring equipment[6]);

(4) service operation instruction document (including a guide for operators of such equipment);

(5) list of technical standards applicable to the service scope;

(6) list of qualified suppliers[7] and relevant documents (for suppliers in China, qualification

[6] Including verification/calibration certificates of newly purchased testing equipment.

[7] Refers to the scenario that when the supplier provides maintenance and testing service for ships, offshore installations and equipment, raw materials, fittings, spare parts, etc., consumed in the process need to be purchased from external suppliers; before the purchase the supplier is to evaluation such external suppliers regularly, and form a list of qualified suppliers, and the supplier can only choose the external supplier from the

certificates of business subcontractors for service outside the approval scope of the applicant and agreements signed by both parties are to be submitted; for suppliers outside China, documents showing subcontractors are in compliance with CCS relevant requirements for suppliers are to be submitted, including evidence of compliance with the quality management system requirements);

(7) operator training procedures, annual training plan (internal and external);

(8) check lists and record, report, certificate formats for recording results of the services provided;

(9) the most current version of ISO9000 quality management system certification covering the applied items and the latest system audit report, records of non-conformities and implementation documents of corrective measures (applicable to suppliers with subsidiaries, suppliers otherwise required by other chapters);

(10) catalogue of quality management system documents and quality manual;

(11) safety management documents (including emergency plans, etc.);

(12) documented procedures for communication with the crew/customers prior to commencing work, so that it is safe to decommission the equipment onboard the ship being maintained, and to provide a safe environment for work;

(13) information on the other activities which may present a conflict of interest, where applicable;

(14) relevant systems of customer complaint and corrective actions;

(15) photos of permanent sites, facilities and equipment related to the service.

1.5.4 Evaluation before initial approval

After receiving the application for initial approval, CCS will evaluate the basic information of the applicant (e.g. site size and area, service workshop height, personnel qualification and experience, essential equipment, quality management system, etc.) and decide whether to process the application according to the evaluation result. If the evaluation confirms that the basic information above does not comply with the requirements of the Guidelines and cannot be changed in the short term, the applicant fails in the evaluation, and CCS will inform the reasons for failure in written form in a timely manner. For applicants holding approval certificates of other classification societies and having relatively good performance, or applicants previously providing service to

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list of qualified suppliers to buy the above purchased products.

CCS-classed ships under the supervision of CCS surveyors with relatively good service quality, and there are no RO-related accidents, quality complaint or PSC/FSC RO-related detention after service, the evaluation for initial approval may be exempted after the evaluation of CCS.

1.5.5 After CCS accepts the application for initial approval, CCS is to review the applicant of initial approval, including document review, site audit and practical operation verification.

1.5.5.1 Document review

Document review is intended to check the integrity and authenticity of the documents submitted by the applicant. If any non-conformities or areas for improvement are found, the applicant is to be notified in writing to supplement or amend. Attention is to be paid to the following requirements:

(1) For subsidiaries and departments of the unit with independent legal entity, when applying for CCS supplier approval, the independent legal entity business license of the superior unit and legal entity authorization letter signed and stamped by the independent legal entity are to be submitted.

(2) Training of personnel: The supplier is responsible for the training of its servicing and maintenance personnel. The servicing and maintenance personnel of the supplier are to have training/qualification certificates issued or accepted by CCS so as to conform to a recognised national, international or industry standard as applicable. Where such standards do not exist, the supplier is to define standards for the training and qualification of its servicing and maintenance personnel relevant to the functions each is authorised to perform. The servicing and maintenance personnel are to also have adequate experience and be familiar with the operation of any necessary equipment.

(3) Supervision: The supplier is to provide supervision for all services provided.

(4) Personnel records: The supplier is to keep records of the approved inspectors. The record is to contain information on age, formal education, identification document, training and experience for the services for which they are approved.

(5) Equipment and facilities: The supplier is to have the necessary equipment and facilities for the service to be supplied. A record of the equipment used is to be kept and available. The record is to contain information on maintenance and results of calibration and verifications. The auditors are

to assess and record the validity of previous measuring results when the equipment is found not to conform to requirements. The auditors are to take appropriate action on the equipment affected, such as measures to prevent the re-use of the non-conforming instruments and equipment, re-verification of the testing equipment, and judgment of whether the previous measurement results should be rejected, etc.

(6) Control of data: When computers are used for the acquisition, processing, recording, reporting, storage, measurement assessment and monitoring of data, the ability of computer software to satisfy the intended application is to be documented and confirmed by the supplier. This is to be undertaken prior to initial use and reconfirmed as necessary.

Note: Commercial off-the-shelf software (e.g. word processing, database and statistical programmes) in general use within their designed application range may be considered to be sufficiently validated and do not require any subsequent confirmation.

(7) Work procedures: The supplier is to have documented work procedures covering all services intended to be applied for approval.

(8) Subcontracting: For suppliers in China, according to the provisions of the Administration, for any part of the services provided exceeding the approval scope, subcontracting may be adopted. The supplier is to submit to CCS evidence of control measures of service quality of the subcontractor, e.g. qualification documents of the subcontractor, agreement of both parties, or control plan for the subcontractor and relevant records. For suppliers outside China, unless specifically required by the local Administration, CCS permits the suppliers to subcontract their service within their approval scope. The suppliers are to be responsible for the service quality of the subcontractors and the subcontractors are to comply with CCS requirements for supplier approval and establish quality management system complying with (12) below.

(9) Verification: The supplier is to verify that the services provided are carried out in accordance with approved procedures.

(10) Reporting: The report is to be prepared in a form approved by or acceptable to CCS. The report is to detail the results of inspections, measurements, tests, maintenance and/or repairs carried out. For detailed requirements, refer to each chapter. The report submitted after each

service is to include necessary supporting documents of the supplier, e.g. copy of the approval certificate (including annex), personnel training certificates (where applicable, for details see the requirements of subsequent chapters), measurement/calibration certificate of the testing equipment used in the service.(Suppliers outside China are to provide authorization from the manufacturer according to requirements of different service categories, relevant conventions, requirements of the government of the flag State.)

(11) Documented instructions/procedures/operation guidelines/techniques of the supplier are to be available for the recording of damages and defects found during inspection, servicing and repair work. This documentation is to be made available upon request.

(12) The quality system requires that the supplier with subsidiaries obtain certificate of compliance certified in accordance with the most current version of ISO 9000 series covering subsidiaries (suppliers specifically required in other chapters need also comply with this requirement).

For the supplier without subsidiaries, its documented Quality system is to contain those listed below unless otherwise specified by each chapter.

① code of conduct for the relevant activity;

② maintenance and calibration of equipment;

③ training programmes for servicing and maintenance personnel;

④ supervision and verification to ensure compliance with operational procedures;

⑤ recording and reporting of information;

⑥ quality management of agents and subcontractors (where applicable);

⑦ job preparation;

⑧ periodic review of work process procedures, complaints, corrective actions, and issuance, maintenance and control of documents.

CCS accepts that the supplier establishes a documented quality system complying with the most current version of ISO 9000 series and covering the elements above.

If the equipment manufacturer (and/or its service provider) applies to CCS for inclusion of its designated agents and/or subsidiaries in the approval, its quality system complying with the most

current version of ISO 9000 series must be certified. The system must include effective control of agents and/or subsidiaries of the manufacturer (and/or its service provider). The designated agents and/or subsidiaries must also establish a quality system complying with the most current version of ISO 9000 series.

If the supplier is not certified according to the most current version of ISO 9000 series but is certified according to other systems, upon quality system evaluation of CCS to the supplier's head office and subsequent audit of its agents or subsidiaries confirming they follow the quality system of the supplier's head office, such system certificates may be accepted.

(13) If a supplier applies for inclusion of its subsidiaries in the approval, the application material is to include the necessary information of the subsidiaries. If the subsidiaries have established an independent quality management system, quality management system certificate adopting the same standard as that of the supplier's head office is also to be provided. At the same time, the supplier is to provide evidence showing that the supplier's head office has complete control on quality over its subsidiaries.

1.5.5.2 On-site audit

After the documents submitted by the applicant for review are found satisfactory, CCS auditor will arrange on-site audit with the applicant. On-site audit is a conformity audit of the applicant's site, equipment, servicing and maintenance personnel and quality management system elements related to the supplier's services in accordance with the requirements of the Guidelines and the approved applicant's documents. If the supplier applies for the inclusion of its subsidiary in the initial approval, the subsidiary is to be audited on site in addition to the supplier's head office. The selection principles of subsidiary audit are as follows:

(1) suppliers with 2 subsidiaries or less

Generally on-site audit is to be conducted for each subsidiary to confirm that the ISO 9000 quality management system implemented by the supplier's head office is well implemented in the subsidiaries, that the personnel, equipment, site, technical documents of the subsidiaries conform to the requirements, that the subsidiaries are capable of testing service in the applied items, and that the service quality is guaranteed.

(2) suppliers with 3 subsidiaries or more

Initial approval and renewal audit may be conducted by means of sampling. The sampling proportion is generally not less than two subsidiaries, and subsequent periodic audits are to be carried out on different subsidiaries as much as possible. For the supplier for which fixed location is required, for approval of its subsidiaries, on-site audit is to be carried out for each subsidiary in principle.

For subsidiaries with an independent and certified quality management system, on-site audit is to be carried out separately.

The subsidiary and approved servicing and maintenance personnel are included in the approval certificate after the audit is found satisfactory.

1.5.5.3 Practical operation verification

The applicant is to prove its actual operational capability and ability to correctly record data results and issue certificates and reports through actual operation, simulation operation and demonstration on the service site, so as to convince CCS auditors that the applicant has the service capability to implement the proposed scope of approval.

If practical operation verification is not completed during the on-site audit due to the applicant, CCS will leave a memo on the approval certificate, and the applicant is to apply to CCS for additional audit of practical operation verification when carrying out the first relevant service. In general, practical operation verification memos in the approval certificate issued are to be eliminated by CCS unit performing the audit of the supplier. The handling methods are as follows:

(1) When the practical operation verification location is within the jurisdiction of the unit carrying out approval audit

Upon application for additional audit from the applicant, the auditors carry out the supplier audit, and the memos are eliminated after satisfactory completion of additional audit, and the certificate is re-issued for the applicant;

(2) When the practical operation verification location is outside the jurisdiction of the unit carrying out approval audit

Upon application for additional audit from the applicant, the auditors carrying out the supplier

audit entrust the surveyor[8] in CCS unit the jurisdiction of which covers the operation verification location to carry out operation verification. Upon completion of practical operation verification, the applicant is to submit the shipboard verification report or record signed by the surveyors carrying out practical operation verification to the auditors performing the supplier audit. The auditors conducting supplier approval are to verify the submitted shipboard verification report or record, eliminate the memos after satisfactory completion, and issue a new certificate cover page and/or attached page for the applicant.

1.6 Approval certificate

1.6.1 Upon satisfactory completion of the approval audit, CCS will issue a Certificate of Approval stating that the supplier's service operation system has been found to be satisfactory and that the results of services performed in accordance with that system may be accepted and utilised by CCS Surveyors in making decisions affecting classification or statutory certification, as relevant. The Certificate is to clearly state the type and scope of services and any limitations or restrictions imposed. The approved suppliers will be included in CCS list of approved service suppliers.

1.6.2 The Certificate is valid for up to three (3) years. During this period, the supplier is to ensure that valid technical support/authorization (if applicable) can be obtained from the equipment manufacturer to maintain its approved conditions. If the supplier is unable to maintain the validity of the manufacturer's technical support or authorization (if applicable) within the scope of the approval, the supplier is to apply for a certificate change to CCS.

1.7 Maintenance of approval

In order to maintain the validity of approval, the applicant is to apply for renewal audit and necessary additional audit in a timely manner.

1.7.1 Renewal audit

1.7.1.1 The approved supplier is to fill in application according to the requirements of 1.5.1 and submit/upload the following documents as a minimum:

(1) A description of the changes made by the supplier since the initial approval or the last renewal

[8] The survey is to have the qualification for survey of the ship and its equipment.

audit (such as site, equipment and their verification and calibration, personnel and their training qualifications, qualified suppliers, applicable service standards, quality management system, etc., if any);

(2) Business license/registration certificate;

(3) Service experience (table) and work summary since the initial approval or the last renewal audit;

(4) Evidence that the supplier has established and effectively operated the quality management system (such as the quality management system certificate (where applicable), the system audit report, the system file directory, etc.);

(5) valid evidence (if any) showing approval/endorsement of the Administration or other third parties.

1.7.1.2 At the renewal audit, CCS checks any alteration to the certified service operating system of the supplier, effectiveness of corrective measures for non-conformities in the last audit and the supplier testing and servicing files since the last audit to verify whether the relevant provisions of the file have been implemented according to 1.5.5.1 document review and 1.5.5.2 on-site audit.

1.7.1.3 For approved suppliers, in principle, practical operation verification is to be combined with renewal audit by CCS if the new scope of service is applied for or record shows that the pervious service quality has some issues during the renewal audit. For the former case, practical operation verification may only be required for the newly added approval items. If practical operation verification are impractical prior to the issuance of the certificate, it is to be handled according to 1.5.5.3.

1.7.1.4 For approved suppliers, renewal audit is in general to be completed within 3 months before the expiry date of the original certificate, the new certificate is to be valid for up to 3 years from the next day after the expiry date of the original certificate. If renewal audit is completed more than 3 months before the expiry date of the original certificate, the new certificate is to be valid for up to three years from the date of completion of renewal audit.

1.7.1.5 The certificate becomes invalid if the renewal audit has been applied for but is not completed before the expiry date of the certificate. When the certificate is invalidated, the supplier

cannot perform relevant suppliers' services accepted by CCS. If the renewal audit is completed within 3 months after the expiry of the certificate, the validity of the new certificate is not to exceed 3 years from the day right after the expiry date of the original certificate. If the certificate is invalid for more than 3 months and the renewal audit has not been completed, the renewal audit is to be terminated and re-applied for in accordance with 1.7.1.6.

1.7.1.6 If the application for renewal audit is submitted within 3 months after the expiry date of the certificate, the supplier is to explain in written form the reason for not timely applying for renewal audit. After CCS confirms that its explanation is consistent with the objective facts, CCS will carry out renewal audit. The validity of the new certificate is not to exceed three years from the day right after the expiry date of the original certificate. If the application for renewal audit is submitted 3- 6 months after the expiry date of the certificate, the supplier is to explain in written form the reason for not timely applying for renewal audit and to submit the full set of audit information. After CCS confirms that its explanation is consistent with the objective facts, CCS will carry out audit within the scope of initial approval (evaluation before approval may be exempted), and the validity of the new certificate is not to exceed 3 years from the date of completion of the audit. If the application for renewal audit is not submitted within 6 months after the expiry date of the certificate, initial approval is to be re-applied for.

1.7.1.7 Approvals for the categories of service suppliers granted before the date of implementation of the Guidelines by CCS may remain valid as stated in the respective certificates for a period up to but not exceeding 3 years. Renewals of such certificates must be carried out in accordance with the Guidelines.

1.7.2 Additional audit

1.7.2.1 In any one of the following cases, additional audit is to be carried out:

(1) the effectiveness of the corrective measures for non-conformities found in the audit;

(2) if the approved supplier is changed as that mentioned in 1.8.1;

(3) if the approved supplier is involved in complaint and safety accident;

(4) if the defects leading to PSC and flag State detention are due to the service of the supplier;

(5) if the notification or information that the qualification of thickness measurement (TM)

suppliers approved by CCS is withdrawn by any other classification society is received, and it is known that the qualification of the supplier approved by CCS is withdrawn by other classification society due to reason not as that in 1.9.1(1);

(6) if the supplier requests to reinstate the certificate that is suspended by CCS within 6 months;

(7) if CCS surveyors have witnessed/monitored the service process on site when the supplier is providing service and give score not more than 2 points to the supplier;

(8) other cases for which an additional audit is deemed necessary.

1.7.2.2 If the servicing and maintenance personnel leave one supplier for another supplier, the supplier previously employing the servicing and maintenance personnel is to apply for additional audit to CCS to guarantee the validity of the approval certificate. After the approval certificate of the supplier of whose personnel is leaving for another supplier is changed, the supplier currently employing the servicing and maintenance personnel can apply for additional audit to CCS and change the approval certificate so that the newly employed personnel can be included in the scope of approval. For the supplier providing servicing and testing services in fixed locations as required by the Guidelines, whose servicing and maintenance personnel are transferred from one subsidiary to another, the supplier's head office is to apply to CCS for additional audit and change the approval certificate.

1.7.2.3 The application for additional audit and the submission/upload requirements are to be the same as descriptions and the relevant supporting evidence documents of 1.7.1.1(1).

1.7.2.4 At additional audit, CCS will audit the matters involved in accordance with the requirements of 1.5.5.1 and 1.5.5.2, and carry out practical operation verification where necessary.

1.7.2.5 After the additional audit is satisfactorily completed, CCS will endorse in the additional audit endorsement column. If the certificate information has been changed, CCS will change the cover page or attached page of the certificate, and the validity period is the same as that of the original certificate.

1.7.3 The supplier is to register the service in the CCS supplier system before the service, so that CCS can know the supplier service updates in a timely manner. For supplier services conducted simultaneously with CCS ship survey, CCS surveyors monitor supplier services on the site, and

make an evaluation of the supplier's services, which will serve as an element for CCS to determine in the renewal audit of the supplier whether the approval is still valid.

1.8 Change of approval

1.8.1 Change of approval applies to the following situations:

(1) change in the items of the approved category;

(2) change in supplier name, address, main equipment, servicing and maintenance personnel and/or qualifications, and relocation of the organization;

(3) change in the supplier service quality management system approved.

1.8.2 The above changes made to the approved suppliers are to be notified to CCS immediately, and an additional audit is to be applied for. The additional audit may also be carried out in conjunction with the renewal audit.

1.8.3 If change of approval is deemed to be likely to result in a change in the quality of service of the supplier, reference is to be made to the initial approval.

1.8.4 After the relevant audit is completed in accordance with 1.7.2.3 and 1.7.2.4, the original approval certificate is to be endorsed. If the certificate information has been changed, CCS will re-issue the cover page/attached page of certificate for the supplier.

1.9 Cancellation, invalidation, suspension and reinstatement of approval certificate

1.9.1 Cancellation of approval certificate

Approval certificate may be cancelled in the following cases:

(1) at the request of the supplier;

(2) where the service was improperly carried out or the results were improperly reported; where the supplier asks employees or operation personnel to reduce the service quality or provide deliberate misrepresentation and false report;

(3) where CCS finds major deficiencies in the approval service operating system of the supplier that cause hidden dangers or accidents of safety and quality and appropriate corrective action is not taken or taken without success by the supplier;

(4) where the supplier intentionally covers up alterations made to the supplier’s Quality System relevant to the approval certificates from CCS;

(5) where the renewal/additional audit has been carried out unsatisfactorily due to major non-conformities;

(6) where wilful acts or omissions are ascertained;

(7) where any deliberate misrepresentation has been made in the process of approval/audit;

(8) where service provided by the supplier is identified and verified as negligence of the supplier and has caused an safety accident of a ship or an offshore unit and relevant equipment;

(9) where the supplier insists on providing relevant services during the period when the certificate is invalid or suspended disregarding relevant provisions;

(10) where the conditions leading to suspension of the certificate are not corrected within specified time and relevant audits are not completed;

(11) where the supplier refuses to be subject to relevant audits specified by the Guidelines;

(12) where the supplier intentionally withholds relevant necessary materials required by the Guidelines (e.g. monitoring video), or does not keep files, records, reports or statements according to the requirements of the Guidelines;

(13) where the supplier intentionally provide services beyond the approved service category and scope and provide services of unapproved category and scope;

(14) where the supplier allows other units or individuals to carry out servicing and testing services under the name of the supplier;

(15) where the supplier allows unqualified personnel or personnel from other units to carry out service within the approved scope of the supplier.

1.9.2 Invalidation of approval certificate

Approval certificate may be invalidated in the following cases:

(1) if the supplier is cancelled by the Administration of the government or the supplier ceases to operate;

(2) if the service system of the supplier has changed;

(3) if the management or operation system of the supplier is found not in compliance with the requirements, and no corrective action is taken within the stipulated time and the corresponding additional audit is not completed;

(4) if the supplier does not apply for renewal audit in time as required by 1.7.1, leading to incomplete audit within validity of the certificate;

(5) if the supplier in China does not complete CCS periodical supervision according to the provisions of the Administration;

(6) if it is found out that service provided by the supplier exceeds restrictions and scope of the approval certificate.

1.9.3 In the case that the approval of CCS to the supplier's head office includes the approval to its subsidiaries, if the approved qualification of supplier's head office is invalidated or withdrawn, the qualification of its subsidiaries will be automatically invalidated or withdrawn.

1.9.4 CCS will inform the IACS and related Members accordingly for companies engaged in thickness measurements (TM) of hulls of CCS classed ships and of offshore mobile units when their approval is expired or cancelled.

1.9.5 Suspension of approval certificate

Approval certificate may be suspended for 3 to 6 months in the following cases:

(1) if service provided by the supplier is identified and verified as negligence of the supplier and has led to detention of a ship in PSC/FSC inspection;

(2) if any quality problems or any false reports are identified as personal or intentional act of its workers or operators and the company is identified and verified as responsible for management;

(3) if the relevant audits are not completed within the validity of the certificate because the supplier submits the application too late;

(4) if the supplier fails to provide relevant necessary materials required by the Guidelines (e.g. monitoring video), or does not keep files, records, reports or statements according to the requirements of the Guidelines due to objective causes;

(5) if it is verified that customer complaints related to 1.7.2.1(3) are due to the supplier's dereliction of duty.

1.9.6 Reinstatement of approval certificate

1.9.6.1 If relevant audits are completed within 3 months after the approval certificate is invalidated, the approval may be reinstated and the approval certificate re-issued. The validity of

the new certificate is the same as the original certificate.

1.9.6.2 If relevant audits are completed 3 months after the certificate is invalidated, the approval may be reinstated and the approval certificate re-issued. The validity of the new certificate is not more than 3 years from the audit completion date.

1.9.6.3 When the suspension period of the certificate is due, the requirements of 1.9.6.1-1.9.6.2 are to be complied with.

1.9.6.4 A supplier whose approval was cancelled, may apply for initial approval provided that it has corrected the non-conformities which resulted in the cancellation, and CCS is able to confirm that it has effectively implemented the corrective action.

1.9.6.5 CCS will not accept applications for re-approval from suppliers whose approval has been cancelled due to gross negligence such as serious breaches of ethical codes.

1.9.6.6 Servicing and maintenance personnel who seriously violates the code of business ethics is to be disqualified for service, and CCS will no longer accept their service for ships surveyed by CCS.

1.9.7 The cancellation, invalidation, suspension and reinstatement of the supplier's approval certificate will be announced to the public in a timely manner.

Chapter 2 Suppliers Engaged in Thickness Measurements of Ships and Metal Structures on Offshore Units above Water

2.1 Application

2.1.1 This Chapter applies to suppliers engaged in thickness measurement of ships and/or metal structures on offshore units above water.

2.1.2 Suppliers engaged in thickness measurement on ships can be divided into two categories: category A are those that can carry out thickness measurement of all ships (including CCS-classed ships; ships engaged on domestic voyages of Chinese registry; ocean-going fishing vessels) and/or metal structures on offshore units above water while category B are those that can only carry out thickness measurement on non-classed ships engaged on domestic voyages of Chinese registry and/or non-classed ocean-going fishing vessels and metal structures on offshore units above water.

2.2 Personnel

2.2.1 Thickness measurement personnel are to be trained on thickness measurement by CCS or in a training body accepted by CCS and to pass CCS' examination and hold the thickness measurement training certificate for metal structures on hulls/offshore units above water issued by CCS. For thickness measurement suppliers outside China, CCS accepts the qualification certificate of thickness measurement training issued or accepted by other IACS members. Personnel who have not carried out thickness measurement for more than one year are to be re-trained and can only be re-listed in the list of thickness measurement operators of the supplier after having been examined/assessed by CCS or a training body accepted by CCS. Thickness measurement training is to include at least the following:

2.2.1.1 For category A TM suppliers

(1) Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships and Guidelines For Thickness Measurement of Hull (effective version), including work process of thickness measurement, hull strength criterion, thickness measurement requirements for hulls of all ships, thickness measurement requirements for hulls of general dry cargo ships, oil tankers (including double hull oil tankers), combination carriers, bulk carriers (including double skin bulk carriers), chemical tankers, minimum requirements on thickness measurement for special survey

of liquefied gas carriers, location selection in the process of thickness measurement, etc. (applicable to the TM suppliers of ships' hulls);

(2) thickness measurement procedures and requirements for units and installations such as offshore mobile units, floating installations, fixed units in the current effective version of Rules for Classification and Construction of Fixed Offshore Units, Rules for Classification and Construction of Fixed Neritic Units, Rules for Classification of Mobile Offshore Units, Rules for Classification of Offshore Floating Installations, Rules for Construction and Classification of Offshore Single-Point Mooring Installations, Rules for Offshore Oil and Gas Process System (applicable to the TM suppliers of offshore units);

(3) introduction of CCS hull structure and thickness measurement management system[9] (applicable to the TM suppliers of ships' hulls);

(4) relevant quality and safety risk management of thickness measurement firms;

(5) quality management system requirements of thickness measurement firms.

2.2.1.2 For category B TM suppliers

(1) regulations of the Chinese Administration, thickness measurement requirements in Chapter 1, PART TEN of CCS Rules for Classification of Sea-going Steel Ships for ships engaged on domestic voyages and Chapter 5, PART EIGHT of CCS Rules for Classification of Sea-going Steel Ships for ocean-going fishing vessels as well as relevant part in Guidelines For Thickness Measurement of Hull;

(2) those specified in 2.2.1.1(3) to (5) above.

2.2.2 In addition to the requirement of 2.2.1 above, operators are also to have UT-I or above personnel level certification issued or accepted by CCS (e.g. EN 473 level I as amended or ISO 9712 level I as amended)[10] and are to have adequate knowledge of ship structures/offshore installation structures sufficient to elect a representative position for each measurement. Job training/internship of operators is to be at least one year in duration.

2.2.3 In addition to the requirement of 2.2.1 above, supervisors are also to have UT-II or above

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[9] The system software is available on request from CCS.

[10] For suppliers in China, CCS currently only accepts certification for NDT personnel of various levels issued by CCS.

personnel level certification issued or accepted by CCS (e.g. EN 473 level II as amended or ISO 9712 level II as amended)[11], and have at least two years of experience as operators.

2.2.4 For thickness measurement suppliers with subsidiaries, the headquarters are to have supporting capability in technology and personnel and are responsible for the quality, safety and legal liabilities of the subsidiaries.

2.2.5 For thickness measurement suppliers in China, regardless of headquarters or subsidiaries, are to designate technical director of report issuance.

2.2.6 Thickness measurement suppliers of category A

2.2.6.1 Thickness measurement suppliers of category A are to guarantee sufficient operators and supervisors for field operation, recording, preparing and reviewing reports satisfying the business scope and scale of the suppliers as well as technical director of report issuance. During thickness measurement, at least one supervisor and one operator are to be on site to operate and make record. The report is developed by the operator, reviewed by the supervisor and issued by the technical director. Thickness measurement personnel of thickness measurement suppliers of category A are to have English reading, writing and listening skills sufficient for business requirements.

2.2.6.2 For thickness measurement suppliers of category A with subsidiaries, the headquarters and each subsidiary are to be provided with sufficient operators and supervisors satisfying the business scope and scale. The headquarters and subsidiaries of thickness measurement suppliers in China are also to designate technical director of report issuance. The provisions for thickness measurement personnel on site are same as those stated in 2.2.6.1.

2.2.7 Thickness measurement suppliers of category B

2.2.7.1 Thickness measurement suppliers of category B are to guarantee sufficient operators and supervisors for field operation, recording, preparing and reviewing reports satisfying the business scope and scale of the suppliers as well as technical director of report issuance. During thickness measurement, at least one supervisor and one operator are to be on site to operate and make record. The report is developed by the operator, reviewed by the supervisor and issued by the technical director.

[11] Same as 10.

2.2.7.2 For thickness measurement suppliers of category B with subsidiaries, the headquarters and each subsidiary are to be provided with sufficient operators and supervisors satisfying the business scope and scale of the suppliers. The provisions for thickness measurement personnel on site are same as those stated in 2.2.7.1.

2.3 Equipment

2.3.1 Thickness gauges are to be instruments with principles of pulsed echo technique. At least one instrument is to be provided for two crew members and such instruments are to comply with the following requirements:

(1) The instrument can be adapted to different surfaces. On coated surfaces, instruments with pulsed echo technique (digital instruments either with oscilloscope or multiple echoes, single crystal technique) are required. Single echo instruments may be used on uncoated surfaces, which have been cleaned and ground.

(2) Accuracy requirement: plate thickness: <10 mm accuracy: ±0.1 mm

plate thickness: ≥10 mm accuracy: ±0.2 mm

2.3.2 Each crew member is to be equipped with explosion-proof flashlight, de-rusting hammer, etc.

2.3.3 The computer and its ancillary equipment and software for transmitting and recording thickness measurement records and reports are to meet the corresponding requirements for recording and transmitting data and reports to CCS.

2.3.4 The thickness gauge is to have a valid verification/calibration certificate issued by the national metrological verification authority.

2.3.5 Thickness measurement suppliers of category A providing thickness measurement service of hulls for CCS-classed ships are to be provided with CCS hull structure and thickness measurement management system software specified in 2.2.1.1(3) above for management of thickness measurement data (suppliers of category B may refer to this requirement and use the software).

2.4 Site

2.4.1 There are to be fixed offices for employees and storage places for documents, materials

and files.

2.4.2 There is to be a storage space for a thickness gauge.

2.5 Documents

2.5.1 Regulations from the Administration and CCS rules and guidelines as appropriate are to be provided.

2.5.2 Documented work procedures and operation instructions are to be provided, including at least:

(1) job identification;

(2) inspection preparation before operation, operation instructions of the equipment;

(3) selection and identification of thickness measurement locations;

(4) surface preparation, protective coating preservation;

(5) provisions and means of coordination and communication between thickness measurement personnel and site surveyors; the procedure and requirement of informing surveyors when thickness measurement personnel find the corrosion of the part or component being measured is close to or exceed the corrosion limit or other abnormalities;

(6) provisions on thickness measurement of ships for ships with ESP notation, where applicable;

(7) thickness measurement operation and supervision, verification;

(8) provisions and means of reviewing thickness measurement results to assist surveyors;

(9) requirements on record sorting and submission to site surveyors for confirmation by signature;

(10) provisions on inputting, confirming thickness measurement data as well as report submission.

2.5.3 The thickness measurement report and record of thickness measurement suppliers of category A are to be in the format released by CCS (according to the guidelines given in IACS URZ7, URZ7.1, URZ7.2, URZ10.1, URZ10.2, URZ10.3, URZ10.4 and URZ10.5, Recommended Procedures for Thickness Measurements in Appendix 13, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships, and those given in IACS URZ15 applicable to offshore units).

2.5.4 The thickness measurement report and record of thickness measurement suppliers of category B may be prepared according to the applicable requirements of 2.5.3 and the formats are

to be approved by CCS.

2.6 Other requirements

2.6.1 Thickness measurement suppliers of category A are to comply with Appendix 8, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships, Guidelines for Thickness Measurement of Hull (relevant parts) as well as relevant provisions. Thickness measurement suppliers of category B may refer to these requirements as well as regulations of the Administration and CCS rules for ships engaged on domestic voyages.

2.6.2 Thickness measurement suppliers are to submit to CCS their experience in thickness measurement of ships or offshore units, including name, type, tonnage, time, place of the ship, survey type of relevant ships and relevant documents.

2.6.3 For practical operation verification during approval, thickness measurement suppliers are generally to arrange thickness measurement for a ship and/or offshore unit in the application scope of approval, and CCS auditors are to designate thickness measurement operators and supervisors and witness their thickness measurement operations, recording and report preparation and review for the above ship and/or offshore unit. For supplies in China, CCS auditors will also confirm whether the documents issued externally by technical director of the thickness measurement supplier comply with the relevant documents.

2.6.4 Thickness measurement suppliers are to properly keep the previous and current testing records, certificates or reports of the same thickness measurement object, archive these files and the retention period is to be at least 5 years.

2.6.5 Thickness measurement suppliers are to provide sufficient labor protective equipment for thickness measurement personnel.

Chapter 3 Suppliers Carrying Out an In-water Survey on Ships and Offshore Units

3.1 Application

3.1.1 This Chapter applies to suppliers carrying out an in-water survey on ships (in lieu of a docking survey) and offshore units by diver or Remotely Operated Vehicle (ROV), including:

3.1.2 Underwater Non-Destructive-Testing (UWNDT) means in-water non-destructive testing of the object being tested, mainly including:

3.1.2.1 Underwater Magnetic Testing (UWMT);

3.1.2.2 Underwater Ultrasonic Testing (UWUT);

3.1.2.3 Underwater Alternating Current Field Measurement (UWACFM).

3.1.3 Underwater Ultrasonic Thickness Measurement (UWTM).

3.1.4 Underwater Visual Testing (UWVT): including visual inspection (including ship's underwater structure and appendages)[12], bearing clearance measurement on rudders and sinking amount measurement on propeller shaft, potential measurement, video recording, photography, underwater cleaning and grinding and underwater cutting, etc.;

3.2 Personnel

3.2.1 UWNDT operators, supervisors are to be trained by CCS or have training accepted by CCS and hold the UWNDT personnel level certification issued or accepted by CCS.

3.2.2 UWTM, UWVT operators, supervisors are to hold training documents issued or accepted by CCS.[13]

3.2.3 The supplier is responsible for the qualification of its diving operators, supervisors and for their training in the use of the testing equipment utilised when carrying out inspection. The following training records are to be available:

(1) visible parts of ship's underwater structure and appendages;

(2) non-destructive testing in accordance with a recognised national or international industrial NDT standard;

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[12] Including side shell plating, bottom plating, bow plating, stern frame and rudder, sea chests and their grating, sea connections, overboard discharge valves, cocks and their fastenings, visible parts of propeller and stern bush rudder, rudder, rudder pintles, rudder shafts and couplings and stern frame, side thruster, etc.

[13] For suppliers in China, CCS only accepts training certificates issued by CCS.

(3) certification requirements as a thickness measurement firm when conducting thickness measurements under water;

(4) bearing clearance measurement on rudders, the clearance in the stern bush and the efficiency of the oil gland;

(5) under-water video monitoring with TV-monitors on deck, as well as still picture work, underwater CCTV monitoring system;

(6) operation of under-water communication system;

(7) any special equipment necessary for the work carried out;

(8) the reporting system, minimum Rule requirements for relevant ship or unit types, ship's or unit's underwater structure, measuring of bearing clearances, the recognition of corrosion damage, buckling and deteriorated coatings, etc.

Suppliers using ROVs to provide service may let ROV operators and supervisors to attend the trainings above and obtain qualification on NDT and thickness measurement.

3.2.4 A plan for training of personnel in the reporting system, minimum Rule requirements for relevant ship or unit types, ship's or unit's underwater structure, measuring of bearing clearances, the recognition of corrosion damage, buckling and deteriorated coatings, etc. are to be included.

3.2.5 The diving operator carrying out the inspection is to have a diver certificate accepted by CCS and have had at least one year's experience as an assistant diver carrying out inspections (including participation in a minimum of 10 different assignments). ROV operators are to have at least one year of experience working with ROVs conducting inspections on vessels or offshore units, or have the qualification certificate of Grade I pilot or above issued by the Administration or internationally recognized industry association (e.g. Pilot Technician Grade I issued by MTCS).

3.2.6 The supervisor is to be qualified according to the requirements for supervisors in Chapter 1, PART ONE of the Guidelines and to have the qualification certificate for diving supervisor accepted by CCS; for UWNDT, the supervisor is to hold UWNDT level certification for underwater NDT personnel Grade II or above issued or accepted by CCS[14]; for UWTM and UWVT, the requirement of 3.2.2 is to be complied with; the supervisor is to have a minimum of

[14] For suppliers in China, CCS only accepts underwater level certification issued by CCS.

two years' experience as a diver carrying out inspection.

3.2.7 The ROV supervisor supervises the underwater inspection carried out with ROVs. The supervisor is to have qualification certificate accepted by CCS (e.g. intermediate and above qualification certificate of Pilot Supervisor issued by MTCS) and to have a minimum of two (2) years of experience conducting inspections with ROVs on vessels or offshore units as an operator.

3.2.8 The number of operators and supervisors is to satisfy the service provided by the supplier. At least one operator and one supervisor are to be provided for each on-site service. For UWNDT service, reports are to be prepared by operators with underwater NDT level certification Grade II or above and reviewed by supervisors with underwater NDT level certification Grade II or above.

3.2.9 For suppliers carrying out underwater NDT with ROVs, if the ROV operator does not have the level certification for NDT personnel, one ROV operator, one NDT operator with NDT level certification are to be ensured for each underwater NDT with ROVs. This requirement also applies to the supervisors. Similarly as required in 3.2.7, underwater ROV NDT reports are to be prepared by operators with NDT level qualification Grade II and reviewed by NDT supervisors with NDT level qualification Grade II.

3.2.10 The supplier is to retain the records of operators and supervisors. The records are to include the name, age, ID No., relevant training and service experience and background information, if any, of personnel.

3.3 Site

3.3.1 The supplier is to have appropriate sites, including:

(1) a warehouse for the storage of diving equipment /ROVs, tools and underwater non-destructive testing equipment;

(2) maintenance and repair site for diving equipment /ROVs and tool;

(3) a warehouse for the storage of spare parts of diving equipment /ROVs, tools and underwater non-destructive testing equipment;

(4) a site for rinsing and cleaning diving equipment/ROVs and tools.

3.4 Equipment

3.4.1 For suppliers carrying out underwater inspection by divers, at least two sets of the following equipment are to be provided according to the work scope and are to be readily

available:

(1) closed circuit colour television (video complies with the relevant requirements for pixel) with sufficient illumination equipment;

(2) two-way communication between diver and surface staff;

(3) video recording device connected to the closed circuit television;

(4) still photography camera;

(5) equipment and tools for carrying out UWVT, UWMT, UWUT,, thickness measurement, potential measurement, UWACFM[15] and relevant measurements, e.g. clearances, indents, etc., as relevant to the work to be performed;

(6) equipment for cleaning of the hull;

(7) endoscope.

3.4.2 In addition to above 3.4.1, at least two sets of the following are to be available for suppliers carrying out underwater survey by ROV:

(1) Remotely Operated Vehicle (ROV);

(2) positioning and navigation equipment of ROV and its mother ship; the positioning accuracy is to satisfy the requirements for underwater survey;

(3) adequate controlling devices and software for the ROV functions required.

3.4.3 According to the unified requirements of the IACS, when TOC documents of offshore units and ships are transferred between classification societies, thickness measurement records in the form of electronic document are to be included, so computer and its accessory equipment, software for recording and transferring reports are to be available, which can meet the requirements for recording and rapid transmission, plotting measurement range and measurement point illustration (by AutoCAD or other software).

3.5 Documents

3.5.1 The supplier is to have documented operational procedures and guidelines for how to carry out the inspection and how to handle the equipment. These are to include:

(1) two-way communication between diver and surface;

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[15] For this equipment, at least one set is to be provided and readily available.

(2) video recording and closed circuit television operation;

(3) guidance on the survey of hull or offshore mobile units, ensuring that the underwater inspection of the diver provides complete coverage of the parts to be inspected.

3.5.2 In addition to above 3.5.1, documented operational procedures and guidelines for suppliers carrying out in-water survey by ROV are also to include:

(1) guidance for the operation and maintenance of the Remotely Operated Vehicle;

(2) methods and equipment to ensure the ROV's location and orientation in relation to the vessel can be determined, and guidance for equipment operation and maintenance.

3.5.3 Detailed procedural manuals for NDT operations in the service range are to be prepared. Such manuals are to be developed according to the corresponding national or industry standards and are to include at least the following:

(1) technical rules, regulations or standards on which testing services are based;

(2) types, technical descriptions and characteristics of equipment and materials used for testing services;

(3) application of various testing services;

(4) qualification requirements for personnel;

(5) detailed inspection preparation before operation, operation circulars and guidance for the equipment;

(6) job control number of the testing report, detailed instructions for report filling, number of copies of reports and distribution requirements;

(7) selection and identification of test locations and confirmation procedure for surveyors;

(8) provisions and means of coordination and communication between testing personnel and site surveyors; the procedure and requirement of informing surveyors when testing personnel find the corrosion of the part or component being inspected is close to or exceed the corrosion limit or other abnormalities;

(9) requirements on record sorting and submission to site surveyors for confirmation by signature;

(10) testing operation and supervision, verification;

(11) provisions and means of reviewing testing results to assist surveyors;

(12) provisions on inputting, confirming testing data as well as report submission.

3.6 Verification

3.6.1 The supplier must have the Surveyor's verification/witness of each separate job, documented in the report by the attending Surveyor(s) signature.

Chapter 4 Suppliers Engaged in Inspections and Maintenance of Fire Extinguishing Equipment and Systems on Ships

4.1 Application

4.1.1 This Chapter applies to suppliers providing inspection and maintenance services of fire extinguishing equipment and systems, self-contained breathing apparatus on ships, including merchant vessels and ocean-going fishing vessels.

4.1.2 Inspection and maintenance services of fire extinguishing equipment and systems, self-contained breathing apparatus on ships include:

(1) inspection, maintenance and filling of marine portable and wheeled CO_2, dry powder, foam, halogenated hydrocarbon, heptafluoropropane and aerosol fire extinguishers;

(2) weighing, testing, maintenance, filling, pipe blowing test, tightness test and hydraulic test of marine CO_2, dry powder, foam, halogenated hydrocarbon, heptafluoropropane and aerosol fire extinguishers;

(3) inspection and maintenance of marine firefighter's outfits and emergency escape breathing devices (EEBDs) or hydrostatic pressure test and filling of air cylinders;

(4) hydrostatic pressure test, inspection and maintenance of marine cylinders with working pressure not more than 30 MPa (including hydrostatic test and filling for CO_2 cylinders intended for rafts with working pressure not more than 32 MPa);

(5) inspection and maintenance of fixed fire detection and alarm devices;

(6) inspection and maintenance of fixed pressure water sprinkler and water mist fire extinguishing systems;

(7) inspection and maintenance of immersion suits and inflatable lifejackets.

4.1.3 Fire-fighting suppliers carrying out inspection and maintenance of immersion suits and inflatable lifejackets are to comply with the technical conditions of Chapter 5, PART ONE of the Guidelines on testing and maintenance of immersion suits and inflatable lifejackets.

4.1.4 Suppliers are to have professional knowledge of fire theory, fire-fighting and fire-extinguishing appliances sufficient to carry out the maintenance and/or inspections, and to make the necessary evaluations of the condition of the equipment. In demonstrating professional

knowledge, suppliers are to have an understanding of the various types of fires and the extinguishing media to be used on them. For fixed fire-extinguishing systems, suppliers are to demonstrate an understanding of the principles involved with gas, foam, sprinkler and water mist systems, as relevant for the approval being sought.

4.2 Personnel

4.2.1 Inspection and maintenance service personnel (operators, supervisors and technical director) of fire extinguishing equipment and systems are to have knowledge of various types of fire as well as the fire extinguishing medium used, knowledge of construction and working principle of various marine fire-fighting systems and equipment relevant to the approval, to master operation and use of inspection and maintenance equipment, to be familiar with relevant provisions of conventions, regulations, rules and standards of related regulations and the latest technical requirements and maintenance procedures, process and test method of specific services.

4.2.2 Operators, supervisors and technical persons in charge are to have relevant training and have training certificates issued or accepted by CCS.

4.2.3 Operators, supervisors and technical persons in charge are to have training on professional knowledge, practical service and maintenance skills and safe production, and the training records are to be retained.

4.2.4 The number of operators and supervisors is to satisfy the service needs provided by the supplier (at least one supervisor is to be provided). For suppliers in China, if they only perform one service item listed in 4.1.2, at least three servicing and maintenance personnel are to be provided, among them at least one operator, one supervisor, one technical director; if they perform two or more service items listed in 4.1.2, at least five servicing and maintenance personnel are to be provided, among them at least three operators, one supervisor, one technical director.

During servicing and maintenance, at least one supervisor and one operator are to perform field operation and recording, the operator responsible for report preparation and the supervisor responsible for report reviewing. For suppliers in China, technical persons in charge are responsible for report issuance; for suppliers outside China, personnel specified by the system are responsible for report issuance.

4.2.5 If the inspection, maintenance and filling service of fixed or mobile pressure vessels is carried out, the personnel are also to meet the relevant requirements of the Administration of the country where the firm is located (for example, the Chinese government requires at least two canister filling personnel to hold type P certificate of special equipment operator of the People's Republic of China).

4.3 Site

4.3.1 The supplier engaged in inspections and maintenance of fire extinguishing equipment and systems is to have a suitable inspection and maintenance workshop, whose total working area is to meet the requirements for the variety and quantity of fire extinguishers to be maintained and is not to be less than 100 m^2. Alternatively, the requirements of the Administration of the country where the firm is located are to be complied with.

4.3.2 The working environment is to meet the requirements of laws and regulations on technology, environmental protection and labor safety.

4.3.3 Separate hydrostatic pressure test room, tightness test area and filling and pressurization room are to be provided. The site layout is to be reasonable, and the usable area is to satisfy the maintenance quantity.

4.3.4 Corresponding protective measures are to be provided for hydrostatic pressure test and tightness test.

4.3.5 The area for storing and filling dry powder extinguishing media, foam liquid, CO_2 and breathing air is to be completely and physically isolated from the hydrostatic pressure test and air tightness test areas.

4.3.6 A test area for respiratory masks is to be provided.

4.3.7 Spare parts warehouse and finished products warehouse are to be set up separately. The usable area of spare parts warehouse and finished products warehouse are to satisfy the maintenance quantity.

4.3.8 Washing and drying areas are to be provided for fire extinguisher canisters and various bottles.

4.3.9 Storage areas for all types of objects to be repaired, maintained and delivered are to be

provided.

4.3.10 Separate scrap storage areas are to be provided.

4.3.11 Video monitoring equipment is to be installed in each place for hydrostatic pressure test, tightness test and canister filling. Other types of data (such as data captured by mobile phones, cameras and other portable devices) are also acceptable if they can prove that the services meet the requirements of specified operation procedures. The above data are to be filed in accordance with the relevant requirements of the quality system, but are to be retained at least for 5 years. For equipment with a long inspection and maintenance interval, the inspection and testing image data are to be kept for a long time.

4.3.12 Video or other types of on-site maintenance data are to be retained and archived for the on-board services such as pipe blowing, cylinder weighing, pipe pressure, system hydraulic test, and main parts overhaul of large fire extinguishing systems, and such data are to be kept at least for 5 years. For equipment with a long inspection and maintenance interval, the inspection and testing image data are to be kept for a long time.

4.4 Equipment

4.4.1 According to the service items seeking approval, equipment, instruments and tools for inspection and maintenance are to be provided as shown in the following table:

Table 4.4.1

Name of the equipment	**Provision requirements**
Measuring cup of 500 ml, 1000 ml	1 for each
Inner diameter measuring card	2
Outer diameter measuring card	2
Steel ruler of 1000 mm	1
Tape of 3m, 5m	1 for each
dial gauge	2
Timer, decompressor, pressure gauge, thermometer	2 for each
Explosion-proof flashlight	1
Inspection platform of 1000 mm * 500 mm	1
Working table (including vise)	Provided according to actual demands
Clamp device for fire extinguisher	2
Clamp device for large CO_2 container	1
Hydrostatic test machine (manual)	1, which is capable of satisfying the test requirements of relevant product standards and the pressure gauge accuracy of which is not lower than grade 1.6
Hydrostatic test machine (electrical)	1, the measuring range of which is at least 50 Mpa

Dryer	1
Dry powder filling machine	1
Foam filling machine	1
CO_2 filling machine	1
Oil free compressor or compressor for human respiration	1, cannot be used for other purposes
Weighing equipment for large CO_2 cylinder	2 pieces; the measuring range of one piece is 0 kg～30 kg and accuracy is 1/3000 while the measuring range of the other piece is 0 kg～50 kg and accuracy is 0.1 kg
Portable electronic scale	1 (including relevant fittings required for weighing), for weighing of large CO_2 cylinders and portable CO_2 fire extinguishers on site, the measuring range is 0 kg～150 kg and the accuracy is 0.1 kg
Temperature control tank	1 large and 1 small; the large temperature control tank can accommodate large CO_2 cylinders (temperature can be controlled between 48 and 52 degrees; the small temperature control tank can hold portable CO_2, dry powder fire extinguishers of 5 kg and more, and foam fire extinguishers of 9 L and more); the accuracy of the thermometer is 1 °
Sink	1
Safety sling	At least 2 pairs
Clamp and tool for overhaul	2 sets
Residual deformation measuring device	1 set
Hoisting rigging and corresponding equipment	In appropriate number
Level gauge for large CO_2 cylinder	1 set
Smoke, temperature tester	1 each
Flame detector	1
Testing bay for full mask of the breathing device	1
Multimeter	1
Special equipment for overhaul and test of Heptafluoropropane system, such as dynamometer, load sensor, voltage resistance tester, etc.	1 set
Electronic scale for filling CO_2 cylinders for liferafts (where applicable)	1 set (the weighing accuracy of cylinders less than 30 liters is required to be ±5 grams, and the weighing accuracy of cylinders more than 30 liters is required to be ±10 grams. For raft stations in China, if the weighing capacity of electronic scales is less than 50 kg, the accuracy is required to be 5 g; if the weighing capacity of the electronic scale is 50 kg and above, the accuracy is required to be 10 g)

4.4.2 If suppliers undertake shore-based inspecting and maintenance, they are to maintain and implement procedures for workshop cleanliness, ventilation and arrangement, with due cognisance of the spares and extinguishing media being stored, to ensure safe and effective working procedures.

4.4.3 Suppliers undertaking inspecting and maintenance of equipment and systems onboard are to provide the appropriate facilities to either complete the work onboard or remove the necessary items to their workshops.

4.5 Documents

4.5.1 International conventions, regulations, circulars, the provisions of the Administration, relevant CCS rules and industrial technical standards are to be provided. For suppliers in China,

the list of technical documents is shown in Appendix 1.

4.5.2 There are to be procedural documents and instructions specifying how to repair equipment and/or systems. These documents include or make reference to the Manufacturer's servicing manuals, servicing bulletins, instructions and training manuals, as appropriate as well as international standards. These documents also make reference to other requirements (e.g. signs to be placed on the equipment/systems).

4.5.3 A working ledger is to be established, indicating all links of inspection and maintenance, and the integrity of inspection and maintenance records are to be maintained. To ensure the traceability of the extinguishing media, the working ledger is to record in detail the ship, system and equipment for which the extinguishing media are used, and the name of the manufacturer, factory number, production date and expiry date (if applicable) of the extinguishing media are to be filled in the blank on the maintenance certificate label.

4.5.4 The warehouse entry and exit ledger is to be established to list the entry and exit time and actual inventory of various filling media, fittings, cylinders, etc. In particular, the whole process of product procurement, purchase verification, registration and identification, warehouse entry and storage, warehouse exit and use is to be recorded in detail to ensure the traceability of products. Special attention is to be paid to the packaging of foam extinguishing media, and the label is to be transferred in order to determine the source of fire extinguishing media, shelf life, and to prevent the use of expired products or extension of shelf life.

4.5.5 There are to be inspection and maintenance certificates, reports and records of fixed formats. For suppliers in China, the certificates, reports and records are to comply with the provisions of Reg.7 of Management Methods of Ship Servicing and Testing Services of MSA.

4.5.6 Certificates, reports and records are to be retained for at least 5 years. For equipment the maintenance interval of which is relatively long (e.g. hydrostatic test for large CO_2 cylinder), certificates, reports and records are to be retained for long term.

4.5.7 All measuring instruments (e.g. pressure gauges, electronic scales and thermometers, etc.) of suppliers in China are to have valid verification/calibration certificates or statements issued by the national statutory metrological verification authorities. All measuring instruments of suppliers

outside China are to have valid verification/calibration certificate or statements.

4.6 Other requirements

4.6.1 Filling media, fittings and cylinders are to come from qualified suppliers accepted by CCS. The evaluation interval of qualified suppliers by the firm is not to exceed 12 months, and suppliers with ISO9000 quality certification qualification are preferred.

4.6.2 The CO_2 gas source for liferaft cylinders is to comply with the requirements of MSC.218(82) (moisture content less than 150ppm) and have quality assurance documents.

Carbon dioxide fire extinguishing agent is to meet the relevant requirements of ISO 5932 or relevant national standards.

4.6.3 The supplier is to have sufficient foam fluid, dry powder, CO_2 gas and other filling media, vulnerable parts and cylinders provided by the manufacturers listed in the list of qualified suppliers accepted by CCS for maintenance.

4.6.4 The scrapping period of fire extinguishers is to be in accordance with the requirements of the Administration/government. Fire extinguishers are not to be serviced by suppliers in China if they reach the following years from the date of delivery:

(1) 6 years for water-based fire extinguishers;

(2) 10 years for dry powder fire extinguishers;

(3) 10 years for clean gas fire extinguishers (e.g. heptafluoropropane fire extinguisher);

(4) 12 years for CO_2 fire extinguishers (including air storage cylinders).

4.6.5 For the foam concentrate described in Annex 1, Appendix 8, Chapter 5 of PART ONE of CCS Rules, when the fire fighting supplier does not have the appropriate chemical analysis equipment and qualification, it is allowed to subcontract the foam concentrate to a qualified testing institution (such as the foam liquid manufacturer) for analysis and identification.

4.6.6 The supplier is, according to the requirements of its quality management system, to conduct regular inspection on the quality of the gas in the cylinders of firefighter equipment and emergency escape breathing devices, and the compressed air quality is to meet the relevant requirements of national standards or the Administration.

Appendix 1 List of Documents

No.	Document No./Document Name	Remarks
1	Manufacturer's maintenance manual, maintenance notice, instruction and training manual	If applicable
2	Type approval certificate to indicate that any conditions of fire extinguishing equipment and systems are appropriate during overhaul and/or maintenance	
3	SOLAS, MSC.1/Circular 1318 (Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire-Extinguishing Systems)	
4	International Code for Fire Safety Systems (FSS Code)	
5	ISO6406 (Seamless Steel Gas Cylinders—Periodic Inspection and Testing)	
6	Any document authorized or licensed by the equipment manufacturer	
7	MSC/Circ.670 (Guidelines for the Performance and Testing Criteria, and Surveys of High-Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems)	
8	MSC/Circ.798 (Guidelines for the Performance and Testing Criteria, and Surveys of Medium-Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems)	
9	MSC.1/Circ.1312 (Guidelines for the Performance and Testing Criteria, and Surveys of Foam Concentrates for Fixed Fire-Extinguishing Systems as revised by MSC/Circ.1312/Corr.1)	
10	MSC.1/Circ.1432 (Revised Guidelines for the Maintenance and Inspection of Fire Protection Systems and Appliances)	
11	IMO resolution A.951(23)(Improved Guidelines for Marine Portable Fire Extinguishers)	
12	MSC.1/Circ.1370 (Guidelines for the Design, Construction and Testing of Fixed Hydrocarbon Gas Detection Systems)	
13	Guidelines for Fire-extinguishing Appliances and Systems Specifically Maintained by Service Suppliers adopted by IMO	
14	MSC.1/Circ.1516 (Revised Guidelines for the Maintenance and Inspection of Fire Protection Systems and Appliances)	
15	Technical Regulations for Statutory Survey of Fishing Vessels (such as Technical Regulations for Statutory Survey of Ocean-going Fishing Vessels, etc.)	
16	China MSA Management Methods of Ship Servicing and Testing Services	
17	China MSA Technical Conditions of Organizations Performing Ship Servicing and Testing Services	
18	CCS Service Guidelines for Organizations Performing Testing of Marine Fire-fighting Systems	
19	MSC/Circ.848 Amendments to the Revised Guidelines for the Approval of Equivalent Fixed Gas Fire-extinguishing Systems, as Referred to in SOLAS 74, for Machinery Spaces and Cargo Pump-rooms(MSC.1/Circ.1267)	
20	Fire testing standards that are suitable for maintenance and testing services, such as ISO 5932, GB 25972-2010, CB/T 4459-2016, etc.	

Chapter 5 Suppliers Engaged in Servicing Inflatable Liferafts, Inflatable Lifejackets, Immersion Suits, Hydrostatic Release Units, Inflatable Rescue Boats and Marine Evacuation Systems

5.1 Application

5.1.1 This Chapter applies to suppliers (servicing stations for inflatable life-saving equipment, hereinafter referred to as servicing stations) engaged in testing, servicing and maintenance of inflatable liferafts, marine evacuation systems, hydrostatic release units, inflatable rescue boats, inflatable lifejackets and immersion suits, as well as testing and filling of cylinders used for liferafts.

5.1.2 The above firms are divided into four categories based on the standards of servicing specification of inflatable liferafts:

(1) Category A: capable of servicing all sizes of inflatable liferafts and/or marine evacuation systems;

(2) Category B: capable of servicing inflatable liferafts with a maximum of 65 persons;

(3) Category C: capable of servicing inflatable liferafts with a maximum of 25 persons;

(4) Category D: capable of servicing inflatable liferafts on ocean-going fishing vessels of Chinese registry.

For servicing stations of above categories, the servicing scope of a higher level servicing station may cover that of a lower level servicing station.

5.1.3 For specific requirements for suppliers engaged in testing and filling of CO_2 cylinders used for liferafts, see relevant requirements of Chapter 4 of the Guidelines.

5.2 Personnel

5.2.1 Servicing personnel are to be trained by CCS or in a training body accepted by CCS and hold the training certificate. They are to have a good work ethics, understand the structure and working principle of various inflatable life-saving equipment, master the operation of servicing equipment and the use of testing tools, and be familiar with the relevant provisions of conventions, regulations, rules and standards and the latest technical requirements as well as servicing and packaging procedures, processes and testing methods for specific service products.

5.2.2 The operator is responsible for the specific implementation of the servicing of the inflatable life-saving equipment and is to have relevant knowledge and skills. Pre-job training is to be conducted, and the training content is to cover the products to be serviced. The pre-job training and work experience for qualification maintenance are to meet the requirements of the Administration.

5.2.3 The supervisor is responsible for supervising and reviewing the quality of servicing the inflatable life-saving equipment. He/she is to have relevant knowledge and skills, and at least two years of working experience as an operator. The specific fitness and work experience for qualification maintenance are to meet the requirements of the Administration.

5.2.4 For servicing stations located in China, the post of technical director is to be set up, responsible for issuing certificates, reports and records externally. For overseas servicing stations, a designated person may be required to issue certificates, reports and records externally in accordance with the existing service system.

5.2.5 The servicing station is to be equipped with a number of certified operators that are appropriate to the quantity and scale of annual servicing, and is to satisfy the requirements of the Administration. For servicing stations located in China, during the servicing process, on-site operation and recording are to be carried out by at least 1 operator and 1 supervisor. The report is developed by the operator and reviewed by the supervisor. Specific requirements are as follows:

5.2.5.1 Requirements for the minimum provision of servicing personnel of inflatable liferafts (servicing stations outside China may refer to the requirements for implementation)

Table 5.2.5.1

Number of liferafts serviced each year	Technical director	Supervisor	Operator
Number of liferafts serviced ≤ 200	1	1	2
200 < Number of liferafts serviced≤ 500	1	1	3
500 < Number of liferafts serviced ≤1000	1	1	5
1000 < Number of liferafts serviced	1	2	7

Note: Hydrostatic release units are to be serviced in conjunction with the liferafts.

5.2.5.2 Requirements for the minimum provision of servicing personnel of inflatable liferafts on ocean-going fishing vessels (servicing stations outside China may refer to the requirements for implementation)

Table 5.2.5.2

Number of liferafts serviced each year	Technical director	Supervisor	Operator
Number of liferafts serviced ≤ 100	1	1	1
100 < Number of liferafts serviced ≤200	1	1	2
200 < Number of liferafts serviced ≤500	1	1	3
500 < Number of liferafts serviced ≤1000	1	1	5
1000 < Number of liferafts serviced	1	2	7

Note: Hydrostatic release units are to be serviced in conjunction with the liferafts.

5.2.5.3 Requirements for the minimum provision of servicing personnel of marine evacuation systems (servicing stations outside China may refer to the requirements for implementation)

Table 5.2.5.3:

Number of marine evacuation systems serviced each year	Technical director	Supervisor	Operator
Number of marine evacuation systems serviced ⩽10	1	1	3
Number of marine evacuation systems serviced >10	1	1	5

Note: Hydrostatic release units are to be serviced in conjunction with marine evacuation systems and associated liferafts.

5.3 Site

5.3.1 Servicing site

5.3.1.1 The servicing workshop is to be in fully enclosed spaces. It is normally to be located on the ground floor of a building; otherwise suitable lifting devices are to be provided.

5.3.1.2 The area and headroom of servicing workshop are to satisfy servicing requirements as follows:

Requirements for Area and Headroom of Servicing Workshop **Table 5.3.1.2**

Category	Servicing type	Area	Headroom[16]	Remarks
Category A	All sizes and types of inflatable liferafts and/or marine evacuation systems[17]	200 m^2	12 m	The servicing scope is covered from top to bottom
Category B	Liferafts with a maximum of 65 persons	120 m^2	5.5 m	
Category C	Liferafts with a maximum of 25 persons	80 m^2	4 m	
Category D	Inflatable liferafts used on ocean-going fishing vessels	50 m^2	4 m	

5.3.1.3 The headroom of servicing workshop for davit-launched liferafts means the vertical distance from the lower end of the hook to the ground, which is not less than 4 m. It is to be guaranteed that under the lifting condition of 110% of the load, the headroom from the lowest point of the floor of liferaft to the ground is to be not less than 0.3 m.

5.3.1.4 The ground of servicing workshop is to be provided with a clean surface sufficiently smooth to ensure that no damage will occur to the liferaft fabric. Wood floors, rubber sheets or other equivalent materials with insulation and protection functions are to be laid on the ground. There is to be no sharp or protruding object that might damage the fabric.

5.3.1.5 The servicing workshop is to be provided with equipment for measuring and regulating temperature and humidity to ensure that the servicing work is carried out in an environment where the temperature is higher than 5 ℃ and the relative humidity is less than 85%. During the air tightness test, the temperature is to be uniform and stable, and the temperature change is not to exceed ± 2 ℃.

5.3.1.6 The repair workshop is to have environmental conditions that maintain a temperature of 20 ± 5 ℃ and a humidity of not more than 75% for 24 hours. Where the conditions of the servicing space can meet the requirements of the repair workshop, a separate repair workshop may be omitted.

5.3.1.7 The servicing workshop and repair workshop are to be efficiently ventilated, but be free from draughts. They are to be well lit, provided that direct rays of sunlight do not enter the space.

5.3.1.8 There is to be no open flame in the servicing space.

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[16] Headroom means the vertical distance from the ground floor to the beam bottom of ceiling.

[17] If Category A servicing station only provides servicing of inflatable liferafts (not involving the servicing of marine evacuation systems), the headroom of servicing workshop is at least to be 5.5 m.

5.3.2 Other sites

5.3.2.1 There are to be spaces for office, rest and storage of files.

5.3.2.2 There is to be a warehouse for storing materials, fittings, spare parts and equipment. In China, the area of the warehouse is not to less than 15 m^2 for Categories A, B and C servicing stations nor less than 10 m^2 for Category D servicing stations.

5.3.2.3 Spare and obsolete pyrotechnics is to be stored in a separate, safe and secure magazine well away from the servicing and storage spaces. The magazine is to comply with safety regulations of the local government and requirements of the Administration. The following requirements are at least to be satisfied by servicing stations in China:

(1) The magazine dedicated to the storage of dangerous articles is to maintain physical isolation from other buildings, well away from living areas and working spaces, heat source and machinery and electrical installations. Direct sunlight is to be avoided.

(2) Spare and obsolete dangerous articles are to be separated. If it is necessary to store them in the same magazine, steel cabinets suitable for the storage of dangerous articles are to be provided to store spare and obsolete pyrotechnics respectively, which are to be clearly identified.

(3) Fire-extinguishing appliances such as fire-extinguishers and sandboxes are to be provided.

(4) The magazine door is to be explosion proof.

(5) The electrical equipment and switches provided in the magazine are to be explosion proof.

(6) The magazine is to be provided with thermometers.

(7) The magazine is to be provided with good ventilation conditions.

5.3.2.4 Storage space for CO_2 cylinders is to be provided. Cylinders to be serviced, spare and scrapped cylinders are to be stored separately.

5.3.2.5 There is to be a separate space for servicing the CO_2 cylinder valve, provided with good ventilation conditions.

5.3.2.6 There is to be a flushing site for servicing inflatable liferafts, marine evacuation systems, inflatable rescue boats, inflatable lifejackets and immersion suits etc. The area of the flushing site is to match the type and size of the inflatable life-saving equipment to be serviced, and separated from the servicing site. The water is to be convenient to use and the drainage is to be unobstructed.

The firm for servicing inflatable lifejackets and immersion suits is to be provided with a separate airing place or drying equipment.

5.3.2.7 There is to be a separate space for servicing the hydrostatic release units. The space is to be provided with a testing tube of hydrostatic release units, a servicing workbench with a vise and other related equipment.

5.3.2.8 There is to be a separate air compressor room, provided with good ventilation conditions.

5.3.2.9 There are to be dedicated spaces for stacking liferafts, marine evacuation systems, inflatable lifejackets and immersion suits to be serviced and delivered separately. Liferafts are not to be stored on top of each other in more than two tiers unless supported by shelving.

5.3.2.10 There is to be a separate space for servicing the liferaft storage container and painting construction, provided with good ventilation conditions.

5.3.2.11 When servicing inflatable lifejackets and immersion suits, a servicing site is to be provided separately, which is isolated from other areas where temperature and humidity need to be controlled. Where repair is involved, the environment is to satisfy the manufacturer's requirements (e.g. temperature and humidity etc.).

5.4 Equipment

5.4.1 Inflation and deflation equipment is to include air compressors, vacuum equipment, air cleaning and drying equipment.

For servicing stations in China, the working pressure provided for the air compressor is to satisfy usage requirements for various servicing services. The space containing the air compressor is to be well ventilated. The filter equipment for air cleaning and drying is to be fitted in the air supply pipeline entering the service workshop. Category A and B servicing stations are to be provided with air compressors with a capacity of 1.2 m^3/min or more, and vacuum equipment with a pumping rate of 25 L/S or more. Servicing of inflatable lifejackets and immersion suits is to be provided with air pumps and pressure gauges (or equivalent equipment).

5.4.2 A set of supports is to be provided for liferaft floor seam test. The support is to prevent scratch and wear of liferafts.

5.4.3 The lifting device used for the overload suspension test of davit-launched liferafts is to be

regularly inspected and tested in accordance with the regulations of the local government authority to ensure that it is in a safe use state[18].

5.4.4 The firm servicing the marine evacuation system is to be provided with a bench and associated equipment for simulative unobstructed test of the marine evacuation system, and is to be capable of lifting the serviced marine evacuation system to the fully unfolded height.

5.4.5 The servicing workshop of the marine evacuation system is to be provided with lifting equipment for the overload test of marine evacuation system platform and its associated liferafts. The height from the bottom of hook to the ground of servicing site is to be not less than 4 m. The lifting equipment is to satisfy the requirements of 5.4.3.

5.4.6 A test tube for hydrostatic release units as well as pressure gauges with corresponding range, pipes and joints are to be provided.

5.4.7 A workbench is to be provided for servicing inflatable lifejackets and immersion suits, and its size is to comply with the requirements of the manufacturer.

5.4.8 Manometers or pressure gauges complying with range requirements are to be provided, at least 4 for servicing inflatable liferafts and at least 10 for servicing marine evacuation systems for servicing stations located in China. Servicing stations outside China may refer to the requirements for implementation, but the requirements for maximum number of repairs carried out simultaneously in the workshop are to be at least satisfied.

5.4.9 For servicing inflatable liferafts and marine evacuation systems, at least one electronic scale for the weighing of air inflation cylinder is to be provided (the accuracy tolerance of the weighing of cylinders below 30 liters is required to be ±5 g, and that of cylinders of 30 liters and

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[18] Suppliers within China are to use cranes with rated lifting capacity of 1 t and above and lifting heights greater than or equal to 2 m and fixed-weight electric hoists in accordance with the Special Equipment Safety Supervision Regulations promulgated by the State Council. Regular inspections are to be conducted by a special equipment inspection and testing organization certified in accordance with the Regulations. The suppliers outside China are to provide evidence of using the relevant hoisting equipment in accordance with the safety laws and regulations of the local Administration.

above is required to be ±10 g. For servicing stations in China, the accuracy requirement is 5 g for weighing capacity of electronic scale below 50 kg and 10 g for weighing capacity of electronic scale of 50 kg and above).

5.4.10 1 time clock and 1 chronograph for various tests.

5.4.11 The servicing site is to be provided with at least two sets of thermometers and hygrometers, which are located far away from each other in the workshop. For servicing stations in China, 1 set of thermometer/hygrometer is to be provided every 40 m^2, and 6 sets of thermometer/hygrometer are to be provided in case of exceeding 200 m^2.

5.4.12 For servicing davit-launched liferafts, one lifting appliance and test ballast are to be provided for carrying out liferaft overload test (satisfying the 1.1 times overload test requirements for davit-launched inflatable liferafts).

5.4.13 For servicing stations in China, video recording equipment and its storage equipment for recording the entire servicing process is to be provided in the servicing workshop, capable of clearly identifying the object to be serviced in the servicing workshop and demonstrating the servicing process. In addition, other effective devices that can shoot short videos may be provided, which are used as a temporary alternative in case of ineffective operation of the above fixed video recording equipment.

5.4.14 Computers, printing equipment, network equipment and storage equipment of servicing and testing data are to be provided.

5.4.15 An enclosed file cabinet for storing technical management documents and servicing certificates, reports, records and other files is to be provided.

5.4.16 Labour safety protection articles necessary for servicing personnel are to be provided.

5.4.17 For common and special servicing tools for inflatable liferafts, reference may be made to Appendix 1.

5.4.18 For common and special servicing tools for marine evacuation systems, reference may be made to Appendix 2.

5.4.19 Special servicing and testing equipment or tools required by the product manufacturer are to be provided (a list of tools with special requirements is to be developed).

5.4.20 For testing inflatable lifejackets and immersion suits, sealing clamps, inflation pumps (or equivalent equipment), tightness test devices, electronic scales (accuracy: 0.1 g, range in compliance with the specification of inflation air cylinder), repair tools, sealing rubber gaskets for compression seals at zippers, and wax blocks for zippers required by the manufacturer are to be provided. Servicing stations in China are to be provided with watertight test tanks (with specifications of 2 m × 1.5 m or the specifications required by the manufacturer) with a grating cover for watertight tests; servicing stations outside China may carry out tightness test by referring to the above method or carry out tightness tests in accordance with IMO MSC/Circ.1114 on Guidelines for periodic testing of immersion suit and anti-exposure suit seams and closures.

5.4.21 For servicing stations that provide repair services for inflatable lifejackets, repair equipment and tools required by the manufacturer are to be provided, at least including one industrial sewing machine.

5.4.22 For tools used for servicing buoyancy tube plenum chamber of inflatable rescue boats, refer to common and special servicing tools for inflatable liferafts. For hard structure and machinery and electrical parts, refer to the requirements of Chapter 9, Part One of the Guidelines.

5.5 Raw materials, outfitting, equipment and spare parts

5.5.1 Firms engaged in servicing inflatable life-saving equipment are to be provided with the materials and vulnerable special parts provided or designated by the manufacturer, including important materials such as repairing rubberized fabric, glue and special cleaning agent.

5.5.2 Outfitting, equipment and spare parts are to comply with the following technical requirements and be obtained from manufacturers in the list of qualified suppliers accepted by CCS.

Outfitting details **Table 5.5.2(1)**

No.	Name	Unit	Number		Technical requirements
			Type A	Type B	
1	Bowline	/	1	1	f≥15kN(more than 25 persons); f≥10kN（25-9 persons）; f≥7.5kN(less than 9 persons) L=10m+storage height, but not less than 15 m Fragile rope, f=2.2±0.4kN
2	Inflatable dragline	/	Note	Note	Generally 2 sets
3	Cylinder	/	Note	Note	Generally 2 sets
4	Boarding rope ladder	/	1	1	
5	Balance bag	/	Note	Note	In accordance with the carrying capacity, several balance bags are fitted symmetrically along the raft bottom
6	Righting band	/	1	1	
7	Becket inside the raft	/	2	2	
8	Becket outside the raft	/	2	2	
9	Position indication light	Set	1	1	Light intensity ≥4.3cd, time ≥12h,
10	Lighting fixture	Set	1	1	Light intensity ≥0.3cd, time ≥12h,
11	Sea anchor	Set	1	1	Provided with one shock-resistant anchor cable and one anchor retrieving cable, one swivel
12	Life-saving floating ring	/	1	1	L=30m, floating on water
13	Buoyant knife	/	1	1	Non-folding type, the head can float on water
14	Water bag	/	2	2	
15	Experience book	/	1	1	Packed in a waterproof container with the liferaft instructions, emergency action card and sea sickness medicine, and hanging in the raft
16	Emergency action card	/	1	1	Same as above
17	Sea sickness medicine	/Person	6	/	Same as above, sufficient for 48 h dosage for each person
18	Reflective band	Each A=5×30cm, spacing=50cm, bottom middle is “+” type			

Equipment details **Table 5.5.2(2)**

No.	Name	Unit	Number			Technical requirements	Certification requirements
			Type A		Type B		
			A PACK	B PACK			
1	Ration	Portion/person	1	-	1/3	Each ration has a caloric value of 10 MJ and is stored in a watertight container	★
2	Fresh water	litre/person	1.5	-	0.5	Stored in a stainless, non-toxic watertight container	
3	Red parachute rocket	/	4	2	1		★
4	Red hand flare	/	6	3	3		★
5	Buoyant smoke	/	2	1	-		★
6	Radar reflector	/	1	1	-		★
7	Daylight signalling mirror	/	1	1	1	Printed on waterproof paper or placed in a waterproof container, together with instructions for use in communication with ships and aircraft	
8	Life-saving instructions	Copy	1	1	1	Waterproof, stored in a watertight container	
9	Diagram of life-saving signals	Copy	1	1	1	Stored in a watertight container or printed on waterproof paper	
10	Waterproof signal flashlight	/	1	1	1	Mohs signal can be transmitted, 1 spare battery and 1 spare bulb, stored in a watertight container	
11	Whistle	/	1	1	1	Effective after immersion in water for 24 hours, the audible distance is not less than 0.5 nautical miles, and tied with a string	
12	Drinking water measuring cup	/	1	-	1	Made of stainless, non-toxic materials, with scale	
13	Can opener	/	3	-	-	Safety type	
14	Fishing tools	Set	1	-	-	The fishing line is to be corrosion resistant, and have handles, 3 hooks, 1 bait, and 30m	

						nylon rope	
15	Insulation bag	/	1 ~ 3	1 ~ 3	-	The number of equipment is 10% of the rated number of occupants, at least two sets	★
16	Clean bag	/person	1	1	/		
17	Oar	/	2	2	2	It can float on water	
18	First-aid case/bag	/	1	1	1		★

Note: 1. Products with ★ are to be approved and surveyed by CCS. Survey marks are to comply with relevant provisions of CCS.

2. Fresh water is to be surveyed by a ship survey organization in accordance with the provisions of the Administration in China. Survey marks are to comply with relevant provisions of the ship survey organization.

Equipment details of type Y liferaft on fishing vessels **Table 5.5.2(3)**

No.	Name	Unit	Number	Technical requirements	Certification requirements
1	Ration	Portion/person	1/3	Each ration has a caloric value ≥ 10 MJ and is stored in a watertight container	★
2	Fresh water	litre/person	0.5	Stored in a stainless, non-toxic watertight container	
3	Red hand flare	/	3	Burning time ⩾ 60S, light intensity ⩾ 15000cd; approved type, installed in waterproof housing	★
4	Red parachute rocket	/	1	Approved type, installed in waterproof housing	★
5	Waterproof signal flashlight	/	1	Mohs signal can be transmitted, 1 spare battery and 1 spare bulb, stored in a watertight container	
6	Whistle	/	1	Effective after immersion in water for 24 hours, the audible distance is not less than 0.5 nautical miles, and tied with a string	
7	Drinking water measuring cup	/	1	Made of stainless, non-toxic materials, with scale	
8	Floatable ladle	/	1	2 for more than 12 passengers	
9	Sponge	/	2	Absorbing water remaining in the raft	
10	Inflator	/	1		
11	First-aid case/bag	/	1	Sealed and water-proof	★
12	Oar	/	2	It can float on water	
13	Knife	/	1	Buoyant handle, round head, unfolded	
14	Repair tool bag	/	1	With instructions and repair tools	
15	Life-saving instructions	/	1	Waterproof, stored in a watertight container	
16	Daylight signalling mirror	/	1	Printed on waterproof paper or placed in a waterproof container, together with instructions for use in communication with ships and aircraft	
17	Stainless drinking water measuring cup	/	1		
18	Spare bowline	/	1	20 in length	
19	Life-saving floating ring	/	1	Attached with a synthetic fiber rope not less than 30m in length and with strength to tow a floating person in water	
20	Experience book	/	1	Packed in a waterproof container with the liferaft instructions, emergency action card and sea sickness medicine, and hanging in the raft	

Note: 1. Products with ★ are to be approved and surveyed by CCS. Survey marks are to comply with relevant provisions of CCS.

2. Fresh water is to be surveyed by a ship survey organization in accordance with the provisions of the Administration in China. Survey marks are to comply with relevant provisions of the ship survey organization.

Tool bag details **Table 5.5.2(4)**

No.	Tool name	Unit	Number		Specification
			Type A	Type B	
1	Sea anchor	Set	1	/	Provided with one shock-resistant anchor cable and one anchor retrieving cable, one swivel★
2	Inflator	/	1	1	
3	Safety knife	/	1	/	May be omitted if the number of passengers is less than 13
4	Floatable small ladle	/	2	2	1 ladle may be provided if the number of passengers is less than 13
5	Sponge	/	2	2	Absorbing water remaining in the raft
6	Leak repair tools	Set	1	1	(1) 2 leak repair clamps (2) 40 gram of repair glue (3) 4 repair tapes (4) 1 piece of sandpaper (5) 1 round head scissors (with a rubber tube around the head) (6) 1 wooden roller (7) large and small leak repair plugs (2 for each size) (8) 1 brush of 13 mm
Products with ★ are to be approved and surveyed by CCS. Survey marks are to comply with relevant provisions of CCS.					

Remarks: the following products in the table above are to be furnished with CCS statutory product certificates: ration, fresh water, red parachute rocket, red hand flare, buoyant smoke, insulation bag, first-aid case/bag, position indicating battery, radar reflector.

5.6 Documents

5.6.1 Relevant international conventions, IMO resolutions, circulars, regulations of the Administration, CCS rules and relevant industry technical standards are to be provided. The Service Supplier is to have access to the following documents:

(1) IMO Resolution A.761 (18)—Recommendation on Conditions for the Approval of Servicing Stations for Inflatable Liferafts, amended by resolutions MSC.55(66), MSC.388(94);

(2) IMO Resolution MSC.55(66);

(3) 1974 SOLAS 1996 amendments;

(4) MSC.48(66) on the International Life-saving Appliance (LSA) Code and amendments adopted by MSC.218(82) and MSC.293(87);

(5) MSC.81(70) on Revised Recommendation on Testing of Life-saving Appliances and amendments adopted by MSC.226(82) and MSC.295(87);

(6) MSC/ Circ.1114 on Guidelines for periodic testing of immersion suit and anti-exposure suit

seams and closures;

(7) IMO MSC.1/Circ.1328—Guidelines for the Approval of Inflatable Liferafts Subject to Extended Service Intervals Not Exceeding 30 Months;

(8) Manufacturer’s servicing manuals, servicing bulletins, instructions and training manuals for equipment of specific type, as appropriate;

(9) Type Approval certificates, showing any conditions that may be appropriate during the servicing and/or maintenance of inflatable liferafts, inflatable rescue boats, inflatable lifejackets, and hydrostatic release units;

(10) LSA code/Chap.IV, 1995 SOLAS Conference Resolution 4 regarding marine evacuation systems (applicable to suppliers of servicing and testing of marine evacuation systems);

(11) Chemical industry standard of the People's Republic of China HG2714.3-1995 Inflatable Liferaft Y type" (applicable to ocean-going fishing vessels).

5.6.2 For servicing of inflatable life-saving appliances by servicing stations located in China, valid personnel training documents, servicing manuals or maintenance manuals (at least including testing and repair of liferafts and marine evacuation systems, and corresponding repair objects of inflatable rescue boats, inflatable lifejackets and immersion suits) for relevant appliances provided by the manufacturer are to be available. For servicing of inflatable life-saving appliances by servicing stations located outside China, service is to be performed to appliances within the scope of valid authorization or approval, personnel training documents, servicing manuals or maintenance manuals provided by the manufacturer in accordance with the requirements of the flag State.

5.6.3 The supplier is to have documented procedures and instructions for how to carry out service of equipment. Where inflatable liferafts are subject to extended service intervals in accordance with the requirements of SOLAS Regulation III/20.8.3, MSC.1/Circ.1328 is to be followed in addition to Resolution A.761(18) as amended by MSC.55(66).

5.6.4 Assessment of qualified suppliers is to be carried out regularly. A list of qualified suppliers, such as main materials, equipment, spare parts and liferaft cylinder inflation approved or accepted by CCS is to be established.

5.6.5 The liferaft cylinder CO_2 inflating station is to establish a gas source procurement and inflation operation account. Note that the liferaft cylinder gas source is to satisfy the requirement of moisture content less than 150 ppm specified in MSC.218(82) (for suppliers in China, the gas used in steel cylinders for rafts is to meet the requirements of the national standard GB1886.228-2016 National Standard for Food Safety Food-Additives-Carbon Dioxide) and obtain product quality documents.

5.6.6 A warehousing and delivery account of raw materials, outfitting, equipment, spare parts and cylinder inflation is to be set up to indicate the batch number, expiration date (where applicable), time of entry and exit, and actual inventory. For raw materials, outfitting, equipment and spare parts with special requirements from the manufacturer, a list is to be developed.

5.6.7 A sound operation process supervision and verification system is to be established to ensure that the products have been serviced and surveyed satisfactorily.

5.6.8 For servicing stations in China, a fixed video recording system is to be arranged in the servicing workshop and video recording of servicing each object to be serviced (liferaft or marine evacuation system) is to be ensured. The video is to clearly identify the object to be serviced and show the complete process. In case the above equipment cannot work normally and effectively, the name of ship, model, serial number, and manufacturing date of the liferaft or marine evacuation system during servicing may be recorded by other video equipment as an alternative (this video is to indicate the surrounding site of the object to be serviced at the same time). A backup of the above video is to be kept for at least 5 years after the completion of the servicing.

5.6.9 A statistical data is to be prepared for all serviced liferafts. The statistics are to reflect the manufacturer, model, ship, date of manufacture and number, carrying capacity of the serviced liferaft, and in particular the defects found and repairs carried out, as well as units condemned and withdrawn from service. These statistics are to be archived at the servicing station for CCS reference.

5.6.10 After completion of the servicing, all documents and documents are to be filed, including the last servicing and testing records, certificates or reports, which are to be kept for a period of at least 5 years.

5.7 Practical operation verification requirements

5.7.1 For servicing of liferafts, practical operation verification tests are to be carried out at initial approval, renewal audit and additional audit, as deemed necessary by CCS. Paragraph 1.7.1.3 of Chapter 1 is to be complied with for inflatable life-saving appliances other than liferafts and hydrostatic release units.

5.7.1.1 In order to verify the actual servicing quality at the initial approval, the inflatable liferaft for practical operation verification test is to be the one that is normally used on board, and practical operation verification is to be carried out under the supervision of the on-site auditor, which includes on-site maintenance and inspection as well as drop test. For servicing stations in China, at the practical operation verification test, the drop test is to be carried out. For servicing stations outside China, at the initial approval and renewal audit, the practical operation verification test is to be carried out according to the requirements of the relevant conventions.

5.7.1.2 2 inflatable liferafts are used for the practical operation verification test, one of which is to have larger specification or higher requirements in the servicing scope applying for approval. The on-site auditor is to witness all workshop testing items for that liferaft and the drop test of the two liferafts.

5.7.1.3 When servicing hydrostatic release units, they are to be placed in the test tube for testing once prior to disassembly to determine the technical condition of the units.

5.7.1.4 After hydrostatic release units are serviced, they are to be tested at least twice to prevent data misreading.

5.7.1.5 A simulated repairing test for liferaft body is carried out by selecting a scrapped liferaft or a piece of raft body rubberized fabric. The repair test is to be carried out in the repair workshop. It is to be noted that at the initial approval, the repair test is carried out by selecting a scrapped liferaft. Relevant necessary additional pressure test and working pressure test are to be carried out after the repair in accordance with the requirements of the servicing manual of the manufacturer.

5.7.2 The drop test is to be carried out at the appropriate space complying with the following conditions:

(1) open water with sufficient depth (recommended to be greater than 4 m) or a tank with

sufficient area and depth;

(2) devices or equivalent means prepared by the servicing station to lift the inflatable liferaft used for the drop test to a height of 18 m required for the drop test[19].

5.7.3 Deployment test of marine evacuation systems

One marine evacuation system that has been serviced by the servicing station is to be used to carry out the deployment test in conjunction with practical conditions at initial approval. Requirements for servicing marine evacuation systems which are developed by the servicing station and approved by CCS are to be satisfied.

5.7.4 Practical operation verification test of servicing inflatable lifejackets and immersion suits

Two inflatable lifejackets and immersion suits that have been serviced by the servicing station are selected by CCS auditors on site to carry out the practical operation verification test. Testing items for inflatable lifejackets and immersion suits which are developed by the servicing station in accordance with the requirements of the manufacturer's servicing manual and approved by CCS are to be satisfied. Practical operation verification test of immersion suits are also to satisfy the requirements of MSC/ Circ.1114 on Guidelines for periodic testing of immersion suit and anti-exposure suit seams and closures.

5.7.5 Test of plenum chamber of inflatable rescue boats

One inflatable rescue boat that has been serviced by the servicing station is used to carry out the examination and test of plenum chambers. Refer to servicing guidance documents of the rescue boat manufacturer. For hard structure and machinery and electrical parts, refer to the requirements of Chapter 9, Part One of the Guidelines.

5.7.6 IMO Res. A.761(18) as amended by MSC.55(66) gives recommendations on conditions for the approval of servicing stations for inflatable liferafts which is to be observed as relevant. Where inflatable liferafts are subject to extended service intervals, MSC.1/Circ.1328 is also to be followed.

[19] For type Y liferaft, the drop test is to be carried out in accordance with the standard height of the manufacturer.

Appendix

Appendix 1 Common and special servicing tools for inflatable liferafts and marine evacuation systems (recommended)

No.	Name	Unit	Number	Purpose	Remarks
1	Ordinary baler	Set	1	Storage container packing	Plastic strapping, snap-on
2	Plastic steel baler	Set	1	Storage container packing	PET plastic steel strapping, snap-on
3	Welding pneumatic baler	Set	1	Storage container packing	PET plastic steel strapping, welding
4	Lead sealing plier	/	1	Lead seal after storage container bales	
5	Capper	/	1	Sealing of record books	Not necessary where a self-sealing bag is used
6	Cylinder clamp	/	1	Fixing the upper valve body when dismantling the cylinder	There are two types, i.e. manual and pneumatic, and large clamps are to be considered for A and B servicing stations
7	Quick release valve reset tool	Set	1	Reset of upper valve body cable	Not universal for all manufacturers, and at least three kinds are common in China
8	Water filter cleaner	/	1	Vacuuming	Or reverse vacuum gun
9	Manual roller (big)	/	1	Large area rolling after repair	Metal handles and rollers
10	Manual roller (small)	/	1	Local or edge rolling after repair	Metal handles and rollers
11	Air tightness test joint	Set	1	For tightness test	Not universal for all manufacturers, generally at least 8 for one manufacturer and 24 for three manufacturers
12	Relief valve commissioning tool	Set	1	For Relief valve pressure commissioning	Not universal for all manufacturers
13	Coding machine	/	1	For identification and coding of storage container	Chinese and English and numbers, the code belt material is to be waterproof and fade-proof.
14	Heat gun or electric dryer	/	1	Accelerating the drying of the glued surface when repairing the liferaft body	
15	Scraper knife	/	2	For cleaning the old identification of storage container	
16	Monkey wrench	Set	1		

17	Open-end wrench	Set	1		
18	Straight screwdriver	Set	1		
19	Cross screwdriver	Set	1		
20	Nipper plier	/	1		
21	Cutting plier	/	1		
22	Long handle cutting plier	/	1	Used to cut steel wire for liferaft binding	
23	Angle grinder	/	1		
24	Grinding machine	/	1		
25	Vise	/	1		
26	Bow fast winding frame	/	1	For arrangement of bow fast in the rope bag	
27	Cylinder inflation hand wheel	/	2	For tightening and sealing the screw plug after cylinder inflation	Not necessary if cylinder inflation is outsourced
28	Cylinder paint tool	Set	1		Spray guns, small air compressors, bottle racks, etc.
*29	Triangle fixator	/	2	Preventing the storage container of the storage platform from falling after the door is opened	Used vertically according to type from the manufacturer
*30	Mallet	/	1		
*31	Pin	/	1	For dismantling of door pin	
*32	Round head scissors	/	1		
*33	Positioning steel bar	/	4	For installation and positioning of box	
*34	Ratchet wrench	Set	1		
*35	Rivet gun	/	1	Fixing of nameplates and warning signs	
*36	Watertightness test tool	Set	1	For box watertightness test	1 water pipe/hose; 1 flush head with nozzle diameter not less than 12 mm; 1 pressure gauge (range 0.5 MPa);

Note: Those with * are common and special servicing tools for marine evacuation systems and the remaining are common and special servicing tools for inflatable liferafts and marine

evacuation systems.

Appendix 2 Test programme of servicing stations (recommended)

1 Purpose

The purpose of the practical operation verification test is to conduct the test according to the approved test programme by selecting liferafts that have been serviced at the station, and to verify the extent of acquiring theoretical knowledge of servicing relevant equipment and the actual operation level of the servicing personnel through the practical operation verification test, and at the same time confirm the overall servicing capability of the station.

The test is to be carried out according to the actual servicing process and procedure of the station. In addition to the test results, the correctness of the servicing operation will be an important factor in determining whether the approval test is passed.

2 Test preparation

Generally CCS surveyor will select liferafts from those that have been serviced at the site of the servicing stations. The type and specifications of the liferafts used for the test are to cover the approved servicing scope intended for the servicing station insofar as practicable. Liferafts at other locations, e.g. sampling on ship in conjunction with ship survey, may be selected for testing if deemed necessary by CCS and allowed by practical conditions.

At least two liferafts are to be selected for approval testing, one subject to tests in 3.1-3.15 of the programme and the other which has been serviced by the servicing station subject to the test in 3.15 of the programme. In addition, an old liferaft or liferaft body rubberized fabric is to be subject to the test in 3.16 of the programme (an old liferaft is to be selected for repair at initial approval).

The servicing record of the liferaft is to be checked before test.

Testing conditions (including calibration of testing equipment, site etc.) are to be confirmed by CCS review personnel as in compliance with the requirements of this Chapter. All test items must be witnessed by attending CCS review personnel.[20]

3 Test items

[20] The test is to be carried out in accordance with the servicing process or procedure recommended by the manufacturer insofar as practicable. No servicing process or test as deemed necessary by the manufacturer is to be dispensed with on account of the programme. (e.g. higher test pressure may be required by some manufacturers).

3.1 Inspection of storage containers

3.1.1 The storage container is to be free from damage, deformation or indentation.

3.1.2 The name or trademark of the manufacturer, the manufacturing date, the serial number of delivery, the name and/or logo of the certifying ship survey organization, the carrying capacity, the SOLAS identification, the type of emergency bag, the date of servicing, the length of the bowline, the maximum allowable storage height, lowering instructions, ship name, port of registry, etc. are to be indicated on the storage container.

3.2 Inspection of liferaft body

The liferaft is unsealed, uncovered, taken out, unwound (drawstring of the cylinder unwound), flattened, with cylinders unloaded. The upper and lower buoyancy tubes and the bottom (where applicable) are manually inflated to the working pressure, and the upper and lower buoyancy tubes, the canopy post and the bottom tape are examined respectively.

3.2.1 The entire liferaft body is to be free from sewage or seawater pollution, clean and dry.

3.2.2 The liferaft body rubberized fabric is to be free from abrasion, degumming, cracking, clamminess and mildew. Rubberized fabric joints are to be free from displacement and tackless.

3.2.3 The canopy is to be free from damage and off-line.

3.2.4 The hanging cloth of bottom clamp plate (where applicable) is to be free from elastic line degumming.

3.2.5 The name of the manufacturer and delivery number, the date of manufacture, the name and logo of the approval organization, the name and location of the servicing station where the last servicing was carried out are to be indicated on the liferaft body. Carrying capacity is to be indicated above each entrance (the word height is not less than 100 mm, and the word color is distinctively different from the color of the liferaft).

3.3 Necessary additional pressure (NAP) test

3.3.1 Plug the pressure release valves.

3.3.2 Gradually raise the pressure to 2.0 times the rated working pressure or the necessary additional pressure specified in the manufacturer’s servicing manual.

3.3.3 After 5 minutes, there is to be no seam displacement, cracking, or other defects, or significant pressure drop. If cracking in the buoyancy tube is audible, the liferaft is to be condemned.

3.3.4 The pressure in all buoyancy chambers is to be reduced simultaneously by removing the plugs from the pressure relief valves.

3.3.5 After pressure relief, sufficient time is allowed for the liferaft to regain fabric tension, and then a working pressure (WP) test is carried out.

3.4 Liferaft body working pressure (WP) test

Inflate the liferaft with dry compressed air to at least the working pressure, or to the pressure required by the manufacturer's servicing manual if higher. The liferaft is to be subjected to a pressure holding test over a period of not less than one hour (2 h for type B liferaft) during which the pressure drop will not exceed 5% of the working pressure after revision of temperature and pressure.[21]

3.5 Inspection of safety valve

Measure the opening and closing pressure of upper and lower buoyancy tube safety valves, and the results are to comply with the requirements of the servicing manual.

3.6 Test of platform check valve

Measure the upper limit pressure from the inflation of the buoyancy tube to the opening of the platform check valve, and the buoyancy tube pressure after the embarkation platform is fully deflated. The results are to comply with the requirements of the servicing manual.

3.7 Floor seam strength test (where applicable)

The buoyancy tube and floor are inflated to the working pressure. Check whether there is any unreliability. Check the seams between floor and buoyancy tube for slippage or edge lifting. Use a special support frame to put the liferaft on (seams are not to be supported). A person weighing not less than 75 kg (82.5 kg for liferafts constructed on or after 2012) is to crawl around the perimeter of the floor for the entire circumference, and another person is arranged to follow the person above in the same direction outside the liferaft and observe whether the bottom of the liferaft and the lower buoyancy tube have slippage or edge lifting, and listen for the sound of tearing. Finally, the liferaft is lowered from the support frame and the seam is checked. There is to be no slippage or edge lifting.

3.8 Liferaft body overload suspension test (applicable to servicing stations for davit-launched

[21] The test is to include floor tightness test and the functional test of canopy post check valve. Specific testing procedures and requirements are to follow the manufacturer's servicing manual.

liferafts)

Test is carried out in accordance with the following procedures and recommendations of the manufacturer:

3.8.1 The upper and lower buoyancy tubes are inflated to the working pressure and the floor is not inflated. The safety valves are in working condition.

3.8.2 Uniformly load the personnel or the substitution load (e.g. sandbags or water bags) into the liferaft until the total weight is as follows: 110% of the sum of the liferaft body weight, equipment weight, total weight of rated personnel (calculated as 75 kg per person, 82.5 kg for liferafts constructed on or after 2012), and then subtracting the liferaft body weight[22].

3.8.3 Use a special davit to lift the liferaft completely off the ground, within the bottom at least 30 cm from the ground.

3.8.4 The suspension state is kept for 5 min, and the buoyancy tube pressure is continuously observed and recorded. The safety valve is to maintain the normal working pressure and basic shape of the buoyancy tube.

3.8.5 Slowly lower the liferaft, move out the substitution load, and record the buoyancy tube pressure.

3.8.6 Check the hoisting rigging, canopy, sling and hoisting ring shackle for damage and deformation. The floor seam is to be free from slippage or edge lifting.

3.9 Inspection of inflation system (cylinder, cylinder valve, one-way inlet valve, high pressure hose)

3.9.1 Outer surface of the cylinder is to be intact and free from rust.

3.9.2 The serial number, empty cylinder weight, wall thickness, capacity, working pressure and hydraulic pressure test date are to be indicated on the cylinder.

3.9.3 The capacity, amount and type of gas inflation, the working pressure are to be compatible with the type of liferaft.

3.9.4 The date of gas inflation and that of hydraulic pressure test indicated on the cylinder are to ensure a servicing period.

3.9.5 The actual total weight of the cylinder is not to differ by more than ±20g from the total

[22] Without any equipment in this test.

weight shown.

3.9.6 The surface of the cylinder valve and its components are to be free from rust, with flexible action. The firing pin is to be moderate in thickness and length. The dragline wire must not be broken or burred. The dragline plastic sleeve is to be intact. The lead seal or helmet is to be intact

3.9.7 The components of the one-way inlet valve are to be free from rust and the free length of the spring is to comply with the requirements of the manufacturer's servicing manual. The diaphragm and upper seat gasket are to be free from aging.

3.9.8 If the liferaft inflation system is fitted with a high-pressure hose, the hose is to be free from damage or breakage, the joint is to be free from corrosion, and the length is to be adapted. According to the requirements of the manufacturer's servicing manual, a high-pressure hose hydraulic test is to be carried out.

3.10 Inspection of position indication and lighting systems

Check that the bulbs, lamp holders, sockets, wires, stay wires, battery bags and strobes (if any) are intact, and the welding spots are secure and reliable. The direction of the stay wire is to be the same as that of the battery latch The battery is to be in good condition, and its effective use period is to guarantee a servicing period and subject to a functional test. If it is a seawater battery, use a multimeter to measure its two-pole resistance, which is to be infinite. The battery type is to match the liferaft type.

3.11 Inspection of outfitting

Outfitting is to be intact and free from damage. The number and specification of outfitting are to comply with the provisions of the manufacturer.

3.12 Inspection of equipment and spare parts

The types and quantities of equipment and spare parts are to be complete, in good packaging, neatly placed, and fragile items well preserved. For spare parts requiring certification, survey certificates are to be complete and markings are to be correct. For spare parts with a valid period, the period of use is to be met. Spare parts are to be kept watertight.

3.13 Inspection of packing

On-site supervision and inspection of whether the maintenance personnel's packaging of liferafts is according to the methods and requirements of the servicing procedures. The inspection contents include: the installation of the outfitting and equipment, the installation of the cylinder, the

preparation of the storage container and the inner and outer sealing strips, the folding of the liferaft, the installation and packaging of the bowline.

3.14 Inspection of hydrostatic release units

The hydrostatic release units are to be clearly marked and intact, and free from rust. The rotating member is to be lubricated. The rubber diaphragm and O ring are to be free from aging and deterioration. The easy-to-break rope is to be renewed. The spring is not fatigued and the free height satisfies requirements. The welding point has no open weld. The connecting members remain firm. The release performance test is carried out, the result is to be able to automatically decouple under the pressure of 0.20-0.40 kg/cm^2.

3.15 Drop test

Drop the serviced liferaft to the water by free falling at a height of 18 m[23]. The liferaft is to be fully inflated within 1 min[24] at ordinary temperature (refer to the manufacturer's manual for the inflating time of liferafts with large specifications), with the liferaft body free from damage. The position indication light is to be switched on automatically. The equipment is to be used normally.

3.16 Simulated repairing test for liferaft body

3.16.1 Sampling: Take an old liferaft at initial approval, or a patch of liferaft body rubberized fabric (with area not less than 0.5m^2) at renewal or additional audit (where applicable).

3.16.2 By simulating common damage cases of liferaft body, cut one or several openings (horizontal line and cross type opening) of approximately 10 cm in length in the buoyancy tube of the scrapped liferaft or the rubberized fabric used for the buoyancy tube.

3.16.3 The defect is repaired in accordance with liferaft body repair techniques.

3.16.4 Check the repaired scar, which are to be regular and beautiful and free from edge lifting.

3.16.5 For liferaft repair carried out at initial approval, upon completion of repair, necessary additional pressure test and working pressure test are to be carried out after it is placed for a period of time required by the manufacturer.

4 Records and reports

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[23] For Y-type liferafts used on ocean-going fishing vessels, the drop test height is to be determined according to the manufacturer’s standards.

[24] In case of extreme low temperature, refer to the manufacturer's maintenance manual. According to MSC.81 (70), the inflating molding time is not to exceed 3min at -30℃.

The followings are to be recorded in the test:

4.1 Particulars of serviced liferaft (model, manufacturer, serial number, carrying capacity, manufacturing date, last servicing date);

4.2 Temperature and humidity during test;

4.3 All original data and calculation results;

4.4 Tests are to be signed by operators and supervisors. The complete test conclusions are to be drawn and signed by the technical director;

4.5 List of testing equipment used in the test.

Appendix 3 Test items and methods of marine evacuation systems (recommended)

No.	Item	Inspection and testing methods
1	Visual inspection	1 Use self-test method to carry out thorough inspection of the platform, passage, container, winch and fittings to check the platform tape, elastic rope and all kinds of ropes for aging, degumming, abrasion, mold, etc., and check whether the joint is displaced or tackless; check the parts of the passage for signs of aging, degumming, abrasion, mold, sewing off line, etc.; check the container for signs of deformation, rust, paint peeling, aging of the seal, etc. 2 After problems are found and repairs are carried out, tests of platform, passage, container and related items. If aging, degumming, wear, deformation and rust are serious so that repairs cannot be carried out or test requirements cannot be met after repair, it is to be scrapped.
2	Safety valve sensitivity	1 Connect the plenum chamber of the platform to the pressure gauge, and then inflate until there is a large amount of exhaust from the safety valve. At this time, record the opening pressure of the safety valve. The required opening pressure range is in accordance with the requirements of the servicing manual of the manufacturer, and then the excess gas is exhausted until the safety valve is closed. At this time, record the closing pressure of the safety valve. The required closing pressure range is in accordance with the requirements of the servicing manual of the manufacturer. 2 Tested according to the requirements of the safety valve opening and closing pressure. If the requirement is not met, commissioning is to be carried out. If the commissioning still fails to meet the requirements, the rubber parts, springs and other spare parts are to be replaced or the entire safety valve is to be replaced before commissioning until it is qualified. Note that the beep of safety valve signals a large amount of exhaust. The valve is to be closed after the neutral soap solution is applied to the safety valve port without any bubble (a bubble is allowed in 2-3 min).
3	Working pressure (WP) test	1 Spread the platform on the ground, inflate the plenum chambers to the working pressure with dry compressed air, maintain the voltage for 30 min, and record the time, temperature, humidity and pressure at this time. 2 After pressure stabilization, accurately adjust to the working pressure and maintain for 1 h, and record the time, temperature and pressure again. 3 After the temperature and atmospheric pressure compensation, the pressure drop is not to exceed 5%. 4 The temperature and pressure compensation standard is: during the test, when the ambient temperature increases or decreases by 1 ^{o}C, the pressure value after the test decreases or increases by 0.4 kPa (3 mmHg), but the temperature change is not to exceed ± 3 ^{o}C throughout the test.
4	Gas inflation (GI) test	1 Place the packaged platform on the clean floor (the folded platform is to be taken out of the storage container), manually pull out the inflation dragline to start the cylinder quick release valve, inflate the platform, record the forming time, check the seam and appearance. 2 Specially check whether the safety valve is effective during the test. 3 After the gas inflation test, the platform is stabilized for some time and working pressure test is carried out for 1 h. 4 At room temperature, if the platform can be normally inflated within 1 min without seam displacement, cracking, damage, etc., it is satisfactory.
5	Necessary additional pressure (NAP) test	1 Plug the safety valve. 2 Inflate the platform upper and lower buoyancy tubes to 2 times the working pressure. 3 After 30 min, there is to be no seam displacement, cracking and other defects, or any obvious pressure drop (the pressure drop is not to exceed 5%). 4 At this time, if the buoyancy tube is broken, the platform is to be scrapped. If it is normal, the safety valve plug is to be pulled out at the same time to reduce the pressure inside the buoyancy tube to the working pressure. 5 Then, the buoyancy tube is kept under working pressure for a certain period of time, and after the rubber cloth stress is restored, a l h working pressure test is performed.
6	Floor seam strength (FS) test	1 Inflate the platform to the working pressure and place it on the floor seam test support. 2 A person weighing not less than 82.5 kg is to walk/crawl around the perimeter of the floor for the entire circumference. 3 Check seams between the floor and buoyancy tube and floor seams for slippage or edge lifting. 4 After deflation, check whether canopy post (if fitted) root and seam are intact. 5 If there is no seam slippage or edge lifting and canopy post root and seam are intact, it is satisfactory.
7	Unobstructed test	1 Connect the upper end of the vertical passage of the satisfactorily serviced marine evacuation system to the container passage upper port (which can be replaced by a simulated device) in accordance with the normal connection type of marine evacuation system. The passage entrance is to be raised to the maximum height insofar as practicable. 2 Insert the passage inspection bag provided on the marine evacuation system into the

		passage from the passage entrance, and observe whether the passage inspection bag can slide through the passage to the ground normally. 3 If the passage inspection bag can slide through the passage to the ground normally, the test is satisfactory; Otherwise, the passage is to be re-arranged and inspected. After the cause is found, the test is to be repeated until it is satisfactory.
8	Watertightness test	1 Place the satisfactorily serviced marine evacuation system container on the ground, flush the container (inner and outer doors) for 5 min by using a water flow with a nozzle with a diameter of φ12 mm, a pressure of 2 bar and a distance of 1.5 m from the system container, and then open the container to check if it is watertight. 2 Except for the bottom drain hole, the container is to be watertight. If the watertightness of inner and outer doors is not met, the container (especially the flatness and sealing strip of the inner and outer doors) is to be re-examined to find and eliminate the cause of non-watertightness. The test is to be repeated until it is satisfactory.
9	Inner and outer door dry release test	1 For the satisfactorily serviced marine evacuation system container, the inner and outer doors are continuously opened and closed 5 times, and they are inspected for damage after the test. 2 The inner and outer doors and fixing devices of the system container are to pass five consecutive dry release tests, and the doors are to be free from damage after the test. If the test fails, the container (especially the inner and outer doors and the rotating part) is to be re-examined to find and eliminate the cause of the test failure. The test is to be repeated until it is satisfactory.
10	Deployment test (at initial approval)	1 The completely packaged marine evacuation system is installed on the ship as required and placed at the design storage height. The system is deployed on water by one person from the ship according to the manufacturer's operating instructions, and the time from the deployment to the system forming time is recorded to check whether the system is in good condition. 2 If the marine evacuation system can be deployed and formed normally, the personnel can slide down to the platform normally after deployment and the system is intact after the test without damage, the test is satisfactory. 3 This test can be carried out in conjunction with deployment test carried out every six years for marine evacuation system.

Note: The above table is for marine evacuation systems with vertical passages; for test of marine evacuation systems with inclined passages, reference may be made to this appendix for implementation.

Appendix 4 Test items and methods of immersion suits (recommended)

No.	Inspection items	Frequency	Inspection contents and methods
1	Delivery information	Every three years from the date of manufacture, every year for more than ten years	Record manufacturer, data of manufacture, type, size etc.
2	Storage bag	Same as above	Whether the stitch of the storage bag and the overall performance of the bag can easily separate the suits from the package; keep the wearing instructions clear and identifiable, and ensure that the model and size of the suits are reflected on the bag.
3	Appearance	Same as above	Boots, leggings, gloves, belts, locks, caps, hats, floats, reflective belts, zippers a. Place the immersion suits on a clean, flat surface to ensure that the inside and outside of the suits are dry. Visually inspect the suits for damage, cracks, breaks, and small holes. Carry out repair if necessary. b. Check the performance of the zipper and pull the zipper up and down twice to ensure smooth operation. Lubricate the zipper teeth with the zipper lubrication recommended by the manufacturer to make the zipper faster and more secure. If the zipper cannot be pulled or is damaged, the immersion suit must be returned to the manufacturer or the zipper is to be replaced. The zipper of serviced immersion suit is to be in open condition. c. Check if the reflective tape is firmly attached and damaged. d. Check whether the belt is intact, and it can not be damaged or broken; the lock is to be able to operate smoothly, and there must be no jamming or damage. If the above configuration is damaged, replacement is to be considered.
4	Tightness test	Same as above	a. For servicing stations located in China, the watertightness test or equivalent test is to be carried out in a manner by referring to the manufacturer's manual. b. For servicing stations located outside China, the tightness test is to be carried out in a manner by referring to the manufacturer's manual. c. If the phenomenon of air leakage is as follows: continuous air bubbles. Based on the characteristics of the immersion suit fabric and stitching, when the immersion suit is under pressure, the air in the stitching or fabric will be exhausted, and a continuous bubble emergence will occur. There are two options for proving that there is leakage:① Waiting: Wait for the air in the stitching and fabric to be exhausted. No more bubbles will emerge after that, but the time limit cannot exceed 15 minutes. That is to say: if the bubbles are still emerging continuously after 15 minutes, It is to be treated as leakage. ② Accelerated venting: For areas where bubbles are continuously emerging, gently rub by hand to accelerate the exhausting of air. If the bubble cannot be eliminated after rubbing, it is considered as leakage, and the time limit cannot exceed 15 minutes. After the test of the whole suit is completed, check the airtightness of the head position. d. Apply waterproof powder to the leaking part to make a mark, in order to facilitate repair. e. After completion of the test, deflate, remove the sealing device, unzip, and hang on the hanger to be dried. (The hangers used for hanging immersion suits cannot be made of iron, and wood or plastic is to be used. When iron collides with each other, it is easy to cause fabric damage. Secondly, during transportation,

			notice that there is to be no collision.) Simultaneously record the testing. f. The leaking part needs to be repaired after the immersion suits are completely dried. (For overseas suppliers, such tightness/pressure tests may be carried out in accordance with the requirements of IMO MSC/Circ. 1114.)
5	Provision inspection	Same as above	Whistle, immersion suit light a. Whistle: Check that the immersion suit is provided with a whistle, and the test blow can make a sound; b. Immersion suit light: Check the immersion suit is provided with a light. If it is a lithium battery or a dry battery light, test whether it can work normally. At the same time, check the date and expiration date of the light, which is to be within the valid period.

Appendix 5 Test items and methods of inflatable lifejackets (recommended)

No.	inspection items	Frequency	Inspection contents and methods
1	Delivery information	Every year	Record manufacturer, data of manufacture, delivery batch no./number, type, size etc.
2	Appearance	As required by the manufacturer, once every three years as recommended	Whether the jacket of the lifejacket is damaged; whether there is obvious wear or other wear on the air chamber; the integrity of the accessories of the lifejacket (including the inflation device, CO_2 cylinder, blowing tube, and retro-reflective tape); the connection between the air chamber and the jacket; the connection of the jacket of the lifejacket with the strap (belt), socket, strap and other accessories; whether the reflective belt falls off. If there is a disconnected or broken line, it is to be repaired and reinforced in time. If a large area is damaged, it is recommended to be scrapped according to the manufacturer's requirements
3	Air tightness test	Same as above	Open the jacket, use the air pump to fill the air into the inflatable lifejacket air chamber from the mouth blowing tube. The pressure is controlled at 20 kPa. Under this pressure, the lifejacket is placed at room temperature for the time specified by the manufacturer (such as 12 hours recommended by a domestic manufacturer)), and then measure the pressure in the air chamber with a manometer. If the pressure drop is not more than 10%, it indicates that the overall airtightness of the lifejacket air chamber (including the inflation device, air chamber and mouth blowing tube) is qualified. For leakage testing of air chamber and mouth blowing tube, after the air chamber is inflated, part of the structure that needs to be leakage tested can be immersed in the water of the sink for the time required by the manufacturer (e.g. 1 min) to observe whether bubbles are generated in the water. If there are bubbles in the mouth blowing tube, it needs to be sent to the manufacturer for repair
4	CO_2 cylinder testing	Every year	1. Replace water soluble tablets in the automatic inflation devices; 2. Weigh the cylinder. If the difference between the actual weight and the nominal weight is greater than 2g, it is to be replaced; 3. Replace the cylinder

Appendix 6　Liferaft servicing test period

This table is taken from IMO A761 (18) and alternative methods proposed by the manufacturer may be accepted during the servicing, provided that they are not less than the requirements of this table.

Frequency of NAP①, WP②, GI③ and FS④ tests are as follow:

Servicing intervals	Annual floor seam and pressure test methods
End of first year	WP test
End of second year	WP test
End of third year	WP test
End of fourth year	WP test
End of fifth year	GI test
End of sixth year	WP test
End of seventh year	WP test
End of eighth year	WP test
End of ninth year	WP test
End of tenth year	GI+FS test
Eleventh to fourteenth year	NAP+FS test
Fifteenth year	GI+NAP+FS test
Sixteenth to nineteenth year	NAP+FS test
Twentieth year	GI+NAP+FS test
Twenty-first to twenty-fourth year	NAP+FS test
Twenty-fifth year etc.	GI+NAP+FS test

① NAP- Necessary additional pressure test (compressed air)

② WP-Working pressure test (compressed air)

③ GI- Gas inflation (fitted gas)

④ FS-Floor seam strength test

Appendix 7 Guidelines for scrapping of inflatable liferafts on ocean-going fishing vessels (recommended)

1 For inflatable liferafts manufactured in China, in accordance with the requirements of the Marine Fisheries Safety Regulations and the technical conditions of the manufacturer, shipowners are to be recommended to scrap inflatable liferafts in the following conditions. (For foreign liferafts, reference may be made to this appendix for implementation)

1.1 Liferafts of more than 15 years.

1.2 Liferafts of more than 10 years, which did not pass one of gas inflation test (GI), necessary additional pressure test (NAP), working pressure test (WP) or floor seam strength test (FS) and could not be repaired.

1.3 Liferafts with one of the following defects:

1.3.1 Buoyancy tube and canopy post tape have a large area of damage exceeding 150 cm^2, embrittlement, stickiness, degumming, seepage, or a large number of bubbles.

1.3.2 The buoyancy tube has a large number of needle-shaped blisters that cannot be repaired.

1.3.3 Large-area damage, degumming, cracking and aging of the bottom tape exceeding 1/10 of the bottom of the liferaft, or severe swelling after inflation which can not be repaired.

1.3.4 Long-term immersion or poor storage of liferaft, causing some structures (such as the surface of the buoyancy tube or the bottom) to be extensively mildewed or have a large number of bubbles that cannot be repaired.

1.3.5 Contaminated and discolored canopy, severe damage or degumming of joints that cannot be repaired.

1.3.6 Important outfitting (balanced water bag, righting belt, sling and embarkation ladder) with severe mildew that cannot be repaired.

1.3.7 Liferaft airtightness test compartment leaks that cannot be repaired.

1.3.8 When the liferaft is over 15 years of age and the shipowner does not have a new one for replacement, one year extension may be specially allowed provided that the appearance quality is still good after inspection and the gas inflation test (GI), necessary additional pressure test (NAP), working pressure test (WP) or floor seam strength test (FS) are satisfactory, with relevant submissions to CCS and the fishing vessel survey unit for filing.

2 Scrapping procedures for inflatable liferafts

2.1 If the operator finds the above situation when servicing the liferaft, he is to promptly report to the supervisor and the technical director of the servicing station. After confirmation by the joint inspection, signatures will be signed jointly upon decision by the technical director of the servicing station and a liferaft scrapping account registration form will be prepared.

2.2 After deciding to scrap a liferaft, the servicing station is to immediately issue a notice of scrapping recommendation, with a copy sent to the unit or shipowner where the liferaft belongs, and dispose of the old one and replaces it with a new one, and report to CCS and the fishing vessel survey unit for review and record.

2.3 For a liferaft with scrapping recommendations, after the servicing station seeks the opinions of the unit or the owner of the liferaft, the certificate is to be withdrawn, and the marks on the liferaft body are to be coated with black paint. The words “To be scrapped” are to be indicated on the liferaft body and canopy. The buoyancy tube is to be damaged.

3 When the servicing station is servicing a liferaft that will be scrapped within a year, a short-term servicing document may be issued if the servicing is satisfactory, and the validity period is until the recommended date of scrapping.

Chapter 6 Suppliers Engaged in Inspections and Testing of Radio Communication Equipment (SR)

6.1 Extent of engagement

6.1.1 Surveys, inspection, testing, and/or measurement of radio equipment aboard ships (including ocean-going fishing vessels) or mobile offshore units for compliance with relevant conventions, regulations or codes.

6.1.2 This Chapter applies to annual testing and maintenance of EPIRBs for compliance with relevant conventions, regulations or codes.

6.1.3 The principles of this Chapter also apply to Service Suppliers involved in inspection, performance testing and maintenance of Automatic Identification Systems (AIS) and ship security alert system (SSAS).

6.2 Personnel

6.2.1 A sufficient number of supervisors and inspectors are to be provided to meet business needs. Suppliers in China are to be provided with verified personnel of ship navigation safety and radio equipment and a technical director. The number of inspectors is to match the amount of business. For suppliers in China, at least one supervisor and one operator are to be provided to conduct on-site operation and recording during testing.

6.2.2 Radio inspector

(1) The inspector carrying out the inspection is to have been subject to the internal training in GMDSS, including initial and renewal survey requirements.

(2) The inspector is also to have at least one year's technical school training of relevant discipline or to have followed a technical course approved by the relevant Administration; or to hold an appropriate radio operators certificate, such as a GMDSS General Operator Certificate (GOC) or a GMDSS Radio Electronic Certificate (REC).

(3) The inspector is to have at least one year's experience as an assistant radio inspector under the guidance of qualified personnel.

6.2.3 Supervisor

(1) The supervisor is to have a minimum two years' technical education of relevant discipline from a technical school; or to hold an appropriate radio operators certificate, such as a GMDSS General Operator Certificate (GOC) or a GMDSS Radio Electronic Certificate (REC).

(2) The supervisor is to have more than two years' experience as inspector.

6.3 Equipment

6.3.1 The following testing equipment is to be provided:

(1) Equipment for measuring frequency, voltage, current and resistance.

(2) Equipment for measuring output and reflect effect on VHF and MF/HF.

(3) Equipment for measuring modulation on MF/HF and VHF (AM, FM, PM).

(4) Acid tester for checking specific gravity of lead batteries.

(5) Tester for checking of correct output from Free-Float Satellite EPIRB.

(6) Equipment for testing the performance of Automatic Identification Systems (AIS).

(7) Radio shielded room or shielded box suitable for detecting satellite emergency radio beacons.

(8) Watertightness test tank.

(9) Suppliers in China are to have 2 sets of office equipment for editing and printing testing reports.

6.3.2 For suppliers located in China, except for the radio shielded room or shielded box, the remaining testing equipment is at least to be duplicated.

6.3.3 The performance indicators such as range, precision and accuracy of the testing equipment is to be able to meet the needs of real ship testing.

6.3.4 Comprehensive tester can replace the provision requirements of frequency meter, power meter and code reader

6.3.5 All testing equipment (including newly purchased equipment) is to be within the validity of calibration.

6.3.6 Records of the use of testing equipment are to be retained. The recorded information is to include the date of use, user, and ship.

6.4 Documents

6.4.1 The supplier is to have documented procedures and instructions for how to carry out testing and examination of radio equipment. Procedures and instructions for operating each item of the testing/inspection equipment is also to be kept and be available at all times.

6.4.2 A log of maintenance and calibrations is to be available. In China, the measurement and testing equipment involved is to have a valid verification/calibration document or certificate issued by the national statutory metrological verification department.

6.4.3 The inspection report recognized by CCS is to be available. Suppliers in China are to be provided with inspection and testing certificates, reports and records as required by the MSA.

6.4.4 For equipment employing software in conjunction with the testing/examination, this software is to be fully described and verified.

6.4.5 The records related to testing are to be filed promptly. Suppliers in China are to appropriately keep the last and current inspection records, documents or reports of any ship for a period of at least 5 years.

6.4.6 Corresponding technical documents are to be provided. Relevant updated versions are to be obtained in a timely manner. The above technical documents include but not limited to those required in Appendix 1.

6.4.7 Suppliers in China are to be provided with operation manual of tested equipment.

6.4.8 Suppliers in China are to be provided with labour safety and protection articles necessary for testing personnel.

6.4.9 Suppliers in China are to establish a recognized quality management system , including working procedures and working instructions for the scope of testing services.

Appendix 1 List of documents to be provided

No	Name	Remarks
1	Notice of the Maritime Safety Administration of the People's Republic of China on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [Haichuanjian No. (2019)172]	Applicable to suppliers in China
2	Notice of the Maritime Safety Administration of the People's Republic of China on Printing and Distributing the Technical Conditions of Organizations Performing Ship Servicing and Testing Services [Haichuanjian No. (2019)173]	Applicable to suppliers in China
3	The latest version and previous versions of relevant chapters and sections of Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on International Voyages of Maritime Safety Administration of the People's Republic of China (MSA)	Applicable to suppliers in China
4	The latest version and previous versions of relevant chapters and sections of Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages of Maritime Safety Administration of the People's Republic of China (MSA)	Applicable to suppliers in China
5	The latest version of and the previous versions of relevant chapters and sections of the International Convention for the Safety of Life at Sea, 1974	
6	CCS Guidelines for Survey of Automatic Identification Systems (AIS)	
7	The latest version of and the previous versions of relevant chapters and sections of the Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU Code)	
8	Relevant requirements of the International Civil Aviation Organization (ICAO)	
9	Relevant provisions and requirements of flag State governments and port State authorities	
10	Manufacturer's servicing manual and technical manual of the relevant products	
11	MSC.1/Circ.1252 on Guidelines on annual testing of the automatic identification system (AIS)	
12	The latest version of Technical Regulations for Statutory Surveys of Ocean-going Fishing Vessels	
13	IMO Res.A.1104 (29)	
14	IMO Res. 74(69), annex 3 IMO SN/Circ.227, IMO SN/Circ.245, MSC.1/Circ.1252	
15	The latest version of and the previous versions of the International Ship and Port Facility Security Code (ISPS Code)	

Chapter 7 Suppliers Engaged in annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR)

7.1 Extent of engagement

7.1.1 Suppliers engaged in testing and servicing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in accordance with conventions, regulations and codes.

7.2 Extent of approval

7.2.1 The supplier is to provide evidence that he has obtained technical support from the equipment's manufacturer to service the particular makes and models of equipment for which approval is sought.

7.2.2 Where the Service Supplier is also the Manufacturer of the Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) and has elected to apply IMO corresponding guidelines on annual testing in its entirety for the purpose of acting as a Service Supplier engaged in annual performance testing, the following is to apply:

(1) The Manufacturer is responsible for appointing Manufacturer's Authorised Service Stations to carry out annual performance testing.

(2) The Manufacturer is required to be an Approved Service Supplier and is to satisfy the requirements for Service Suppliers engaged in annual performance testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR), as applicable.

(3) The Manufacturer's Authorised Service Station is not required to be an Approved Service Supplier.

(4) The Manufacturer is to demonstrate that IMO corresponding guidelines on annual testing is applied in its entirety.

7.3 Personnel

7.3.1 A sufficient number of supervisors and operators are to be provided to meet business needs. Suppliers in China are to be provided with verified testing personnel of shipborne Voyage Data Recorders (VDR) and a technical director. The number of inspectors is to match the amount of business. For suppliers in China, at least one supervisor and one operator are to be provided to conduct on-site operation and recording during testing.

7.4 Equipment

7.4.1 The supplier is to have the equipment specified by the manufacturer.

7.4.2 The supplier is to have the following testing equipment:

(1) computer for downloading and reproducing recorded data from VDR;

(2) playback software (installed version) and operating instruction provided by VDR manufacturer to the supplier;

(3) digital multimeter of 3 and a half digits or more;

(4) positioning beacon detector;

(5) digital recorder (which may be replaced by smartphones);

(6) digital cameras of more than 3 million pixel (which may be replaced by smartphones with 3 million pixels and above);

(7) special equipment specified by the equipment manufacturer.

7.4.3 Suppliers in China are to have more than two sets of testing equipment.

7.5 Documents

7.5.1 The supplier is to have documented procedures and instructions for how to carry out testing and examination of VDR equipment.

7.5.2 Where the Service Supplier is also the Manufacturer of the Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) and has selected to apply IMO - MSC.1/Circular.1222 Rev.1- Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in its entirety for the purpose of acting as a Service Supplier engaged in annual performance testing, the following is to apply:

(1) The Manufacturer is to have documented procedures for the assessment and authorisation of Manufacturer's Authorised Service Stations who carry out annual performance testing.

(2) The Manufacturer is to have documented procedures for the review of Manufacturer's Authorised Service Stations annual performance test reports, analysis of the Voyage Data Recorder (VDR) and Simplified Voyage Data Recorder (S-VDR) 12 hour log and the issue of annual performance test certificates to the Owner/Operator.

(3) The Manufacturer is to maintain a list of Manufacturer's Authorised Service Stations that can be accessed (by any available means, e.g. via a nominated contact point or from the Manufacturer's website) upon request.

7.5.3 The supplier is to issue the following testing reports:

(1) Issuing a certificate of compliance as specified in the International Convention on Safety of Life at Sea (SOLAS 1974), as amended, Ch V, Reg 18.8.

(2) Annual Performance Test of VDR and S-VDR is to be recorded in the form of the model test report given in the Appendix to MSC.1/Circular.1222, signed and stamped by the Service Supplier and attached to the annual performance test certificate.

(3) Where the Service Supplier is also the Manufacturer of the Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) and has selected to apply IMO - MSC.1/Circular.1222 Rev.1- Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in its entirety for the purpose of acting as a Service Supplier engaged in annual performance testing, the Manufacturer is to make arrangements for the following:

① review of the Manufacturer's Authorised Service Station annual performance test report;

② analysis of the recorder's 12 hour log;

③ checking of the master record/database for the recorder.

(4) Issue of the annual performance test certificate to the Owner/Operator within 45 days of completion of the annual performance test.

7.5.4 The records related to testing are to be filed promptly. Suppliers in China are to appropriately keep the last and current inspection records, documents or reports of any ship for a period of at least 5 years.

7.5.5 Corresponding international conventions, codes, circulars, regulations of the Administration, technical rules concerning ship survey and technical standards of the industry are to be provided. Relevant updated versions are to be obtained in a timely manner. The above technical documents include but not limited to those required in Appendix 1.

Appendix 1 List of documents

No	Document name/number	Remarks
1	Notice of the Maritime Safety Administration of the People's Republic of China on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [Haichuanjian No. (2019)172]	Applicable to suppliers in China
2	Notice of the Maritime Safety Administration of the People's Republic of China on Printing and Distributing the Technical Conditions of Organizations Performing Ship Servicing and Testing Services [Haichuanjian No. (2019)173]	Applicable to suppliers in China
3	The latest valid version and previous versions of Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on International Voyages of Maritime Safety Administration of the People's Republic of China (MSA)	Applicable to suppliers in China
4	The latest valid version and previous versions of Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages of Maritime Safety Administration of the People's Republic of China (MSA)	Applicable to suppliers in China
5	The latest valid version of and the previous amendments to the International Convention for the Safety of Life at Sea, 1974	
6	Previous versions of the Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU Code)	
7	MSC.1/Circular.1222/Rev.1 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) 14 June 2019)	
8	CCS Guidelines for Survey of Shipborne Voyage Data Recorder	
9	Relevant provisions and requirements of flag State governments and port State authorities	
10	Manufacturer's servicing manual and technical manual of the relevant products	

Chapter 8 Suppliers Engaged in Shore Based Maintenance of Ship GMDSS Equipment

8.1 Application

8.1.1 This Chapter applies to suppliers engaged in shore based maintenance of ship (including ocean-going fishing vessels) GMDSS equipment (SBM-GMDSS).

8.2 Personnel

8.2.1 The supplier is to be equipped with a sufficient number of supervisors and operators to meet the business requirements for GMDSS equipment maintenance and equipment inspection after maintenance.

8.2.2 The operator is to meet the following qualifications:

(1) Having at least one year’s technical school training or having followed a technical course approved by the relevant Administration; or holding an appropriate Radio Operators Certificate, such as a GMDSS General Operator Certificate (GOC) or a GMDSS Radio Electronic Certificate (REC);

(2) One year or above GMDSS equipment maintenance experience;

(3) Holding the maintenance training qualification certificate issued by the manufacturer of GMDSS equipment or passing the supplier's internal training (the trainer is to hold the maintenance training qualification certificate issued by the manufacturer of GMDSS equipment);

(4) Having a good command of English reading and comprehension;

(5) Familiar with GMDSS equipment related conventions, circulars, standards and technical documents.

8.2.3 The supervisor is to meet the following qualifications:

(1) Having at least two years’ technical school training or having followed a technical course approved by the relevant Administration; or holding an appropriate Radio Operators Certificate, such as a GMDSS General Operator Certificate (GOC) or a GMDSS Radio Electronic Certificate (REC);

(2) Two years or above GMDSS equipment maintenance experience and familiar with the supplier's quality management system;

(3) Holding the maintenance training qualification certificate issued by the manufacturer of GMDSS equipment or passing the supplier's internal training (the trainer is to hold the maintenance training qualification certificate issued by the manufacturer of GMDSS equipment);

(4) Having a good command of English reading and comprehension;

(5) Familiar with GMDSS equipment related conventions, circulars, standards and technical documents.

8.3 Equipment

8.3.1 The supplier is to have the following maintenance and inspection equipment:

(1) Equipment for measuring frequency, voltage, current and resistance;

(2) Equipment for measuring output and reflect effect on VHF and MF/HF;

(3) Equipment for measuring modulation on MF/HF and VHF (AM, FM, PM);

(4) Tester for checking of correct output from Free-Float Satellite EPIRB;

(5) Equipment for testing the performance of Automatic Identification Systems (AIS);

(6) Radio shielding room suitable for detecting the satellite position indication radio beacon;

(7) Watertight test tank;

(8) Oscilloscope;

(9) Spectrum analyzer;

(10) Comprehensive tester (which may replace equipment required in (2) and (3) above);

(11) Insulation resistance meter;

(12) Wrist strap.

8.4 Documents

8.4.1 The supplier is to have the maintenance manual or technical manual provided by the authorized GMDSS equipment manufacturer, including the technical requirements for the spare parts.

8.4.2 The supplier is to have operation instructions for important maintenance and test equipment and instruments.

8.4.3 The supplier is to hold the reference documents listed in Appendix 1 and have access to the latest GMDSS equipment performance standards.

8.5 Site

8.5.1 The supplier is to have an appropriate maintenance workshop, inspection space, testing equipment storage space, maintenance equipment storage space, spare parts storage space, offices and document storage space.

8.5.2 The maintenance workshop and inspection space are to be provided with sufficient lighting,

clean working environment, suitable working table, adequate ventilation and air circulation and anti-static measures.

8.5.3 In addition to cleanliness and brightness, temperature and humidity are also to be controlled in the space for storing components, spare pieces and spare parts in order to meet the environmental requirements of related electronic products.

8.6 Other requirements

8.6.1 The supplier is to obtain the written authorization agreement from the GMDSS equipment manufacturer. The agreement is to specify the authorization for equipment "maintenance" and the scope of products for authorized maintenance.

8.6.2 The maintenance is limited to the product scope specified in the authorization agreement of GMDSS equipment manufacturer.

8.6.3 Maintenance is generally to be carried out in a special space within the supplier. If it is required to operate on board, necessary protective measures and anti-static measures are to be taken.

8.6.4 The maintenance record file is to be established for all maintained GMDSS equipment.

8.6.5 The spare pieces/spare parts for GMDSS equipment maintenance are to be purchased from the GMDSS manufacturer or the brand or type designated by the GMDSS manufacturer and to have the quality certificate.

Appendix 1 List of documents

No.	Document No./Document Name	Remarks
1	The latest valid version and previous versions of Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on International Voyages of Maritime Safety Administration of the People's Republic of China (MSA)	Applicable to suppliers in China
2	The latest valid version and previous versions of Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages of Maritime Safety Administration of the People's Republic of China (MSA)	Applicable to suppliers in China
3	Latest valid version and previous amendments of the International Convention for the Safety of Life at Sea (SOLAS), 1974	
4	Guidelines for Survey of Automatic Identification System (AIS), China Classification Society	
5	Successive versions of Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU CODE)	
6	Requirements of International Civil Aviation Organization (ICAO)	
7	MSC/Circ.882– Guidelines on Annual Testing of 406 MHz Satellite EPIRBs	
8	MSC/Circ.1040/Rev.1 – Guidelines on Annual Testing of 406 MHZ Satellite EPIRBs	
9	MSC.1/Circular.1222/Rev.1 –Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) (14 June 2019)	
10	Relevant provisions and requirements of flag State governments and port State authorities	
11	Manufacturer's maintenance manual and technical manual of the relevant products	
12	Technical Regulations for Statutory Surveys of Ocean-going Fishing Vessels (latest effective edition and previous editions)	
13	IMO Res.A.1104(29) Survey Guidelines under the Harmonized System of Survey and Certification (HSSC)	

Chapter 9 Suppliers Engaged in the Servicing and Maintenance of Lifeboats/Rescue Boats, Boat/Raft Launching Appliances and Boat/Raft Release Gear

9.1 Application

9.1.1 This Chapter applies to the suppliers engaged in the maintenance, thorough examination, operational testing, overhaul and repair of:

.1 lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats; and

.2 launching appliances and on-load and off-load release gear for lifeboats (including primary and secondary means of launching appliances for free-fall lifeboats), rescue boats, fast rescue boats and davit-launched liferafts.

9.1.2 Definitions

(1) Manufacturer means the original equipment manufacturer or any entity which has taken legal and legitimate responsibilities for equipment when the original equipment manufacturer no longer exists or supports the equipment.

(2) Off-load release mechanism means a release mechanism which releases the lifeboat/rescue boat/fast rescue boat/liferaft when it is waterborne or when there is no load on the hooks.

(3) On-load release mechanism means a release mechanism which releases the lifeboat/rescue boat/fast rescue boat/liferaft with load on the hooks.

(4) Repair means any activities requiring disassembly of equipment, or any other activities outside the scope of the instructions for on-board maintenance and for emergency repair of life-saving appliances prepared in accordance with SOLAS regulations III/36.2 and III/35.3.18, respectively.

(5) Overhaul means a periodical activity defined by the manufacturer that proves continued fitness for purpose for a defined period subject to correct maintenance.

9.1.3 The requirements of this Chapter also apply to manufacturers engaged in services within the scope of 9.1.1.

9.2 Personnel

9.2.1 Annual thorough examinations, operational tests, five-year thorough examination, any overhaul, overload operational tests[25] and repair are to be conducted by certified personnel of an

[25] See SOLAS regulations III/20.11.1.2, III/20.11.2.2 and III/20.11.3.2. For ocean-going fishing vessels, the maintenance and service of the lifeboat system is to be in accordance with the regulations of the Administration.

authorized service provider.

9.2.2 Certification of 9.2.1 above means that the certified personnel is to be furnished with service training documents issued by the manufacturer or authorized service provider for each make and type of equipment for which the following two categories of work need to be carried out:

(1) annual thorough examinations, operational tests; and/or

(2) five-year thorough examination, any overhaul, overload operational tests[26] and repair.

9.2.3 Initial certification is to be issued by the manufacturer or authorized service provider only to personnel engaged in work specified in 9.2.2 and having completed education, training and competence assessment. Education is to address, as a minimum:

(1) relevant rules and regulations, including international conventions;

(2) design and construction of lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats, including on-load release gear and launching appliances;

(3) causes of lifeboat and rescue boat accidents;

(4) education and practical training in the procedures specified in Appendix 1 for which certification is sought;

(5) detailed procedures for thorough examination, operational testing, repair and overhaul of lifeboat (including free-fall lifeboats), rescue boats and fast rescue boats, launching appliances and on-load release gear, as applicable;

(6) procedures for issuing a report of service and statement of fitness for purpose upon completion of thorough examination, operational testing, repair and overhaul; and

(7) work, health and safety issues while conducting activities on board.

9.2.4 Training is to include practical technical training on thorough examination, operational testing, maintenance, repair and overhaul techniques using the equipment for which the personnel are to be certified. The technical training is to include disassembly, reassembly, correct operation and adjustment of the equipment. Field experience in the operations under the supervision of

[26] See SOLAS regulations III/20.11.1.2, III/20.11.2.2 and III/20.11.3.2. For ocean-going fishing vessels, the maintenance and service of the lifeboat system is to be in accordance with the regulations of the Administration.

certified personnel[27] is to be supplementary to certified classroom training.

9.2.5 Prior to issuance of certification by the manufacturer or authorized service provider, a competency assessment is to be satisfactorily completed, using the equipment for which the personnel are to be certified.

9.2.6 Upon completion of education, training and competency assessment, a certificate is to be issued defining the level of qualification and the scope of the certification (i.e. makes and types of equipment and specifically state which activities in paragraphs 9.2.2(1) and 9.2.2(2) are covered by the certification). The expiry date is to be clearly written on the certificate and is to be three years from the date of issue. The validity of any certificate is to be suspended in the event of any shortfall in performance and only revalidated after a further competency assessment.

9.2.7 A competency assessment is to be conducted by the manufacturer or authorized service provider to renew the certification. In cases where refresher training is found necessary, a further assessment is to be carried out after completion.

9.2.8 The supplier is to at least appoint operators and supervisors who can meet the scale and quantity of business carried out by the supplier. The supplier in China is to appoint the technical director. For suppliers that establish branches, the headquarters and each branch are to have adequate operators and supervisors to meet the scale and quantity of business carried out by the supplier. The branch of suppliers in China is also to appoint the technical director of the branch. The headquarters are to have supporting capability in technology and personnel and be responsible for the quality, safety and legal responsibilities of the branch. For suppliers outside China, the post of technical director may be omitted.

9.2.9 For suppliers in China, testing and overhaul are to be performed by at least one operator and one supervisor for spot operation and record. The operator is to prepare the report, the supervisor is to review the report, and the technical director is to issue the report and statement of fitness for purpose. For suppliers outside China, personnel meeting demands are to be appointed when performing services, and relevant certificates and reports are to be completed in accordance with paragraph 5.3 of annex to MSC.402(96)/Corr.1.

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[27] Certified personnel means certified maintenance and service personnel who have passed certification scheme of the manufacturer or approved supplier.

9.3 Equipment

The supplier is to have access to testing equipment and tools that are appropriate for the completion of maintenance and inspection and that conform to the equipment manufacturer's instructions, including at least:

9.3.1 Sufficient tools, and in particular any specialized tools specified in the equipment manufacturer's instructions, including portable tools as needed for work to be carried out on board ship.

9.3.2 Clearance measurement devices, e.g. plug gauge, vernier caliper, micrometer caliper etc.

9.3.3 NDT equipment (if applicable), e.g. ultrasonic and magnetic particle testing equipment, penetrant testing equipment.

9.3.4 Hydraulic testing equipment (if applicable), e.g. pressure gauge, manometer.

9.3.5 Inflatable equipment for pressure parts (if applicable), e.g. nitrogen gas cylinder, gas-charging connection.

9.3.6 Meters for voltage, current, and resistance measurement, e.g. multimeter.

9.3.7 Load test equipment[28].

9.4 Site

The supplier is to have appropriate spaces. Separate and suitable fixed premises for the following items are to be provided:

9.4.1 A site where staff work and store data files.

9.4.2 A site for storing products to be repaired, maintained, and delivered.

9.4.3 Storage and separation area of scrapped products/components.

9.4.4 A warehouse for storing raw materials, accessories, and spare parts.

9.4.5 A site for washing and cleaning product parts (if such service is provided by the supplier).

9.5 Raw materials, spare parts and accessories

9.5.1 In accordance with IMO resolution MSC.402(96), the supplier is to have access to sufficient materials, spare parts and accessories as specified by the equipment manufacturer for repairing lifeboats/rescue boats, boat/raft launching appliances and on-load/off-load release gear, as applicable. These materials and vulnerable parts are to be consistent with the serviced

[28] The supplier may have calibrated test weight, e.g. water bag or lease calibrated test weight from a qualified supplier.

equipment and to the satisfaction of the manufacturer.

9.5.2 For servicing and repair work involving disassembly or adjustment of on-load/off-load release gear, genuine replacement parts as specified or supplied by the equipment manufacturer are to be available.

9.5.3 The list of qualified suppliers used by the supplier is to be confirmed by CCS and spare parts and accessories used in the service process are to be purchased from the list of qualified suppliers.

9.6 Documents

9.6.1 The supplier is to be provided with or have access to the latest versions and applicable versions of international conventions, IMO resolutions, circulars, relevant requirements of CCS and flag States, and relevant technical documents necessary for the provision of services and versions applicable to the equipment under service, including at least:

(1) IMO Resolution A.689(17) on Recommendation on Testing of Life-saving Appliances;

(2) Resolution MSC.81(70) on Revised Recommendation on Testing of Life-saving Appliances;

(3) Resolution MSC.402(96) and its amendments on Requirements for Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair of Lifeboats and Rescue Boats, Launching Appliance and Release Gear;

(4) Resolution MSC.404(96) on Amendments to the International Convention for the Safety of Life at Sea, 1974, as amended;

(5) MSC.1/Circ. 1578 on the Guidelines on safety during abandon ship drills using lifeboats;

(6) MSC.1/Circ. 1579 on amendments to the Guidelines for developing operation and maintenance manuals for lifeboat systems (MSC.1/Circ.1205);

(7) MSC.1/Circ. 1584 on amendments to the Guidelines for evaluation and replacement of lifeboat release and retrieval systems (MSC.1/Circ.1392);

(8) Maintenance manual and relevant technical documents provided by the manufacturer. For servicing and repair work involving disassembly or adjustment of on-load/off-load release mechanisms and davit winches, the equipment manufacturer’s instructions for repair work are to be available;

(9) Type Approval certificate showing any conditions that may be appropriate during the servicing and/or maintenance of lifeboats, launching appliances and on-load/off-load release gear.

9.6.2 The supplier is to develop a personnel training and certification programme in accordance with a recognized national, international or industry standard as applicable, or a manufacturer's established certification programme. In either case, the certification programme is to comply with the requirements of 9.2.2 to 9.2.7 for each make and type of equipment for which service is to be provided.[29]

9.6.3 A documented and certified quality system, which covers at least the following:

(1) code of conduct for personnel involved in the relevant activity;

(2) maintenance and calibration of measuring tools and gauges;

(3) training programmes for personnel;

(4) supervision and verification to ensure compliance with operational procedures;

(5) recording and reporting of information;

(6) quality management of subsidiaries and agents, subcontractors (if any);

(7) job preparation; and

(8) periodic review of work process procedures, complaints, corrective actions and issuance, maintenance and control of documents.

Note: A documented quality system complying with the most current version of the ISO 9000 series and including the above items would be considered acceptable.

9.6.4 The supplier is to have documented operation procedures/guides which are to cover all services applying for approval and include methods for addressing damage and defect found during service besides specifying regulations for process and operation of its service. These measures include making records in the Service Log book made by the supplier when damage and defect are found, reporting the serious damage and defect to the manufacturer, etc. The records are available to CCS surveyors.

9.6.5 The supplier is to offer services according to operation procedures and guides, and records/reports submitted after completion of maintenance are to at least include the following:

(1) Type/specification and serial number of the product;

(2) Checklist of maintenance/testing items;

(3) Applicable basis;

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[29] For suppliers outside China, attention is to be given to special requirements for personnel training and authorization of the Administration of the flag State.

(4) Maintenance/test date and location;

(5) Condition of maintenance equipment and measuring instruments (including the number of equipment and instruments, period of validity of calibration);

(6) Maintenance/test results.

The above reports and records are to be completed and signed by the person who carries out the inspection and maintenance work and countersigned by the Company's representative or the ship's master. One copy is to be kept on the ship and another copy is to be kept by the supplier for information.

9.6.6 When thorough examination, operational testing, overhaul and repair are completed, a statement confirming that the lifeboat arrangements remain fit for purpose in accordance with paragraph 5.3, annex of IMO Res. MSC.402(96)/Corr.1 is to be promptly issued by the supplier. A copy of relevant service records and reports and documents of supplier approval is to be included with the statement. One copy is to be kept on the ship and another copy is to be kept by the supplier for information. The statement and relevant records and reports are to be written in a language which can be read and understood by the party being served or relevant parities. CCS accepts the overhaul proofs and test reports and records in English.

9.6.7 When performing the service, the supplier is to obtain from the ship copies of records and reports of last thorough examination, operational testing, overhaul and repair, and of statement of fitness for purpose.

9.6.8 In cases where a manufacturer is no longer in business or no longer provides technical support, CCS will consider whether the testing service provided will be accepted for one time based on previous testing experience of the supplier. If the manufacturer provided technical support to the supplier but ceased to do so subsequently, CCS will confirm that the supplier has established and implemented a training and assessment system complying with the requirements of 9.2, and consider to include the testing of each make and type of equipment within the scope of technical support by the manufacturer into the approval scope based on previous testing experience and demonstrated expertise/skill.

9.6.9 After the service is completed, documents generated by the service are to be filed by the supplier for easy traceability., which are to be kept for at least 5 years from the date of completion of the service.

9.6.10 It is to be ensured that all service work is supervised and verified by the supervisor and/or technical director, and meets the requirements of the approved operation procedures/guides, and the verification is satisfactory.

9.6.11 An effective control, calibration and maintenance system is to be established for all equipment required for maintenance services, and relevant provisions are to be strictly implemented to ensure that the equipment is in an effective calibration and applicable state.

9.6.12 Working procedures, handling of complaints, corrective actions of non-conformity, and document issuance, maintenance and control are to be regularly checked. Management reviews and internal audits are to be regularly conducted as planned, and relevant records are to be maintained. The time interval for management review is not to exceed 12 months.

9.6.13 If some parts of the service are provided by the subcontractor of the service provider, e.g. non-destructive testing of the steel structure defects of launching appliances and release gears, the supplier is to provide the agreement signed with the subcontractor and measures taken to control the service quality of the subcontractor (the subcontractor is to be a supplier approved by CCS).

9.6.14 The supplier is to establish a safety management system and provide adequate labor safety protection supplies to ensure the safety of maintenance and testing personnel when providing services.

Appendix

Appendix 1: Specific Procedures for Inspection, Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair Specified in MSC.402(96)

Appendix 2: Special Requirements from some flag State Administrations Regarding Resolution MSC.402(96)

Appendix 3: Lifeboats Checklist (Recommended)

Appendix 4: Launching Appliance (including launching appliances for davit launched liferaft) Checklist (Recommended)

Appendix 5: On-load Release Gear Checklist (Recommended)

Appendix 6: Special Provisions for Authorization of the Government of Liberia

Appendix 1: Specific Procedures for Inspection, Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair Specified in MSC.402(96)

1.1 General/Maintenance

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

1.1.2 A full set of maintenance manuals and associated technical documentation as specified in paragraph 1.1.1 shall be available on board.

1.1.3 The maintenance manuals and associated technical documentation as specified in paragraph 1.1.1 shall include the items listed in sections 1.2 and 1.3 as a minimum and shall be kept up to date by the Company taking into account relevant information provided by the manufacturer.

1.2 Annual thorough examination and operational test

1.2.1 All items listed in checklists for the weekly/monthly inspections required by SOLAS regulations III/20.6 and III/20.7 also form the first part of the annual thorough examination.

1.2.2 Records of inspections and routine on-board maintenance carried out by the ship's crew and the applicable certificates for the equipment shall be reviewed.

1.2.3 For lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats, the following items shall be thoroughly examined and checked for satisfactory condition and operation:

(1) condition of the boat structure including fixed and loose equipment (including a visual examination of the external boundaries of the void spaces, as far as practicable);

(2) engine and propulsion system;

(3) sprinkler system, where fitted;

(4) air supply system, where fitted;

(5) manoeuvring system;

(6) power supply system;

(7) bailing system;

(8) fender/skate arrangements; and

(9) rescue boat righting system, where fitted.

1.2.4 For release gear of lifeboats (including free-fall lifeboats), rescue boats, fast rescue boats and liferafts, the following shall be thoroughly examined for satisfactory condition[30] and operation after the annual operational test of the winch brake with the empty boat or equivalent load, as required by paragraph 1.2.10:

(1) operation of devices for activation of release gear;

(2) excessive free play (tolerances);

(3) hydrostatic interlock system, where fitted;

(4) cables for control and release; and

(5) hook fastening.

Notes: (1) The setting and maintenance of release gear are critical operations with regard to maintaining the safe operation of lifeboats (including free-fall lifeboats), rescue boats, fast rescue boats and davit launched liferafts. Utmost care shall be taken when carrying out all inspection and maintenance operations on the equipment.

(2) No maintenance or adjustment of the release gear shall be undertaken while the hooks are under load.

1.2.5 The operational test of davit-launched lifeboats' and rescue boats' on-load release function shall be carried out as follows:

(1) position the boat partially in the water such that the mass of the boat is substantially supported by the falls and the hydrostatic interlock system, where fitted, is not triggered;

(2) operate the on-load release gear;

(3) reset the on-load release gear; and

(4) examine the release gear and hook fastening to ensure that the hook is completely reset and no damage has occurred.

1.2.6 The operational test of davit-launched lifeboats' and rescue boats' off-load release function shall be carried out as follows:

(1) position the boat so that it is fully waterborne;

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[30] Hanging-off pennants may be used for this purpose but should not remain connected at other times, such as when the lifeboat is normally stowed and during training exercises. The release gear is to be examined prior to its operational test. The release gear is to be re-examined after its operational test and the operational test of the winch brake. Special consideration shall be given to ensure that no damage has occurred during the winch brake test, especially to the hook fastening.

(2) operate the off-load release gear;

(3) reset the off-load release gear; and

(4) recover the boat to the stowed position and prepare for operational readiness.

During the test, prior to hoisting, it shall be checked that the release gear is completely and properly reset. The final turning-in of the boat shall be done without any persons on board.

1.2.7 The operational test of the free-fall lifeboat release function shall be carried out as follows:

(1) engage the arrangements for the test without launching the lifeboat, required by paragraph 4.7.6.4 of the LSA Code, as specified in the manufacturer's operating instructions;

(2) if required to be on board, ensure that the operator is properly seated and secured in the seat location from which the release mechanism is to be operated;

(3) operate the release mechanism to release the lifeboat;

(4) reset the lifeboat in the stowed configuration;

(5) repeat the procedures referred to in .2 to .4 above, using the back-up release mechanism, if applicable;

(6) remove the arrangements for the test without launching the lifeboat, required by paragraph 4.7.6.4 of the LSA Code; and

(7) verify that the lifeboat is in the ready to launch stowed configuration.

1.2.8 The operational test of the davit-launched liferaft automatic release function shall be carried out as follows:

(1) manually release the hook with a load of 150 kg on the hook;

(2) automatically release the hook with a dummy weight of 200 kg on the hook when it is lowered to the ground; and

(3) examine the release hook and hook fastening to ensure that the hook is completely reset and no damage has occurred.

If a raft is used for the test instead of a dummy weight, the automatic release function shall release the raft when waterborne.

1.2.9 For launching appliances for lifeboats (including free-fall lifeboats), rescue boats, fast rescue boats and liferafts, the following items shall be examined for satisfactory condition and operation:

(1) davit or other launching structures, in particular with regard to corrosion, misalignments,

deformation and excessive free play;

(2) wires and sheaves, possible damage such as kinks and corrosion;

(3) lubrication of wires, sheaves and moving parts; and

(4) if applicable:

(a) functioning of limit switches;

(b) stored power systems;

(c) hydraulic systems; and

(5) for winches:

(a) inspecting the braking system in accordance with winch manual;

(b) replacing brake pads, when necessary;

(c) winch foundation; and

(d) if applicable:

i. remote control system; and

ii. power supply system.

1.2.10 For winches of the launching appliances for lifeboats (including free-fall lifeboats), rescue boats, fast rescue boats and liferafts, annual operational testing shall be done by lowering the empty craft or boat or equivalent load. When the craft has reached its maximum lowering speed and before the craft enters the water, the brake shall be abruptly applied. Following these tests, the stressed structural parts shall be re-inspected[31] where the structure permits the re-inspection.

1.3 Five-year thorough examination, overhaul and overload operational tests

1.3.1 The five-year operational test of the winches of the launching appliances shall be carried out with a proof load equal to 1.1 times the weight of the survival craft or rescue boat and its full complement of persons and equipment. When the proof load has reached its maximum lowering speed, the brake shall be abruptly applied.

1.3.2 Following these tests, the stressed structural parts shall be re-inspected[32] where the

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[31] In loading the craft or boat for this test, precautions should be taken to ensure that the stability of the craft or boat is not adversely affected by free surface effects or the raising of the centre of gravity.

[32] In loading the craft or boat for this test, precautions should be taken to ensure that the stability of the craft or boat is not adversely affected by free surface effects or the raising of the centre of gravity.

structure permits the re-inspection.

1.3.3 The operational tests and overhaul at five-year intervals of release gear for lifeboats (including free-fall lifeboats), rescue boats, fast rescue boats and liferafts shall include:

(1) dismantling of hook release units;

(2) examinations with regard to tolerances and design requirements;

(3) adjustment of release gear system after assembly;

(4) operational tests as per paragraphs 1.2.5, 1.2.6, 1.2.7 or 1.2.8 above, as applicable, but with a load equal to 1.1 times the weight of the survival craft or rescue boat and its full complement of persons and equipment; and

(5) examinations of vital parts with regard to defects and cracks[33].

1.3.4 Any other overhaul if required shall be carried out in accordance with paragraph 1.3.3.

[33] Non-destructive testing (NDT) techniques, such as dye penetrants (DPE), may be suitable.

Appendix 2: Special Requirements from some flag State Administrations Regarding Resolution MSC.402(96)

No.	flag State Administration	Whether the service provider can only be approved by the Administration	Whether service providers approved by other Administrations are accepted	Whether service providers approved by CCS or other ROs are accepted	Remarks
1	Department of Marine Services and Merchant Shipping of Antigua and Barbuda	No	Yes	Yes	Specific requirements are given in ADOMS Information Notice 2017-006(Rev 2)
2	Bahamas Maritime Authority	See remarks	See remarks	See remarks	Suppliers approved by RO may be accepted during the transition period from 1 January 2020 to 30 June 2020; Suppliers must be approved by the Administration from 1 July 2020; Specific requirements are given in BMA Information Bulletin No.184
3	Barbados Maritime Ship Registry	See remarks	Yes	Yes	Specific requirements are given in BMSR Bulletin 32
4	Merchant Marine Registry of Belize	See remarks	See remarks	See remarks	If the supplier is approved by ROs or IACS members, the Administration will decide whether to accept it case-by-case. Specific requirements are given in IMMARBE MMN-20-001
5	China MSA	See remarks	See remarks	See remarks	Within China and in Chinese waters, only suppliers released on the China Maritime Integrated Services Platform are accepted; Specific requirements are given in the Notice of the Maritime Safety Administration of the People's Republic of China on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [Haichuanjian No. (2019)172]. Outside China, suppliers approved by RO are accepted

6	Union of Comoros	Yes	-	-	Specific requirements are given in NTA20/01925
7	Maritime Cook Islands	No	Yes	Yes	Specific requirements are given in Cook 212-2019
8	Maritime Cyprus	No	Yes	Yes	Specific requirements are given in Cyprus Circular 21-2019
9	Danish Maritime Authority	See remarks	See remarks	See remarks	Service providers approved by SOLAS contracting Administrations or by Recognized Organizations accepted by the European Union are accepted. Specific requirements are given in DMA Circular No.28
10	Maritime Administration of Georgia	No	Yes	Yes	Specific requirements are given in Georgia No.32-Circ-FSI
11	Hellenic Republic	Yes	-	-	
12	Gabon Register of Shipping	No	Yes	Yes	Service providers approved by Gabon Republic or by Recognized Organizations accepted by other SOLAS contracting Administrations are accepted. Specific requirements are given in ISRG MARCIR 06/2020
13	Marine Department of Hong Kong	No	Yes	Yes	None
14	Kiribati Register of Shipping	No	Yes	Yes	Service providers approved by Recognized Organizations accepted by Kiribati or other Administrations are accepted. Specific requirements are given in KSR Circular 54/2020.
15	Liberia Maritime Authority	See remarks	See remarks	See remarks	After RO approval, review by the flag State Administration and authorization issued by the flag State.; Specific requirements are given in Liscr Marine Operations Note 03-2019
16	Grand Duchy of Luxembourg	No	See remarks	See remarks	Service providers approved by other European Union members or by Recognized Organizations accepted by other European Union members are accepted. Specific requirements are given in Circular CAM 08/2019

17	Marshall Islands	No	No	Yes	Specific requirements are given in Marshall Technical Circular 1(Revision 6)
18	Malta Maritime Authority	No	-	Yes	Specific requirements are given in MMA TNSLS.2 Rev.2
19	Niue Register of Shipping	No	Yes	Yes	Service providers approved by Recognized Organizations accepted by Niue or by other Administrations or by Recognized Organizations accepted other Administrations are accepted. Specific requirements are given in Circular NMC 6. 2020
20	Panama Maritime Authority	Yes	No	No	Specific requirements are given in PMA MMC-258
21	Maritime and Port Authority of Singapore	No	No	Yes (limited to ABS, BV, CCS, DNV-GL, KR, LR, NK, RINA)	(1) Service providers need to be approved by one RO (ABS, BV, CCS, DNVGL, KR, LR, NK, RINA) authorized by MPA. (2) The original equipment manufacturer when carrying out the services on its own equipment need not be approved by ROs. (3) MPA's requirements for personnel certification are higher than those of MSC.402(96). Personnel certified with a standard other than the manufacturer's established certification programme will not be accepted by MPA. (4) Existing authorized service providers are allowed to continue to provide services to ships flying the flag of Singapore, subject to the RO's confirmation that the service providers meet the requirements of MPA Shipping Circular No.11 of 2019. Specific requirements are given in MPA Circular No.11 of 2019
22	Saint Kitts and Nevis	No	-	Yes	
23	St. Vincent & the Grenadines	No	Yes	No	Specific requirements are given in SVG Circular No. SOL 012
24	South Africa	No	Yes	Yes	Specific requirements are given in SAMSAF MN12-2019

25	Tuvalu	No	Yes	Yes	Specific requirements are given in TVShip MC-5/2012/1
26	Vanuatu MSA	No	No	Yes	If the date of issuance of the approval certificate in accordance with MSC.1/ CIRC1277 and IACS URZ17 is earlier than 1 January 2020, the certificate will be valid until the natural expiry date or 31 December 2022, whichever is the earlier. Specific requirements are given in VUT FSL121819

Appendix 3: Lifeboats Checklist (Recommended)

Service Items	Scope of Inspection	Remarks
Visual examination of hull	All labels and identification marks are clear with no serious corrosions.	
	Check the outer color and confirm no breakage of peelings, cracks etc.	
	Check for deformation of the hull.	
	Check the tightness of the hull. Check whether door/window strips are damaged. If condition permits, check the tightness through flushing test.	
	Check for abnormality of retro-reflective tape.	
	Check for fastness of ladder seat and rail, and no breakage of lifeline	
Fitting inspection	Check for abnormality of painter release device.	
	Confirm skate, fendering/collision prevention arrangements in good condition.	
	Rescue boat righting system (if any)	
	Confirm no breakage of equipment box and storage box.	
	Check safe belts in normal condition.	
	Confirm all equipment have been fully fitted as per Equipment Provision List. Check the expiry date of food, fresh water, first aid medicine and smoke signals.	
	Check the warning sign and instructions.	
Main engine propulsion system	Check for abnormality of main engine.	
	Check whether fuel oil, lubricating oil and cooling water of main engine need to be refilled or replaced. Check for leakage.	
	Check fuel oil pipes and fuel tanks.	
	Check shafting in good condition.	
	Inspect for any damage of propeller and guard	
	Check meters in proper indication. Confirm temperature of water and oil as well as tachometer in normal condition.	
	Engine should run for a total period of not less than 3 min (if applicable). Inspect ahead/aster operation and verify function of reversion in compliance with requirements.	
Rudder system inspection	Confirm rudder blade, rudder stock in good condition and with no corrosion.	
	Confirm the good operation of hydraulic steering control system.	
	Operate emergency tiller to make sure emergency steering system operate well.	
Electrical system	Confirm battery and switch in compliance with starting requirements. Two packs of batteries can be initiated separately.	

	Confirm the connection charging for batteries are in good condition.	
	Confirm inside lamps, indicating lights, search lights are in good condition.	
	Confirm magnetic compass is in good condition.	
	Check whether electric wires are damaged or corroded. Joints have no looseness or corrosion.	
Drainage system	Confirm manual pump is in good condition.	
	Confirm drainage piping is not blocked or damaged.	
	Confirm bilge plugs/valves is not corroded or damaged.	
Fire extinguisher inspection	Confirm the fire extinguishers provided on the lifeboat have been maintained by recognized firefighting service supplier.	
Sprinkler system	Confirm sprinkler pump and main engine connection belt are in good condition. Spray pipe, spray nozzles have no corrosion or blocking.	
	Check good operation of sprinkler system. If condition permits, sprinkler test should be carried out.	
Air supply system	Confirm bottle valve, air pipes, air bleeder connection are in good condition. Open air cylinders to make sure the pressure is enough. Air cylinder should be checked one by one. Check the pressure value on the pressure meter. (Pressure value of air cylinder and blow-off pressure can be found in the operation manual.)	
	Open air bleeder (close immediately). Confirm air bleeder and meter in good condition.	
	Visual inspection to air cylinders should be carried out each year, and hydrostatic testing to air cylinders every 5 years.	every 5 years
	Check for abnormalities of air pressure balance valves.	
Hook release system	Check the connection of base and hull, and of base and hook, confirm no corrosion.	
	Operate release handle to release hooks. Confirm hooks can be released simultaneously.	
	Deformation and crack inspection for main components. (Dye penetrant inspection may be carried out after test.)	every 5 years
	Check all control and release cables are in good condition.	
	Check the hydrostatic interlock system, where fitted.	
	Check hooks for locking and resetting function.	
	Check the assembly clearance between moving parts.	
	1.1 times loading test every	every 5 years

Note: 1. Requirements above are for yearly inspection. Items in the remarks are for quinquennial inspection.

2. In addition to the recommended items in the table, items required in 1.2.1 and 1.2.2 of Appendix 1 are to be completed at the same time.

Appendix 4: Launching Appliance (including launching appliances for davit launched liferaft) Checklist (Recommended)

Davit service item		
Service Items	**Scope of Inspection**	**Remarks**
Davit (raft) frame (the part welded with the deck)	Check for looseness, misalignments, corrosion, deformation and depression.	
Davit (raft) arm	Check for looseness, misalignments, corrosion, deformation and depression.	
	Turn out from stowage position.	
	Reset from the lowering position.	
Sheave, suspension block	Check wear and corrosion.	
	Check moving condition.	
	Lubricate/ grease.	
Hinge pin, sheave pin	Lubricate/ grease.	
Boat fall	Check diameter and corrosion	
Limit switch of davit (raft) arm and stop unit	Check wear and corrosion.	
	Check out clearance of limit switch positioned between frame and davit arms (fore and aft)	
	Test the operation of limit switch	
	Check moving condition for stop unit.	
	Lubricate/ grease.	
Davit (raft) wire rope, turn buckle	Check corrosion, wear, breakage, rupture, kinking and looseness for wire rope.	
	Lubricate/ grease.	
	Check securing condition of wire rope.	
	Replace davit (raft) wire rope in excess of the regulation (5 years or less).	Every 5 years
Lashing wire rope (raft tying rope)	Check wear, corrosion and securing condition.	
Deck operation device	Check securing condition.	
	Lubricate/ grease.	
Remote control wire	Check wear and corrosion.	
	Check securing condition.	
	Lubricate/ grease.	
Boat chock	Inspect wear and corrosion.	
Hydraulic system	Check out corrosion and leakage of pipe system, replace oil if necessary.	
Stored power system	Inspect charging pressure and corrosion.	
Trigger hook (automatic decoupling)	Check release flexibility and corrosion	Raft hook
Spare parts	Check corrosion.	Raft hook

Boat Winch		
Winch foundation	Check looseness or corrosion.	
Gear box, gear, bearing, oil seal	Open to inspect wear of gear surface.	
	Inspect lubrication level and deterioration. Replace if necessary.	
	Check unusual noise.	
Brake device (centrifugal brake)	Open and inspect wear of brake device.	
	Check wear of brake pad.	
	Check corrosion or any defects.	
	Check out reset.	
Fastening device of wire dram	Inspect corrosion and looseness.	
Brake lever	Check corrosion or any defects.	
	Check operation condition. Adjust to proper angle if considered necessary.	
Remote control system	Lubricate/ grease.	
Dynamic winch brake test	The brake should be abruptly applied when empty boat has reached its maximum lowering speed and before the boat enters the water (at annual operational testing).	
	The brake should be abruptly applied at maximum lowering speed with 1.1 times the maximum working load.	Every 5 years
Electric motor	Check out insulation and wiring.	
	Carry out function test and confirm normal operation.	
Limit switch	Check wiring.	
	Carry out function test and confirm normal operation.	
	Lubricate/ grease.	
Push-button box and cable	Check wiring, insulation and other defects.	
	Confirm normal operation.	
Start panel	Check wiring, insulation and other defects.	
	Carry out function test and check normal operation.	
Others		
Warning signs & instructions	Check for post location, labels, text etc.	

Note: 1. Requirements above are for yearly inspection. Items in the remarks are for quinquennial inspection.

2. In addition to the recommended items in the table, items required in 1.2.1 and 1.2.2 of Appendix 1 are to be completed at the same time.

Appendix 5: On-load Release Gear Checklist (Recommended)

Service Items	Scope of Inspection	Remarks
Visual inspection	Check the connection between base and hull as well as base and hook. Check corrosion.	
Thorough examination or overhaul after brake testing	Check out release gear system.	
	Equipment and component overhaul	Every 5 years
	Check the assembly clearance and damage of moving parts.	
	Check control and release wires.	
	Check the hydrostatic interlock system, where fitted.	
	Hooks can be fastened and reset well.	
Adjustment after assembly	Check normal operation.	Every 5 years
	Check locks.	Every 5 years
Operational test of release function	Operational test of on-load release function (Operate on-load release; Reset the release equipment; Confirm it is reset without damage)	
	Operational test of no-load release function (Operate no-load release; Reset the release equipment)	
	1.1 times loading test	
Post-test visual inspection	Deformation and crack check for main components.(Dye penetrant inspection may be carried out afterwards.)	Every 5 years
Inspection for simultaneous release of hooks	Operate release handle to release hooks. Confirm fore and aft hooks can be released simultaneously.	Every 5 years
	Others	
Warning signs & instructions	Check for post location, labels, text etc.	

Note: 1. Requirements above are for yearly inspection. Items in the remarks are for quinquennial inspection.
2. In addition to the recommended items in the table, items required in 1.2.1 and 1.2.2 of Appendix 1 are to be completed at the same time.

Appendix 6: Special Provisions for Authorization of the Liberian Administration

1. Purpose:

On 5 December 2019, the Liberian Administration issued Marine Operation Note 03/2019 Authorization of Service Providers for Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair of Lifeboats and Rescue Boats, Launching Appliances and Release Gear (the Note), promulgating that only service providers authorized in accordance with Resolution MSC.402(96) and the provisions of the Note will be authorized to carry out maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear. The Provisions is intended to specify the relevant requirements for CCS-approved suppliers seeking authorization from the Liberian Administration.

2. Applicability:

The Provisions apply to all CCS-approved suppliers seeking authorization of the Liberian Administration to carry out maintenance, thorough examination, operational testing, overhaul and repair of:

(I) lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats; and

(II) launching appliances and on-load release gear for lifeboats (including primary and secondary means of launching appliances for free-fall lifeboats), rescue boats, fast rescue boats and davit-launched life rafts.

3. Authorization requirements for suppliers:

3.1 Initial application for authorization from the Administration

All CCS-approved suppliers seeking authorization to provide service to CCS-classed Liberian flagged ships are to submit an application to CCS and CCS will audit the supplier and issue a certificate indicating compliance to the supplier, with the following documents, to the Liberian Administration for review.

3.1.1 A report of the most recent audit of the supplier by CCS demonstrating compliance with the Requirements promulgated by Resolution MSC.402(96).

3.1.2 A copy of the supplier approval certificate issued by CCS (a list of all equipment manufacturers for whom the supplier is authorized or licensed to service their equipment is also to be provided).

3.1.3 A list of all supplier personnel who will carry out maintenance, annual and five-year thorough examination and operational tests of lifeboats and rescue boats, launching appliances and release gear, any overhaul, overload operational tests, and repairs of the equipment. A copy of each person’s training certificate is also to be provided.

3.1.4 A certificate or report verifying that the supplier has a documented quality system that has at least the following:

a. code of conduct for personnel involved in the relevant activity;

b. maintenance and calibration of measuring tools and gauges;

c. training programs for personnel;

d. supervision and verification to ensure compliance with operational procedures;

e. recording and reporting of information;

f. quality management of subsidiaries and agents;

g. job preparation;

h. periodical review of work process procedures, complaints, corrective actions; and

i. issuance, maintenance and control of documents.

3.1.5 A statement from CCS recommending the supplier be issued an Authorization Document by the Liberian Administration.

3.1.6 A copy of any authorization issued by or on behalf of another flag state in accordance with Resolution MSC.402(96).

3.1.7 Where a supplier has several subsidiaries, each subsidiary must be approved and authorized separately, except when the supplier has a quality system certified to the current ISO 9000 standard and all subsidiaries are included in the supplier's ISO quality system and on CCS approval document.

3.1.8 According to the Note, upon satisfactory completion of the review, the Liberian Administration will issue an Authorization Document valid for three years from the date of the audit. The Authorization Document will be subject to annual endorsement by the Liberian Administration. When the CCS approval certificate and ISO 9000 certification document include subsidiaries, the subsidiaries will be listed in the above-mentioned Authorization Document.

3.2 Renewal of an Authorization Document

3.2.1 Upon expiration of the Authorization Document, the authorized supplier is to submit, via CCS that audited the supplier for issuance of the initial Document, an application for renewal of the Authorization Document. The items listed in 3.1 above for the Application for Authorization must be submitted with the application for renewal.

3.2.2 To ensure continuity of an authorized supplier authorization, the application for renewal of the Authorization Document may be submitted up to three months prior to the expiration of the existing Authorization Document. The renewed Authorization Document is to be valid for three years from the expiration date of the existing Authorization Document.

3.3 Annual endorsement

3.3.1 Within three months before to three months after the anniversary date of the Authorization Document, the authorized supplier is to undergo an annual assessment consisting of an onsite audit conducted by a CCS auditor.

3.3.2 Upon successful completion of the onsite audit, CCS will issue a statement recommending the Administration to endorse the Authorization Document.

4 Certification of personnel

All authorized supplier personnel who will carry out maintenance, annual and five-year thorough examination and operational tests of lifeboats and rescue boats, launching appliances and release gear, any overhaul, overload operational tests, and repairs of the equipment are to:

4.1 Be trained and certified by the manufacturer of the equipment or by an authorized supplier's competent person trained and certified by the manufacturer. The training and certification are to comply, at a minimum, with the education, training, and competency requirements of Section 8.2 of Resolution MSC.402(96).

4.2 Upon successful completion of the requirements of Section 8.2 of Resolution MSC.402(96), each person is to be issued a certificate defining the level of qualification and the scope of the certification (i.e. marks and types of equipment and specifically state which activities are covered by the certification).

4.3 All authorized suppliers that use a competent person to carry out in-house training and certification of their personnel must have a quality system documented to the current ISO 9000 standards. The quality system must include procedures for the training of personnel. The

procedures should incorporate the guidelines and standards in Parts 1 to 4 of ISO Public Available Specification on the training of service personnel (ISO/PAS 23678:2019).

4.4 The expiry date is to be clearly written on the certificate and is to be three years from the date of issue. The validity of any certificate is to be suspended in the event of any shortfall in performance and only revalidated after a further competency assessment.

4.5 For renewal of the training certification a competency assessment is to be conducted by the manufacturer of the equipment or by an authorized supplier's competent person trained and certified by the manufacturer. In cases where refresher training is found necessary a further assessment is to be carried out after completion of such training.

5. Fees

The Liberian Administration will charge review and authorization fees according to the Note.

Annex Liberia Maritime Authority Marine Operation Note 03/2019 Authorization of Service Providers for Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair of Lifeboats and Rescue Boats, Launching Appliances and Release Gear (5 December 2019)

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MARINE OPERATIONS NOTE 03/2019

Subject: **Authorization of Service Providers for Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair of Lifeboats and Rescue Boats, Launching Appliances and Release Gear**

Reference: a. Resolution MSC.402(96)
b. Resolution MSC.404(96)

Purpose:

This Marine Operations Note promulgates the Liberian Administrations requirements and procedures for authorization of service providers for Maintenance, Thorough Examination, Operational Testing, Overhaul and Repair of Lifeboats and Rescue Boats, Launching Appliances and Release Gear on Liberian flagged vessels. Only service providers authorized in accordance with Resolution MSC.402(96) and the provisions of this Note will be authorized to carry out the aforementioned services on Liberian flagged vessels commencing 1 January 2020.

Background

Amendments to SOLAS regulations III/3 and III/20 for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear were adopted through Resolution MSC.404(96). The Requirements for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear were adopted through Resolution MSC.402(96). Resolution MSC.404(96) and Resolution MSC.402(96) will take effect on 1 January 2020. Resolution MSC.402(96) amalgamates Annex 1 of MSC.1/Circ.1206/Rev.1, Guidelines for periodic servicing and maintenance of lifeboats, launching appliances and on-load release gear, and MSC.1/Circ.1277, the Interim Recommendation on conditions for authorization of service providers for lifeboats, launching appliances and on-load release gear.

The Requirements establish a uniform and documented standard for maintenance, thorough examination, operational testing, overhaul and repair of the equipment.

Applicability:

This Marine Operations Note applies to all service providers seeking authorization to carry out maintenance, thorough examination, operational testing, overhaul and repair of:

1. lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats; and

2. launching appliances and on-load and off-load release gear for lifeboats (including primary and secondary means of launching appliances for free-fall lifeboats), rescue boats, fast rescue boats and davit-launched life rafts.

Definitions:

1. **Authorized service provider** means an entity authorized by the Administration to carry out maintenance, thorough examination, operational testing, overhaul and repair of the equipment listed in 1. and 2. under **Applicability.**

2. **Company** means the owner of the ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the owner of the ship and who on assuming such responsibility has agreed to take over all the duties and responsibilities imposed by the International Safety Management Code.

3. **Equipment** means the equipment listed in 1. and 2. under **Applicability.**

4. **Manufacturer** means the original equipment manufacturer or any entity which has taken legal and legitimate responsibilities for equipment when the original equipment manufacturer no longer exists or supports the equipment.

5. **Off-load release mechanism** means a release mechanism which releases the survival craft/rescue boat/fast rescue boat when it is waterborne or when there is no load on the hooks.

6. **On-load release mechanism** means a release mechanism which releases the survival craft/rescue boat/fast rescue boat with load on the hooks.

7. **Overhaul** means a periodical activity defined by the manufacturer that proves continued fitness for purpose for a defined period subject to correct maintenance.

8. **Recognized Organization** means one of the vessel classification society's delegated authority by the Liberian Administration to conduct inspection, survey, audit, plan review, and certification of Liberian flagged ships and equipment and systems installed on those ships in accordance with the applicable international rules and regulations.

9. **Repair** means any activities requiring disassembly of equipment, or any other activities outside the scope of the instructions for on-board maintenance and for emergency repair of life-saving appliances prepared in accordance with SOLAS regulations III/36.2 and III/35.3.18, respectively.

Requirements

Weekly and monthly inspections and routine maintenance as specified in the equipment maintenance manual(s), shall be conducted by authorized service providers, or by shipboard personnel under the direction of a senior ship's officer in accordance with the maintenance manual(s).

Annual thorough examinations and operational tests described in section 6.2 of Resolution MSC.402(96) shall be conducted by certified personnel of either a manufacturer or an authorized service provider in accordance with the Requirements and SOLAS regulation III/20. The service provider may be the ship operator if the operator is authorized in accordance with this Marine Operations Note.

Five-year thorough examination, any overhaul, overload operational tests, as described in section 6.3, of Resolution MSC.402(96) and repair shall be conducted by certified personnel of either the manufacturer or a service provider authorized by the Administration.

The Liberian Administration will issue an Authorization Document to service providers determined to comply with the Requirements as implemented by this Note. The Authorization Document may be valid for a period of up to three years and will be subject to annual endorsements.

Commencing 1 January 2020 only authorized service providers issued an Authorization Document by this Administration in accordance with the provisions of this Note will be accepted to carry out the aforementioned services on Liberian flagged vessels regardless of approvals from other flag States.

In cases where a manufacturer is no longer in business or no longer provides technical support, the Administration may, on a case by case basis, authorize a service provider to service the equipment if the service provider had prior authorization for the equipment and/or long-term experience and demonstrated expertise as an authorized service provider can be provided.

Application for Authorization as an Authorized Service Provider

All entities, including Manufacturers that service equipment other than its own or for which it has taken legal and legitimate responsibility, requesting to be authorized to provide services for Liberian flagged vessels must submit an application via the Liberian Administration Recognized Organization (RO) that audited the service provider and issued the service provider a certificate indicating compliance with the Requirements, with the following documents, to the Liberian Registry for review.

1. A report of the most recent audit of the service providers by the RO demonstrating compliance with the Requirements promulgated by Resolution MSC.402(96).

2. A copy of any type approval or service provider approval document issued by the RO to the authorized service provider. A list of all equipment manufacturers for whom the service provider is authorized or licensed to service their equipment shall also be provided.

3. A list of all service provider personnel who will carry out the maintenance, annual and five-year thorough examinations and operational tests of lifeboats and rescue boats, launching appliances and release gear, any overhaul, overload operational tests, and repairs of the equipment. A copy of each person's training certification shall also be provided person.

4. A certificate or report verifying that the authorized service provider has a documented quality system that has at least the following:
    a. code of conduct for personnel involved in the relevant activity;
    b. maintenance and calibration of measuring tools and gauges;
    c. training programs for personnel;
    d. supervision and verification to ensure compliance with operational procedures;
    e. recording and reporting of information;
    f. quality management of subsidiaries and agents;
    g. job preparation; and
    h. periodic review of work process procedures, complaints, corrective actions and issuance, maintenance and control of documents.

5. A statement from the RO recommending the service provider be issued an Authorization Document by the Administration.

6. A copy of any authorization issued by or on behalf of another flag stated in accordance with Resolution MSC.402(96).

Where several service providers are owned or operated by a given entity each service provider must be approved and authorized separately, except when the owning entity has a quality system certified to the current ISO 9000 standard and all of the service providers are included in the primary entity's ISO quality system and on the RO approval document.

Initial Issuance of the Authorization Document

Upon satisfactory completion of the review the Administration will:

1. Issue an Authorization Document valid for three years from the date of the audit. The Authorization Document will be subject to annual endorsement by the Liberian Administration.

2. When a service provider's ISO 9000 certification document includes subsidiary service providers, the subsidiaries will be listed in an attachment to the Authorization Document issued to the primary service provider.

Renewal of an Authorization Document

Upon expiration of the Authorization Document, the authorized service provider must submit, via the RO that audited the service provider for issuance of the initial Document, an application for renewal of the Authorization Document. The items listed in this Note for the Application for Authorization as an Authorized Service Providers must be submitted with the application for renewal.

To ensure continuity of an authorized service provider authorization, the application for renewal of the Authorization Document may be submitted up to three months prior to the expiration of the existing Authorization Document. The renewed authorization Document shall be valid for three years from the expiration date of the existing Authorization Document.

Annual Endorsement

Within three months before to three months after the anniversary date of the Authorization Document, the authorized service provider shall undergo an annual reassessment consisting of an onsite audit conducted by an authorized RO auditor.

Upon successful completion the onsite audit the Administration will issue an endorsement to the Authorization Document.

Certification of Personnel

All authorized service provider personnel who will carry out the maintenance, annual and five-year thorough examinations, operational tests of lifeboats and rescue boats, launching appliances and release gear, any overhaul, overload operational tests, and repairs of the equipment shall:

1. Be trained and certified by the manufacturer of the equipment or by an authorized service provider's competent person trained and certified by the manufacturer. The

training and certification shall comply, at a minimum, with the education, training, and competency requirements of Section 8.2 of Resolution MSC.402(96).

2. Upon successful completion of the requirements of Section 8.2 of Resolution MSC.402(96), each person shall be issued a certificate defining the level of qualification and the scope of the certification (i.e. makes and types of equipment and specifically state which activities are covered by the certification).

3. All authorized service provider that use a competent person to carry out in-house training and certification of their personnel must have a quality system documented to the current ISO 9000 standards. The quality system must include procedures for the training of personnel. The procedures should incorporate the guidelines and standards in Parts 1 thru 4 of ISO Public Available Specification on the training of service personnel (ISO/PAS 23678:2019).

The expiry date shall clearly be written on the certificate and shall be three years from the date of issue. The validity of any certificate shall be suspended in the event of any shortfall in performance and only revalidated after a further competency assessment.

For renewal of the training certification a competency assessment shall be conducted by the manufacturer of the equipment or by an authorized service provider's competent person trained and certified by the manufacturer. In cases where refresher training is found necessary a further assessment shall be carried out after completion of such training.

Fees

The Administration will assess the following administrative and documentation fees for the review of the application for authorization as a service provider and for the issuance of initial Authorization Document, and the subsequent annual endorsements and renewal of the Document.

1. Initial Review and Authorization - US$1000.
2. Renewal Review and Authorization – US$750.
3. Audits of service provider performed by the Administration and Authorization – US$5,000, plus expenses.

If you have any questions on this Marine Operations Note please contact technical@liscr.com or call : 703 790 3434 and ask for the Technical Department.

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Privacy Policy

*Any personal data collected by the Liberia Maritime Authority and its Agent in the course of its operations shall be handled in accordance with data protection standards. You can learn more about the Privacy Policy here *LINK*.*

Chapter 10 Suppliers Engaged in Non-destructive Testing for Ships, Marine Products and Metal Structures of Offshore Units above Water

10.1 Application

10.1.1 This Chapter applies to the suppliers providing non-destructive testing services for ships, marine products and metal structures of offshore units above water.

10.1.2 The suppliers referred to in this Chapter mean the independent non-destructive testing companies or non-destructive testing departments providing services for ships, marine products and metal structures of offshore units above water. If the non-destructive testing department of the shipyard/ offshore unit manufacturer/product manufacturer has been included in the approved quality system of the shipyard, this chapter can be referred to for implementation; If the non-destructive testing department of the shipyard provides external non-destructive testing services, it is to be approved by CCS in accordance with the requirements of this chapter.

10.1.3 The non-destructive testing methods involved in this chapter include but not limited to radiographic testing (RT), ultrasonic testing (UT), magnetic particle testing (MT), penetrant testing (PT), digital radiography (RT-D, including CR or DR), visual testing (VT), time of flight diffraction testing (TOFD), phased array ultrasonic testing (PAUT) and electromagnetic testing (including eddy current testing (ET) and/or alternating current field measurement (ACFM)). For suppliers applying for other NDT methods, this chapter is to be referred to.

10.1.4 The suppliers engaged in non-destructive testing services for ships, marine products and metal structures of offshore units above water are divided into categories A and B according to the scope of services.

Category A suppliers are to be capable of undertaking the non-destructive testing of all ships, marine products and metal structures of offshore units above water. Category B suppliers are to be limited to undertaking non-destructive testing for non-classed ships (including non-classed ships engaged on domestic voyages and non-classed ocean-going fishing vessels), and non-classed marine products, and metal structures of non-classed offshore installations above water.

10.1.5 The requirements of category A suppliers in the Guidelines for non-destructive testing of metal structures of classed ships and offshore units above water are to be in accordance with IACS UR W35[34].

10.2 Site

10.2.1 There are to be fixed spaces for offices and storage of documents, materials and files.

10.2.2 The safety area is to be provided for operation of radiographic testing. Necessary protective measures and monitoring means are to be taken which are to meet the requirements of relevant provisions of the state on labor protection.

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[34] IACS UR W35 will be uniformly implemented by IACS Societies on or after 1 July 2020. The implementation of revisions to this Chapter will be synchronized with UR W35.

10.2.3 The suppliers engaged in radiographic testing services are to set up an independent dark room, which is divided into the "dry area" and the "wet area". The temperature and humidity of the "dry area" and the temperature of the "wet area" are to be controlled within the range recommended by the film manufacturer and to be well ventilated.

10.2.4 In the case of manual processing of the film, the film drying chamber, drying oven or dryer is to be provided.

10.2.5 An independent film evaluation room is to be provided.

10.3 Personnel

10.3.1 The supplier is responsible for approval of qualification of its technical director (if any), supervisors and operators. For the supplier in China, the qualification approval organization is to be CCS or a third party accepted by CCS. For the suppliers outside China, the qualification approval organization is to be CCS or a third party accepted by CCS that complies with the certification scheme based on ISO 9712:2012. Level III personnel is to be certified by CCS or a certification organization accepted by CCS.

10.3.2 Personnel qualification to a supplier outside China based qualification scheme as e.g. SNT-TC-1A, 2016 or ANSI/ASNT CP-189, 2016 may be accepted if the Supplier's written practice is reviewed and found acceptable by CCS. The Supplier’s written practice is to as a minimum, except for the impartiality requirements of a certification body and/or authorised body, comply with ISO 9712:2012.

10.3.3 The supervisor is to be directly involved in review and acceptance of NDT Procedures, NDT reports, calibration of NDT equipment and tools. The supervisor is to on behalf of the Supplier re-evaluate the qualification of the operators annually. (When the supplier in China conducts NDT services, the technical director is to on behalf of the Supplier re-evaluate the qualification of the operators annually.)

10.3.4 The operator carrying out the NDT and interpreting indications, as a minimum, is to be qualified and certified to Level II in the NDT method(s) concerned and as described in 10.3.1. The operator is to have adequate knowledge of materials, weld, structures or components, NDT equipment and limitations that are sufficient to apply the relevant NDT method for each application appropriately. However, operators only undertaking the gathering of data using any NDT method and not performing data interpretation or data analysis may be qualified and certified

as appropriate, at level I. Personnel of the suppliers certified to level I and II are to be full-time; for personnel certified to level I and II of suppliers in China, the certification body is to be CCS.

10.3.5 The supervisors' and operators' certificates and competence are to comprise all industrial products/categories and techniques being applied by the Supplier.

10.3.6 Category A and B suppliers are to have operators competent for testing services with Level II certification issued or accepted by CCS. Category A suppliers in China are to have at least one professional with appropriate Level III radiographic or ultrasonic testing certification issued by CCS.

10.3.7 For category A suppliers engaged in non-destructive testing for classed ships, marine products and metal structures of offshore units above water, the supplier is to have a supervisor or supervisors, responsible for the appropriate execution of NDT operations and for the professional standard of the operators and their equipment, including the professional administration of the working procedures. The supplier is to employ, on a full-time basis, at least one supervisor independently certified to Level III in the method(s) concerned as per the requirements of 10.3.1. It is not permissible to appoint Level III personnel; they must be certified by an accredited certification body. It is recognised that a Supplier may not directly employ a Level III in all the stated methods practiced. In such cases, it is permissible to employ an external, independently certified, Level III in those methods not held by the full-time Level III(s) of the Supplier.

10.3.8 Category A and B suppliers are, for each of the testing items, to be provided with at least one operator and one supervisor with appropriate Level II or above technical qualification certificate issued or accepted by CCS for on-site operation and record. The operator is to prepare the report, and the supervisor is to issue or review the report (when the supplier conducts non-destructive testing services in China, the technical director is to issue the report).

10.3.9 When applying for phased array ultrasonic testing or time of flight diffraction testing services, category A and B suppliers are to have one full-time or part-time professional with appropriate Level III non-destructive testing technical level certification issued or accepted by CCS.

10.3.10 Personnel engaged in non-destructive testing services of category A suppliers is to have English skills to meet business needs.

10.4 Equipment

10.4.1 The Supplier is to maintain records of the NDT equipment used and detail information related to maintenance, calibration and verification activities. Under any circumstance, the Supplier is to possess sufficient equipment to carry out the services being a part of the NDT scope required by CCS.

10.4.2 Where the equipment is of unique nature, the NDT operators are to be trained by competent personnel in the operation and use of the equipment before carrying out NDT using this equipment.

10.4.3 When conducting non-destructive testing services, the supplier in China is to at least be equipped with the following testing equipment according to the test scope to be applied:

(1) Radiographic testing

① Category A suppliers are to be equipped with at least 3 radiographic testing instruments; Category B suppliers are to be equipped with at least 2 radiographic testing instruments.

② Supporting film drying oven (dryer), film illuminator, nigrometer, density film for calibration, intensifying screen, IQI(image quality indicator), reference block, etc. (when applicable);

③ To be equipped with radiation meter alarm, radiation meter, personal radiation meter, etc.

(2) Ultrasonic testing

① Category A suppliers are to be equipped with at least 3 ultrasonic instruments while Category B suppliers are to be equipped with at least 2 ultrasonic instruments;

② Supporting standard test blocks, reference test blocks and series probes.

(3) Magnetic particle testing

① Category A suppliers are to be equipped with at least 3 magnetic instruments while Category B suppliers are to be equipped with at least 2 magnetic instruments;

② Supporting calibration test pieces;

③ Lifting force test blocks.

(4) Eddy current/alternating current field testing

① For eddy current/alternating current field measurement testing services, suppliers are to be equipped with at least 1 corresponding instrument;

② Supporting probe, connecting cable, scanning device and encoder (when applicable), software and calibration test pieces;

(5) Penetrant testing

Category A and B suppliers are to be provided with sufficient quantities of penetrant testing material (cleaning agent, penetrant, remover, developing agent) and corresponding calibration test

block;

(6) Time of flight diffraction testing

① For time of flight diffraction testing services, suppliers are to be equipped with at least 1 TOFD instrument;

② Supporting probe, wedge, scanning device, encoder, software, dead zone test block, reference test block and simulation verification test block.

(7) Phased array ultrasonic testing

① For phased array ultrasonic testing services, suppliers are to be equipped with at least 1 PAUT instrument;

② Supporting probe, wedge, scanning device, encoder, software, standard test block, reference test block and simulation verification test block;

(8) Digital radiography testing

① For CR/DR testing services, suppliers are to be equipped with at least 1 corresponding radiography instrument;

② Supporting digital imaging plate (IP), metal screen, linear and duplex wire image quality indicator, backscatter shield lead plate, scanner and software for CR testing;

③ Supporting digital detector, filter plate, linear and duplex wire image quality indicator, testing tooling and software for DR testing.

10.4.4 When conducting NDT services, the supplier outside China is allowed to rent equipment with updated calibration record and the operator is to be familiar with the equipment before use.

10.5 Quality system

10.5.1 The supplier is to have a documented quality management system covering at least:

(1) work procedures for all tasks and operations, including the various NDT methods and NDT techniques for which the Supplier is involved;

(2) preparation, issuance, maintenance and control of documents;

(3) maintenance and calibration of the equipment;

(4) training programs for the NDT operators and the supervisors;

(5) maintenance of records for NDT operators' and the supervisors' training, qualification and certification;

(6) certification of NDT operators including re-validation and recertification;

(7) procedure for test of operators' visual acuity;

(8) supervision and verification of operation to ensure compliance with the NDT procedures;

(9) quality management of subsidiaries (if any, the quality system is to be certified);

(10) job preparation;

(11) order reference system where each engagement is traceable to when, who and where the test was carried out;

(12) recording and reporting of information, including retention time of records;

(13) code of conduct for the Supplier's activities, especially the NDT activities;

(14) periodic review of work process procedures;

(15) corrective and preventive action;

(16) feedback and continuous improvement;

(17) internal audits;

(18) the provision of accessibility to required codes, standards and procedures to assist NDT operators.

10.5.2 For Category A suppliers engaged in non-destructive testing for metal structures of classed ships and offshore units above water, a documented quality system complying with the most current version of ISO/IEC 17020:2012 and including the contents of 10.5.1 would be considered acceptable. The Supplier should satisfy the requirements of Type A or Type B inspection body, as described in ISO/IEC 17020:2012.

10.6 Documents

10.6.1 The supplier is to provide the following documents as required by the classification society:

(1) an outline of Supplier's organisation and management structure, including any subsidiaries (if any);

(2) information on the structure of the Supplier’s Quality Management System;

(3) quality manual and documented procedures covering the requirements given in 10.5;

(4) operational work procedures for each NDT method including selection of the NDT technique;

(5) for suppliers outside China with in-house certification of persons scheme; a written practice developed in accordance with a recognised standard or recommended practice (i.e. ASNT’s SNT-TC-1A, 2016, ANSI/ASNT CP-189, 2016 or similar);

(6) training- and follow-up programmes for NDT operators including practical training on various ship, marine products and offshore units;

(7) procedure for supervisor’s authorisation of NDT operators;

(8) experience of the Supplier in the specific service area;

(9) a list of documented training and experience for NDT operators within the relevant service area, including qualifications certification;

(10) description of equipment used for the services performed by the Supplier;

(11) a guide for NDT operators to use equipment mentioned above;

(12) record formats for recording results of the services referred to in 10.7;

(13) information on other activities which may present a Conflict of interest (if any);

(14) record of customer claims and corrective actions (if any);

(15) any legal proceedings against the company in the past/currently in the courts of law (if any).

10.6.2 The supplier is to be provided with the following technical documents, which are to be up-to-date and valid:

(1) Relevant CCS rules;

(2) Relevant international, national or industry standards.

10.6.3 A list of qualified suppliers such as testing equipment and consumables accepted by ship survey organizations is to be provided.

10.6.4 The inventory book of consumables is to be set up, listing the quantity, time and actual inventory of various consumables.

10.6.5 The valid verification/calibration certification or certificate issued by the national statutory metrological verification department is to be provided for metering equipment.

10.6.6 The previous and current testing records, certificates or reports are to be properly kept for not less than 5 years.

10.6.7 The Supplier is to produce written procedures for the NDT being applied. Procedures are to define all relevant information relating to the inspection including defect evaluation against acceptance criteria in accordance with CCS rules. For Category A suppliers engaged in the non-destructive testing for classed ships, marine products and metal structures of offshore units above water, these procedures are to be written, verified or approved by the Supplier's Level III. All NDT procedures and instructions are to be properly documented in such a way that the performed testing can be easily retraced and/or repeated at a later stage. All NDT procedures are to be acceptable to CCS.

10.6.8 When conducting radiography-related testing services, suppliers in China must hold a radiation safety license within the validity period issued by relevant Chinese authorities.

10.7 Reports and other requirements

10.7.1 All NDT reports are to be properly documented in such a way that the performed testing and examination can be easily retraced and/or repeated at a later stage. The reports are to identify the defects present in the tested area, and a conclusive statement as to whether the material, weld, component or structure satisfies the acceptance criteria or not.

10.7.2 The report is to include a reference to the applicable standard, NDT procedure and acceptance criteria applied in the applicable NDT method/technique. In general, the acceptance criteria are to comply with CCS rules.

10.7.3 The NDT report used by the supplier is to be in the format accepted by CCS. The content of the report is to meet the relevant requirements in CCS Guidelines for Inspection of Hull Welds as a minimum. NDT reports for category A suppliers are to be prepared in English as a minimum and NDT reports for category B suppliers are to be prepared in Chinese as a minimum.

10.7.4 The labor safety protection equipment required by testing personnel is to be provided.

10.8 Sub-contractors

When a Supplier outside China conducts NDT service, the Supplier is to give information of agreements and arrangements if any part(s) of the services provided are subcontracted. The Supplier, in the following-up of subcontracts is to give emphasis to the quality management system of the subcontractor. Subcontractors are to meet the same requirements placed on Suppliers for any NDT performed.

Chapter 11 Suppliers Engaged in Measurements of Shipboard Noise, Underwater Radiated Noise and Shipboard Vibration

11.1 Application

11.1.1 This Chapter applies to the suppliers providing measurements of shipboard noise, underwater radiated noise and shipboard vibration.

11.1.2 The supplier is to meet the requirements of 14, Annex 1, Appendix 8, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships, the Guidelines for Control and Measurement of Noises for Ships and Marine Products (applicable part), the Guidelines for Underwater Radiated Noise of Ships (applicable part), the Guidelines for Shipboard Vibration Control (applicable part) and relevant provisions.

11.2 Personnel

11.2.1 The operator, supervisor and technical director are to be trained by CCS or training organizations accepted by CCS, and to hold training certificates issued or accepted by CCS. In addition to meeting the relevant requirements of 1.2.1 (9), (10) and (11), Chapter I, Part One of the Guidelines, the following requirements are to be met:

(1) Having relevant knowledge or experience, receiving training concerning basic knowledge of acoustic/vibration of ship mechanical equipment and hull structures, noise (including shipboard noise and underwater radiated noise) and vibration measurement and control methods; Familiar with the selection, sampling methods and measuring conditions of measuring points and having the ability to correctly select and identify specific measuring points on site; Receiving relevant training of measurement equipment and capable of using and maintaining measurement equipment skillfully;

(2) Familiar with the requirements of relevant conventions, rules and other technical standards, receiving training concerning relevant measurement procedures and professional knowledge specified in IMO and CCS rules and guidelines. Adequate knowledge of the applicable international requirements (SOLAS Regulation II-1/3-12, as amended, and IMO Code on noise levels onboard Ships, as amended,); Familiar with the selection, sampling requirements of measuring points;

(3) Familiar with measurement operation procedures and able to fill in measurement report skillfully.

(4) The operator is to have at least one year relevant working experience and be involved in at least 5 different measurement tasks.

11.2.2 The number of operators and supervisors is to be sufficient for the services provided by the supplier and it is to be ensured that there are sufficient operators and supervisors on site to operate, record, prepare and review reports for each measurement. At least one supervisor and one operator are to be provided for on-site operation and record during measurement. The report is developed by the operator, reviewed by the supervisor and issued by the technical director.

The requirements for technical director appointed by the on board noise measurement service supplier are to be comparable to the requirements for the supervisor.

11.3 Equipment

11.3.1 Measurement of shipboard noise

(1) Sound level meters

Measurement of sound pressure levels is to be carried out using precision integrating sound level meters. Such meters are to be manufactured to IEC 61672-1 (2002-05) type 1 standard as applicable, or to an equivalent standard acceptable to the Administration. At least two weighting networks (A and C) are required for sound level meters. In addition to the above standards, the sound level meter with spectrum analysis function is also to meet the standards for the octave filter set in subparagraph (2) below.

(2) Octave filter set

As the main equipment for acoustic spectrum analysis, the octave filter set can be used alone, or in conjunction with a sound level meter, as appropriate. The octave filter set is to conform to IEC 61260 (1995), or an equivalent standard acceptable to the Administration.

(3) Sound level calibrator

Sound level calibrator is the device for calibrating sound level meters. Sound calibrators are to comply with the standard IEC 60942 (2003-01), and to be approved by the manufacturer of the sound level meter used.

(4) Sound Calibrator and sound level meter are to be verified at least every two years by a national Standard laboratory or a competent laboratory accredited according to ISO 17025(2005), as amended. A record with a complete description of the equipment used is to be kept, including a calibration log.

(5) Loudspeaker windscreen

A loudspeaker windscreen is to be used when taking readings outside, e.g. on navigating bridge wings or on deck, and below deck where there is any substantial air movement. The loudspeaker windscreen should not affect the measurement level of similar sounds by more than 0.5 dB(A) in "no wind" conditions.

(6) The supplier is to be equipped with at least one set of the above mentioned equipment.

11.3.2 Underwater radiated noise measurement

(1) Hydrophone

The hydrophone is to be omni-directional. The maximum uncertainty of the hydrophone sensitivity is to be within 3 dB from 10 Hz to 50 kHz. The auxiliary structure of the hydrophone is not to affect the test results. The open steel frame can be used. The bracket is generally an elongated member. The base area of the steel frame structure is to be 0.4~0.7 m^2.

(2) Data acquisition equipment

The sampling frequency of data acquisition equipment is at least to be 2 times the maximum analysis frequency. The dynamic range of the acquisition and data analysis equipment is not to be less than 90 dB. The 1/3 octave band in the required band can be analyzed, and the 1/3 octave band filter is to comply with the relevant requirements of IEC 61260 standard, either alone or in conjunction with data acquisition equipment.

(3) Distance measurement equipment

Distance measurement equipment is to be used for measuring the distance between the ship to be tested and the hydrophone. The distance measurement accuracy is to be within ±5 m. Distance measurement is to be continuously recorded in 2 second cycles for each complete voyage.

(4) Hydrophones, amplifiers and data acquisition equipment are to be calibrated by a qualified organization every two years and within the validity period.

11.3.3 Vibration measurement

(1) Ship vibration measuring instruments are to the electronic measuring system with multi channels, which is capable of maintaining the records for a long period of time and consists of sensor, amplifier, filter, recorder, etc. They are to have the sufficient width of frequency range and amplitude linearity to meet the requirements of frequency and amplitude for the measured part and be suitable for the environmental conditions onboard ships, such as temperature, humidity, noise,

etc. The metrological verification and calibration for sensitivity, amplitude frequency characteristic and amplitude linearity of the instruments are to be carried out periodically, generally not to exceed one year, as to maintain the accuracy of instruments in a specified range. Under the condition of complying with the measurement requirements, an electronic instrument for single point measurement or handheld mechanical vibration measurement instrument may be used.

(2) Mechanical and shafting vibration measuring instrument and system generally consist of sensor, amplifier, recorder, monitoring indicator, etc. They are to have wider frequency range, the allowable error of straight section of frequency response is with the range of ±10％ and being suitable for the environmental conditions onboard ships, such as temperature, humidity, noise, etc. They are able to correctly reflect the amplitude or deformation in way of the measured point. The measuring instruments are to be calibrated periodically, generally not to exceed one year, so as to maintain the accuracy of instruments in a specified range.

11.3.4 Computers, auxiliary equipment and software for transmitting and recording measurement records and reports are to be provided, the performance of which is to meet the corresponding requirements for recording and transmitting data and reports to CCS.

11.4 Site

11.4.1 There are to be fixed spaces for offices and storage of documents, materials and files.

11.4.2 There are to be storage spaces for measurement equipment and instruments.

11.5 Documents

11.5.1 Relevant international conventions, codes, circulars, relevant rules, guidelines and industrial technical standards and other technical standards are to be provided.

(1) Shipboard noise

① IMO Resolution A.468(XII) Code of Noise Levels on Board Ships;

② IMO Resolution MSC.337(91) Code of Noise Levels on Board Ships;

③ IMO Resolution A.343(IX) Recommendation on Methods of Measuring Noise Levels at Listening Posts;

④ CCS Guidelines for Control and Measurement of Noises for Ships and Marine Products;

⑤ ISO 2923 Measurement of Noise on Board Vessels;

⑥ Rules, standards or guidelines of ship survey organizations accepted or recognized by

Maritime Safety Administration of Ministry of Transport of China, as applicable;

⑦ GB/T 4595 Measurement of Noise on Board Vessels, as applicable;

(2) Underwater radiated noise

① CCS Guidelines for Underwater Radiated Noise of Ships;

② Rules, standards or guidelines of ship survey organizations accepted or recognized by Maritime Safety Administration of Ministry of Transport of China, as applicable;

(3) Shipboard vibration

① CCS Guidelines for Shipboard Vibration Control.

Main international standards for ships applying for class notation of HAB(VIB):

① ISO6954 Mechanical vibration — Guidelines for the Measurement, Reporting and Evaluation of Vibration with Regard to Habitability on Passenger and Merchant Ships;

② ISO4868 Code for the Measurement and Reporting of Local Vibration Data of Ship Structures and Equipment;

③ ISO 20283-5 Mechanical vibration -- Measurement of Vibration on Ships - Part 5: Guidelines for Measurement, Evaluation and Reporting of Vibration with Regard to Habitability on Passenger and Merchant Ships

Main international standards for ships applying for class notations of VIB(S) or VIB(M) or VIB:

① ISO4868 Code for the Measurement and Reporting of Local Vibration Data of Ship Structures and Equipment;

② IS0 10816-6 Evaluation Of Machine Vibration by Measurements on Non-rotating Parts – Part 6: Reciprocating Machines with Power Rating above 100 kW.

11.5.2 Documented procedures and instructions for how to carry out service of equipment include:

(1) Identification of work;

(2) Preparation for inspection and calibration inspection;

(3) Operation or installation of equipment;

(4) Selection and marking of measuring position;

(5) Regulations, methods or procedures and requirements for coordination and liaison with attending surveyors;

(6) Conduct, supervision and verification of measurement;

(7) Relevant requirements of record sorting and submission to the attending surveyor for signature and confirmation;

(8) Relevant provisions on data entry, confirmation and report preparation.

11.6 Measurement report

11.6.1 Measurement report of shipboard noise

11.6.1.1 Measurement certificates, reports and records in a uniform and fixed form or as required by the flag State governments are to be provided.

11.6.1.2 The report is to comprise information on the noise levels in the various spaces on board. The report is to show the reading at each specified measuring point. The points are to be marked on a general arrangement plan, or on accommodation drawings attached to the report, or otherwise to be identified.

11.6.1.3 The format is set out in Appendix 1 of Guidelines for Control and Measurement of Noises for Ships and Marine Products.

11.6.2 Underwater radiated noise measurement report

11.6.2.1 The measurement report is to include at least the following:

(1) Measurement equipment;

(2) Measurement conditions, the operation status of the ship and list of operating equipment;

(3) Differences with the measurement program, such as required measurement conditions, ship operation status, measurement procedure, etc.

(4) Background noise spectrum, background noise correction method;

(5) Result and criterion of sound source frequency band sound pressure level of one-third octave.

11.6.3 Shipboard vibration measurement report

11.6.3.1 The test report and record are to be in a fixed format accepted by CCS and to contain at least the contents specified in CCS Guidelines for Shipboard Vibration Control:

(1) Name and signature of measurement organization;

(2) Ship’s particulars;

(3) Description of environmental condition, ship condition and measuring instruments;

(4) Summary (at least including measurement basis, measurement conditions, applicable standards and measurement conclusions);

(5) Arrangement of measuring points (equipment and diagram);

(6) Analysis results of measurement;

(7) Curve of amplitude-speed (typical position, if any);

(8) Main original measurement record.

11.7 Verification

The supplier, after noise and/or vibration measurement, is to submit the measurement results to CCS Surveyor for verification and endorsement.

11.8 Storage

The measurement records, certificates or reports are to be properly kept for not less than 5 years.

11.9 Safety protection

The labor safety protection articles required by testing personnel are to be provided.

Chapter 12 Suppliers Engaged in Tank Test of Energy Efficiency Design Index (EEDI) of Ships

12.1 Application

12.1.1 This Chapter applies to the approval of organizations/units conducting model tests for the purpose of energy efficiency design index (EEDI) preliminary verification of ships (hereinafter referred to as "tank test organization").

12.2 General requirements

12.2.1 Tank test organizations are to be members of International Towing Tank Conference (ITTC).

12.2.2 Tank test organizations are to have the experience of carrying out ship model tests in the past.

12.2.3 The test organization is to have an effective management of data generated during test, which includes:

(1) Properly recording key data and results during test;

(2) Showing test results (such as resistance coefficient, wake fraction, thrust deduction and delivered power curves) in diagrams after test.

12.2.4 An appropriate test data management and analysis software platform is to be provided. Model tank test data are to be so accumulated that the accuracy requirements for correction of the tested ship type are complied with.

12.2.5 The tank test work is not to be subcontracted in whole or in part.

12.3 Personnel

12.3.1 At least two operators and one supervisor are to be provided for on-site operation and record by the supplier during tank test. The report is developed by the operator, reviewed by the supervisor and issued by the technical director.

12.3.2 The operator is to have appropriate professional knowledge on marine engineering and fluid mechanics and to pass the examination after professional training.

12.3.3 Minimum of 2 years of experience as an operator is required for the supervisor. Having knowledge background of marine engineering, fluid mechanics and other related professional education.

12.3.4 Relevant personnel for the manufacture and measurement of ship models and propeller

models are to have certain model making experience and to pass the examination after professional training.

12.4 Equipment and Location

12.4.1 The dimension of tank, the length of measuring section, the flatness of the trailer guide track and the maximum test speed of the trailers are to be suitable for the ship model tests carried out.

12.4.2 Tank temperature measurement and adjustment equipment is to be equipped to ensure constant tank water temperature and water density.

12.4.3 Test locations are to be provided with equipment and instrumentation for resistance test, self-propulsion test and propeller open water test. Tanks are to be at least provided with the following equipment and facilities:

(1) Wave generator and wave damper (necessary for the verification of f_w and Attained $EEDI_{weather}$);

(2) Processing/measuring equipment of model and propeller (the model is to meet the requirements of EEDI model test);

(3) Instruments for measuring force and speed, capable of measuring at least:

- model speed (V_m);
- total resistance of model (R_m);
- propeller thrust (T_m);
- propeller torque (Q_m);
- rate of revolution of propeller (n_m);

12.4.4 Other measuring devices, e.g. trim meter, draught meter, gravimeter, wave height meter, Prandtl pitot tube and five-hole pitot tube, pressure sensor, water pressure gauge, hot-wire meter, Doppler laser velocimeter, strainmeter bridge equipment, electronic equipment (recorder, filter, analyzer), etc.

12.4.5 Specific requirements for calibration of test equipment can be found in Appendix 4 of CCS Guidelines for Verification of the Energy Efficiency Design Index (EEDI) of Ships.

12.5 Documents

12.5.1 The supplier is to have access and capability to obtain the latest ITTC, IMO, IACS and CCS technical standards and other technical documents related to the test, and to ensure that these

documents used are up to date and effective.

12.5.2 Tank test working procedure and operation instructions are to be prepared according to the requirements of the ITTC ship model tank test guidelines and standards.

12.5.3 The test record, test data, forecast analysis and test report are to be kept for 5 years.

Chapter 13 Suppliers Engaged in Sea Trial Speed Measurement of Ships

13.1 Application

13.1.1 This Chapter applies to the organizations providing sea trial speed measurement of actual ships.

13.1.2 Unless otherwise specified in the Guidelines, the requirements of CCS Guidelines for Verification of the Energy Efficiency Design Index (EEDI) of Ships are to be met.

13.2 Personnel

13.2.1 Operators and supervisors are to be trained by CCS or training organizations accepted by CCS and pass the CCS assessment, and hold the qualification certificate issued by CCS. Personnel who have an interruption period of more than two years in actual ship speed measurement are to re-participate in the training and pass the CCS assessment before they can be re-listed in the list of operators of the trial speed measurement organizations approved by CCS.

13.2.2 Operators are to be familiar with relevant ship types, measuring equipment, relevant current effective speed measurement standards at home and abroad (ISO15016, ITTC Recommended Procedures and Guidelines for Speed and Power Trials, CB/T 3970, CBT 3767, etc.), and obtain national, industrial or internationally recognized industry qualification certificates after relevant training and assessment.

13.2.3 Supervisors are to have sufficient knowledge of the relevant ship type, measuring equipment, and relevant current effective speed measurement standards at home and abroad (ISO15016, ITTC Recommended Procedures and Guidelines for Speed and Power Trials, CB/T 3970, CB/T 3767, etc.) to verify that the test procedures are in accordance with the required test conditions. Supervisors are to have nationally or internationally recognized industry qualification certificates, or at least two years of experience as trial speed measurement testers or supervisors.

13.2.4 Trial speed measurement organizations are to ensure the number of supervisors and operators necessary for site operation, recording, preparing and reviewing reports, with at least one supervisor.

13.3 Equipment

13.3.1 At least two differential global positioning systems (DGPS) that meet the following requirements are to be provided:

(1) The positioning accuracy is within 5 meters;

(2) The position and speed of the ship can be continuously monitored and recorded.

13.3.2 Shaft power and shaft speed measuring system meeting the following requirements is to be provided:

(1) Shaft power is derived from shaft torque and propeller shaft speed. Shaft torque can be measured by dynamometer or telemetry torque meter, or in a manner recommended by the manufacturer and approved by CCS. Shaft torque measurement accuracy is to be controlled within 2%. Shaft speed measurement accuracy is to be controlled within ±0.5%.

(2) Shaft torque and shaft speed measurement system has synchronous testing function.

13.3.3 At least one wind vane and anemograph meeting the following requirements is to be provided:

(1) Easy to install;

(2) Wind speed: measuring range 0-30 m/s; Measurement accuracy (0.3+0.03×V) m/s (V is the actual wind speed);

(3) Wind direction: measurement range 0 ~ 360 °, 16 azimuth; measurement accuracy: ±0.5 azimuth.

13.3.4 According to the needs of measurement, wave measurement devices meeting the following requirements may be provided:

(1) A wave measuring buoy or radar can be used as wave measuring device;

(2) Significant wave height: accuracy ±10% or ±0.5 m, measurement range 0.5-20 m;

(3) Wave period: accuracy ±5%, measuring range 3.5-40 s;

(4) Wave measuring devices are to be calibrated and their accuracy is to be verified and documented.

13.3.5 At least one set of accelerometer meeting the following requirements is to be provided:

(1) The accelerometer is to be able to continuously monitor and record the vertical acceleration of the bow;

(2) Requirements for accuracy of acceleration sensor: measurement range: ±2g, measurement accuracy: 6mg.

13.3.6 Data acquisition system meeting the following requirements is to be provided:

(1) The data acquisition system is to be able to simultaneously collect and record time, propeller shaft torque or power, propeller shaft speed, ship position, ship course, ship-to-ground velocity,

relative wind direction, relative wind speed, hull bow vertical acceleration etc.;

(2) The data acquisition system is to be able to collect and store the above data at a sampling rate of at least 1 Hz.

13.4 Documents

13.4.1 Relevant national regulations, CCS rules and relevant industry technical standards are to be provided.

13.4.2 The working procedure and operation instructions for trial speed measurement and testing to be approved are to be provided. The working procedure for trial speed measurement is to include:

(1) Measurement basis;

(2) Inspection and preparation of measuring equipment before operation;

(3) Selection of measuring point position;

(4) Installation and commission of measuring equipment/system;

(5) Equipment operation instructions;

(6) Relevant requirements for the record sorting of measurement data and submission to the attending surveyor for signature and confirmation;

(7) Relevant requirements for preparation, proofreading and review of measurement reports.

13.5 Other requirements

13.5.1 The trial speed measurement organization is to submit to CCS its experience in the field of ship trial speed measurement service, including the ship name, ship type, tonnage, time, location, etc., as well as relevant certificates.

13.5.2 For the trial speed measurement organizations which establish branches, the Headquarters are to have the technical and personnel support ability, and to be responsible for the quality, safety and legal responsibility of branches.

Chapter 14 Suppliers Engaged in Condition Monitoring of Machinery Installations

14.1 Application

14.1.1 This Chapter applies to suppliers providing condition monitoring of machinery installations of ships. The suppliers are to be able to provide condition monitoring, health assessment, assistant decision-making[35] and/or condition-based maintenance[36] of ship machinery installations according to the actual operating condition of the machinery installations, and the results are to be taken as the inspection basis by the surveyor.

14.1.2 If the supplier adopts the lubricating oil analysis technology in condition monitoring of machinery installations of ships, the approval requirements for the suppliers engaged in lubricating oil analysis in Chapter 15 of Part One of the Guidelines are to be met.

14.2 Personnel

14.2.1 Operators and supervisors have some knowledge of mechanical engineering, data and statistical analysis, sensor/monitoring technology, and limitations of using condition monitoring methods.

14.2.2 Operators and supervisors are to have at least 2 years of relevant working experience.

14.2.3 Operators and supervisors are to receive at least 1 year of on-the-job training and regular internal and/or external training.

14.2.4 In the case of adopting vibration, acoustic emission, thermal imaging, ultrasound etc., the supplier is to train the relevant operators and supervisors according to the requirements for condition monitoring service, and obtain the qualification certificates issued by the third party according to the corresponding standards of ISO 18436-2, ISO 18436-6, ISO 18436-7 and ISO 18436-8.

(1) The operator who provides the assistant decision-making supplier service is to have the corresponding qualification level of Grade I or above in ISO 18436-2, 18436-6, 18436-7 and 18436-8. The operator who provides the condition-based maintenance supplier service is to have the qualification level of Grade II or above in ISO 18436-2, 18436-6, 18436-7 and 18436-8.

(2) The supervisor who provides the assistant decision-making supplier service is to have the

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[35] Assistant decision-making: refer to Chapter 4 of Rules for Intelligent Ships. The analysis and assessment results and operation suggestions provided by the supplier can not serve as the basis for CCS to open the equipment for inspection.

[36] Condition-based maintenance: refer to Chapter 4 of Rules for Intelligent Ships. The condition-based maintenance plan provided by the supplier can serve as the basis for CCS to open the equipment for inspection.

corresponding qualification level of Grade II or above in ISO 18436-2, 18436-6, 18436-7 and 18436-8. The supervisor who provides the condition-based maintenance supplier service is to have the qualification level of Grade III or above in ISO 18436-2, 18436-6, 18436-7 and 18436-8.

14.2.5 The supplier is to keep records of the personnel performing condition monitoring, which include name, age, education background, personnel training, qualification certificate, time limit/experience engaged in condition monitoring.

14.3 Equipment

14.3.1 According to the adopted monitoring technology, the corresponding equipment is to be provided to meet the needs of service provided by the supplier.

14.3.2 The computer and its associated equipment and software for transmission and recording of measurement records and reports are to be provided with the performance to meet the corresponding requirements of recording and transmitting data and reports.

14.3.3 When computer is used to carry out data collection, processing, record, report, storage, measurement evaluation and monitoring, the supplier is to demonstrate capability of computer software used for the service. This is to be undertaken prior to initial use and reconfirmed as necessary.

14.4 Documents

14.4.1 Relevant CCS rules and relevant technical standards are to be provided.

14.4.2 The supplier is to have working procedure and/or operation instructions for condition monitoring of machinery installations, including at least:

(1) Methods, calibration, measurement and inspection procedures and health assessment criteria used in condition monitoring;

(2) Data collection and analysis to determine whether there are defects or hidden dangers in related equipment of the ship;

(3) Drawings or specifications of the monitored equipment;

(4) Inspection, preparation, calibration and operation instructions of portable monitoring equipment before operation;

(5) Regulations or procedures for the surveyor to review the condition monitoring and health assessment results;

(6) Relevant provisions on monitoring data entry, confirmation and submission of condition

monitoring reports, especially the reporting system when defects or hidden dangers are found in related equipment of ships.

14.4.3 A list of monitoring equipment and tools accepted by CCS is to be provided. If the equipment is installed or used in a dangerous area, the corresponding explosion-proof requirements are to be met.

14.4.4 At least one condition monitoring analysis report and record of monitored equipment is to be issued quarterly, and one annual report and record is to be issued annually.

14.4.5 Condition monitoring and health assessment reports and records are to be in a fixed format and to include at least the following information:

(1) Name of ship;

(2) IMO number;

(3) Inspection time;

(4) Monitoring/testing equipment used;

(5) Information of monitored equipment (name, number), scope and location of measurements performed for equipment monitoring, trend or defect status of equipment, and conclusive analysis results for crew to view equipment conditions. The report is to detail the results of the inspection, measurement, testing, maintenance and/or repair carried out, including system maintenance record, general operation record, failure condition of monitored machinery equipment, cause analysis, equipment replacement condition as well as operation and maintenance record of renewed equipment since last annual survey;

(6) Signature and date of the operator, supervisor and person issuing the report.

14.4.6 Condition monitoring raw data and reports are to be kept for at least 5 years.

14.5 Other requirements

14.5.1 In addition to the documents required for initial approval in Chapter 1, Part One of the Guidelines, the supplier is to submit the following documents to CCS:

(1) machinery installations condition monitoring and health assessment, assistant decision-making and/or condition-based maintenance plan and implementation procedure;

(2) Detailed description of strategy used for machinery installations condition monitoring, health assessment, assistant decision-making and/or condition-based maintenance, including method, means and monitoring technology, etc.

14.5.2 The condition monitoring system is to be approved and certified (if applicable).

Chapter 15 Suppliers Engaged in Lubricating Oil Analysis of Propeller Shafts, Diesel Engines and Condition Monitoring of Machinery Installations

15.1 Application

15.1.1 This Chapter applies to lubricating oil analysis suppliers engaged in condition monitoring of propeller shafts, diesel engines and machinery installations.

15.2 Personnel

15.2.1 The lubricating oil analysis supplier engaged in condition monitoring of propeller shafts, diesel engines and machinery installations is to be manned according to its workload.

15.2.2 Operators and supervisors are to have at least two years' relevant working experience and have received at least one year's on-the-job training and receive regular internal or external training.

15.2.3 Operator

(1) The operator is to have education, training and practical experience.

(2) The operator is to have some basic knowledge of mechanical lubrication and lubricating oil analysis technique and understand the principles and procedures of mechanical lubrication and lubricating oil analysis.

(3) The operator is to be familiar with the basic principles and testing methods of analytical testing instruments and be able to complete the correct handling and testing of lubricating oil samples according to established procedures.

(4) Operators of supplier providing assistant decision-making[37] services of machinery installations are to be certified to Grade I or above of ISO 18436-4 or ISO 18436-5, or certified to a similar recognized standard.

(5) Operators of supplier providing condition-based maintenance[38] services of machinery installations are to be certified to Grade II or above of ISO 18436-4 or ISO 18436-5, or certified to a similar recognized standard.

15.2.4 Supervisor

(1) Relevant qualifications of operator are required.

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[37] Assistant decision-making: refer to Chapter 4 of Rules for Intelligent Ships. The analysis and assessment results and operation suggestions provided by the supplier can not serve as the basis for CCS to open the equipment for inspection.

[38] Condition-based maintenance: refer to Chapter 4 of Rules for Intelligent Ships. The condition-based maintenance plan provided by the supplier can serve as the basis for CCS to open the equipment for inspection.

(2) The supervisor is to be familiar with the lubricating oil analysis technique, skilled at proper operation of instrumentation, and capable of working independently, giving guidance to other operators and making a correct evaluation of the analysis results.

(3) The supervisor of supplier providing assistant decision-making services of machinery installations is to be certified to Grade II or above of ISO 18436-4 or ISO 18436-5, or certified to a similar recognized standard.

(4) The supervisor of supplier providing condition-based maintenance services of machinery installations is to be certified to Grade III or above of ISO 18436-4 or ISO 18436-5, or certified to a similar recognized standard.

15.3 Equipment

15.3.1 Analytical testing instruments are to be provided to meet the service requirements, including at least:

(1) Physical and chemical analysis equipment for oil products, such as viscometers, moisture meters, total base number meters and other auxiliary analytical equipment;

(2) Analysis equipment for element content (mainly metal content), such as oil analysis spectrometer;

(3) Grinding particle morphology and concentration analysis equipment, such as ferrograph;

(4) Other analytical equipment: computers and related computational procedure.

15.4 Documents

15.4.1 The records and analysis reports in the fixed format are to include the relevant contents of records and analysis reports in Appendix 14 and 15, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships. For suppliers who provide condition-based maintenance services for ships with i-Ship (Mx) or CBM (X) class notation, the records and analysis reports are to meet the requirements of 14.4.4-14.4.5, Chapter 14, Part One of the Guidelines.

15.4.2 Equipment maintenance procedures and maintenance record keeping procedures are to be provided. The records are to at least include the maintenance manual, instructions, periodic inspection certificate of equipment and maintenance instructions.

15.4.3 Working procedures in accordance with the relevant requirements of Appendix 14 and 15, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships are to be provided, including at least:

(1) confirming the lubricating oil to be analyzed according to the procedure, and determining the indexes and parameters to be analyzed for the lubricating oil;

(2) obtaining relevant equipment drawings or specifications (such as propeller shafting drawings, diesel engine or machinery installations specifications, or lubricating oil specifications, etc.);

(3) obtaining previous relevant records of lubricating oil;

(4) carrying out and checking the testing and analysis of lubricating oil;

(5) analyzing lubricating oil to determine whether defects or hidden dangers are found in ship related equipment;

(6) preparing and submitting analysis reports, especially the report system when defects or hidden dangers are found in ship related equipment.

15.5 Other requirements

15.5.1 The analysis supplier is to comply with the international standards for approval of laboratories (e.g., ISO/IEC 17025) or the standards accepted by CCS (e.g., CMA).

15.5.2 In case of approval in accordance with the requirements for the initial approval, the on-site audit and practical operation verification of the lubricating oil testing and analysis are to be carried out. The relevant parts of the equipment found with obvious defects by lubricating oil analysis are to be disassembled and inspected for verification.

Chapter 16 Suppliers Engaged in Survey Using Remote Inspection Techniques (RIT) as An Alternative Means for Close-up Survey of the Structure of Ships and Mobile Offshore Units

16.1 Application

16.1.1 This Chapter applies to suppliers using remote inspection techniques (RIT) for close up survey of the structure of ships and mobile offshore units.

16.1.2 For in-water close-up survey of the internal compartments by Remotely Operated Vehicle (ROV), the supplier is to comply with the requirements of Chapter 3 of Part One of the Guidelines.

16.1.3 Suppliers engaged in thickness measurements are to comply with the requirements of Chapter 2 of Part One of the Guidelines.

16.2 Definitions

16.2.1 Close-Up Survey: A Close-Up Survey is a survey where the details of structural components are within the close visual inspection range of the surveyor i.e. normally within reach of hand.

16.2.2 Remote Inspection Techniques (RIT): RIT is a means of survey that enables examination of any part of the structure without the need for direct physical access of the surveyor(refer to IACS Rec.42). Remote inspection techniques (RIT) may include the use of:

(1) Unmanned aerial vehicle (UAV);

(2) Drones;

(3) Unmanned robot arm;

(4) Remotely Operated Vehicles (ROV);

(5) Climbers;

(6) Other means acceptable to CCS.

16.3 Personnel

16.3.1 Training and qualification of operators – The supplier is responsible for the training and qualification of its operators to undertake the remote inspections. UAV Pilots are to be qualified and licenced in accordance with applicable national requirements or an equivalent industrial standard acceptable to CCS. Knowledge of the following is to be documented:

(1) Marine and/or offshore nomenclatures;

(2) The structural configuration of relevant ships types and mobile offshore units, including internal structure;

(3) The remote inspection equipment and its operation;

(4) Survey plans for examination of hull spaces of various configurations, including appropriate flight plans if using a UAV.

(5) Thickness measurement and non-destructive examination in accordance with a recognised National or International Industrial NDT Standard when these are part of the service.

16.3.2 The supplier is to maintain a documented training plan for personnel. The plan is to include requirements for training in the minimum rule requirements for the structure of relevant ships types and mobile offshore units, the recognition of structural deterioration (including corrosion, buckling, cracking and deteriorated coatings) and use of the reporting system.

16.3.3 The supervisor is to be certified according to the recognized national requirements or an equivalent industrial standard (e.g. XXX Level) and to have a minimum of two years' experience in the inspection of structure of ships and/or mobile offshore units.

16.3.4 The operator carrying out the inspection is to be certified according to the recognized national requirements or an equivalent industrial standard (e.g. YYY Level) and have had at least one year's experience as an assistant carrying out inspections of ships' and/or mobile offshore units' structure (including participation in a minimum of five different assignments). The operators of those RIT which require, according to the international and national legislations, to be licensed for their use are to hold valid documentation issued by the appropriate Bodies (e.g. UAV Pilots are to be qualified and licenced in accordance with applicable national requirements).

16.4 Equipment

16.4.1 The following are to be available:

(1) Remotely operated platform with data capture devices capable of operation within an enclosed space;

(2) Means of powering the platforms with sufficient capacity to complete the required inspections, including spare batteries if applicable;

(3) Data collection devices which may include cameras capable of capturing in high definition both video images and still images;

(4) Illumination equipment;

(5) High definition display screen with live high definition feed from inspection cameras. (When this is part of the RIT);

(6) Means of communication;

(7) Data recording devices, as applicable;

(8) Equipment for carrying out thickness gauging and/or non-destructive testing, as relevant to the work to be performed (when this is part of the service).

16.5 Documents

16.5.1 The supplier is to have documented operational procedures and guidelines for how to plan, carry out and report inspections; how to handle/operate the equipment, collection and storage of data. These are to include:

(1) Requirements for preparation of inspection plans when UAV are part of the equipment flight plans are to be included;

(2) Operation of the remotely operated platforms;

(3) Operation of lighting;

(4) Calibration of the data collection equipment;

(5) Operation of the data collection equipment;

(6) Two-way communication between the operator, platform, surveyor, other personnel such as support staff and ships officers and crew;

(7) Guidance of the operator to provide complete coverage of the structure to be inspected;

(8) Guidance for the maintenance of the remotely operated platforms, data capture and storage devices and display screens, as applicable;

(9) Requirements for the collection and validation of data;

(10) If data is to be stored, then requirements for location attribution (geo-tagging), validation and storage of data;

(11) Requirements for the reporting of inspections, including the recording of damages and defects found during inspection and repair work.

16.5.2 The supplier is to maintain the following documents:

(1) Records of training;

(2) Operator statutory and regulatory certificates and licences;

(3) Equipment register for UAVs, Robots, data collection devices, data analysis devices and any

associated equipment necessary to perform inspections;

(4) Equipment maintenance manuals and records / logbook;

(5) Records of calibration;

(6) UAV/Robot operation logbook.

16.6 Verification

16.6.1 The supplier must have the surveyor's verification of each separate job, documented in the report by the attending surveyor(s) signature.

16.7 Supplementary requirements for UAV inspection service firms

16.7.1 The management requirements of the local aviation Administration in the place where the inspection is conducted for the "use of UAV for close-up survey of the structure of ships and mobile offshore units" are to be complied with. When applicable, such as: management requirements of the Civil Aviation Administration of China for institutions, pilots, UAVs, flight activities, airspace restrictions, real-name registration and other relevant requirements.

16.7.2 Supervisors and operators are to be trained by CCS or training organizations accepted by CCS on "use of UAV for close-up survey of the structure of ships and mobile offshore units" and hold the training certificate issued by CCS or training organizations accepted by CCS. The training is to include at least the following:

(1) hull structure knowledge and close-up survey requirements and/or mobile offshore unit structure knowledge and close-up survey requirements;

(2) Guidelines for Use of Unmanned Aerial Vehicles for Surveys;

(3) Relevant requirements of Guidelines for Management of Approval of Suppliers and Personnel Qualification.

For the thickness measurement personnel who holds the thickness measurement training certificate for hull/offshore unit above water issued by CCS, the "training on hull thickness measurement requirements" received is equivalent to the "hull structure knowledge and close-up survey requirements" required in this paragraph, and the "training on offshore unit thickness measurement requirements" received is equivalent to the "mobile offshore unit structure knowledge and close-up survey requirements" required in this paragraph. The relevant training requirements can be dispensed with according to the training contents recorded in the thickness measurement training certificate.

For suppliers outside China performing UAV inspection service, CCS accepts training certificates related to “use of UAV for close-up survey of the structure of ships and mobile offshore units” issued or accepted by other IACS members.

16.7.3 The supplier is to ensure the operators and supervisors necessary for the on-site operation, recording, preparation and review of reports of the given business scale and quantity.

16.7.4 The supplier is to have UAVs complying with the following requirements in accordance with the given business scale and quantity and the UAVs are to be properly maintained as per the requirements of the manufacturers.

16.7.4.1 Safety performance

(1) UAVs that carry out survey in spaces where light and GPS signals are weak or lost are to be capable of flying and hovering stably in this environment;

(2) UAVs are to be capable of automatic collision prevention or anti-collision;

(3) UAVs are to be capable of forced landing when the battery is running low;

(4) UAVs are to be capable of automatic hovering, forced landing or returning in case of loss of communication;

(5) UAVs are to be equipped with warning lights;

(6) UAVs and their flight control systems are not to affect normal operation of electrical and electronic equipment onboard ships;

(7) Tethered UAVs are to be equipped with spare batteries to meet the requirements of forced landing or flight return;

(8) UAVs are to have wind resistance capacity to meet the survey requirements;

(9) UAVs operating in dangerous areas are to be explosion-proof UAVs. Unless the areas are qualified after explosion measurement, they are to be well-ventilated at all times, and regular inspections are conducted to confirm no re-accumulation of flammable gas, and there is no explosion risk due to the use of UAVs.

16.7.4.2 Data transmission and communication

(1) Data transmission and communication is under open wireless band or wire communication;

(2) UAVs are to have stable communication and real-time image transmission capability.

16.7.4.3 Data storage

(1) Data type: video, photo;

(2) Video resolution: no less than 1920×1080 pixels;

(3) Image resolution: no less than 3840×2160 pixels;

(4) Video format: MP4 or other mainstream formats;

(5) Photo format: JPG or other mainstream formats;

(6) Storage mode and capacity: the storage capacity of the airborne storage card is to be not less than the data volume for continuous collection during the maximum endurance time of the UAV, and there are to be enough spare memory cards to complete the scheduled inspection.

16.7.4.4 Requirements for airborne lighting

(1) The UAV carrying out survey in spaces where light is weak or lost is to be equipped with sufficient airborne lighting equipment to meet survey requirements.

16.7.4.5 Requirements for airborne cameras

(1) Adapting to low light environment;

(2) Having good anti - shake performance;

(3) The image taken is to be able to reflect the structural details clearly and truthfully;

(4) Having function of taking photos in real time.

16.7.5 Performance verification of UAV. CCS is to conduct spot check and verification of UAVs used for the close up survey of the structure of ships and mobile offshore units in accordance with the requirements in 16.7.4.1 to 16.7.4.5 of this Chapter, including documentation verification and/or on-site verification. The firm performing UAV inspection service or UAV manufacturer is to provide UAV related documents, including but not limited to: manufacturer certificate or equivalent document, quality testing report or equivalent document, performance parameters and specification of usage restrictions, etc. If necessary, the firm performing UAV inspection service or the UAV manufacturer is to arrange a site for UAV performance verification.

16.7.6 Practical operation verification of UAV inspection. The firm performing UAV inspection service is to arrange a ship and/or offshore unit within the scope of application for approval to conduct practical operation verification of UAV inspection. The CCS auditor is to designate the operator and to witness the inspection operation, recording and report preparation of the above ship and/or offshore unit by the operator throughout the process.

Chapter 17 Suppliers Engaged in Tightness Testing of Closing Appliances with Ultrasonic Equipment

17.1 Application

17.1.1 This Chapter applies to suppliers using ultrasonic wave for leak detection of closing appliances of ships such as cargo hold hatch covers, small hatches, watertight/weathertight doors and windows, ramp doors, bow and stern doors, etc.

17.1.2 The services specified in this Chapter apply to the items in Table 1 of "Annex 1 Procedures for Testing Tanks and Tight Boundaries" of Chapter 4 of PART ONE of *CCS Rules for Classification of Sea-going Steel Ships* (same as IACS UR S14) where the ultrasonic test is allowed to replace the hose test, such as:

(1) watertight doors below freeboard or bulkhead deck;

(2) weathertight hatch covers and closing appliances;

(3) dual purpose tanks/dry cargo hatch covers;

(4) watertight bulkheads where a hose test is not practicable.

17.1.3 Definitions

Tightness Testing of Closing Appliances with Ultrasonic Equipment: An ultrasonic echo transmitter is to be arranged inside of a compartment and a detector is to be arranged on the outside. The watertight/weathertight boundaries of the compartment are scanned with the detector in order to detect an ultrasonic leak indication. A location where sound is detectable by the detector indicates a leakage in the sealing of the compartment.

Open Hatch Value (OHV): The ultrasonic intensity, measured in dB (decibels), received by an ultrasonic detector when the hatch cover or door is fully open.

17.2 Personnel

17.2.1 A sufficient number of supervisors and operators are to be provided to meet business needs and to be trained by the equipment manufacturer or its authorized organization. During actual detection, at least 1 operator and 1 supervisor are to be equipped with the following qualifications:

(1) Have knowledge of different closing appliances such as hatches, doors etc. including their design, functioning and sealing features ;

(2) Have experience with the operation and maintenance of different closing appliances such as

hatches, doors etc.;

(3) Be able to document theoretical and practical training onboard in using the ultrasonic equipment specified.

17.2.2 The operator is to have at least 1 year of on-the-job training/internship experience and receive regular internal or external training.

17.2.3 The supervisor is responsible for checking the correct performance of the detection and verifying the correctness of the record report. The supervisor is to have at least 2 years of operation and inspection experience as an operator in similar business.

17.2.4 The supplier is to provide a record of operator and supervisor's experience in ultrasonic leak technology training and practical application.

17.3 Equipment

17.3.1 Under any circumstance, the supplier is to have sufficient equipment to perform the relevant services within the scope of ultrasonic leak detection, and to have no less than two sets of test equipment.

17.3.2 Each ultrasonic leak detection equipment is to have the certificate of compliance issued by the manufacturer.

17.3.3 A clear and complete equipment operation instruction provided by the equipment manufacturer is to be available, which is to include but not limited to: equipment calibration method, leakage determination criteria and equipment maintenance.

17.3.4 The ultrasonic leak detection equipment is to have the following functions:

(1) The signal intensity emitted by the transmitter can be adjusted to produce a uniform and stable open hatch value in the test area;

(2) The detector is to display a reading of decibel value that preserves the peak value tested;

(3) The detector is to have both sound and displayed leak indication and the transmitter is to be reminded of insufficient power.

17.3.5 The equipment is to be calibrated at least once a year by the equipment manufacturer or its authorized organization. The equipment is to be calibrated after the main parts are repaired. The calibration document is to be issued after calibration.

17.3.6 Each equipment is to have a calibration and maintenance record sheet.

17.3.7 If the supplier changes the ultrasonic leak detection equipment manufacturer or

equipment model, the personnel training certificate is to be updated, and CCS is to be timely notified to conduct additional audit and carry out approval test.

17.4 Documents

17.4.1 The supplier is to prepare written procedure documents, operation instructions and detection procedures, including at least the following contents:

(1) Self-test, adjustment and calibration methods of ultrasonic equipment before test;

(2) Operation requirements during equipment test and criteria for determining leakage;

(3) Equipment maintenance and calibration requirements.

17.4.2 A working ledger is to be established and each test record, certificate or report is to be properly kept for not less than 5 years.

17.4.3 Relevant international conventions, rules, circulars, regulations of Administrations, CCS related rules and relevant industry technical standards are to be provided. The above technical documents are to include but not limited to:

(1) The latest valid version of and previous amendments to the *International Convention for the Safety of Life at Sea*, 1974;

(2) PART ONE of *CCS Rules for Classification of Sea-going Steel Ships*;

(3) *Testing Procedures of Watertight Compartments* of IACS UR S14;

(4) *CCS Guidelines for Application of Ultrasonic Leak Detection Technology*;

(5) The latest valid version of and previous amendments to the *International Convention on Load Lines*.

17.5 Report requirements

17.5.1 The supplier is to provide the test report to the surveyor after the test, which is to include at least the following information:

(1) Ship name;

(2) Ship identification number (for ships engaged in domestic voyage), IMO No. (for ships engaged in international voyage) or shipyard number;

(3) Time and place of detection;

(4) Number of the detection equipment used, the date of calibration and the situation of self-test;

(5) Basic information of the detected object, selection of open hatch value, determination criteria for leakage, location of leak defect and ultrasonic test value (if any), ultrasonic test value after

defect repair (if any), and other information that needs to be explained;

(6) Signature of operator and supervisor.

17.5.2 The surveyor is to witness the test of the supplier, review the report and endorse it.

17.6 Practical operation verification

The supplier is to conduct practical operation verification in accordance with the established practical operation verification procedure when applying for initial approval from CCS. The supplier is to select a real ship to conduct ultrasonic leak detection on all typical closing appliances and demonstrate to CCS surveyors that the ultrasonic equipment is fit for the purpose of detecting leakages in closing appliances.

Appendix 1 General Procedure of Practical Operation Verification (Recommended)

1. The preparation work before the test is to be carried out in accordance with Chapter 3 of *Guidelines for Application of Ultrasonic Leak Detection Technology*. This appendix takes cargo hatch cover as an example to explain the general procedure of approval test, and the weathertight door, small hatch cover and other equipment are to be carried out in accordance with this Procedure.

2. Arrange artificial leak points for detection

2.1 Artificial leak points are made by using 1-3 mm diameter steel wire arranged perpendicular to the direction of the rubber compass bar prior to closing the hatch cover, as shown in the figure below:

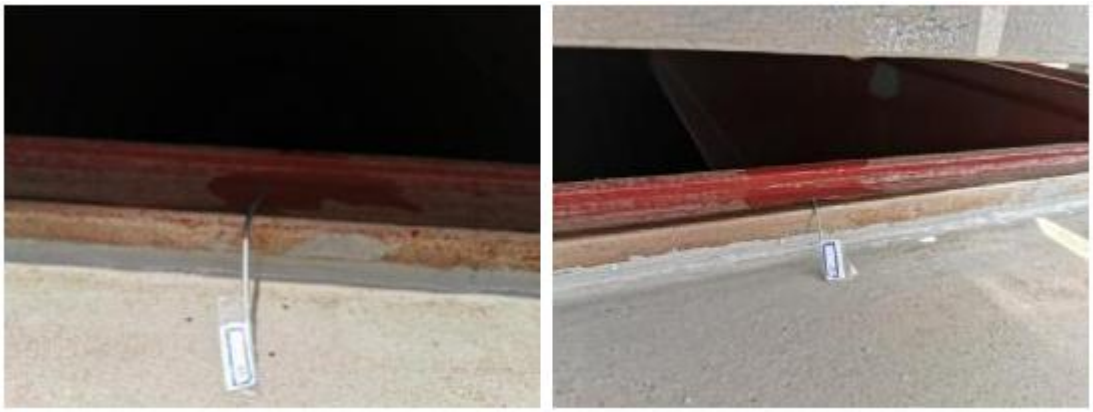

Illustration of artificial defect arrangement

2.2 Under the same condition, the ultrasonic leak detection and hose test are to be carried out on the hatch cover successively, and the hatch cover is not to be opened before the two tests are completed. The leak point is to be found by the hose test, and at the same time the ultrasonic leak detection method is to be used to accurately find the leak point to verify the test sensitivity of the ultrasonic leak detector. If the leak point is not found by using ultrasonic leak detection method, the equipment is to be stopped or the test is to be carried out again after corrective measures are taken.

3. Remove artificial leak points for detection

3.1 The artificial leak points made by steel wire is to be removed and the rubber sealing material is to be inspected for damage by wire.

3.2 The ultrasonic leak detection and hose test are to be carried out on the hatch cover successively. By comparing the results of the two tests, the test sensitivity of the ultrasonic leak

detector is to be verified. If the leak point is not found by using ultrasonic leak test method, the equipment is to be stopped or the test is to be carried out again after corrective measures are taken.

4. Test results

If the test results are approved, the operator is to provide the field test report.

Appendix 2 Key Points for Use in Special Cases (Recommended)

The transmitter is to be so arranged that it can produce as much uniform sound field as possible and cover the back of all seams in the hatch area. If there are obstructions in the cargo hold that prevent some areas from being covered by ultrasonic wave, the transmitter may be moved and the detection is to be split into multiple sessions. In the actual application process, the size, shape and arrangement of the cargo holds are different. Some cargo holds have internal partitions, such as intermediate beams and tween decks. The length and width of some cargo holds are relatively large, so it is very important to choose the appropriate position to arrange the transmitter.

1. If there are tween decks in the cargo hold, part of the ultrasonic beam will be reflected back after the ultrasonic wave hits the tween deck, so the intensity of the ultrasonic wave above the tween deck will be weakened. It is better to place the transmitter in the central area of the double deck hatch or raise the transmitter appropriately. (See Figure 1)

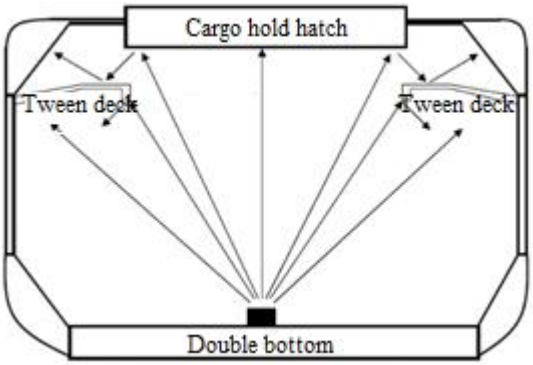

Figure 1 Double deck cargo hold

2. If there are intermediate beams in the cargo hold, the two hatch covers are to be inspected separately. During the test, the transmitter is to be placed under each hatch cover, and the position of the transmitter is to be raised if necessary. (See Figure 2)

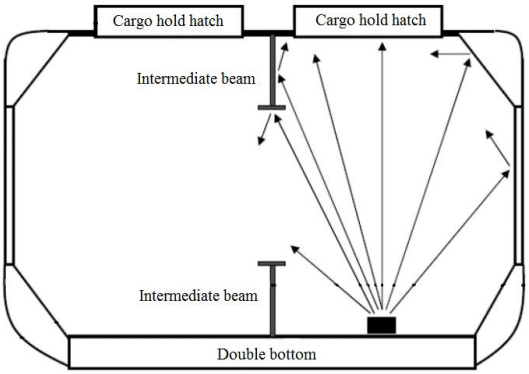

Figure 2 Cargo hold with intermediate beams

3. For ships with long and narrow cargo holds, the cargo holds are to be inspected in blocks according to the standard of obtaining the appropriate open hatch value. The transmitter is to be placed in the center of each area in turn to detect the tightness of the hatch cover in each area. (See Figure 3)

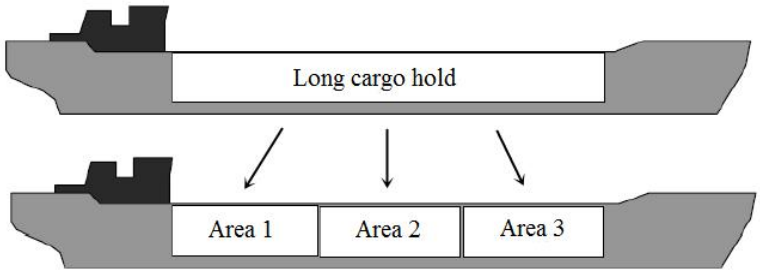

Figure 3 Long and narrow cargo hold

4. In the operation of the ship, when there is no suitable flat surface in the cargo hold or there is cargo in the cargo hold, the transmitter can be suspended on the reverse side of the hatch cover with additional guide ropes if necessary. (See Figure 4)

Figure 4 Suspension of transmitter

5. The distance between the probe of ultrasonic detector and the seam of the hatch cover is to be as close as possible. At present, consideration has been given to structural arrangement for the seam design of hatch cover to prevent flooding. For example, for side open (relatively flat open on both sides) hatch covers, the gap in the middle seam position is very small with water retaining structure, so the probe may not reach into the gap to the rubber groove surface for detection. At this time, direct flushing can be considered to make up for the limitations of ultrasonic leak detection. (See Figure 5)

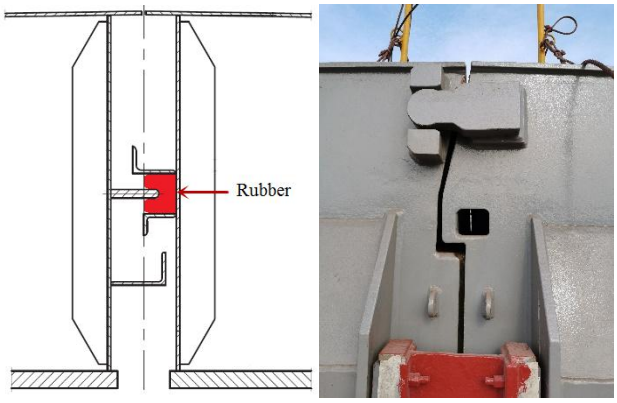

Figure 5 Middle seam of hatch cover

6. For the watertight doors and windows that have been tested in the product factory, the hydraulic test is generally replaced by hose test if it is difficult to conduct the hydraulic test on board. As the hose test may cause damage to the insulation of machinery and electrical equipment or outfitting parts, the ultrasonic leak detection can be used to replace the hose test on board.

7. When testing watertight/weathertight doors and windows on board the ship, the transmitter can be fixed behind the door or window with brackets, facing the center of the door or window without any obstruction in the middle, and the openings in the bulkhead around the door and window have been closed with effective measures taken. The distance from the transmitter to the door is recommended to be no less than the larger value of the door height and width. If the power of the transmitter is too high, the ultrasonic wave may penetrate the steel door and window. Therefore, the probe is to be close to the center of the door before detection and the edge of the door is to be tested after confirming that there is no ultrasonic wave penetration.

Appendix 3 Format of Test Report (Recommended)

Ultrasonic Leak Detection Report		Report No.:
1. Ship information		
Ship name, identification number (ship project number):	Ship type:	Test object and size:
Test object number:	Test place	Test date:
Ultrasonic equipment:	Receiver serial number:	Transmitter serial number:
Date of last calibration:	Receiver probe serial number:	
2. Equipment self-test Equipment self-test status before the test: Equipment self-test status after the test:		
3. Measurement of open hatch value		
4. Determination criteria for leakage		

5. Description of leak defects

Defect location	Decibel reading	Decibel reading after repair	Remarks

6. Diagram	7. Description
	Operator: Supervisor: Surveyor:

Chapter 18 Suppliers Engaged in Cable Transit Seal Systems Inspection on Ships and Mobile Offshore Units

18.1 Application

18.1.1 This Chapter applies to suppliers providing cable transit seal systems inspection on ships and mobile offshore units. The supplier inspect the cable transit seal systems for compliance with the relevant approval certificates and product installation manuals, (types of cable transit seal systems, dimensions, fill ratio and insulation details, as applicable) , the results of which will be used by the surveyor as the basis for survey.

18.1.2 The requirements of this Chapter apply equally to manufacturers or shipyards when they are acting as Service Providers.

18.2 Personnel

18.2.1 The operator is to have at least 1 year of relevant training experience.

18.2.2 The supervisor is to have at least 2 years of working experience as an operator.

18.2.3 The training of personnel is to comply with the following requirements.

18.2.3.1 Training is to include:

(1) procedures and instructions for the inspection of the cable transit seal systems;

(2) common problems found with the initial installation and in-service inspections of cable transit seal systems;

(3) relevant rules and regulations, including international conventions;

(4) procedures for reporting on initial installation and in-service inspections of cable transit seal systems in the Cable Transit Seal Systems Register.

18.2.3.2 The education and training for the personnel are to include practical technical training on actual inspection using the cable transit seal systems for which the personnel are to be certified. The technical training is to include disassembly, reassembly and adjustment of the equipment. Classroom training is to be supplemented by field experience in the inspections for which certification is sought, under the supervision of an experienced senior certified person.

18.3 Equipment

18.3.1 Sufficient tools, and in particular any specialized tools specified in the equipment manufacturer’s instructions, including portable tools as needed for work to be carried out on board ship.

18.4 Documents

18.4.1 Manufacturer's servicing manuals, servicing bulletins, instructions and training manuals as appropriate.

18.4.2 Type Approval certificate showing any conditions that may be appropriate during the installation or maintenance of the cable transit seal system.

18.4.3 On completion of inspection, the Service Provider will issue a report confirming the condition of the Cable Transit Seal System. They will also record the results of their inspection in the Cable Transit Seal System Register.

18.4.4 The Cable Transit Seal System Register to include at least the following information:

(1) marking/identification system;

(2) documentation referencing manufacturer manual(s) for each type of cable transit installed;

(3) Type Approval certification for each type of transit system;

(4) applicable installation drawings;

(5) a recording of each installed transit documenting the as built condition after final inspection in the shipyard;

(6) sections to record any inspection, modification, repair and maintenance.

18.4.5 The Cable Transit Seal System Register is to be kept on board the ship or mobile offshore unit throughout the ship's or unit's life and be registered and maintained in accordance with UR Z28.

18.4.6 The supplier is to be qualified in these inspections for each make and type of equipment for which they provide the inspection, and provide manufacturers documentary evidence that they have been so authorized/technically supported or they are certified in accordance with an established system for training and authorization/technical support. Such qualification is to include, as a minimum: employment and documentation of personnel certified in accordance with a recognized national, international or industry standard as applicable, or an equipment manufacturer's established certification program. In either case, the inspection for each make and type of equipment is to be included.

At the time of initial certification and at each renewal of certification, the service provider is to provide documentation to verify personnel's satisfactory completion of a competency assessment using the equipment for which the personnel are certified.

18.4.7 In cases where an equipment manufacturer is no longer in business or no longer provides technical support, Service Providers may be authorized/technically supported for the equipment on the basis of prior authorization/technical support for the equipment and/or long term experience and demonstrated expertise as an authorized/technically supported service provider.

PART TWO TRAINING AND TEST ORGANIZATIONS

Chapter 1 Welder Test Committee

1.1 Application

1.1.1 This Chapter applies to the assessment of CCS Welder Test Committee.

1.2 Definitions and abbreviations

(1) Welder Test Committee: For the purposes of this Chapter, Welder Test Committee may be set up by the relevant factory/training organization independently or jointly, which is responsible for assisting CCS to organize welders and welding operators to carry out test and verification work, hereinafter referred to as "WTC".

(2) Welding operator means the person responsible for setting up and/or adjusting the parameters of fully mechanized and automatic welding equipment or systems, whether he operates the equipment or not.

(3) Welder Qualification Test System means the management software commonly used by CCS and the welder test committee, in which the assessment of Welder Test Committee and the welder test management are completed.

1.3 Assessment

1.3.1 WTC is to meet the following requirements:

(1) To be equipped with a special welding operation site meeting the requirements of the welder test. To be equipped with no less than 10 test stations, including at least two welding methods of shielded metal arc welding and gas shielded arc welding;

(2) To be provided with welding equipment (including matching electrode and flux drying equipment), specimen and sample processing equipment, measurement and testing equipment suitable for the test scope;

(3) Non-destructive testing, mechanical properties and machining are allowed to be outsourced, but a valid contract is to be provided;

(4) To have welding procedure specifications meeting the requirement of welder test;

(5) To have welder test rules and related management system.

1.3.2 WTC is to submit assessment application materials to CCS, including:

(1) Full name, detailed address, postal code, telephone/fax number of WTC;

(2) Type of welder test;

(3) Brief introduction of WTC;

(4) The list of the WTC personnel is to include the director, deputy director, welding engineer/technician, test personnel, administrator/user of "welder qualification test system" and other technical personnel, etc. The qualification and experience certificates of the main technical personnel of WTC are to be submitted.

(5) The specific requirements for the detailed list of the professional equipment used in the specific welder test and the qualification certificate of the equipment owned by WTC are as follows:

① Number, type, model, manufacturer and storage location of welding equipment and test equipment;

② Equipment maintenance and calibration provisions;

③ Equipment calibration records according to the specified calibration period and copy of calibration certificate;

(6) Management system or procedure of welder test;

(7) File management system or procedure of welder test;

(8) List of technical specifications, rules and standards used by the organization, including name, version, etc.

1.3.3 After satisfactory review of the documents, CCS is to conduct on-site review of the welder test committee applying for assessment, and fill in the "Check List of Assessment of Welder Test Committee".

1.3.4 After the assessment is satisfactory, CCS is to make a record in the Welder Qualification Test System.

1.4 Maintenance of Qualification

1.4.1 The assessment is valid for 3 years.

1.4.2 WTC is to submit the application for reassessment to CCS 6 months prior to the expiry date of assessment.

1.4.3 If CCS finds the following problems in the welder qualification test or verification process, the qualification of WTC is to be suspended and rectification is to be required until the requirements are met.

(1) There is a change in the composition of WTC, which does not meet the requirements;

(2) The welding equipment and experimental equipment is still used for welder test after defects

are found in it;

(3) Failure to organize welder test as specified;

(4) The welder test is conducted without prior notice to CCS;

(5) Chaotic site organization and management affects the normal welder test;

(6) The technical level at the time of initial assessment cannot be maintained;

(7) Failure to timely input information of welder or welding operator in "welder qualification certificate management system".

1.4.4 CCS will disqualify the WTC if it finds the following problems in the welder qualification test or verification process.

(1) During the period when the qualification of WTC is suspended and rectification is required, no preventive or corrective measures are taken after CCS's reminder;

(2) If serious defects have been found in the welding equipment and experimental equipment, the equipment is still used for welder test after CCS's reminder;

(3) Welders cheat in operating tests or verifications;

(4) Chaotic site management affects the normal welder test;

(5) There is evidence that the WTC personnel have conducted improper services or violated ethical standards (such as issuing false records and reports) and other serious errors;

(6) Untrue application information is provided to CCS;

(7) Other deliberate misconduct is identified;

(8) No related work has been done within 3 years after the completion of the assessment.

PART THREE PERSONNEL QUALIFICATION

Chapter 1 Qualification for Welders of Ships and Marine Products, Offshore Installations and Steel Structures above Water

1.1 Application

1.1.1 This Chapter applies to the approval of welder qualification of structures, machinery, boilers, pressure vessels and piping used in ships and offshore installations as specified in CCS Rules for Materials and Welding, the Guidelines for Inspection of Hull Welds (including the welding operator responsible for setting up and/or adjusting the parameters of fully mechanized and automatic welding equipment or systems (whether he/she operates the equipment or not)).

1.2 Definitions and abbreviations

1.2.1 Welding operator means the person responsible for setting up and/or adjusting the parameters of fully mechanized and automatic welding equipment or systems, whether he operates the equipment or not.

1.2.2 Welder Qualification Test System means the management software commonly used by CCS and the welder test committee, in which the assessment of Welder Test Committee and the welder test management are completed.

1.2.3 Welder Test Committee: Welder Test Committee may be set up by the relevant factory/training organization independently or jointly, which is responsible for assisting CCS to organize welders and welding operators to carry out approval test and verification work after such committee having passed CCS assessment, hereinafter referred to as "WTC".

1.3 Application

1.3.1 Applicants satisfying one of the following requirements may submit an application to WTC and take part in the tests upon approval:

(1) Holding a graduation certificate of welder training of a technical school and being engaged in welding work;

(2) Being capable of welding independently with adequate skill and being engaged in welding work;

(3) Having been trained in basic knowledge and operational skill.

1.4 Test

1.4.1 Welders and welding operators applying for the CCS welder certificate for the first time must take a test of operation skills. On the test day, the surveyor is to go to the site to supervise the

welder and welding operator skills test and confirm the "welder test site record". After the test, the surveyor is to check the mechanical property test specimen or the radiographic testing negative of welder test to evaluate the conformity of the results.

1.4.2 The welding operator responsible for setting up and/or adjusting the parameters of fully mechanized and automatic welding equipment or systems (whether he operates the equipment or not) is not to apply for the operation skill test until he has passed a theoretical test related to the welding equipment or systems used for the test. WTC/factory is to be responsible for the theory test (including test paper composition), and the test results are to be submitted to CCS. The test method specified in Section 3, Chapter 3 of the CCS Guidelines for Inspection of Hull Welds is to be adopted for the operational test for the welding operators of automatic submerged arc welding. The operational test of other welding operators is to refer to the test method of the automatic submerged arc welding and is to be conducted after the approval of CCS. The welding operator who has successfully completed the welding procedure approval test may also be deemed to have passed the corresponding welding condition test.

1.5 Second test and retest

1.5.1 When a welder fails to pass all test items, the following is to apply:

1.5.1.1 In cases where the welder fails to meet the requirements in part of the tests, a retest may be welded immediately, consisting of another test assembly of each type of welded joint and position that the welder failed. In this case, the test is to be done for duplicate test specimens of each failed test. All retest results are to meet all of the specified requirements.

1.5.1.2 In cases where the welder fails to meet the requirements in all parts of the required tests or in the retest, the welder is to undertake further training and practice before reapplying for the tests.

1.5.2 When there is specific reason to question the welder’s ability or the period of effectiveness has lapsed, the welder is to be re-qualified in accordance with the tests.

1.5.3 Where any test specimen does not comply with dimensional specifications due to poor machining, a replacement test assembly is to be welded and tested.

1.6 Certification

1.6.1 After the test， WTC is to faithfully fill in welder’s test information in the “Welder Qualification Certificate Management System” and submit electronic documents and written

materials to CCS to apply for Welder Qualification Certificate. The following information is to be provided when submitting application:

a. Application for Qualification Test

b. Field Record of Qualification Tests of Welders

c. Sum-up List of Scores of Qualification Tests of Welders

d. Specimen Measurement or Test Record

1.6.2 For the qualified welder, the welder's chest card is to be made and issued to the welder according to the requirements by the WTC/factory. Following information is to be included in the chest card: name, gender, welder qualification category (e.g., S for ship and offshore installations or B for marine boilers and pressure vessels), certificate number, application, term of validity, parent material, etc.

1.7 Maintenance of Qualification

1.7.1 Period of validity

1.7.1.1 Normally the validity of the welder or welding operator's approval begins from the issue date of qualification certificate when all the required inspections/tests are satisfactorily completed in the first welder test.

1.7.2 Maintenance of Qualification

1.7.2.1 The certificate is to be signed at six-month intervals by the shipyards/manufacturers personnel who is responsible for production weld quality (such as the person in charge of quality control department) provided that all the following conditions are fulfilled:

(1) The welder is to be engaged with reasonable continuity on welding work within the current range of approval. An interruption for a period no longer than six months is permitted.

(2) No major quality accidents occurred during the period of validity.

1.7.2.2 If any of these conditions is not fulfilled, the shipyards/manufacturers are to notify CCS in writing and CCS is to cancel the welder's certificate and file the relevant data.

1.7.3 Renewal of certificate

1.7.3.1 Except that the qualification certificate of welders engaged in tack welding is valid for long term, the qualification of the welder is to be periodically verified by one of the following methods:

(1) The welder is to be tested every 3 years: During the last 6 months of the validity period of the

certificate, the welder is to take a practice test. After the welder passes the test, a new welder qualification certificate is to be issued, valid from the date of issuing the new certificate.

(2) The qualification is to be verified every 2 years: During the last 6 months of the validity period of the certificate, two welds (welds to be welded on ships or marine products with at least 200 mm length per weld and 2 welds for each welding method) made by the welder are to be tested by radiographic or ultrasonic testing or destructive testing and are to be recorded. The weld tested is to reproduce the initial test conditions except for the thickness. After the verification, a new welder qualification certificate is to be issued, and the tests revalidate the welder's qualifications for an additional 2 years. The certificate can be verified and renewed every 2 years in this way.

(3) Verification no longer than 3 years: subject to 1.7.2.1, the frequency of verification by CCS is to be no longer than 3 years and is to be agreed between CCS and the shipyards/manufacturers.

a) The welder is working for the same shipyard/manufacturer which is responsible for the qualification of the welder.

b) CCS is to verify that the welder quality management system of the shipyard/manufacturer includes as minimum:

- A designated person responsible for the coordination of the welder quality management system.
- List of welders and welding supervisors in shipyard/manufacturer
- Qualification certificate of welders and description of the associated management system
- Training requirements for welder qualification programme
- Identification system for welders and WPS used on welds
- Monitoring procedure (welds examination records).

The shipyards/manufacturers have to document at least once a year that the welder has met the requirement of the welder certificate, and such documents are to be agreed by CCS.

1.7.3.2 The qualification of the welding operator is to be periodically verified by one of the following methods

(1) The skill test is to be conducted every 6 years: During the last 6 months of the validity period of the certificate, the welding operator is to take a practice test. After the welding operator passes the test, a new welding operator qualification certificate is to be issued, valid from the date of issuing the new certificate. If bending test is used, the number of samples is to be reduced by half.

(2) The qualification is to be verified every 3 years: During the last 6 months of the validity period of the certificate, two welds (welds to be welded on ships or marine products with at least 500 mm length per weld and 2 welds for each welding method) made by the welding operator are to be tested by radiographic or ultrasonic testing or destructive testing and are to be recorded. The weld tested is to reproduce the initial test conditions except for the thickness. After the verification, a new welding operator qualification certificate is to be issued, and the tests revalidate the welding operator's qualifications for an additional 3 years. The certificate can be verified and renewed every 3 years in this way.

1.7.3.3 For the verification of 1.7.3.1 and 1.7.3.2 above, the WTC/factory is to submit a written application for verification to CCS 6 months prior to the expiration of the welder/welder operator certificate with a detailed plan: time, place, the number of personnel to be verified, welding method, welding position, inspection methods, welding material (test plates, products), welding joint type. A new welder/welding operator certificate is to be issued to extend the validity period after CCS on-site supervision and satisfactory verification.