GUIDANCE NOTES

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CHINA CLASSIFICATION SOCIETY

GUIDELINES FOR MANAGEMENT OF APPROVAL OF SERVICE SUPPLIERS AND PERSONNEL QUALIFICATION

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PREFACE

1 These Guidelines specify principles to be followed during the certification or assessment of capability of service suppliers (hereinafter referred to as "suppliers")/personnel providing servicing and testing services to ships and offshore installations surveyed by China Classification Society (hereinafter referred to as "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, capability certification of external personnel.

2.1 Part One applies to approval of firms providing service to ships 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 capability certification 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

1.1.1 PART ONE applies to suppliers of the following categories:

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

Items: thickness measurements of hulls of CCS-classed ships engaged on international voyages; thickness measurement of hulls of CCS-classed ships engaged on domestic voyages; thickness measurements of metal structures of CCS-classed offshore units above water; thickness measurements of hulls of non CCS-classed Chinese ships engaged on domestic voyages; thickness measurements of metal structures of non CCS-classed offshore units above water; 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 two methods, i.e.: diver, 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, 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[1], heptafluoropropane and aerosol fixed firefighting systems (B);

[1] Servicing and testing service of halohydrocarbon firefighting systems fitted in existing ships.

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 and 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)[2];

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

Items: liferafts; hydrostatic release units; marine evacuation systems; inflatable lifejackets; immersion suits; hydraulic testing and filling of CO_2 cylinders for liferafts[3].

(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

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[2] The supplier is only engaged in the inspection and maintenance of fire-fighting equipment and systems, and does not carry out the maintenance and overhaul services of inflatable liferafts, inflatable lifejackets, immersion suits, hydrostatic release units and marine evacuation system. However, when the inspection and maintenance services of inflatable lifejackets and immersion suits is intended to carry out, the approval may be applied in the category of suppliers engaged in inspection and maintenance of fire-fighting equipment and systems.

[3] In addition to providing services for maintenance and overhaul of inflatable liferafts, inflatable lifejackets, immersion suits, hydrostatic release units and marine evacuation system, the supplier dose not carry out the inspection and maintenance service category of fire-fighting equipment and systems. However, when the service of hydrostatic testing and filling of CO_2 cylinders for liferafts is intended to provide, the approval may be applied in the category of suppliers engaged in maintenance and overhaul of inflatable liferafts, inflatable lifejackets, immersion suits, hydrostatic release units and marine evacuation system.

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), all rescue boats (including inflatable 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), automatic ultrasonic testing (AUT), 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[4] and/or condition-based maintenance[5].

(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) for the structure of ships and offshore units

Items: Close-up Survey of ship structure and offshore unit structure by remote inspection techniques; in-water close-up survey of the internal compartments by Remotely Operated Vehicle (ROV); thickness measurement and/or NDT using RIT for metal structures of ships and offshore units above water, etc.

(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 Watertight Systems inspection on ships and mobile offshore units (CTS)

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[4] Assistant decision-making: refer to Appendix 22, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships and 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.

[5] Condition-based maintenance: refer to Appendix 22, Chapter 5, PART ONE of CCS Rules for Classification of Sea-going Steel Ships and 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.

Items: inspection of Cable Transit Watertight Systems on ships and mobile offshore units.

(18) Suppliers engaged in conditioning testing of Ballast Water Management Systems (BWMSs) (BW)

Items: conditioning testing of BWMS, including indicative analysis, detailed analysis and sample counting.

(19) Suppliers engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service (BBT)

Items: global vacuum test, acoustic emission test, thermal imaging test.

1.1.2 This guidelines provides the specific implementation requirements for supplier approval management according to the CCS Rules for Classification of Sea-going Steel Ships, the Management Methods of Ship Servicing and Testing Services and Technical Conditions of Organizations Performing Ship Servicing and Testing Services issued by the Maritime Safety Administration of P.R.China. At meanwhile, it formulates the specific implementation requirements for supplier approval management in other categories based on the development of new technologies and the needs of the industry. For non mandatory supplier approval categories, the supplier organizations can voluntarily apply for CCS approval, and the specific categories are shown in the following table:

Category	Approval basis[6]	Approval requirements
Suppliers engaged in thickness measurement of ships and metal	Rules for Classification of Sea-going Steel Ships,	Mandatory

[6] The Management Methods of Ship Servicing and Testing Services and Technical Conditions of Organizations Performing Ship Servicing and Testing Services in the approval basis are only applicable to the supplier approval within Chinese territory (excluding Hong Kong, Macao, and Taiwan).

structures on offshore units above water	Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	
Supplies carrying out an in-water survey on ships and offshore units	Rules for Classification of Sea-going Steel Ships	Mandatory
Suppliers engaged in inspection and maintenance of fire-fighting equipment and systems on ships (including inspection and maintenance of self-contained breathing equipment)	Rules for Classification of Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory
Suppliers engaged in servicing inflatable liferafts, inflatable lifejackets, immersion suits, hydrostatic release units, inflatable rescue boats and marine evacuation systems	Rules for Classification of Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory
Suppliers engaged in inspection and testing of radio communication equipment, AIS inspection, performance testing and maintenance of automatic identification system, SSAS inspection, performance testing and maintenance of security	Rules for Classification of Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory

alarm system		
Suppliers engaged in annual performance testing of voyage data recorders (VDR) and simplified voyage data recorders (S-VDR)	Rules for Classification of Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory
Suppliers engaged in shore-based maintenance of ship GMDSS equipment	Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory
Suppliers engaged in the servicing and maintenance of lifeboats/rescue boats, boat/raft launching appliances and boat/raft release gear	Rules for Classification of Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory
Suppliers engaged in non-destructive testing for ships, marine products and metal structures of offshore units above water	Rules for Classification of Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	Mandatory
Suppliers engaged in measurement	Rules for Classification of	Mandatory

of shipboard noise, underwater radiated noise and shipboard vibration	Sea-going Steel Ships, Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services	
Suppliers engaged in tank test of energy efficiency design index (EEDI) of ships	Guidelines for Verification of Ship Energy Efficiency Design Index (EEDI)	Voluntary
Suppliers engaged in sea trail speed measurement of ships	Guidelines for Verification of Ship Energy Efficiency Design Index (EEDI)	Voluntary
Suppliers engaged in condition monitoring of machinery installations[7]	Rules for Classification of Sea-going Steel Ships, Rules for Intelligent Ships	Voluntary
Suppliers engaged in lubricating oil analysis of propeller shafts, diesel engines and condition monitoring of machinery installations[8]	Rules for Classification of Sea-going Steel Ships, Rules for Intelligent Ships	Voluntary
Suppliers engaged in survey using remote inspection techniques (RIT) for the structure of ships and offshore units	Rules for Classification of Sea-going Steel Ships	Mandatory
Supplies engaged in tightness testing of closing appliances with ultrasonic equipment	Rules for Classification of Sea-going Steel Ships	Mandatory

[7] Ships assigned with the class notation of PMS are to be serviced by the suppliers approved by CCS.

[8] Ships assigned with the class notation of SCM are to be serviced by the suppliers approved by CCS.

Supplies engaged in watertight cable transit seal systems inspection on ships and mobile offshore units	Rules for Classification of Sea-going Steel Ships	Mandatory
Suppliers engaged in commissioning testing for ballast water management system (BWMS)	Rules for Classification of Sea-going Steel Ships	Mandatory
Suppliers engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service	Rules for Classification of Sea-going Steel Ships, Rules for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk	Mandatory

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[9] 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: An individual or company, performing official duties entrusted by the manufacturer or approved/recognized supplier, or on behalf of the manufacturer or approved/recognized supplier.

[9] Refer to individual businesses within Chinese territory (excluding Hong Kong, Macao and Taiwan).

(4) Subsidiary[10]: A company partly or wholly owned by a Manufacturer or approved/recognized supplier. "Subsidiary" means a company carrying 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 site and equipment for servicing and testing, and to employ fixed-term staff. A subsidiary of a supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) 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.

(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: applying to CCS for supplier approval for the first time, or intending to add a new supplier category approval when CCS supplier approval qualification has been obtained.

(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 renews the certificate and endorses the new approval certificate in the endorsement column of additional audit.

(9) Operator: personnel of the supplier who carries out the servicing and testing 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 be trained, certified and qualified as required

[10] 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.

for relevant category service, 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 internship[11]. Where it is not possible to perform internal internship, a program of external internship and the experience may be considered as acceptable.

(10) Supervisor[12]: personnel of the supplier who supervises all services provided. Supervisors are to have at least two years of working experience as an operator[13] 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 (For suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan, in the same actual service process, the supervisor is to perform only one of the jobs; for suppliers from Hong Kong, Macao and Taiwan and outside the Chinese territory, the supervisor is to comply with the requirements for supervisors).

(11) Technical director: for the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan), including the subsidiaries, the supplier is to appoint a technical director according to the provisions of the Administration to guide, supervise and manage the service quality and safety of the supplier, and issue servicing and testing certificates required by the Administration. Refer to other chapters and sections of these Guidelines for the detailed requirements.

The technical director is to have working experience as a supervisor[14] and is to work

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[11] The working experience of the manufacturer employees in the manufacture and inspection of relevant category of equipment is to be regarded as the internship experience in servicing and testing.

[12] 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.

[13] The working experience of the operator is counted from the date when the employment document of the supplier becomes effective. If the supplier claims that the person has performed the work of an operator in another supplier, it needs to submit to CCS evidence that has been approved, verified, recognized, or accepted, adopted by the Administration of the flag State or its recognized survey organization, impartiality organization or the unit under inspection. The experience of the manufacturer employees in the manufacture and inspection of relevant category of equipment is to be regarded as the working experience in servicing and testing.

[14] The working experience of the supervisor is counted from the date when the employment document of the

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 actual service process, the supervisor is to perform only one of the jobs).

(12) Servicing and testing personnel: the general term for operators, supervisors and technical directors above, where applicable.

(13) Workplace: a place set up by the supplier for office, servicing and testing operations, storage, and other functions to provide servicing and testing services accepted by CCS.

(14) 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 of these Guidelines in accordance with service category, in addition to Chapter 1 General of these Guidelines.

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 by CCS in accordance with the requirements of the Guidelines, the services provided and the records, reports or certificates issued can only be accepted by CCS after the services are performed by servicing and testing personnel within the approval scope using the approved equipment in the approved servicing and testing site (where applicable) according to regulations of the Administration, international conventions, CCS rules and guidelines, 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

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supplier becomes effective. If the supplier claims that the person has performed the work of a supervisor in another supplier and has 6 months or more working experience, it needs to submit to CCS evidence that has been approved, verified, recognized or accepted, adopted by the Administration of the flag State or its recognized survey organization, impartiality organization or the unit under inspection. The experience of the manufacturer employees in the manufacture and inspection of relevant category of equipment is to be regarded as the working experience in servicing and testing.

and economic liabilities, and the supplier has the obligation to keep the information of the unit under inspection confidential.

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. Prior to the application, the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) is to be a legal person or obtain individual business licence (with a unified social credit code). 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 obtain 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 commitment/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 have fixed-term servicing and testing personnel who can only work for one supplier during one period. The supplier is responsible for training of these personnel so that they can have, maintain and continuously raise the professional knowledge level and practical operation capability for carrying out the service. If the supplier has subsidiaries, its servicing and testing personnel can only work in one of the subsidiaries during one period. The supplier cannot meet the human resource requirements of the Guidelines in the form of loaning, temporary hiring, etc. servicing and testing personnel (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).

Within Chinese territory (excluding Hong Kong, Macao and Taiwan), in addition to sign a fixed-term employment contract conforming to national laws and regulations with the servicing and testing personnel, the suppliers are to provide records of paying

social insurance[15], or provide documents such as proof of personal income tax payment as evidence of fixed employment for employees.

Within Chinese territory (excluding Hong Kong, Macao and Taiwan), the suppliers are to take necessary safety precautions to ensure the personal safety of the servicing and testing personnel according to the laws and regulations, and provide employees with compensation insurance in case of accidental injury.

In Hong Kong, Macao, Taiwan and the areas outside Chinese territory, the supplier is to provide CCS auditors with document of proof or statement of employment in accordance with local laws.

1.3.7 The supplier is to comply with the following requirements as a minimum and be equipped with work place and working environment meeting the requirements of each chapter of PART ONE of the Guidelines.

(1) The work place is for the sole use of the supplier, and two or more suppliers or organizations are not allowed to share the same site;

(2) If the supplier is engaged in two or more categories of services at the same time, the requirements of different categories of service sites are to be met, and the servicing and testing operations in permanent sites are not to interfere with each other, resulting in adverse effects on service quality and safety;

(3) The supplier services of categories (3), (4), (5)[16],(7), (9)[17], (11), (13), (14), (18)[18] in 1.1 of this Chapter are to be carried out in the permanent servicing and testing site.

1.3.8 The supplier is to be equipped with the equipment, facilities, tools and

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[15] If social security for servicing and testing personnel is not paid by the supplier, the supplier is to explain the compliance status. For example, servicing and testing personnel from branches or subsidiaries are allowed to sign employment contracts with the Headquarters of company or superior units/companies by which pay social insurance and commercial insurance for them. For another instance, it is allowed for servicing and testing personnel to sign employment contracts with qualified labor dispatching companies, by which pay personnel social security, and the supplier signs a long-term agreement with the labor dispatching company to employ the above-mentioned servicing and testing personnel.

[16] Translation: "Including shore-based maintenance of Emergency Position Indicating Radio Beacons (EPIRBs)."

[17] Such as containing radioactive testing (RT).

[18] Only refer to category A supplier.

instruments and is to ensure that these equipment, facilities, tools and instruments are readily available at any time. CCS does not accept supplier sharing and leasing equipment of other institution or individual to meet the equipment requirements of the Guidelines (unless specifically required in other chapters and sections of PART ONE of the Guidelines).

1.3.9 The supplier is to establish a documented Quality system complying with the most current version of ISO 9000 series; if the supplier has agents or subsidiaries, the supplier's quality management system is to include all agents or subsidiaries and obtain a third-party quality management system certificate. If there are special requirements for quality management system certification in other chapters and sections of PART ONE of the Guidelines, such requirements are to be complied with.

If the agent or subsidiary has established an independent quality management system, the supplier is to demonstrate its complete quality control capability over the agent or subsidiary.

If the supplier has already established non ISO 90000 series quality management system or has already obtained other system certificates, they 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 has agents or subsidiaries, the workplace, working environment, servicing and testing personnel and equipment of the subsidiaries are also to meet the requirements of 1.3.6-1.3.8.

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 servicing and testing 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 testing personnel.

1.3.12 Servicing and testing 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 within Chinese territory, excluding Hong Kong, Macro and Taiwan) of the servicing and testing operations required by other chapters and sections of PART ONE of these Guidelines are to be properly stored at least 5 years in accordance with the provisions.

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

1.4 Application for supplier approval and service registration after approval

1.4.1 Application

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

(1) Login to website https://www.ccs-service.net/loginNew.jsp, after entering the "Online Customer Service Center", log in (or seek guidance from CCS and register first);

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

"Online Service" → "Client Service System" to enter the login page (or seek guidance from CCS and register first).

1.4.1.2 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 official website "Information Center" → "Application Forms Download" – "Approval Application by Service Supplier" 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.

1.4.2 Service registration after approval

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

1.4.3 Data maintenance

The supplier is to maintain the registration data in the system through CCS online customer service center in a timely manner to ensure that the supplier information and contact information are correct and valid.

1.5 Initial approval

1.5.1 The following items are to be completed and selected for initial approval application (applicants of Hong Kong, Macro, Taiwan and outside Chinese territory may complete the followings in English), and attention is to be paid that the following (1) to (3) are to be consistent with the registration information:

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

(2) registration address, business/office premise address of the applicant, in Chinese and English;

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

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

(5) Chinese and English name, address and service items[19] of the subsidiaries intended to be applied for approval;

[19] Including the level of subsidiaries, such as the grades of thickness measurement, service of inflatable life-saving appliances.

(6) the approval certificate mode (electronic certificate is selected by default);

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

(8) the manufacturer's technical support documents[20] (when the service category is applicable, it includes name of the manufacturer, models, etc. to which technical support is available).

1.5.2 The electronic documents submitted to CCS systems are to be uploaded or paper documents are to be submitted to CCS together with initial approval application:

(1) brief introduction of the supplier, briefly explaining company name, registration/operation/office/servicing and testing address[21], contact person and contact information, service business scope, organizational and management organizations (including the subsidiaries to be approved/certified), company's brief history in carrying out relevant services and certification (if any), etc.);

(2) legitimate and valid business license/registration certificate, legal person authorization document[22] (where applicable);

(3) service experience (table) of the supplier in the category intended for approval (where applicable[23]);

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

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

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[20] Any other requirements of the Administration within Chinese territory (excluding Hong Kong, Macao, and Taiwan) are to be followed.

[21] Where the operation/servicing and testing address is not same as the registration address, reasons are to be given.

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

[23] It refers to the service experiences accepted by the Administration of the Flag State or its recognized survey organization, or unit under inspection.

(6) permanent service operation site floor plan (including auxiliary sites such as service operation sites, storage rooms; for permanent working site of the service category with area and height requirements, plane dimension, area and height of the space are to be marked);

(7) information of servicing and testing personnel, including list of servicing and testing personnel (showing name, gender, job position, ID number), servicing and testing personnel level approval/training certificates, documents showing personnel training experience, personal experience in relevant service categories and posts, labor contract and necessary evidence. For that requirement, suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to provide records of paying social security/personal tax record commercial insurance for accidental injury; suppliers in Hong Kong, Macro, Taiwan or outside Chinese territory are to abide by local laws and submit proof or statement of hiring the employee lawfully;

(8) list of equipment, facilities, tools and instruments required by the service, the content of which includes name, model and type of the equipment, the time when the equipment is first put to service, and the validity of verification/calibration[24], (where applicable) and equipment operating guidance;

(9) list of nominated agents, subsidiaries and subcontractors (the registration address, business address/servicing and testing address, servicing and testing personnel, service item/scope, etc. are to be specified, where applicable);

(10) When required by the service category, the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) is to submit the manufacturer's technical supporting documents, including: personnel training certificate[25], servicing/maintenance manual list, special servicing tools list (where applicable) and list of raw materials/parts/spare parts provided or designated by the manufacturer, etc.

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[24] For the testing equipment with metering function (including newly purchased equipment), it is to be sent to the national statutory or authorized metrological technical institutions for verification/calibration on a regular basis and kept within the validity period.

[25] Any other requirements of the Administration are to be followed.

The supplier in Hong Kong, Macao, Taiwan and outside Chinese territory is at least to submit manufacturer's certification, licensing document and the manufacturer's certificate of training of servicing and testing personnel, etc;

(11) Photographs of the operation site, including the workplace, permanent servicing and testing premises and the servicing and testing facilities and equipment installed on the site, as well as the other auxiliary locations, where applicable.

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) organization chart (including subsidiaries to be approved);

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

(3) list of technical standards applicable to the service scope (the current valid edition);

(4) list of qualified suppliers[26] and relevant documents (for suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), qualification 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 in Hong Kong, Macao, Taiwan and outside Chinese territory, 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);

(5) training procedures, annual training plan (internal and external) for servicing and testing personnel;

(6) Evidence documents indicating that servicing and testing personnel understand and accept the employee code of conduct established by the supplier;

[26] Refers to the scenario that when the supplier provides servicing and testing 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 prepare a list of qualified suppliers, and the supplier can only choose the external supplier from the list of qualified suppliers to buy the above purchased products.

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

(8) the latest system audit report, records of non-conformities and implementation documents of corrective measures (applicable to suppliers of which the quality management system has been certified), quality manual, internal audit report of effective operation of supplier's quality management system and management review report (applicable to suppliers not certified);

(9) safety management documents (including contingency plans, etc.), including communication with the crew/customers prior to commencing work, so that it is safe to shut down the equipment onboard the ship being maintained, and to provide a safe environment for work;

(10) information on the other activities which may present a conflict of interest, such as service independence and impartiality statement of the supplier, where applicable;

(11) relevant systems of customer complaint and corrective actions.

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. administrative license and safety license of the Administration, plane size, area and height of the permanent servicing and testing site, personnel employment, training and experience, essential equipment, quality management system, etc.). The evaluation includes document evaluation and/or site evaluation. The evaluation results will determine whether to process the application. 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 CCS not accepting the application and the supplier's failure in evaluation in written form

For applicants holding approval certificates of other classification societies that have undergone compliance verification under QSCS Annex 1, Section 5, and having relatively good performance, or applicants previously providing service to

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 liability retention detention after service, the site evaluation 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) Personnel training and verification requirements: The supplier is responsible for the training of its servicing and testing personnel so that they conform to a recognized national, international or industrial standard as applicable. Where such standards do not exist, the supplier is to define standards for the training and level/capability of its servicing and testing personnel relevant to the functions each is authorized to perform. The servicing and testing personnel are to have adequate experience and be familiar with the operation of any necessary equipment. The servicing and testing personnel of the supplier are to have training/qualification certificates issued or accepted by CCS and their expertise level and practical operation capability are to be verified by CCS.

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

(4) Personnel records: The supplier is to keep records of its servicing and testing personnel. 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 verification. The auditors are to assess and record the validity of previous measuring results when the equipment is found not to conform to requirements, and take appropriate action on the equipment affected, such as measures to prevent the re-use of the non-conforming instruments and equipment, re-verification/calibration of the testing equipment, and judgment of whether the previous measurement results are to 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 programs) 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 prepare work procedure documents covering all services intended to be applied for approval.

(8) Subcontracting: For suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), according to the provisions of the Administration, for 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, control plan for the subcontractor and relevant records. For suppliers in Hong

Kong, Macao, Taiwan and outside Chinese territory, unless specifically required by the local Administration, CCS permits the suppliers to subcontract some items of their service within their approval scope according to the provisions of relevant regulations of IACS UR Z17. 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 service 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 by the supplier after each service for CCS acceptance is to include necessary supporting documents of the supplier, e.g. electronic certificate (including attached pages) or copy of the paper approval certificate (including attached pages), etc. Suppliers in Hong Kong, Macao, Taiwan and outside Chinese territory are to provide manufacturer's certification/licensing according to requirements of different service categories, relevant conventions, requirements of the government of the flag State.

(11) Instructions/procedures/operation guidelines/techniques, etc. of the supplier documents 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 and/or its agents, its documented system is to be

established 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 programs for servicing and testing personnel;

④ supervision and verification to ensure compliance with operational procedures;

⑤ recording and reporting of information;

⑥ quality management of 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 is to be certified. The system is to include effective control of agents and/or subsidiaries of the manufacturer (and/or its service provider). The designated agents and/or subsidiaries are also to 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 satisfactory 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.

If a supplier applies for inclusion of its agents and/or subsidiaries in the approval, the application material is to include the necessary information of the agents and/or subsidiaries. If the agents and/or 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 agents and/or 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 testing 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 agents and/or subsidiary in the initial approval, the agents and/or subsidiary is to be audited on site in addition to the supplier’s head office. The selection principles of on-site audit are as follows:

(1) suppliers with 2 agents and/or subsidiaries or less

On-site audit is to be conducted for each agent and/or subsidiary to confirm that the quality management system implemented by the supplier’s head office is well implemented in the agents and/or subsidiaries, that the servicing and testing personnel, equipment, site, technical documents of the agents and/or subsidiaries conform to the requirements, that the subsidiaries are capable of servicing and testing service in the applied items, and that the service quality is guaranteed.

(2) suppliers with 3 agents and/or subsidiaries or more

Initial approval and renewal audit may be conducted by means of sampling. Sampling not less than two agents and/or 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 agents and/or subsidiaries, on-site audit is to be carried out for each agent and/or subsidiary in principle.

(3) For agents and/or subsidiaries with an independent and certified quality management system, on-site audit is to be carried out separately.

(4) If any agent and/or subsidiary is not in the jurisdiction of the audit implementation unit, the unit of the auditor may entrust the CCS unit in the jurisdiction of the agent and/or subsidiary to conduct the on-site audit of the subsidiary.

The agent and/or subsidiary (including the registration address, servicing and testing site (where applicable), approved service scope, and verified servicing and testing personnel) is included in the approval certificate after the audit is found satisfactory.

1.5.5.3 Practical operation verification

The applicant is to demonstrate its mastering of regulations/conventions /rules/standards, actual operational capability and ability to objectively record data results and correctly 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 service items within the proposed scope of approval.

CCS approval and certification for suppliers is based on the actual operation of the specific service categories provided by the suppliers and the satisfaction degree with the practical operation report. In the process of initial approval, if the supplier has obtained approval certificates from other societies that have undergone compliance verification under QSCS[27] Annex 1, Section 5 and is able to provide practical verification reports signed by the surveyors to the societies, and has been verified by CCS auditor to meet the practical verification requirements of this guidelines through document review, it can be considered that the supplier's practical verification results are satisfactory. If all or part of practical operation verification is not completed during the on-site audit due to the applicant, CCS will endorse a memorandum on the approval certificate, and the applicant is to apply to CCS for additional audit of practical operation verification when providing the first relevant service or before providing the first relevant service, to complete all or part of practical operation items specified in the memorandum. In general, practical operation verification memos in

[27] QSCS: Quality System Certification Scheme.

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 renewed for the applicant;

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

The applicant is to apply for additional audit from the approval audit implementing unit, the supplier's practical process is witnessed by the CCS unit within the jurisdiction of which covers the operation verification location.If the CCS unit witnessing the practical verification is satisfied with the results, the relevant report or record is to be endorsed. The approval audit implementing unit is to verify the practical verification report or record, eliminate the memos after satisfactory completion, and renew certificate for the applicant.

1.6 Approval certificate

1.6.1 Upon satisfactory completion of the approval audit, CCS will issue a Certificate of Approval for Service Supplier[28] to prove that the supplier's technical conditions comply with CCS requirements and that the results of services performed after approval may be accepted and utilized by CCS Surveyors as evidence in issuing classification or statutory certificates. The Certificate is to clearly state the the supplier's name, address[29], category and items of services, servicing and testing personnel, manufacturer's technical support (if applicable), any limitations or restrictions imposed and remarks. The approved suppliers will be published in "List

[28] The mode of the Certificate of Approval for Service Supplier includes paper certificate and electronic certificate.

[29] Where the registration address and office/servicing and testing address of the supplier are different, both addresses are to be listed in the Certificate of Approval for Service Supplier.

of Approved Suppliers" under "Approval of Suppliers" column at CCS official website.

1.6.2 Content that fails to pass the audit in the process of approval cannot be included in the scope of approval[30].

1.6.3 The Certificate is valid for up to three (3) years. During this period, the supplier is to ensure that valid technical support or certification/licensing (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 certification/licensing (if applicable) within the scope of the approval, the supplier is to apply for additional audit to CCS to change certificate contents.

1.7 Maintenance of approval

1.7.1 Suppliers approved by CCS is to maintain their basic contents in accordance with the requirements of this Guidelines and carry out servicing and testing in accordance with the requirements of this guidelines.

1.7.2 Suppliers are to register this service in the CCS supplier system before the service is provided, so that CCS can timely master the supplier's service dynamics. For supplier services that are synchronized with CCS ship surveys, CCS surveyors are to monitor the supplier's services on site and evaluate their services.

1.7.3 Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) approved by CCS are to maintain their basic contents of approval in accordance with the requirements of the Management Methods of Ship Servicing and Testing Services, Technical Conditions of Organizations Performing Ship Servicing and Testing Services issued by the Maritime Safety Administration of P.R.China, carry out servicing and testing, and fulfill the on-site technical condition monitoring and activity supervision implemented by CCS.

1.7.4 Based on the service performance of the suppliers, CCS is to implement

[30] Including subsidiary, service scope, personnel, manufacturer's technical support (if applicable), etc.

supervision and management to the suppliers in various extents.

1.8 Renewal audit

1.8.1 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 audit (such as business licence information, work site, essential equipment, personnel, qualified suppliers, applicable service standards, quality management system, etc., if any);

(2) business license/registration certificate and legal person authorization letter (when applicable);

(3) service experience (table) since the initial approval or the last renewal audit;

(4) evidence of the effective operation of the quality management system, including the supplier's system document directory and system documents related to changes. For the supplier with certified system, quality management system certification certificate and the latest system audit report are to be submitted. For the supplier without certified systems, internal audit report and management review report for the last year;

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

(6) personnel information files after the change, including personnel list, relevant information of new personnel or personnel position changes (if any), etc.;

(7) list of servicing and testing equipment, facilities tools and verification/calibration ledger for measuring and testing equipment[31], including updated equipment (if any), verification and effectiveness of testing equipment with metering function, etc.;

(8) the latest annual training plans (including training plans involving change documents);

(9) qualified supplier information documents (when applicable for service categories),

[31] Only the verification/calibration ledger for measuring and testing equipment may be submitted, if no changes.

including the valid list of qualified suppliers, new added qualification documents of qualified supplier and the subcontracting agreement after the change, etc. (if any);

(10) summary and analysis of customer quality feedback;

(11) If the workplace, major equipment and facilities have been changed, the photos after change are to be submitted.

1.8.2 At the renewal audit, CCS will confirm whether the technical conditions of the supplier still comply with the requirements of CCS Guidelines, whether the changes stated are real, the effectiveness of corrective measures for non-conformities in the last audit and verify whether the relevant provisions of the servicing and testing service file have been implemented according to the requirements of 1.5.5.1 document review and 1.5.5.2 on-site audit.

1.8.3 At the renewal audit, in case of the following cases:

(1) the approved supplier applies for new approval scope or item;

(2), the previous service quality has some issues;

(3) The supplier has no service experience within the scope of approval since the last audit;

(4) The supplier, which needs to provide services at a permanent servicing and testing site, has changed the servicing and testing site;

Practical operation verification is to be proceed in conjunction with renewal audit by CCS. For case (1), practical operation verification may only be required for the newly added approval items; for case (4), practical operation verification may only be required for approval items carried out at the permanent servicing and testing site.

If practical operation verification of all or part of items is impractical prior to the issuance of the certificate, it is to be handled according to 1.5.5.3.

For suppliers in categories 1.1.1 (3) and (4), practical operation verification of renewal audits is to be carried out in accordance with the specific requirements of the relevant sections.

In addition to the above cases, CCS can check the service files or service videos

(when applicable for service categories), or if the supplier's services have been accepted by a society that has undergone compliance verification in accordance with QSCS Annex 1, Section 5 since the last audit and can provide relevant documentary evidence, and CCS supplier auditors confirm that these services meet the requirements of this Guideline through document review, then the practical operation verification results can be deemed satisfactory, confirming that the supplier maintains a service level and capability that meets the requirements.

1.8.4 For approved suppliers, renewal audit is 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.

1.8.5 The certificate becomes invalid if the renewal audit has been applied for but is not completed before the expiry date of the certificate. Prior to the new approval certificate is obtained, the supplier cannot perform servicing and testing services intended to be 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 1.8.6.

1.8.6 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 required for the initial approval. 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.

1.8.7 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.

1.9 Additional audit

1.9.1 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 last audit;

(2) if the approved supplier is changed as that mentioned in 1.10.1;

(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 thickness measurement supplier is withdrawn by other classification society due to reason not as that in 1.11.3.1(1);

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

(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 in

service evaluation;

(8) practical verification not completed in initial approval, renewal audit or additional audit is arranged;

(9) other cases for which an additional audit is necessary.1.9.2 The following application information is to be submitted as a minimum for the additional audit:

1.9.2 The following application information is to be submitted as a minimum for the additional audit:

(1) documents on this additional audit involving changes, accidents, complaints and defects;

(2) documents related to changes, accidents, complaints and defects (such as site, equipment, personnel, systems, etc.);

(3) other documents with changes in validity period (such as manufacturer's technical support documents, verification/calibration ledger of testing and measuring equipment, list of qualified suppliers, annual training plan, existing personnel contracts, subcontracting agreements (when applicable), etc.).

1.9.3 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, for the new added personnel (if any), CCS will carry out verification according to his expertise level and practical operational capability.

1.9.4 After the additional audit is completed, CCS is to renew the the approval certificate, and endorse in the the endorsement column of additional audit. The validity period of the changed certificate is the same as that of the original.

1.10 Change of approval

1.10.1 Change of approval applies to the following situations:

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

(2) changes in basic contents of the supplier approval, including changes in supplier name, legal representative/operator, registration address and address for office/business/servicing and testing site, essential equipment, servicing and testing

personnel, quality management system, manufacturer's technical support[32] (if applicable), subsidiaries, etc.

1.10.2 The above changes made to the approved suppliers are to be notified to CCS in written form in 15 working days, and an additional audit is to be applied for. In case of window period of renewal audit, the additional audit may also be carried out in conjunction with the renewal audit. In the following cases, prior to the supplier obtaining the changed certificate for approval of service supplier, CCS is not to accept the servicing and testing service results provided by the supplier.

(1) the removing from post/departure of personnel involved[33], resulting in the number of personnel, posts, etc. not meeting the requirements of this Guidelines;

(2) changes of supplier names involved;

(3) changes of the fixed servicing and testing premises of the supplier involved, and the original site is no longer able to carry out services;

(4) main equipment involved has been damaged or failed, resulting in the inability to carry out services normally.

1.10.3 For suppliers who are required by this Guideline to provide servicing and testing in fixed servicing premises, and whose servicing and testing personnel are transferred from one subsidiary to another, or whose posts are changed, the supplier's Headquarters is to apply in writing to CCS for additional audit and renewal of approval certificate within 15 working days. During the audit period, the suppliers can provide services to CCS accredited supplier services according to the personnel before the change.

1.10.4 When personnel whose work experience is interrupted returns to work, CCS

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[32] Changes in manufacturer's technical support mean additions or deletions of manufacturers, additions or deletions of manufacturer's product types and the renewal of non-existing manufacturer's technical support documents due to expiration

[33] The supplier or its resigning personnel is to, within 15 working days after the resignation takes effect, declare in writing the resignation situation to the CCS audit department for supplier approval within the jurisdiction of the supplier. For contact details, see Resource Center - Supplier Approval - CCS Supplier Approval Management Contact List on the CCS official website.

acknowledges their work experience before interruption.

1.10.5 After the relevant additional approval is completed, CCS is to issue a new approval certificate and endorse in the endorsement column.

1.11 Invalidation, suspension, cancellation, and reinstatement of approval certificate

1.11.1 Approval certificate may be invalidated automatically in case of the followings:

(1) the certificate holder alters the certificate without authorization;

(2) the annulment of conventions, laws, rules and standards applicable to the original approval certificate;

(3) the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) fails to carry out the periodical on-site technical condition monitoring and activity supervision by CCS as required by the Administration;

(4) changes in the basic contents of the supplier approval, including the supplier's name, legal representative/operator, registration address and address of office/business/servicing and testing site, essential equipment, servicing and testing personnel and agents and/or subsidiaries, and/or major changes in the quality management system (such as changes in the company structure and job responsibilities);

(5) the supplier is canceled by the Administration of the government according to law or the supplier ceases to operate.

1.11.2 Suspension and reinstatement of approval certificate

1.11.2.1 Approval certificate may be suspended for 3 to 12 months in case of the followings and rectifications are to be carried out according to CCS requirements:

(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 supplier fails to provide relevant necessary materials required by the Guidelines and the Administration (e.g. monitoring video, etc.), or does not keep service files and video materials according to the requirements of the Guidelines and the Administration;

(4) if it is verified that customer complaints and safety accidents in which the supplier is involved are due to the supplier's dereliction of duty.

(5) when there are changes in the basic contents of the supplier approval, including the supplier's name, legal representative/operator, registration address and address of office/business/servicing and testing site, major equipment, servicing and testing personnel and subsidiaries, and/or major changes in the quality management system (such as changes in the company structure and job responsibilities), no application for the additional audit is submitted in written form within 15 working days, and no non-compliance servicing and testing service is provided;

(6) the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) fails to carry out the periodical on-site technical condition monitoring and activity supervision by CCS as required by the Administration;

(7) when the supplier fails in the additional audit due to the discovery of major deficiencies;

(8) other cases that CCS deems necessary to suspend the certificate.

1.11.2.2 The supplier is to complete the rectification as required by CCS and apply to CCS for additional audit after the certificate suspension period. CCS will not accept the servicing and testing services provided by the supplier until the certificate is renewed. When additional audit results are found satisfactory, the supplier's approval qualification can be reinstated, the approval certificate will be renewed. The renewed certificate is valid for the validity of the original certificate. If the additional audit application is submitted when the original approval certificate has entered the renewal window period or has expired, the supplier can directly apply for the renewal audit, and the application will be processed as renewal audit.

1.11.3 Cancellation of approval certificate

1.11.3.1 Approval certificate may be canceled in case of the followings:

(1) at the request of the supplier no longer provides servicing and testing;

(2) where the supplier intentionally provide services beyond the approved service category and scope;

(3) the supplier is canceled by the Administration of the government according to law;

(4) at the additional audit, it is found that the supplier's nonconformity has not been corrected within the specified time;

(5) where the service was improperly carried out or the results were improperly reported; where the supplier or its employees reduce the service quality or provide deliberate misrepresentation and false report;

(6) where CCS finds deficiencies 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;

(7) when there are changes in the basic contents of the supplier approval, including the supplier's name, legal representative/operator, registration address and address of office/business/servicing and testing site, major equipment, servicing and testing personnel and subsidiaries, and/or major changes in the quality management system (such as changes in the company structure and job responsibilities), no application for the additional audit is submitted in written form within 15 working days, and the supplier intentionally conceals the fact to CCS and continues to carry out servicing and testing services within the approved scope, resulting in the invalidation of CCS survey;

(8) where willful acts or omissions are ascertained;

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

(10) 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 facility and

relevant equipment;

(11) where the supplier provides relevant services during the certificate suspension period;

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

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

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

(15) where the supplier allows servicing and testing personnel not included in the CCS supplier approval certificate or personnel from other units to carry out service within the approved scope of the supplier;

(16) other situations where the CCS determines that a certificate needs to be canceled.

1.11.3.2 For suppliers within Chinese territory (Hong Kong, Macao and Taiwan) whose approval certificate is canceled due to the above situations (except for 1.11.3.1(1)), CCS will inform the relevant situations to the Administration. If the supplier has already provided non-conforming servicing and testing services prior to the cancellation of the approval certificate, CCS will inform the relevant shipowners or owners of offshore installations in a timely manner after investigation. The supplier is to take full responsibility for the adverse consequences that have been caused.

1.11.3.3 A supplier whose approval was canceled, may apply for initial approval provided that it has corrected relevant non-conformities. For those who re-apply to work for the relevant supplier, CCS will re-verify their professional knowledge level and practical operation. At the same time, CCS implements the supplier integrity management system. For servicing and testing personnel who seriously violates the code of business ethics and lack integrity, CCS will no longer accept their application for servicing and testing service.

1.11.4 Cancellation, invalidation, suspension and reinstatement of certificate for suppliers with subsidiaries

1.11.4.1 In case that the approval certificate of the supplier’s head office is canceled, suspended or invalidated, the approval of all of its subsidiaries will be automatically canceled, suspended or invalidated;

1.11.4.2 In case that the approval certificate of the supplier’s subsidiary is invalidated or canceled (except for the case mentioned in 1.11.3.1(1)), the approval of its head office and other subsidiaries will be invalidated at the same time;

1.11.4.3 In case that the approval qualification of the supplier’s subsidiary is suspended, the approval qualification of its head office and other subsidiaries will be suspended at the same time;

1.11.4.4 Reinstatement of the approval certificate is carried out in accordance with 1.11.2.2 and 1.11.3.3 above.

1.11.5 CCS will inform the IACS and related Members accordingly for companies engaged in thickness measurements (TM) of hulls of CCS classed ships and metal structures of offshore mobile units above water when their approval is invalidated or canceled.

1.11.6 The cancellation, 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:

(1) Category A are those that can carry out thickness measurement of all ships and/or metal structures on offshore units above water;

(2) Category B are those that can only carry out thickness measurement for non CCS-classed Chinese ships engaged on domestic voyages, non CCS-classed Chinese ocean-going fishing vessels, non CCS-classed metal structures on offshore units above water.

2.1.3 Thickness measurement methods include:

(1) Thickness measurement by personnel, i.e. thickness measurement operation performed by personnel close to the structure；

(2) Thickness measurement by using remote inspection technology (referred to as RIT thickness measurement) means the operation of remote control unmanned aerial vehicles (drones), climbing robots and other machines and equipment close to the structure under the condition that the thickness measurement personnel are far away from the structure.

2.1.4 This Chapter specifies the requirements for service providers for personnel thickness measurement method. For details of the supplier requirements for RIT thickness measurement service, see Chapter 16 of the Guidelines. A supplier that has obtained personnel thickness measurement approval and intends to provide RIT

thickness measurement service to customers is to apply for RIT thickness measurement provider approval to CCS in accordance with the requirements of Chapter 16 of the Guidelines.

2.2 Personnel

2.2.1 The suppliers are to be responsible for the training and certification of the thickness measurement personnel to ensure that the service level and capability of the thickness measurement personnel satisfy the requirements for thickness measurement service[34]. Personnel who have not engaged in any thickness measurement work within one year is to participate in training again and be verified by CCS before being included in the list of thickness measurement suppliers approved by CCS.

Operators are to obtain certification of a level of UT-I or above, supervisors are to obtain certification of a level of UT-II or above, and technical directors are to obtain certification of a level of UT-II or above. For suppliers within Chinese territory (excluding Hong Kong, Macao, and Taiwan), CCS only accepts the certificates at various levels of UT issued by CCS; For thickness measurement suppliers of Hong Kong, Macao, Taiwan and outside Chinese territory, CCS may accept the UT level certification issued or recognized by other classification societies certified by QSCS.

On the basis of possessing the industry non-destructive testing UT personnel level certificates issued or recognized by CCS (such as the revised EN 473 or ISO 9712), thickness measurement personnel is to be subject to thickness measurement training and have appropriate knowledge in ship structure so as to select typical positions for each measurement. At least include the following contents[35]:

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

[34] CCS auditor will verify the professional theoretical level and practical operation capability of the thickness measurement personnel during the on-site audit.

[35] Any special requirements for ship thickness measurement training required by the competent authority of the country where the supplier is located, are to be complied with.

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 ship 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 CCS Rules for Classification and Construction of Fixed Offshore Units, Rules for Classification and Construction of Fixed Units in Shallow Water, 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) thickness measurement requirements of statutory survey regulations for ocean-going fishing vessels of the related Administration, and Chapter 1 of PART TEN in CCS Rules for Classification of Sea-going Steel Ship;

(4) introduction of CCS hull structure and thickness measurement management system[36] (applicable to the TM suppliers of ship hulls);

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

(6) 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 as well as relevant part in Guidelines For

[36] The system software is available on request from CCS. Alternatively, go to the CCS official website and click "Information Center"- "Approval of Suppliers"- "Software Download" to search and download.

Thickness Measurement of Hull;

(2) those specified in 2.2.1.1(4) to (6) above.

2.2.2 For thickness measurement suppliers with subsidiaries, the level of the head office is not to be less than that of the subsidiaries and the head office is to have supporting capability in technology and personnel and are responsible for the quality, safety and legal liabilities of the subsidiaries.

2.2.3 Thickness measurement suppliers of category A

2.2.3.1 Thickness measurement suppliers of category A are to guarantee sufficient thickness measurement personnel for field operation, recording, preparing and reviewing reports satisfying the business scope and scale of the suppliers. Within Chinese territory (excluding Hong Kong, Macao and Taiwan), according to the provisions of the Administration, 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 and issued by the supervisor and the technical director is responsible for final review and issuance of the face page of the report required by the Administration. Therefore, for a supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan), at least the posts of one operator, one supervisor and one technical director are to be set up.

2.2.3.2 Thickness measurement personnel of category A is to have the corresponding work/experience in thickness measurement for ships engaged on international voyages/offshore facilities.

2.2.3.3 Within Chinese territory (excluding Hong Kong, Macao and Taiwan), thickness measurement personnel of thickness measurement suppliers of category A are to have English reading, writing and listening skills sufficient for business requirements.

2.2.3.4 Thickness measurement personnel are to be proficient in operation and daily maintenance methods for thickness gauge.

2.2.4 Thickness measurement suppliers of category B

2.2.4.1 Thickness measurement suppliers of category B are to guarantee sufficient thickness measurement personnel for field operation, recording, preparing and reviewing reports satisfying the business scope and scale of the suppliers. The personnel allocation requirements are same as those stated in 2.2.3.1.

2.2.4.2 For thickness measurement personnel of category B is to have the corresponding work/experience in thickness measurement for ships.

2.2.4.3 Thickness measurement personnel are to be proficient in operation and daily maintenance methods for thickness gauge.

2.3 Equipment

2.3.1 Thickness gauges provided by suppliers are to be instruments with principles of pulsed echo technique. At least one instrument is to be provided for two persons[37] 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: ±0.1 mm for plate thickness <10 mm ±0.2 mm for plate thickness ≥10 mm

2.3.2 Each on-site thickness measurement personnel 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 calibration certificate issued by the national statutory or metrological verification authority.

2.3.5 Thickness measurement suppliers of category A providing thickness

[37] One set of equipment may be provided if the supplier only has one technical director, one supervisor and one operator.

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 or adopt the other data management system accepted by CCS).

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 and other auxiliary tools.

2.5 Documents

2.5.1 Regulations from the Administration and CCS rules and guidelines as appropriate are to be provided, at least include the contents of Appendix 1.

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 (applicable to Category A thickness measurement supplier);

(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 services for ships engaged on international voyages and offshore installations are to comply with Appendix 8 and Appendix 10, 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 services for ships engaged on domestic voyages and ocean-going fishing vessels may refer to the above-mentioned requirements and the 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 (if any).

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 scope of approval intended to apply[38], and CCS auditors are to witness thickness measurement personnel's thickness measurement operations, recording and report preparation and review for the above ship and/or offshore unit. For supplies within Chinese territory (excluding Hong Kong, Macao and Taiwan), CCS auditors are also to 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 personnel protective equipment and appliances for thickness measurement personnel.

[38] Suppliers applying for Category A thickness measurement are to select ships engaged on international voyages and offshore facilities to conduct practical verification tests.

Appendix 1 List of documents

No.	Document No./name	Remark
1.	CCS Rules for Classification of Sea-going Steel Ships	
2.	CCS Rules for Construction and Classification of Offshore Floating Installations	
3.	CCS Rules for Classification of Mobile Offshore Units	
4.	CCS Rules for Construction and Survey of Fixed Units in Shallow Sea	
5.	CCS Rules for Construction and Classification of Fixed Offshore Units	
6.	CCS Guidelines for Thickness Measurement of Ships	
7.	MSA Regulations for Statutory Surveys of Ships and Offshore Installations	
8.	Regulations for Statutory Surveys for Fishing Vessels (e.x.: Technical Regulations for Statutory Surveys for Ocean-going Fishing Vessels, etc.)	
9.	China MSA Management Methods of Ship Servicing and Testing Services,	
10.	China MSA Technical Conditions of Organizations Performing Ship Servicing and Testing Services	

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 using Remotely Operated Vehicle (ROV), including:

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

Underwater Ultrasonic Testing (UWUT) and Underwater Alternating Current Field Measurement (UWACFM).

(2) Underwater Ultrasonic Thickness Measurement (UWTM);

(3) Underwater Visual Testing (UWVT): including visual inspection (including ship's underwater structure and appendages)[39], 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.

3.1.2 For details of approval requirements for suppliers carrying out internal compartment underwater close-up inspection using remotely operated vehicles (ROV), see Chapter 16 of PART ONE.

3.2 Personnel

3.2.1 For each service in 3.1.1, The in-water survey suppliers are to be manned at least one supervisor and one operator with corresponding training certification.

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

[39] 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.

accepted by CCS. For suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), except for ACFM, CCS only accepts proficiency certificates issued by CCS itself. Operators are to at least hold level certification for UWNDT personnel Grade I and supervisors are to at least hold level certification for UWNDT personnel Grade II.

3.2.3 UWTM, UWVT operators, supervisors are to hold level certification documents issued or accepted by CCS. For suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), CCS only accepts proficiency certificates issued by CCS itself.

3.2.4 The suppliers are to be responsible for the training of operators and supervisors carrying out underwater survey and the use of various testing equipment, with the following training records available:

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

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

(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.

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 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), and have at least one year of experience working with ROVs conducting inspection on vessels or offshore units.

3.2.6 The supervisor is to be qualified according to the requirements for supervisors in Chapter 1, PART ONE of the Guidelines and also to have the qualification certificate for diving supervisor or diving project manager accepted by CCS. The supervisor is to have a minimum of two years' experience as a diver carrying out independent 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 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 divers performing underwater visual inspection and underwater thickness measurement services, a report is to be prepared by a person with qualification of diving project manager or diving supervisor, and reviewed by another person with qualification of of diving project manager or diving supervisor.

For divers performing UWNDT, reports are to be prepared by operators with qualification of diving project manager or diving supervisor or 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 For ACFM field testing, the trained underwater visual testing personnel are allowed to place probes on the underwater structure as required by ACFM certified 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[40] 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 or operation platform; 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 Relevant regulations of Administration and CCS rules/guidelines are to be provided, including at least the contents of Appendix 1.

3.5.2 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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[40] 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.

3.5.3 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 to ensure location and orientation of ROV and its mother ship or operation platform and guidance for equipment operation and maintenance.

3.5.4 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 industrial 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 Other requirements

3.6.1 In the process of service provided by the suppliers,each item is to be verified/witnessed by surveyor, who is to endorse the reports and documents, and the files are to be retained.

Appendix 1 List of documents

No.	Document No./Name	Remark
1	CCS Rules for Classification of Sea-going Steel Ships	
2	CCS Rules for Materials and Welding	
3	CCS Rules for Classification and Construction of Offshore Floating Installations	
4	CCS Rules for Classification of Mobile Offshore Units	
5	CCS for Construction and Survey of Fixed Units in Shallow Sea	
6	CCS Rules for Construction and Classification of Fixed Offshore Units	
7	CCS Rules for Qualification and Certification of NDT Personnel	
8	CCS Guidelines for Structural Surveys of In-Service Jacket Units	
9	Safety Regulations for Fixed Offshore Units issued by the State Economic and Trade Commission of China (applicable within Chinese territory (excluding Hong Kong, Macao and Taiwan)	
10	CCS Rules for Submarine Pipeline Systems	
11	CCS Rules for Classification of Offshore Single-Point Mooring Installations	
12	CCS Rules for Construction and Classification of Diving Systems and Submersibles	
13	Technical Regulations for Statutory Surveys of Fishing Vessels (e.x.: Technical Regulations for Statutory Surveys of Ocean-going Fishing Vessels, etc.)	
14	China MSA Management Methods for Ship Servicing and Testing Services	
15	China MSA Technical Conditions of Organizations Performing Ship Servicing and Testing Services	

16	MSA Safety Regulations for Offshore Floating Installations (applicable within Chinese territory (excluding Hong Kong, Macao and Taiwan)	
17	MSA Safety Regulations for Diving Systems and Submersibles (applicable within Chinese territory (excluding Hong Kong, Macao and Taiwan)	
18	Recognized national or internationally recognized industrial non-destructive testing standards for various underwater non-destructive testing	

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, 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 as well as 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[41].

[41] If the suppliers of the categories described in this Chapter only carry out the test and maintenance of lifejackets (immersion suits) and inflatable lifejackets, and do not engage in other services of the categories in Part One, Chapter 5 of this Guidelines (engaged in servicing of inflatable liferafts, hydrostatic release units and marine evacuation system), the suppliers can apply for approval of test and maintenance of lifejackets and inflatable lifejackets in the service categories described in this Chapter.

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 Servicing and testing personnel 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 Servicing and testing personnel are to have training on servicing and testing professional knowledge of fire-fighting appliances and systems and actual servicing and testing operation skills and their professional knowledge level and practical operation capabilities are to be verified by CCS to demonstrate that they are capable of providing servicing and testing services for fire-fighting appliances and systems.

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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 the servicing and testing, sufficient number of supervisors/operators are to be manned to perform on-site operations, record and prepare reports. When conducting servicing and testing within Chinese territory (excluding Hong Kong, Macao and Taiwan), at least one supervisor and one operator are to perform on-site operations and records, the operator is to prepare reports, and the supervisor is to review the reports. For suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), report is to be issued by technical director, while for suppliers in Hong Kong, Macao and Taiwan and outside Chinese territory, report is to be issued by personnel specified in their systems.

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 suppliers engaged in inspection and maintenance for marine fire-extinguishing equipment and systems are to have a proper inspection and maintenance workshop with a total usage area meeting the requirements for the variety and quantity of fire extinguishers to be repaired. The total usable area of the

supplier's workshop within Chinese territory (excluding Hong Kong, Macao and Taiwan) is not to be less than 100m². Sites outside Chinese territory are to comply with the relevant requirements of the Administrations of the State.

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	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
Weighing equipment for large CO_2 cylinder	1 (including relevant fittings required for weighing), for weighing of large CO_2 cylinders, 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 maintenance and testing of heptafluoropropane systems, such as load gauges or electronic hanging scales (including load sensors or electronic display interfaces), voltage withstand testers, 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 details, see 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 with metering function (e.g. pressure gauges, electronic scales and thermometers, etc.) of suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to have valid verification/calibration certificates or statements issued by the national statutory or metrological authorities. All measuring instruments of suppliers in Hong Kong, Macao, Taiwan and outside Chinese territory are to have valid verification/calibration certificate or statements.

4.5.8 Before conducing the servicing and testing, the suppliers are to verify and collect type approval certificates of relevant mobile fire-extinguishing equipment, fixed fire-extinguishing systems, marine fireman's equipment, EEBD self-contained compressed air respirators, fire detection and alarm devices, lifejackets (immersion suits) and inflatable lifejackets, and these type approval certificates are to be filed.

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 5923 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan) 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, etc.;

(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.

4.6.7 Practical operation verification is to be carried out for the initial approval. Based on the relevant contents of the service scope in the certificates intended to issue, practical operation verification is to be conducted for at least one mobile fire extinguisher, one fixed fire extinguishing system, firemen outfits or emergency escape breathing apparatus, hydrostatic test of gas cylinders, hydrostatic test of raft gas cylinders, fire detection and alarm devices, one water mist fire extinguishing system, immersion suits, and inflatable life jackets (if any).

The practical operation verification of renewal audit can refer to the requirements for initial approval. Additional audit is to be conducted in accordance with 1.9.3 of Chapter 1.

Appendix 1 List of Documents

No.	Document No./Document Name	Remarks
1	Manufacturer's servicing manual, servicing notice, instruction and training manual	If applicable
2	SOLAS, MSC.1/Circular 1318 Rev.1 (Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire-Extinguishing Systems)	
3	International Code for Fire Safety Systems (FSS Code)	
4	ISO6406 (Seamless Steel Gas Cylinders—Periodic Inspection and Testing)	
5	Any document authorized or licensed by the equipment manufacturer	
6	MSC/Circ.670 (Guidelines for the Performance and Testing Criteria, and Surveys of High-Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems)	
7	MSC/Circ.798 (Guidelines for the Performance and Testing Criteria, and Surveys of Medium-Expansion Foam Concentrates for Fixed Fire-Extinguishing Systems)	
8	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)	
9	MSC.1/Circ.1432 (Revised Guidelines for the Maintenance and Inspection of Fire Protection	

	Systems and Appliances)	
10	IMO resolution A.951(23) (Improved Guidelines for Marine Portable Fire Extinguishers)	
11	MSC.1/Circ.1370 (Guidelines for the Design, Construction and Testing of Fixed Hydrocarbon Gas Detection Systems)	
12	Guidelines for Fire-extinguishing Appliances and Systems Specifically Maintained by Service Suppliers adopted by IMO	
13	MSC.1/Circ.1516 (Revised Guidelines for the Maintenance and Inspection of Fire Protection Systems and Appliances)	
14	Technical Regulations for Statutory Survey of Fishing Vessels (such as Technical Regulations for Statutory Survey of Ocean-going Fishing Vessels, etc.)	
15	China MSA Management Methods of Ship Servicing and Testing Services	
16	China MSA Technical Conditions of Organizations Performing Ship Servicing and Testing Services	
17	CCS Service Guidelines for Organizations Performing Testing of Marine Fire-fighting Systems	
18	MSC/Circ.848 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 and its amendments	
19	Fire testing standards that are suitable for servicing and testing, such as ISO 5923, GB 25972-2010,	

	CB/T 4459-2016, etc.	
20	International and national standards related to the maintenance and repair of fire-fighting equipment and systems, as well as standards of the National Emergency Management Department	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macau, and Taiwan)

Chapter 5 Suppliers Engaged in Servicing Inflatable Liferafts, Inflatable Lifejackets, Immersion Suits, Hydrostatic Release Units 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 lifejackets and immersion suits, as well as testing and filling of cylinders used for liferafts[42].

5.1.2 Within Chinese territory (excluding Hong Kong, Macao and Taiwan), the above-mentioned 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-mentioned categories, the servicing scope of a higher

[42] If the servicing station only engages in CO_2 raft gas cylinder filling service and does not carry out other supplier services of inspection and maintenance for fire-extinguishing equipment and systems mentioned in Chapter 4 , Part One of this Guidelines, it can apply for CCS supplier approval within the categories described in this Chapter; If the servicing station carries out the CO2 raft gas cylinders filling service, and also carries out other categories of services for the suppliers engaged in inspection and maintenance for marine fire-extinguishing equipment and systems described in Chapter 4, Part One of this Guidelines, the CO_2 raft gas cylinders filing service does not need to be applied for within the categories described in this Chapter.

level servicing station may cover that of a lower level servicing station. Servicing stations in Hong Kong, Macao, Taiwan and outside Chinese territory may refer to the above-mentioned category standards, however, their technical conditions are at least to meet the requirements of IMO A761 (18), local Administrations and manufacturers.

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 Suppliers are to be responsible to train the servicing personnel so as that they can obtain the training certification as required by the Administration and the manufacturers. The servicing personnel 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 internship is to be conducted, and the internship content is to cover the products to be serviced. The pre-job internship 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), the post of technical director is to be set up, responsible for approving and issuing servicing and testing certificates required by the Administration

which are to be provided to the external. For servicing stations in Hong Kong, Macao, Taiwan and outside Chinese territory, a designated person may be required to issue certificates, reports and records externally in accordance with the approved service system requirements.

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 within Chinese territory (excluding Hong Kong, Macao, Taiwan), during the servicing process, on-site operation and recording are to be carried out by at least one operator and one supervisor. The operator is to be responsible to formulate records and reports and endorse under the completed servicing and testing items. The supervisor is to be responsible to review the records and reports and endorse. The specific requirements are as follows:

5.2.5.1 Requirements for the minimum provision of servicing personnel of inflatable liferafts (servicing stations in Hong Kong, Macao, Taiwan and outside Chinese territory 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 which are serviced periodically 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 in Hong Kong, Macao, Taiwan and outside Chinese territory 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 which are serviced periodically 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 in Hong Kong, Macao, Taiwan and outside Chinese territory 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	1	1	3

evacuation systems serviced ≤10			
Number of marine evacuation systems serviced >10	1	1	5

Note: Hydrostatic release units which are serviced periodically 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 for servicing stations within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to satisfy servicing requirements as follows, (the servicing stations located in Hong Kong, Macao, Taiwan and outside Chinese territory may implement by reference to the requirements, however, at least to meet the requirements of IMO A.761(18):

Requirements for Area and Headroom of Servicing Workshop Table 5.3.1.2

Category	Servicing type	Area	Headroom [43]	Remarks
Category A	All sizes and types of inflatable liferafts and/or marine evacuation systems[44]	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	

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

[44] 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.

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 working 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 draught. 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.

5.3.2 Other sites

5.3.2.1 Spaces for office, rest and storage of files are to be provided.

5.3.2.2 Warehouse is to be provided for storing materials, fittings, spare parts and equipment. Within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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. (The servicing stations located in Hong Kong, Macao, Taiwan and outside Chinese territory may implement by reference to the requirements, however, at least to meet the routine servicing and testing needs).

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 within Chinese territory (excluding Hong Kong, Macao and Taiwan):

(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 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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). (The servicing stations located in Hong Kong, Macao, Taiwan and outside Chinese territory may implement by reference to the requirements, however, at least to meet the routine servicing and testing needs).

5.4.2 A set of brackets is to be provided for the bottom joint strength test of liferaft within the scope of intended service, , the brackets are be able to prevent scratches and wear on the liferaft.

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[45].

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

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[45] Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to provide evidence of using relevant lifting equipment in accordance with local safety laws and regulations.

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 within Chinese territory (excluding Hong Kong, Macao and Taiwan). Servicing stations located in Hong Kong, Macao, Taiwan and outside Chinese territory may implement by reference to the requirements, however, at least to meet the requirements for maximum number of services carried out simultaneously in the workshop.

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 above is required to be ±10 g. For servicing stations within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 recording the whole servicing process so as to prove the compliance of its services. In addition, other effective devices that can shoot short videos may be recommended to provide, 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 paper archives, such as technical management documents, servicing certificates, reports, records and other files is to be provided. If electronic archives are used, facilities and equipment that meet the requirements for storing electronic documents are 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), work benches, 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to be

provided with watertight test tanks (with specifications of 2 m × 1.5 m) with a grating cover[46] for watertight tests in accordance with the provisions of the Administration; servicing stations located in Hong Kong, Macao, Taiwan and outside Chinese territory 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.

5.5 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.

[46] Grating cover is to ensure that the immersion suits are completely submerged in water during tightness test.

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	Set	1	1	Light intensity ≥4.3cd, time ≥12h，

	light				
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			

Accessories 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	/	1	1	1	Printed on	

	signalling mirror					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.							

Tool bag details Table 5.5.2(3)

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	⑴ 2 leak repair clamps ⑵ 40 gram of repair glue ⑶ 4 repair tapes ⑷ 1 piece of sandpaper ⑸ 1 round head scissors (with a rubber tube around the head) ⑹ 1 wooden roller ⑺ large and small leak repair plugs (2 for each size) ⑻ 1 brush of 13 mm

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

Accessories details of type Y liferaft on fishing vessels Table 5.5.2(4)

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	/	1	With instructions and repair	

	bag			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.					

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, at least including the contents in Appendix 8. 5.6.2 For servicing of inflatable life-saving appliances by servicing stations located within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 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 in Hong Kong, Macao, Taiwan and outside Chinese territory, 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 In addition to the relevant requirements of Chapter 4, PART ONE of this Guidelines, the liferaft cylinder CO_2 inflating station is to:

(1) 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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;

(2) Develop appropriate measures to ensure that inflated gas cylinders are allowed to stand for a sufficient period of time according to the requirements of the Administration before being installed on life rafts[47].

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[47] CCS accepts alternative measures for cylinder standing approved by the

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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 Upon the completion of servicing, all documents are to be filed. The archives of servicing stations located within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to include the last servicing and testing records, certificates or reports, which are to be kept for a period of at least 5 years[48].

Administration.

[48] CCS accepts the filing method of electronic documents.

5.6.11 Type approval certificate is to demonstrate that any conditions of inflatable liferaft, marine evacuation system, inflatable lifejackets, immersion suits and hydrostatic release units are suitable in the process of servicing and/or maintenance; This requirement can also be replaced by the following methods: it is stipulated that the approval conditions of the equipment to be serviced before the service is carried out in the supplier's servicing and testing operation manual, and the approval certificates are to be collected and archived.

5.7 Other requirements

5.7.1 The practical operation verification of inflatable life-saving equipment is to meet the following requirements.

5.7.2 For servicing of liferafts, practical operation verification tests are to be carried out at initial approval. The practical operation verification for renewal audit can be carried out by reference of the relevant requirements of initial approval, at least one life raft is to be randomly selected for practical verification (including throwing test) according to the maintenance and testing requirements corresponding to the age of the raft. Additional audit is to be carried out in accordance with the requirements of 1.9.3 in Chapter 1.

5.7.2.1 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 has been put into normal operation and is immediately available, and practical operation verification is to be carried out under the supervision of the on-site auditor. For servicing stations within Chinese territory (excluding Hong Kong, Macao and Taiwan), at the practical operation verification test, the drop test is to be carried out. For servicing stations in Hong Kong, Macao, Taiwan and outside Chinese territory, the practical operation verification test is to be carried out according to the requirements of the relevant conventions for the initial audit.

5.7.2.2 For servicing stations within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 (for specific requirements see Appendix 2). The servicing stations in Hong Kong, Macao, Taiwan and outside Chinese territory may implement by reference of the above-mentioned requirements, however, at lease in compliance with the relevant requirements of local Administration and conventions.

5.7.2.3 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. After hydrostatic release units are serviced, they are to be tested at least twice to prevent data misreading (for specific requirements, see Appendix 2).

5.7.2.4 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 an entire 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 (for specific requirements, see Appendix 2).

5.7.3 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[49].

5.7.4 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

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

approval. Requirements for servicing marine evacuation systems which are developed by the servicing station and approved by CCS are to be satisfied (for specific requirements see Appendix 3).

5.7.5 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 (for specific requirements see Appendices 4 and 5).

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.

Appendices

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

Appendix 2 Practical operation verification test programme of servicing stations

Appendix 3 Test items and methods of marine evacuation systems

Appendix 4 Test items and methods of immersion suits

Appendix 5 Test items and methods of inflatable lifejackets

Appendix 6 Liferaft servicing test period

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

Appendix 8 List of documents

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

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

1 Purpose

The purpose of the practical operation verification test is to conduct the test according to the approved test programme by selecting liferafts in service, 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 technical conditions and 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

The liferafts used for testing are to be those that have been put into normal operation and are immediately available. Generally CCS auditors are to 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 entire liferaft or liferaft body rubberized fabric is to be subject to the test in 3.16 of the programme (an entire liferaft is to be selected for repair at initial approval).

The servicing record of the liferaft is to be checked by servicing and testing personnel 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 are to be witnessed by attending CCS review personnel.[50]

3 Test items

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

[50] 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).

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.[51]

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.

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[51] 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.

3.7 Floor seam strength test

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 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[52].

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

[52] Without any accessories in this test.

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 as well as the working pressure are to be compatible with the type of liferaft according to the provisions of manufacturer’s Servicing Manual.

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 0-20g from the total 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[53]. The liferaft is to be fully inflated within 1 min[54] 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.

For suppliers in Hong Kong, Macao and Taiwan and outside Chinese territory, if there is no special requirement from the Administration and the actual conditions on the site are limited, it can be considered to replace the drop test with the inflating test. For the specific requirements, see 3.17.

3.16 Simulated repairing test for liferaft body

3.16.1 Sampling: Take an entire 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.

3.17 Inflation test for liferafts (where applicable)

3.17.1 Place the liferaft packaged for servicing in the center of the servicing site, cut the easily broken ropes on the upper and the lower cover buttons of the storage

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

[54] 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℃.

canister or the easily broken rope on the packaging belt with scissors, and lift the upper cover upward; then unfasten the starting rope of the cylinder within liferaft, so as not to cause the cylinder to start accidentally; then remove the cable bag and liferaft from the lower cover of the storage canister, and spread the tent on the servicing site. Pull the quick release valve cable assembled from the gas cylinder in original packaging, inflate the liferaft with the gas in the gas cylinder, and record the time when the following conditions are reached:

(1) the floating tires are inflated to be circular; and

(2) the roof is set up, and the position indicator light at the top lights up automatically; and

(3) the safety valves of the upper and lower floating tires are open.

3.17.2 The inflatable time to reach the above state is not to exceed 1min (For the inflatable time of large size liferafts, see the manufacturer's manual).

4 Records and reports

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

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 original cylinder quick release valve in package, 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	1 Plug the safety valve.

	pressure (NAP) test	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	Weathertightness 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 weathertight. 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

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 within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 in Hong Kong, Macao, Taiwan and outside Chinese territory, 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.②Accelerated 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 suppliers in Hong Kong, Macao, Taiwan and outside Chinese territory, 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

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

1 For inflatable liferafts manufactured in China, in accordance with the requirements of the Marine Fisheries Safety Regulations and the technical conditions of the liferaft 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.

Appendix 8 List of documents

No.	Name	Remark
1	IMO Resolution A.761 (18) - Recommendation on conditions for the Approval of Servicing Stations for Inflatable Liferafts - Revised Resolutions MSC.55(66) and MSC.388(94)	
2	IMO Resolution MSC.55(66)	
3	IMO SOLAS 1974 and its 1996 amendments	
4	IMO Resolution MSC.48(66) LSA Code and its amendments MSC.218(82) and MSC.293(87)	
5	IMO Resolution MSC.81(70) Recommendations on Testing of Life-saving Appliances and its amendments MSC.226(82) and MSC.295(87)	
6	IMO MSC.Circ.1114 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	Servicing manuals, servicing bulletins, instructions, and training manuals for manufacturer specific equipment models, if applicable;	
9	IMO LSA Code Chapter IV, Resolution of 1995 SOLAS Conference — 4 marine evacuation system (applicable to the suppliers providing service and test for marine evacuation system)	
10	Chemical industrial standard of the P.R.China HG2714.3-1995 Inflatable Life Raft for Y- Type Raft (applicable to ocean-going fishing vessels)	Applicable to suppliers within Chinese territory

		(excluding Hong Kong, Macao and Taiwan)
11	China MSA Notice on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [HCJ (2019) No. 172]	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
12	China MSA Notice on Printing and Distributing the Technical Conditions of Organizations Performing Ship Servicing and Testing Services [HCJ (2019) No. 173]	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)

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

6.1 Extent of engagement

6.1.1 This chapter applies to suppliers engaged in inspection, examination, testing, and/or measurement of wireless equipment for ships and/or mobile offshore facilities.

6.1.2 This chapter applies to the suppliers engaged in annual testing and maintenance of satellite emergency radio positioning beacons, as well as the suppliers engaged on satellite emergency radio positioning beacon shore-based maintenance at intervals not exceeding 5 years.

6.1.3 This chapter also applies to the suppliers engaged in inspection, performance testing and maintenance of Automatic Identification Systems (AIS) and ship security alert system (SSAS).

6.2 Personnel

6.2.1 The supplier is to be provided with a sufficient number of supervisors and operators to meet business needs. In accordance with the requirements of the Administration, in addition to the operators and supervisors, suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to appoint technical directors, and at least one person is to be provided for each post respectively. Suppliers are to ensure that 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 operator 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 operator 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 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, including 121.5MHz monitoring receiver and AIS receiver.

(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 within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to have 2 sets of office equipment for editing and printing testing reports.

6.3.2 For suppliers located within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 with metering function 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 used is to be recorded. Records are to include equipment

manufacturer and equipment type information, as well as maintenance and calibration.

6.4 Documents

6.4.1 The documented procedures and instructions on how to conduct radio equipment testing and inspection are to be provided. The operating procedures and instructions for inspecting/testing equipment are to be retained and available for reference at any time.

6.4.2 A log of maintenance and calibrations is to be available. In Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 and the form can be downloaded from CCS official website[55]. Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to be provided with inspection and testing certificates, reports and records as required by the MSA. The shore-based maintenance report and annual testing report satisfying the requirements of MSC.1/Circ.1039/Rev.1 and MSC.1/Circ.1040/Rev.2 are to be available.

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

6.4.5 The records related to testing are to be filed promptly. Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) 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 Technical manual and service announcement are to be available, and relevant updated versions are to be obtained in a timely manner. The technical documents include but not limited to those required in Appendix 1.

6.4.7 Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to be provided with operation manual of tested equipment.

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[55] Go to CCS official website and click “Information Center” - “Approval of Suppliers” - “Service Report of Supplier” to search and download.

6.4.8 Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to be provided with labour safety and protection articles necessary for testing personnel.

6.4.9 Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) 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

No	Name	Remarks
1	Revised SOLAS 1974	
2	IMO Res.MSC.349(92): Code for Recognized Organizations (RO Code)	
3	MSC.1/Circ.1040/Rev.2—Guidelines on Annual Testing of 406MHz Satellite EPIRBs	
4	MSC.1/Circ.1252 — Guidelines on Annual Testing of Automatic Identification System (AIS)	
5	SN/Circ.227, SN/Circ.227/Corr.1 and 245 — Guidelines on Installation of Shipborne Automatic Identification System (AIS) and its amendmeents	
6	ITU Radio Regulations	
7	IMO performance standards of equipment of service suppliers to be approved	
8	Requirements of Administration of flag State	
9	Relevant parts of CCS rules and guidelines (if any)	
10	Revised International Ship and Port Facility Security Code (ISPS Code)	
11	China MSA Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on International Voyages	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
12	China MSA Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for	Applicable to suppliers within

	Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages	Chinese territory (excluding Hong Kong, Macao and Taiwan)
13	China MSA Technical Regulations for Statutory Surveys of Ocean-going Fishing Vessels	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
14	China MSA Notice on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [HCJ (2019) No. 172]	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
15	China MSA Notice on Printing and Distributing the Technical Conditions of Organizations Performing Ship Servicing and Testing Services [HCJ (2019) No. 173]	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
16	MSC.1/Circ.1039/Rev.1 Guidelines on Shore-Based Maintenance of EPIRB	
17	Guidelines on False Alarm in Distress (Resolution A.814(19), as may be updated)	

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 Authorized 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 Authorized 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 The supplier is to be provided with a sufficient number of supervisors and operators to meet business needs. In accordance with the requirements of the Administration, in addition to the operators and supervisors, suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to appoint technical directors, and at least one person is to be provided for each post respectively. Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to ensure that 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 (if applicable).

7.4.3 Suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) 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 authorization of Manufacturer's Authorized Service Stations who carry out annual performance testing.

(2) The Manufacturer is to have documented procedures for the review of Manufacturer's Authorized 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 Authorized 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[56] of the model test report given in the Appendix to MSC.1/Circular.1222/Rev.1, 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 Authorized Service Station annual performance test report;

[56] The report form can be downloaded from CCS official website. Go to CCS official website and click "Information Center" - "Approval of Suppliers" - "Service Report of Supplier" to search and download.

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 within Chinese territory (excluding Hong Kong, Macao and Taiwan) 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	IMO - SOLAS (74/78) Reg. V/18.8 - Approval, inspection, and performance standards for navigation systems and equipment, as well as navigation data recorders	
2	MSC.1/Circular.1222/Rev.1 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR)(11 December 2006)	
3	The Performance Standards for Shipborne Voyage Data Recorders (VDRs) amended by IMO Resolution MSC.214(81), Resolution MSC.333(90) and Resolution MSC.494(104)	
4	Resolution MSC.163(78) - the Performance Standards for Shipborne Simplified Voyage Data Recorders (S-VDRs) amended by IMO Resolution A.214(81)and resolution MSC.493(104)- adopted on 17 May 2004	
5	IEC 61996 - Maritime Navigation and Radiocommunication Equipment and Systems - Shipborne Voyage Data Recorder (VDR)	
6	IEC 61996-2 - Maritime Navigation and Radiocommunication Equipment and Systems - Shipborne Voyage Data Recorder (VDR) - Part 2: Simplified Voyage Data Recorder (S-VDR) - Performance Requirements, Methods of Testing and Required Test Results	
7	Revised Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU CODE)	
8	China MSA Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on	Applicable to suppliers within Chinese territory

	International Voyages	(excluding Hong Kong, Macao and Taiwan)
9	China MSA Regulations for Statutory Surveys of Ships and Offshore Installations - Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
10	China MSA Technical Regulations for Statutory Surveys of Ocean-going Fishing Vessels	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
11	China MSA Notice on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [HCJ (2019) No. 172]	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
12	China MSA Notice on Printing and Distributing the Technical Conditions of Organizations Performing Ship Servicing and Testing Services [HCJ (2019) No. 173]	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)

Chapter 8 Suppliers Engaged in Shorebased 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. In accordance with the requirements of the Administration, in addition to the operators and supervisors, suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to appoint technical directors, and at least one person is to be provided for each post respectively. Suppliers are to ensure that at least one supervisor and one operator are to be provided to conduct on-site operation and recording during testing.

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 servicing and testing 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	Revised SOLAS 1974	
2	Revised Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU CODE)	
3	Requirements of International Civil Aviation Organization (ICAO)	
4	IMO performance standards of equipment of service suppliers to be approved	
5	Relevant provisions and requirements of flag State governments and port State authorities	
6	Manufacturer's maintenance manual and technical manual of the relevant products	
7	Revised Technical Regulations for Statutory Surveys of Ocean-going Fishing Vessels	Applicable to suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
8	IMO Res.A.1156(32) 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), all rescue boats (including inflatable 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 of ship operators 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[57] and repair are to be conducted by certified servicing and testing personnel of an authorized service provider.

9.2.2 Certification of 9.2.1 above means that the certified servicing and testing personnel is to obtain the equipment service certification carried out 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[58] and repair.

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

(1) causes for lifeboat and rescue boat accidents;

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

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

(4) education and practical training in the procedures specified in Section 6 of Annex in IMO Resolution MSC.402(96)/Corr.1 for which certification is sought (see Appendix 1 for details);

(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

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[57] 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.

[58] 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.

according to the requirements of 5.3, Annex 1 of IMO Resolution MSC.402(96)/Corr.1, 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 a certified personnel[59] is to be supplementary to certified classroom training.

9.2.5 Prior to issuance of certification, a competency assessment is to be satisfactorily completed, using the equipment for which the servicing and testing personnel are to be certified.

9.2.6 Upon completion of education, training and capability 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 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 re-validated after a further capability 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan) is to appoint the technical director. For suppliers that establish subsidiaries, the headquarters and each subsidiary are to have adequate operators and supervisors to meet the scale and quantity of business carried out by the supplier. The subsidiary of suppliers within Chinese

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

territory (excluding Hong Kong, Macao and Taiwan) is also to appoint the technical director of the subsidiary. The headquarters are to have supporting capability in technology and personnel and be responsible for the quality, safety and legal responsibilities of the subsidiary. For suppliers in Hong Kong, Macao, Taiwan and outside Chinese territory, the post of technical director may be omitted.

9.2.9 For suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), 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 record and report, the supervisor is to review the record and report, and the technical director is to issue the testing certificates and statement of fitness for purpose required by the Administration. For suppliers in Hong Kong, Macao, Taiwan and outside Chinese territory, personnel meeting demands are to be appointed when performing services, and relevant certificates and reports are to be completed in accordance with 5.3 of annex to MSC.402(96)/Corr.1.

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[60].

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 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,

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

including the contents of Appendix 7, as a minimum:

9.6.2 The supplier is to develop a personnel training and certification programme in accordance with a recognized national, international or industrial 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.[61]

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 programs 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 and 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.

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[61] For suppliers in Hong Kong, Macao, Taiwan and outside Chinese territory, attention is to be given to special requirements for personnel training and authorization of the Administration of the flag State. For applications for authorization/approval from flag State Administrations other than China, attention is to be paid to meet the special requirements of these flag State Administrations.

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;

(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 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 and verify the copies of records and reports of last thorough examination, operational testing, overhaul and repair, and of statement of fitness for purpose for the serviced equipment.

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. For the suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), the archives 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, 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 servicing and testing personnel when providing services.

9.6.15 Type approval certificate is to demonstrate that any conditions of inflatable life

boats, launching appliances and on-load and off-load release gears are suitable in the process of servicing and/or maintenance. This requirement can also be replaced by the following methods: it is stipulated that the approval conditions of the equipment to be serviced before the service is carried out in the supplier's servicing and testing operation instructions, and the approval certificates are to be collected and archived.

Appendices

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

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

Appendix 5 On-load Release Gear Checklist

Appendix 6 Special Provisions for Authorization of the Government of Liberia

Appendix 7 List of documents

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 are to 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 1.1.1 is to be available on board.

1.1.3 The maintenance manuals and associated technical documentation as specified in 1.1.1 are to include the items listed in sections 1.2 and 1.3 as a minimum and are to 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 are to be reviewed.

1.2.3 For lifeboats (including free-fall lifeboats), rescue boats and fast rescue boats, the following items are to 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 is to be thoroughly examined for satisfactory condition[62] and operation after the annual operational test of the winch brake with the empty boat or equivalent load, as required by 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 is to be taken when carrying out all inspection and maintenance operations on the equipment.

(2) No maintenance or adjustment of the release gear is to 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 is to 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

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[62] Hanging-off pennants may be used for this purpose but are not to 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 is to be given to ensure that no damage has occurred during the winch brake test, especially to the hook fastening.

(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 is to be carried out as follows:

(1) position the boat so that it is fully waterborne;

(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 is to be checked that the release gear is completely and properly reset. The final turning-in of the boat is to be done without any persons on board.

1.2.7 The operational test of the free-fall lifeboat release function is to be carried out as follows:

(1) engage the arrangements for the test without launching the lifeboat, required by 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 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 is to 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 is to 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 are to 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 is to 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 is to be abruptly applied. Following these tests, the stressed structural parts are to be re-inspected[63] where the structure permits the re-inspection.

1.3 Five-year thorough examination, overhaul and overload operational tests

[63] In loading the craft or boat for this test, precautions are to 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.

1.3.1 The five-year operational test of the winches of the launching appliances is to 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 is to be abruptly applied.

1.3.2 Following these tests, the stressed structural parts are to be re-inspected[64] where the 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 are to 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 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[65].

1.3.4 Any other overhaul if required is to be carried out in accordance with 1.3.3.

[64] In loading the craft or boat for this test, precautions are to 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.

[65] 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 4)
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 are to 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 322
4	Merchant Marine Registry of Belize	See remarks	See remarks	See remarks	If the supplier is approved by ROs or QSCS, 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 Chinese territory (excluding Hong Kong, Macao and Taiwan) and in Chinese waters, only suppliers released on the China Maritime Integrated Services Platform are accepted; Specific requirements are given in the China MSA Notice on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [Haichuanjian No. (2019)172]. In Hong Kong, Macao, Taiwan and outside Chinese territory, the suppliers approved by RO are accepted

6	Union of Comoros	Yes	-	-	Specific requirements are given in NTA20/01925 and 21/02439
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	-	-	Service providers approved by Recognized Organizations accepted by other flag States or the European Union are accepted in areas outside

					Greece.
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	Yes	No	No	Specific requirements are given in PMA MMC-258

	Authority				
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 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 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
27	Palau Maritime Authority	Yes	No	No	Service providers approved before 1 January 1 2020 will continue to be valid until the expiration date, but not later than 31 December 2022. Specific requirements are given in Palau MN 242.2.
28	Malaysia Marine Department	No	-	Yes	Specific requirements are given in Section 24 of RO Instructions
29	Myanmar Maritime Authority	No	Yes	Yes	Specific requirements are given in Directive 8/2018

Appendix 3 Lifeboats Checklist

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 is to 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 is to 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 is to 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 is to 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

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 is to 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 is to 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

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 are to 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 re-validated 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)

THE REPUBLIC OF LIBERIA
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5 December 2019

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*.*

Appendix 7 List of documents

No.	Document No./name	Remark
1	IMO Resolution A.689(17) Recommendations on Testing of Life-saving Appliances	
2	IMO Resolution MSC.81(70) Revised Recommendations on Testing of Life-saving Appliances	
3	IMO Resolution MSC.402(96)/Corr.1 Requirements for Maintenance, Thorough Examination, Operational testing, Overhaul and Repair of Lifeboats and Rescue Boats, Launching Appliances and Release Gears and its amendments	
4	Resolution MSC.404(96) Amendments to Revised SOLAS 1974	
5	IMO MSC.1/Circ.1578 Guidelines on Safety During Abandon Ship Drills Using Lifeboats	
6	IMO MSC.1/Circ.1579 Amendments to Guidelines on the Preparation and Replacement of Operation and Maintenance Manual for Lifeboat Systems（MSC.1/Circ.1205）	
7	IMO MSC.1/Circ.1584 Amendments to Guidelines on the Evaluation and Replacement of Lifeboat Release and Retrieval Systems (MSC.1 /Circ.1392）	
8	Maintenance manuals and related technical documents provided by the manufacturers. For the overhaul and repair work of the dismantling or commissioning of the on-load and off-load release gears and the davit winch, the	

	operational instructions are to be obtained from the equipment manufacturers	
9	China MSA Notice on Printing and Distributing the Management Methods of Ship Servicing and Testing Services [HCJ (2019) No. 172]	Applicable to the suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)
10	China MSA Notice on Printing and Distributing the Technical Conditions of Organizations Performing Ship Servicing and Testing Services [HCJ (2019) No. 173]	Applicable to the suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan)

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 ship/offshore installations manufacturing plant/product manufacturing plant provides external non-destructive testing services which are required to be accepted by CCS, 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), automatic ultrasonic testing (AUT) 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 ships engaged on domestic voyages, non-classed ocean-going fishing vessels, marine products, and metal structures of non-classed offshore installations above water.

10.1.5 Category A suppliers in the Guidelines are to provide non-destructive testing service of metal structures of classed ships engaged on international voyages and offshore units above water in accordance with the requirements of IACS UR W35. If category B suppliers provide non-destructive testing service of classed ships engaged on domestic voyages, the requirements of IACS UR W35 are to be met.

10.1.6 According to IACS UR W35 requirements, the construction stage during the manufacturing of newbuilding and offshore structures includes the service application of the following hull structures and related items:

(1) Welding of structural members for ships or offshore installations;

(2) Independent fuel tanks or cargo tanks (including tanks used for low-flash point fuels, such as Type A, B, and C independent tanks described in IMO, IGC, and IGF codes);

(3) Items listed in the definition of hull structure found in CCS Rules for Classification of Sea-going Steel Ships, Appendix 1, Chapter 4, PART ONE;

(4) Rudder with welded structures.

10.2 Site

10.2.1 Permanent offices and spaces for storing equipment, documents, materials and files are to be provided. The storage area for radiographic negatives and films is to meet the temperature and humidity conditions recommended by the film manufacturer.

10.2.2 The security alert 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.

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 in the dry area are to meet the conditions for film cutting and packaging, while the temperature in the wet area are to meet the conditions for film darkroom processing and to be well ventilated.

10.2.4 In the case of manual processing of the film, the film drying space, drying oven or dryer is to be provided.

10.2.5 An independent film evaluation room is to be provided., and it is to be clean, quiet, with a suitable temperature and dim and soft lighting.

10.3 Personnel

10.3.1 The supplier is to ensure that NDT personnel employed by itself have the level and capability of performing NDT service. For the suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), radiographic testing (RT), ultrasonic testing (UT), magnetic particle testing (MT), penetrant testing (PT), visual testing (VT), time of flight diffraction (TOFD) and phased array ultrasonic testing (PAUT) Level I and II personnel level certification organization is to be CCS, and other Level I, II and all Level III personnel level certification organization can be CCS or a third party accepted by CCS that meets the requirements of ISO 9712:2021.

10.3.2 For suppliers from Hong Kong, Macau, Taiwan, and overseas China, the personnel level certification organization is to be CCS or a third-party organization accepted by CCS that meets the requirements of ISO 9712:2021. Level III personnel can also obtain certification under the supplier's self certification program through exams based on the implementation details. When adopting the SNT-TC-1A, 2020 or ANSI/ASNT CP-189, 2020 level certification schemes, CCS is to review the implementation details and decide whether to accept such certificates. In addition to the impartiality requirements of certification organizations and/or authorized organizations, the implementation details prepared by the supplier are at least to meet the basic requirements of ISO 9712:2021. For non-destructive testing operators holding certificates issued by the supplier's self certification program, when both parties terminate their employment relationship, the supplier's self certification is to

be deemed revoked.

10.3.3 The operator is to hold at least a Level I personnel certificate. The operator is to have adequate knowledge of materials, welding, structures or components, NDT equipment and limitations that are sufficient to apply the relevant NDT methods for each application appropriately. However, operators only undertaking the gathering of data using any NDT methods and not performing data interpretation or data analysis may be certified as appropriate, at Level I. If the operator is also responsible for testing implementation, defect assessment and test report preparation, he/she is to at least hold a Level II personnel certificate in respect of the corresponding NDT technology.

10.3.4 In addition to meeting all requirements for operators, the supervisor is to hold at least a Level II personnel certificate. 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 level of the operators annually. (When the suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) conducts NDT services, the technical director is to on behalf of the Supplier re-evaluate the level of the operators annually.)

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 or above certification issued or accepted by CCS. Category A suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to have at least one full-timer with appropriate Level III radiographic or ultrasonic testing certification issued or accepted by CCS, and this person is to be designated as the technical director or supervisor. When the category A supplier does not engage in radiographic or ultrasonic testing, at least one of the non-destructive testing methods is to be provided with corresponding Level III full-time personnel.

10.3.7 For category A suppliers engaged in non-destructive testing for classed ships

engaged on international voyages, marine products and metal structures of offshore units above water, one supervisor or supervisors are to be responsible to verify the non-destructive testing operation manual and procedures prepared and reviewed by Level III personnel; review non-destructive testing reports; supervise all tasks and non-destructive testing operations of non-destructive testing personnel at all levels; inspect non-destructive testing equipment, tools, and calibration; and evaluate the qualifications of operators on behalf of suppliers annually.The supplier is to employ, on a full-time basis, at least one supervisor (the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) may designate a technical director to undertake these responsibilities) with corresponding Level III certification. If a supplier can not employ a full-time Level III personnel in all the stated NDT methods practiced, it is permissible to employ an external and independently certified Level III part-time personnel on those methods that can not be held by him to undertake various responsibilities of supervisors.

For the supplier within Chinese territory (excluding Hong Kong, Macao, and Taiwan), with the consent of CCS, the supplier may designate a full-time non-destructive testing personnel within the company as a supervisor. The supervisor does not need to hold a Level III personnel certificate, but at least holds a Level II personnel certificate. For suppliers adopting this alternative solution, all other requirements of IACS UR W35 must be met, and Level III personnel outside the supplier is to be employed (part-time or on contract) to perform functions such as procedure preparation, approval, consultation, audit, etc.

The employed Level III personnel is to be certified by authoritative certification organization for all applicable testing methods within the scope of services provided by the supplier.

For the supplier within Chinese territory (excluding Hong Kong, Macao, and Taiwan), Level III part-time personnel cannot participate in specific NDT services, including on-site operation, report preparation, report review and report issuance.

10.3.8 Category A and B suppliers within Chinese territory (excluding Hong Kong, Macao, and Taiwan) are, for each of the testing items, to be provided with at least two personnel, one is for operator and one is for supervisor, both of them are to hold appropriate Level II or above technical level certificate issued or accepted by CCS for on-site operation and record. The operator is to prepare the report, and the supervisor is to review and endorse the report (when the supplier conducts non-destructive testing services in Chinese territory (excluding Hong Kong, Macao and Taiwan), the technical director is to issue the servicing and testing certificate).

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 reading, writing, listening and specking skills to meet service 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 within Chinese territory (excluding Hong Kong, Macao and Taiwan) is to at least be equipped with the following testing equipment according to the test scope to be applied[66]:

[66] The supplier is to have ownership of these devices.

(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 Equipped with radiation dose monitoring devices, alarms, and personal radiation dose monitoring devices, 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 (emulsifier, cleaning agent, penetrant, 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 in Hong Kong, Macao, Taiwan and outside Chinese territory 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 Category A suppliers and Category B suppliers meeting the requirements of IACS UR W35 are 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 suppliers and the competent authorities;

(5) maintaining the records of NDT operator, training of competent authorities, personnel qualification and certification;

(6) certification of NDT operators including re-validation and re-certification;

(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) detecting the record 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 and Category B supplies meeting the requirements of IACS UR W25, which are engaged in non-destructive testing for metal structures of classed ships and offshore units above water, a documented quality system complying with the requirements of ISO/IEC 17020:2012 and including the contents of 10.5.1 would be considered acceptable. The Supplier is to satisfy the requirements of Type A, Type B or Tyoe C inspection organization, as described in ISO/IEC 17020:2012. In any case, it is strictly prohibited for production personnel to conduct self inspection of the work performed by Type C inspection organizations.

10.5.3 The Category B suppliers who do not need to meet the requirements of IACS UR W35 are to be able to control the following activities and demonstrate their

effective implementation:

(1) Code of conduct and ethics;

(2) Testing procedure control;

(3) Supervision procedure, supervising the various testing services provided and keeping written records;

(4) Testing report and records;

(5) Control of testing equipment and accessories, regular calibration, maintenance to ensure that the equipment is in effective condition;

(6) Regularly reviewing the operational procedures, taking customer complaints seriously, and promptly developing corrective measures.

10.6 Documents

10.6.1 The Category A suppliers and Category B suppliers meeting the requirements of IACS UR W35 are to provide the following documents as required by the classification society:

(1) an outline of Supplier's organization 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 in Hong Kong, Macao, Taiwan and outside Chinese territory with in-house certification of persons scheme; a written practice developed in accordance with a recognized standard or recommended practice (i.e. ASNT’s SNT-TC-1A, 2020, ANSI/ASNT CP-189, 2020 or similar);

(6) training and follow-up programmes for NDT operators including practical training on various ships and offshore installations;

(7) a written statement issued by the supplier to authorize the operator to perform

designated tasks within the scope of certification;

(8) authorization procedure for NDT operators by technical responsible persons or supervisors corresponding to each testing method;

(9) experience of the Supplier in the specific service area;

(10) For suppliers who have obtained certification from certification organizations, NDT operators' training records and job lists in relevant service areas, including personnel qualifications and third-party certification according to the ISO 9712:2021 certification plan;

(11) description of equipment used for the services performed by the Supplier;

(12) a guide for NDT operators to use equipment mentioned above;

(13) record formats for recording results of the services referred to in 10.7;

(14) information on other activities which may present a Conflict of interest (if any);

(15) record of customer claims and corrective actions (if any);

(16) any legal proceedings against the company in the past/currently in the courts of law (if any).

10.6.2 For the Category B suppliers not meeting the requirements of IACS UR W35, documents in 10.6.1, except (5), (7), (8) and (10), are to be submitted.

10.6.3 The supplier is at least to be provided with the technical documents required in Appendix 1, which are to be up-to-date and valid:

10.6.4 A list of qualified suppliers such as testing equipment and consumables which are evaluated periodically, accepted by CCS is to be provided.

10.6.5 The inventory book of consumables is to be set up, listing the quantity, time and actual inventory of various consumables.

10.6.6 The valid verification/calibration conformity certification or certificate issued by the national statutory or authorized metrological technical institution is to be provided for testing equipment with metering function.

10.6.7 The suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to properly keept the previous and current testing records, certificates or

reports are to be properly kept for not less than 5 years.

10.6.8 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 prepared, verified or approved.

10.6.9 When conducting radiography-related testing services, suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to hold a radiation safety license within the validity period issued by relevant Chinese Administration.

10.7 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 in Hong Kong, Macao, Taiwan and outside Chinese territory

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.

Appendix 1 List of documents

No.	Document No./name	Remark
1	CCS Rules for Classification of Sea-going Steel Ships	
2	CCS Rules for Materials and Welding	
3	CCS Guidelines for Inspection of Hull Welds	
4	IACS UR W35	Category A, and Category B meeting the standards
5	IACS UR W33	Category A, and Category B meeting the standards
6	ISO 9712:2021; Non-destructive testing-Qualification and certification of NDT personnel	Category A, and Category B meeting the standards, if applicable
7	ISO/IEC 17020:2012; Conformity assessment-Requirements for the operation of various types of bodies performing inspection	Category A, and Category B meeting the standards, if applicable
8	ISO/IEC 17024:2012; Conformity assessment-General requirements for bodies operating certification of persons	Category A, and Category B meeting the standards, if applicable

9	ISO 9001:2015; Quality Management Systems-Requirements	If applicable
10	SNT-TC-1A: 2020; Personnel Qualification and Certification in Nondestructive Testing	Category A, and Category B meeting the standards, if applicable
11	ANSI/ASNT CP-189:2020; ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel	Category A, and Category B meeting the standards, if applicable
12	China MSA Management Methods of Ship Servicing and Testing Services	
13	China MSA Technical Conditions of Organizations Performing Ship Servicing and Testing Services	
14	Non-destructive testing standards appropriate to servicing and testing service, i.e.: CB/T3558-2011, CB/T3559-2011, CB/T3958-2004, IACS Rec. 20, etc.	
15	CCS (2013) Circular No. 165 Total No. 451- CCS NDT Acceptance Criteria	

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 servicing and testing personnel are to be trained in the professional knowledge of onboard noise, underwater noise and/or onboard vibration measurement and practical measurement operation skills, and is to pass CCS verification to confirm that his professional knowledge level and practical measurement operation ability meet the needs of providing services. In addition to meeting the relevant requirements of 1.2.1 (9), (10) and (11), Chapter 1, 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 for projects to be engaged in.

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.

For the suppliers within Chinese territory (excluding Hong Kong, Macao and Taiwan), at least one supervisor and one operator are to be provided for on-site operation and record during the onboard noise measurement. The report is prepared by the operator, reviewed by the supervisor and issued by the technical director.

Suppliers providing onboard noise measurement services within Chinese territory (excluding Hong Kong, Macao, and Taiwan) are to appoint a technical director with the requirements not lower than those of a 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 (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) The standard version for instrument calibration is to be consistent with that used by the manufacturer when manufacturing the instrument. 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/IEC 17025(2017), as amended. The sound calibrator and the sound level meter are to be calibrated according to the IEC61672-3 standard. 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 is not to 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 at least every two years and within the validity period.

(5) The supplier is to be equipped with at least one set of the above equipment.

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.

(3) The supplier is to be equipped with at least one set of the above equipment.

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;

⑦GB/T 4595 Measurement of Noise on Board Vessels, as applicable;

⑧ IMO MSC.1/Circ.1509 Unified Interpretations of the Code on Noise Levels onboard Ships (MSC. 337 (91)).

(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 Other requirements

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 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.

11.6.4 Verification

The supplier, after noise and/or vibration measurement, is to submit the measurement results to CCS Surveyor for verification and endorsement.

11.6.5 Storage

The measurement records, certificates or reports are to be properly kept for not less than 5 years.

11.6.6 Safety protection

The labor safety protection articles required by testing personnel are to be provided.

Appendix 1 List of documents

No.	Document No./name	Remark
1	IMO Resolution A468(XII) Code on Noise Levels on Board Ships	Shipboard noise
2	IMO Resolution MSC.337(91) Code on Noise Levels on Board Ships	Shipboard noise
3	IMO Resolution A.343(IX) —Recommendations on the Measurement Method of Noise Level at Monitoring Stations	Shipboard noise
4	CCS Guidelines for Control and Measurement of Noises for Ships and Marine Products	Shipboard noise
5	ISO 2923 Measurement of Noise Levels on Board Ships	Shipboard noise
6	Rules, standards or guidelines of ship survey organizations accepted or recognized by the Maritime Safety Administration of the Ministry of Transport of China (if applicable)	Shipboard noise
7	GB/T 4595 Measurement of Noises on Board Ships (if applicable)	Shipboard noise
8	CCS Guidelines for Underwater Radiated Noise from Ships	Underwater radiated noise
9	Rules, standards or guidelines of ship survey organizations accepted or recognized by the Maritime Safety Administration of the Ministry of Transport of China (if applicable)	Underwater radiated noise
10	CCS Guidelines for Shipboard Vibration Control	Shipboard vibration

11	ISO 6954 Mechanical vibration — Guidelines for the measurement, reporting and evaluation of vibration with regard to habitability on passenger and merchant ships	Main international standards for vibration measurement with regard to habitability on ships (Vibration)
12	ISO 4868 Code for the measurement and reporting of local vibration data of ship structures and equipment	Main international standards for vibration measurement with regard to habitability on ships (Vibration)
13	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 vibration measurement with regard to habitability on ships (Vibration)
14	ISO 4868 Code for the measurement and reporting of local vibration data of ship structures and equipment	Main international standards for structural vibration VIB(M), or vibration VIB
15	ISO 10816-6 Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 6: Reciprocating machines with power ratings above 100kW	Main international standards for structural vibration VIB(M), or vibration VIB
16	IMO MSC.1/Circ.1509 Unified Interpretations of the Code on Noise Levels onboard Ships (MSC. 337 (91)).	Noise onboard Ships

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 and issued by the supervisor.

12.3.2 The operator is to have appropriate professional knowledge on marine engineering and fluid mechanics and to pass the evaluation 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 evaluation 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 water temperature measurement equipment is to be provided.

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, and at least include the contents in Appendix 1.

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.

Appendix 1 List of documents

No.	Document No./name	Remark
1	GB/Z 816-2019 Open water test method for propeller models	
2	GB/Z 817-2019 一 Test method for resistance of general displacement-type ship models	
3	GB/Z 818-2019 Test method for single propeller self-propulsion of general displacement-type ship models	
4	GB/Z 239-2008 Test method for dual propeller self- Propulsion of conventional displacement-type ship models	
5	ITTC 7.5-01-01-01, 7.5-02-02-01, 7.5-02-03-01.1, 7.5-02-03-01.4, 7.5-02-03-02.1, 7.5-02-03-02.4	

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 The supplier is to be responsible for training its operators and supervisors to ensure that these personnel have the professional knowledge and practical operation ability of ship trial speed measurement, and pass the CCS verification. 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 verification before they can be re-listed in the list of servicing and testing personnel 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 have relevant training and verification, or at least one year of internship/work experience related to trial speed measurement.

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 at least two years of independent working experience as trial speed measurement

operators.

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) or Beidou positioning system (BDS) 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, at least including the contents in Appendix 1.

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.

Appendix 1 List of documents

No.	Document No./name	Remark
1	CCS Guidelines on Calculation and Verification of the Energy Efficiency Design (EEDI) of International Sea-going Ships	
2	CCS Guidelines on Calculation and Verification of the Energy Efficiency Design (EEDI) of Ships Engaged on Domestic Voyages	
3	CCS Guidelines on Calculation and Verification of the Energy Efficiency Design (EEDI) of Inland Ships	
4	CB/T3767 Test Methods for Speed Measurement of Sea-going Ships	
5	CB/T3970 DGPS Test Methods for Ship Speed and Maneuverability	
6	ISO15016 Ships and marine technology —Guidelines for the assessment of speed and power performance by analysis of speed trial data	
7	ITTC Recommended Procedures for Speed and Power Testing	

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[67] and/or condition-based maintenance[68] 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,

[67] Assistant decision-making: refer to Appendix 22, Chapter 5, PART ONE of Rules for Classification of Sea-going Steel Ships and 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.

[68] Condition-based maintenance: refer to Appendix 22, Chapter 5, PART ONE of Rules for Classification of Sea-going Steel Ships and 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.

ultrasound etc., the supplier is to train the relevant operators and supervisors according to the requirements for condition monitoring service, and obtain the training 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 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 corresponding 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 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).

Appendix 1 List of documents

No.	Document No./name	Remark
1	ISO/IEC 17025：2017 Accreditation criteria for the competence of testing and calibration laboratories	
2	ISO 18436 series standards	
3	CCS Rules for Intelligent Ships	
4	CCS Guidelines for Surveys of Intelligent Machinery of Ships	
5	URZ 27 Condition Monitoring and Condition Based Maintenance	
6	CCS Rules for Classification of Sea-going Steel Ships	

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[69] services of machinery installations are to obtain training level certification of Grade I or above of ISO

[69] Assistant decision-making: refer to Appendix 22, Chapter 5, PART ONE of Rules for Classification of Sea-going Steel Ships and 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.

18436-4 or ISO 18436-5, or training certification in accordance with a similar recognized standard.

(5) Operators of supplier providing condition-based maintenance[70] services of machinery installations are to obtain training level certification of Grade II or above of ISO 18436-4 or ISO 18436-5, or training certification in accordance with a similar recognized standard.

(6) The supplier engaged in lubricating oil analysis of screwshaft condition monitoring is to be provided with at least three approved lubricating oil analysts (at least one for physical and chemical analysis, one for spectrum analysis and one for ferrographic analysis) with at least a secondary technical school degree (or an equivalent education). The supplier engaged in lubricating oil analysis of diesel engine condition monitoring is to be provided with at least three approved lubricating oil analysts.

15.2.4 Supervisor

(1) Relevant training levels of operator are required.

(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 obtain training level certification of Grade II or above of ISO 18436-4 or ISO 18436-5, or training certification in accordance with a similar recognized standard.

(4) The supervisor of supplier providing condition-based maintenance services of machinery installations is to obtain training level certification of Grade III or above of ISO 18436-4 or ISO 18436-5, or training certification in accordance with a similar recognized standard.

[70] Condition-based maintenance: refer to Appendix 22, Chapter 5, PART ONE of Rules for Classification of Sea-going Steel Ships and 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.

(5) The supplier engaged in lubricating oil analysis is to be provided with at least one supervisor and the supervisor engaged in lubricating oil analysis of screwshaft and diesel engine condition monitoring is to have at least college degree (or an equivalent education).

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.

15.3.2 The instruments and equipment of the supervisor engaged in lubricating oil analysis of screwshaft and diesel engine condition monitoring may be purchased at its discretion or leased from other organizations.

15.4 Documents

15.4.1 The supervisor engaged in lubricating oil analysis of screwshaft and diesel engine condition monitoring applying for approval is to submit the following documentation: name and particulars of the supplier; number, condition and qualification of the analysts to be approved; type, date of manufacture, name of manufacturer, manufacturer’s certificate, class of accuracy and (or) calibration certificate of analytical instruments; various management systems; fees to be charged for service.

15.4.2 The analysts of the supervisor engaged in lubricating oil analysis of screwshaft and diesel engine condition monitoring applying for approval are to submit the following documentation: name, age, education background and health condition

of the applicant; technical resume (i.e. experience of lubricating oil analysis) and certificates; recommendation by the organization and qualification documents.

15.4.3 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.

15.4.4 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.

15.4.5 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 The supervisor engaged in lubricating oil analysis of screwshaft and diesel engine condition monitoring is to have a complete set of quality assurance system or quality system for lubricating oil analysis condition monitoring, including: work post responsibility; analysis result and report review; files management; analytical instrument management and calibration; personnel training and assessment.

15.5.3 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.

Appendix 1 List of documents

No.	Document No./name	Remark
1	ISO/IEC 17025：2017 Accreditation criteria for the competence of testing and calibration laboratories	
2	ISO 18436 series standards	
3	CCS Rules for Intelligent Ships	
4	CCS Guidelines for Surveys Intelligent Machinery of Ships	
5	URZ 27 Condition Monitoring and Condition Based Maintenance	
6	CCS Rules for Classification of Sea-going Steel Ships	

Chapter 16 Suppliers Engaged in Survey Using Remote Inspection Techniques (RIT) for the Structure of Ships and Offshore Units

16.1 Application

16.1.1 This Chapter applies to suppliers engaged in survey using Remote Inspection Techniques (RIT) for the following survey items of ships and offshore units' structure:

(1) Suppliers engaged in using Remote Inspection Techniques (RIT) for Close-Up Survey of ships and offshore units' structure.

(2) Suppliers engaged in using Remotely Operated Vehicles (ROV) for in-water Close-Up Survey of the internal compartments. Such suppliers are firstly to comply with the requirements of Chapter 3, Part 1 of this Guidelines and hold the approval of in-water survey.

(3) Suppliers engaged in above-water thickness measurement and/or non-destructive testing using RIT of metal structures of ships and offshore units. Such suppliers are firstly to comply with the requirements of Chapter 2 and/or Chapter 10 of Part 1 of this Guidelines and hold the approval of above-water thickness measurement of metal structures and/or above-water non-destructive examination of metal structures.

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 The supplier is to train its supervisor and operator to apply the remote inspection technology and to ensure that their capability and competence are verified by CCS. The supervisor and operator are to have training records of the following knowledge:

(1) Marine and/or offshore nomenclatures.

(2) The structural configuration of relevant ships types and offshore units, including internal structure；the minimum Rule requirements for the structure of relevant ships types and MOUs, the recognition of structural deterioration (including corrosion, buckling, cracking and deteriorated coatings) and use of the reporting system.

(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 (TM) and non-destructive examination (NDE) in accordance with a recognized National or International Industrial NDE Standard (if applicable).

(6) Requirements for close-up inspection and thickness measurement of ship and/or offshore unit structures (if applicable).

(7) When using UAVS for services, CCS “Guidelines for Using UAV for Survey” and/or related operational guidelines.

According to the requirements of Chapter 2, Part 1 of this Guideline, thickness measurement personnel who have completed the training of above-water thickness measurement of metal structures of ships and/or offshore units may be exempted from relevant thickness measurement trainings according to the training certificate.

For suppliers engaged in using RIT for survey and located in Hong Kong, Macau, Taiwan and overseas, the training certificate of “suppliers engaged in using remote inspection technology for survey of ships and MOU structures” issued or accepted by QSCS certified classification societies is acceptable to CCS.

16.3.2 The operators carrying out the inspection are 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 ship and/or MOU's 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. UAV pilots are to be qualified and licensed in accordance with applicable national requirements and/or an equivalent industrial standard accepted by CCS. Operators are to fully understand the performance parameters, scope of application, and usage limitations of RIT equipment.

16.3.3 In addition to meeting the requirements for operators in 16.3.2, supervisors are to be certified according to the recognized national requirements or an equivalent industrial standard (e.g. YYY level) and have a minimum of two years' experience in survey of ship and/or MOU's structure. Supervisors are to fully understand the performance parameters, scope of application, and usage limitations of RIT equipment.

16.3.4 The supplier is to ensure that the number of operators and supervisors is commensurate with the established business scale and the quantity of on-site operation, recording, preparation and audit reports. At least one RIT supervisor and one RIT operator are to be provided for on-site service. When using remote inspection technology for above-water thickness measurement and/or non-destructive examination of metal structures, RIT supervisors and operators are to meet the relevant requirements of Chapter 2 and/or Chapter 10, Part 1 of this Guideline. The supervisors (technical director) and operators are to be approved by CCS, the NDT personnel is to hold corresponding level certificate, and the thickness measurement personnel is to be subject to relevant training. When using ROV for in-water close-up survey of internal compartments, RIT supervisors and RIT operators are firstly to meet the relevant requirements of Chapter 3, Part 1 of this Guideline and hold the corresponding ROV qualification certificate.

16.4 Equipment

16.4.1 The followings are to be available for RIT：

(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 function of capturing in high definition both video images and still images;

(4) Illumination；

(5) High definition display screen with live high definition feed from inspection cameras (if applicable)；

(6) Means of communication；

(7) Data recording (if applicable)；

(8) Equipment for carrying out thickness gauging and/or non-destructive examination, as relevant to the work to be performed，the requirements of Chapter 2 or/and Chapter 10, Part 1 of this Guideline are to be complied.

16.4.2 Apart from the requirements of Chapter 3.4.1 of Part 1 of this guideline, Suppliers engaged in using ROVs for in-water close-up survey of internal compartments are to be equipped with at least two sets of equipment that meet the following requirements:

(1) Remote Operated Vehicle (ROV) that meets the requirements for in-water inspection of internal compartments;

(2) The accuracy of positioning and navigation equipment of ROV is to meet the requirements of in-water close-up survey of internal compartments;

(3) Control equipment and software that meet the various functions of ROV.

16.4.3 Suppliers engaged in using UAVs for above-water close-up survey and/or thickness measurement of metal structures of ships and MOUs are to be equipped with at least two sets of UAVs that meet the following requirements.

16.4.3.1 Safety performance

(1) UAVs that carry out survey in spaces where light intensity is insufficient and GPS signals are weak or lost are to be capable of flying and hovering stably in this environment. The UAV can stably approach the inspected structure.

(2) UAVs are to have automatic collision evasion or certain anti-collision capability. The UAVS are not to cause damage to the structure and its coating.

(3) When powered by battery, UAVs are to have power warning and low power alarm function, and are to be capable of forced landing or returning when the battery is running low.

(4) When using tethered power supply, UAVs are to be equipped with spare batteries to enable forced landing or flight return, and have the cable plug anti- disengage device.

(5) Where there is risk of loss of communication, UAVs are to have one of the functions of automatic hovering, forced landing or returning.

(6) UAVs are to be equipped with warning lights，with different colors indicating the status of the UAVs.

(7) UAVs and their flight control systems are not to affect normal operation of electrical and electronic equipment onboard ships and offshore units.

(8) UAVs are to have wind resistance capacity required by surveys.

(9) UAVs operating in dangerous areas are to be explosion-proof, unless the areas have been tested as being safe from explosion, well-ventilated at all times, and inspected regularly to ensure that there is no re-accumulation of flammable gas, and there is no explosion risk due to the use of UAVs.

16.4.3.2 Data transmission and communication

(1) Data transmission and communication are to be via open wireless band or wire communication.

(2) UAVs are to have strong anti-interference ability. When working in the internal compartments of steel vessels and offshore units， UAVs are to have stable communication and real-time image transmission capability.

16.4.3.3 Data storage

(1) Data type: video, photo， thickness measurement data (when using RIT for thickness measurement services);

(2) Video resolution: no less than 1080P;

(3) Image resolution: no less than1080P;

(4) Video format: MP4 or other mainstream formats;

(5) Photo format: JPG or other mainstream formats;

(6) Thickness measurement data (when using RIT for thickness measurement

services): common data format easy to be stored, read, and exchanged;

(7) Storage mode and capacity: the storage capacity of the airborne storage card or the software system of the UAV ground control station is to be not less than the data volume collected continuously during the maximum endurance time of the UAV, meanwhile, spare storage cards or space enough for this survey or continuous operation of not less than 4 hours are to be provided.

16.4.3.4 Requirements for airborne illumination

UAVs carrying out survey in spaces where illumination is insufficient are to be equipped with suitable airborne lighting equipment to meet survey requirements. The light is generally to be flooded to avoid light spots in the image or reflections due to insufficient lights or over-brightness, so that structural details can be seen clearly.

16.4.3.5 Requirements for airborne cameras

(1) Adapting to environment with insufficient light

(2) Good anti - shake performance

(3) Images taken are to be able to show the structural details clearly and truthfully without distortion

(4) Having real-time photo function

16.4.3.6 Requirements for thickness measurement equipment (when using RIT to measure thickness)

(1) The thickness gauge carried by UAVs is to meet the requirements of Article 2.3 of Chapter 2, Part 1 of this Guideline；

(2) Thickness gauge carried by UAVs is to be able to adjust position via remote control. The probe of the thickness gauge is to be perpendicular to the surface of the structure being measured, and able to continuously measure the thickness of the structure from different directions using the maneuverability characteristics of UAVs and the dynamics of the thickness gauge probe. The measurement direction can be defined as: horizontal (-90° to+90°), vertical upward, vertical downward, inclined upward (0° to 90°), inclined downward (0° to -90°), inclined rightward(0° to 90°), inclined leftward (0° to -90°), and the composite direction of the above directions in the three-dimensional space;

(3) During thickness measurement, UAVs are to maintain a stable flight and operation

state, especially in areas disturbed by local air flow, such as narrow /top areas;

(4) During thickness measurement, the probe is to be able to fit the structural surface in a stable manner and maintain such fitness for at least 5 consecutive seconds；

(5) The ground control station of UAVs is to be able to display real-time thickness measurement data and corresponding pulse reflection waveform；

(6) UAVs are to be equipped with camera to collect real-time images of the thickness measurement probe and the measured structure, which are to be displayed at the ground control station of UAVs；

(7) UAVs are to be equipped with software to record real-time thickness measurement data and images of the measured structure; such software is to be able to record the cabin/location, structural unit, and component location corresponding to the thickness measurement data.

16.4.4 Suppliers using Climbers for above-water close-up survey and/or thickness measurement of metal structures of ships and MOUs are to be equipped with at least two sets of Climbers that meet the following requirements.

16.4.4.1 Safety performance

(1) Being able to climb, overcome obstacles and prevent falls during survey, and are to be equipped with sufficient strength and reliable fall arrest rope and/or fall arrest device. Under the operating conditions, climbers are to be prevented from slipping or falling due to damaged coatings, rust scales, oil sludge, cargo residues, silt, etc., or falling when overcoming obstacles;

(2) Anti-collision measures are to be in place to avoid damages to the structure and its coating caused by the Climbers and their walking devices；

(3) When powered by battery, power warning and low power alarm are to be given;

(4) When using tethered power supply, tethered Climbers are to be equipped with spare batteries to enable forced landing or flight return. Cable plug anti-disengage device are to be provided;

(5) In case of power failure, Climbers are to have no risk of falling;

(6) In case of failure, Climbers are to be able to return or to be recovered;

(7) Shall be equipped with warning lights， indicating status of the Climbers with different colors of the warning lights;

(8) Climbers and their climbing control systems are not to affect normal operation of electrical and electronic equipment onboard ships and offshore units;

(9) Climbers operating in dangerous areas are to be explosion-proof, unless the areas have been tested as being safe from explosion, well-ventilated at all times, and inspected regularly to ensure that there is no re-accumulation of flammable gas, and there is no explosion risk due to the use of Climbers

(10) The Climbers are to have self-cleaning function;

(11) The Climbers are to have braking function or slow down and stop functions;

(12) Climbers with a permanent magnet wheel are to be equipped with a magnetic detection device and a device that can be conveniently removed from their structures. The devices referred to in this Article may be self-contained devices and need not be part of the Climbers.

16.4.4.2 Data transmission and communication

(1) Data transmission and communication are to be via open wireless band or wire communication;

(2) Climbers are to have strong anti-interference ability. When working in the internal compartments of steel vessels and offshore units， Climbers are to have stable communication and real-time image transmission capability

16.4.4.3 Data storage

(1) Data type: video, photo， thickness measurement data (when using RIT for thickness measurement);

(2) Video resolution: no less than 1080P;

(3) Image resolution: no less than1080P;

(4) Video format: MP4 or other mainstream formats;

(5) Photo format: JPG or other mainstream formats;

(6) Thickness measurement data (when using RIT for thickness measurement) : common data format that is easy to store, read, and exchange;

(7) Storage mode and capacity: the storage capacity of the onboard storage card or the software system of the ground control station of the Climber are to be not less than the data volume collected continuously during the maximum endurance time of the Climber, meanwhile, spare storage cards or space enough for this survey or

continuous operation of not less than 4 hours are to be provided.

16.4.4.4 Requirements for onboard illumination

(1) Climbers carrying out survey in spaces where illumination is insufficient are to be equipped with suitable onboard lighting equipment to meet survey requirements. The light is generally to be flooded to avoid light spots in the image or reflections due to insufficient lights or over-brightness, so that structural details can be seen clearly.

16.4.4.5 Requirements for onboard cameras

(1) Adapting to environment with insufficient light;

(2) Good anti-shake performance;

(3) Images taken is to be able to show the structural details clearly and truthfully without distortion;

(4) Having real-time photo function

16.4.4.6 Requirements for thickness measurement equipment requirements (when using RIT to measure thickness)

(1) The thickness gauge carried by Climbers is to meet the requirements of Article 2.3 of Chapter 2, Part 1 of this Guideline；

(2) Thickness measurement equipment onboard Climbers is to be able to adjust position via remote control. The probe of the thickness gauge is to be perpendicular to the surface of the structure being measured, and able to continuously measure the thickness of the structure from different directions using the maneuverability characteristics of Climbers and the dynamics of the thickness gauge probe. The measurement direction can be defined as: horizontal (-90° to+90°), vertical upward, vertical downward, inclined upward (0° to 90°), inclined downward (0° to -90°), inclined rightward(0° to 90°), inclined leftward (0° to -90°), and the composite direction of the above directions in the three-dimensional space;

(3) During thickness measurement, Climbers are to maintain a stable working state;

(4) During thickness measurement, the probe of the onboard thickness gauge is to be able to fit the structural surface in a stable manner, and maintain such fitness for at least 5 consecutive seconds；

(5) The ground control station of Climbers is to be able to display real-time thickness measurement data and corresponding pulse reflection waveform；

(6) Climbers are to be equipped with camera to collect real-time images of the thickness measurement probe and the measured structure, which is to be displayed at the ground control station of Climbers；

(7) Climbers are to be equipped with software to record real-time thickness measurement data and images of the measured structure; such software is to be able to record the cabin/location, structural unit, and component location corresponding to the thickness measurement data.

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 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 licenses;

(3) Equipment register for UAVs, Climbers, 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/ Climber operation logbook.

16.5.3 Suppliers engaged in using remotely operated vehicle (ROV) for in-water close up survey of the internal compartment, in addition to the applicable provisions of Section 3.5.1, Chapter 3, Part 1 of this Guideline, the followings are also to be included in the operational procedures and guidance:

(1) ROV operation and maintenance guidelines;

(2) Means to ensure the positioning and navigation of the ROV within the compartment and guidelines for operation and maintenance of the equipment.

16.5.4 The supplier is to provide documentation explaining the performance parameters, scope of application, and usage limitations for the remote survey equipment and the equipment used for thickness measurement and/or non-destructive examination (if applicable).

16.6 Other requirements

16.6.1 Performance verification of remote inspection equipment

During the initial approval or additional review following changes to RIT equipment, CCS is to conduct verification of RIT equipment and equipment for thickness measurement and/or non-destructive examination (if applicable) in accordance with the requirements in 16.4 to 16.5 of this Chapter. Verification is to include documentation verification and/or on-site verification. The suppliers and/or RIT equipment manufacturers are to provide documents related to remote inspection, including but not limited to: manufacturer certificate or equivalent document, quality testing report or equivalent document, performance parameters， scope of application and specification of usage restrictions, etc. The suppliers and/or RIT equipment manufacturers are to arrange a site to carry out performance verification of RIT equipment.

16.6.2 Operational verification

CCS conducts operational verification for items within the scope of services for which

the suppliers have applied for approval. Generally, compartments of typical structures of ships in service may be selected for operational verification.

16.6.3 Suppliers using UAV are to comply with the requirements of the local civil aviation administrations, such as the relevant requirements of the Civil Aviation Administration of China for institutions, pilots, UAVs, flight activities, airspace restrictions, real-name registration and other relevant requirements.

16.6.4 Other requirements for thickness measurements with RIT

(1) Thickness measurement is to be carried on clean surface and under good coating condition. In case there are attachments such as rust, oil sludge, cargo residue and silt on the surface of the structure that affect the accurate acquisition of thickness measurement data, RIT is not to be used for thickness measurement unless the attachments can be removed prior to the measurement.

(2) The thickness gauge probe is to be clean during the service process, and corresponding operation procedures are to be developed；

(3) For each thickness measurement point, the thickness data displayed by the ground control station of the RIT equipment is to remain unchanged for at least 5 consecutive seconds before it can be considered valid.

16.6.5 The supplier is to have data storage devices and retain survey data for at least 5 years, including videos, images, thickness measurement data, reports, and other files.

16.6.6 The supplier is to obtain verification/witness of the surveyor for all work during the service, who is also to sign the report document. The report document are to be filed.

Appendix 1 List of documents

No.	Document No./name	Remark
1	IACS UR Z7	
2	IACS UR Z10	
3	IACS UR Z17	
4	CCS GUIDELINES FOR USE OF UNMANNED AERIAL VEHICLES FOR SURVEYS	
5	CCS Guidelines for Thickness Measurement of Hull	
6	CCS Rules for Classification of Sea-going Steel Ships	
7	CCS Rules for Classification of Mobile Offshore Units	
8	CCS Rules for Classification of Offshore Floating Installation	
9	The relevant administrative provisions of the local civil aviation administrations for the "use of UAV for survey of ships and/or MOUs".	

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 the contents in Appendix 4:

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 Other requirements

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

Appendix 2 Key Points for Use in Special Cases

Appendix 3 Format of Test Report (Recommendation)

Appendix 4 List of documents

Appendix 1　General Procedure of Practical Operation Verification

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:

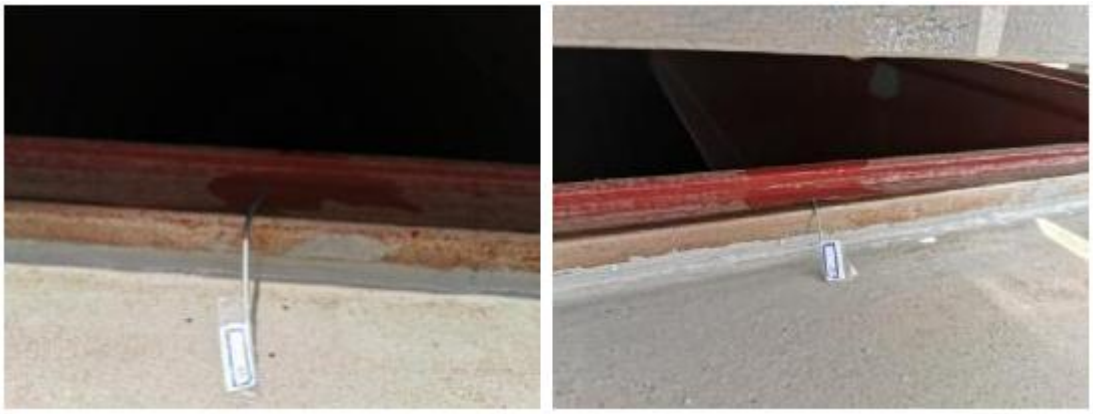

Illustration of artificial defect arrangement

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

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)

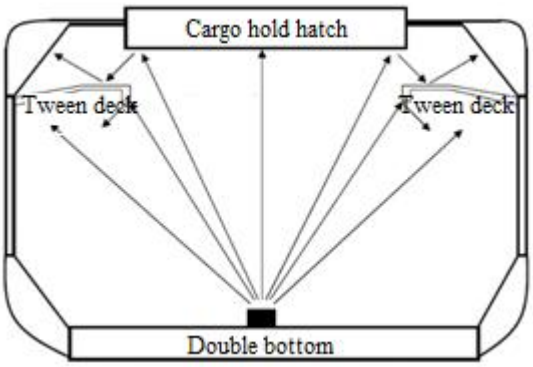

Figure 1 Double deck cargo hold

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)

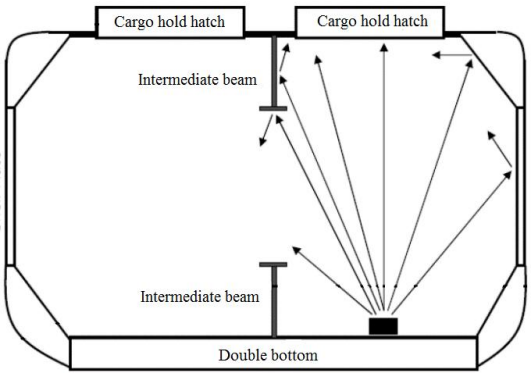

Figure 2 Cargo hold with intermediate beams

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)

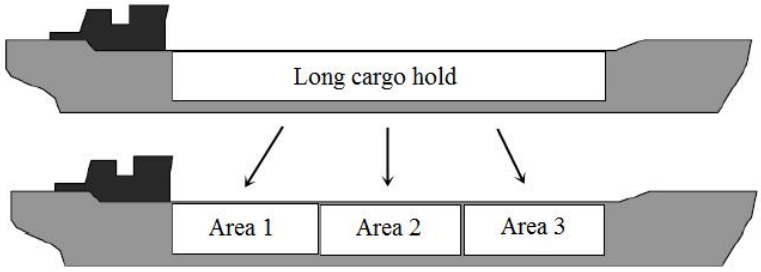

Figure 3 Long and narrow cargo hold

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)

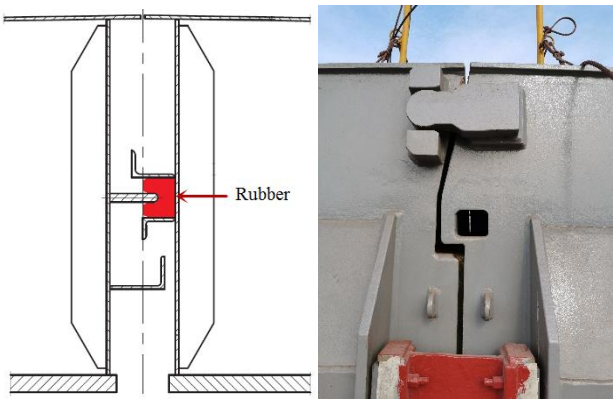

Figure 5 Middle seam of hatch cover

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 (Recommendation)

<table>
<tr><td colspan="4">Ultrasonic Leak Detection Report Report No.:</td></tr>
<tr><td colspan="4">1. Ship’s particulars
Ship name, identification number (ship project number)，IMO NO.: 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:</td></tr>
<tr><td colspan="4">2. Equipment self-test
Equipment self-test status before the test:
Equipment self-test status after the test:</td></tr>
<tr><td colspan="4">3. Measurement of open hatch value</td></tr>
<tr><td colspan="4">4. Determination criteria for leakage</td></tr>
<tr><td colspan="4">5. Description of leak defects</td></tr>
<tr><td>Defect location</td><td>Decibel reading</td><td>Decibel reading after repair</td><td>Remarks</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">6. Diagram</td><td colspan="2">7. Description

Operator: Supervisor: Surveyor:</td></tr>
</table>

Appendix 4 List of documents

No.	Document No./name	Remark
1	SOLAS 1974 and its amendments	
2	IACS UR S14 Procedures for watertightness test	
3	IACS UR Z17	
4	CCS Guidelines for Application of Ultrasonic Leakage Testing Technology	
5	International Convention on Load Lines and its amendments	
6	CCS Rules for Classification of Sea-going Steel Ships	

Chapter 18 Suppliers Engaged in Cable Transit Watertight Systems Inspection on Ships and Mobile Offshore Units

18.1 Application

18.1.1 This Chapter applies to suppliers providing cable transit watertight systems inspection on ships and mobile offshore units. The supplier inspect the cable transit watertight systems for compliance with the relevant approval certificates and product installation manuals, (types of cable transit watertight 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 watertight systems;

(2) common problems found with the initial installation and in-service inspections of cable transit watertight systems;

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

(4) procedures for reporting on initial installation and in-service inspections of cable transit watertight 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 watertight 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 watertight system.

18.4.3 On completion of inspection, the Service Provider will issue a report confirming the condition of the Cable Transit Watertight System. They will also record the results of their inspection in the Cable Transit Watertight 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 industrial 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.

Appendix 1 List of documents

No.	Document No./name	Remark
1	CCS Rules for Classification of Sea-going Steel Ships	
2	IACS UR Z17	
3	Manufacturer's maintenance manual	

Chapter 19 Suppliers Engaged in Commissioning Testing for Ballast Water Management System

19.1 Purpose

The purpose of commissioning testing is to validate the installation of a ballast water management system (BWMS) by demonstrating that its mechanical, physical, chemical and biological processes are working properly. Commissioning testing is not intended to validate the design of type-approved BWMS that are approved by the Administration.

19.2 Definitions

19.2.1 Independent organization means that BWMS commissioning and testing organization is to be independent of BWMS stakeholders (such as manufacturers, agents, shipyards installing BWMS, shipyards manufacturing spare parts for BWMS, etc.).

19.2.2 Laboratory testing capability means the ability to carry out detailed analysis of ballast water and sample enumeration in the analytical laboratory.

19.2.3 Rapid testing capability means the ability to carry out ballast water indicative analysis on board.

19.2.4 Suppliers of Category A engaged in commissioning testing of BWMS means an independent organization capable of verifying the effectiveness of BWMS self-monitoring equipment, sampling BWMS, pre-treatment and transportation of water samples, onboard rapid testing and laboratory testing capabilities, indicative analysis, detailed analysis and sample identification and enumeration of ballast water.

19.2.5 Suppliers of Category B engaged in commissioning testing of BWMS means an independent organization capable of verifying the effectiveness of BWMS self-monitoring equipment, sampling BWMS, onboard rapid testing capabilities, indicative analysis of ballast water.

19.2.6 Equal - momentum sampling refers to a special sampling method used to

obtain representative water samples. During the collection of ballast water samples, the flow velocity of the ballast water entering the sampling pipe is equal to the flow velocity of the ballast water at that point in the ballast pipe.

19.3 Application

19.3.1 This chapter applies to suppliers who, for statutory purposes, sample, analyse and verify the effectiveness of the BWMS self-monitoring equipment during BWMS commissioning tests.

19.3.2 Suppliers of Category A engaged in commissioning testing of BWMS can carry out commissioning testing for all BWMS.

19.3.3 Suppliers of Category B engaged in commissioning testing of BWMS can only carry out commissioning testing for BWMS specified by the Administration which accepts or is recommended to accept the indicative analysis methodology.

19.3.4 In case the Administration has special requirements, consideration is to be given to meeting these special requirements.

19.4 Personnel

19.4.1 Operators and supervisors of the supplier are to have knowledge for carrying out sampling and analysis of ballast water and verifying the effectiveness of the BWMS self-monitoring parameters, so as to carry out the biological sampling and analysis, sample enumeration and assessment of the BWMS self-monitoring parameters and have responsibility for document that the requirements of the manufacturer to the operator of the BWMS are satisfied.

19.4.2 Operators of the supplier are to:

(1) have sufficient engineering and biological knowledge and practical experience. Operators are to have one year or more working experience in engineering installation commissioning or biological testing;

(2) have knowledge and experience of working principle, design, construction, installation process and operation of BWMS with different processing technologies for the purpose of assessing biological efficacy;

(3) have knowledge of IMO Guidance for the Commissioning Testing of Ballast Water Management Systems (BWM.2/Circ.70/Rev.1), IACS Rec.180 Recommendation on Commissioning Tests for Ballast Water Management Systems, and IMO Guidance on Ballast Water Sampling and Analysis for Trial Use in accordance with the BWM Convention and Guidelines (G2)(BWM.2/Circ.42/Rev.2);

(4) be trained in the proper use of portable indicative analysis equipment, be familiar with the technologies utilized by the indicative sampling equipment (such as chlorophyll determination, pulse determination and fluorescence, etc.);

(5) be familiar with the equal momentum sampling method to ensure representativeness of water samples;

(6) be familiar with high temperature and high pressure sterilization of bacterial collection vessel (*)[71];

(7) be familiar with the method of controlling water sample flow rates;

(8) be capable of determining the pre-treatment and analysis method for water samples according to the condition of water samples;

(9) be trained in the proper disposal procedures for water samples following testing;

(10) be trained in properly conducting detailed analysis and sample enumeration of water samples, be capable of detailed analysis and sample enumeration of water samples (*);

(11) be familiar with the system design limitations of the BWMS and the BWMS self-monitoring parameters, such as flow rate, pressure, TRO concentration, UV transmittance/intensity, etc. The operator is to have knowledge of the BWMS records, indications or alarms in case he operates BWMS outside its system design limitations. In case the supplier is not present during ballasting operations, the operator of the supplier is to have knowledge of how to access the BWMS log to evaluate that the BWMS is operated in accordance with the requirements of the manufacturer.

19.4.3 Supervisors of the supplier, in addition to the requirements for operators, are

[71] Category B suppliers may not meet the requirements with (*).

to:

(1) have three years or more working experience in engineering installation commissioning or biological testing;

(2) be familiar with the design limits and self-monitoring parameters of each type of BWMS, capable of assessment of BWMS correct installation.

19.4.4 Operators and supervisors are to receive training in professional knowledge, practical operation and safety production in accordance with the requirements of the quality management system every year, and keep training records.

19.4.5 The number of operators and supervisors is to be sufficient to meet the needs of the supplier to provide the service (at least one supervisor and one operator). At least one supervisor and one operator are to perform field operation and recording during sampling analysis, sample enumeration and assessment of the BWMS self-monitoring parameters, with the operator preparing reports and the supervisor reviewing the reports.

19.5 Facilities

19.5.1 The supplier engaged in BWMS commissioning testing is to have a suitable analytical laboratory to carry out detailed analysis and sample enumeration of ballast water samples. The laboratory environment is not to adversely affect the validity of the results and is to comply with the relevant provisions of the Administration of the host country. Influences that can adversely affect the validity of results may include, but are not limited to: microbial sterility, dust, radiation, humidity, electrical supply, temperature, sound and vibration levels (*).

19.5.2 The analytical laboratory is to implement measures to control the facilities, which are to include but are not limited to: control of access to and use of areas affecting laboratory activities; prevention of contamination, interference or adverse influences on laboratory activities; effective separation between areas in which there are incompatible laboratory activities (*).

19.5.3 An isolation buffer zone is to be established between the laboratory used for

bacterial analysis and the office area (*).

19.5.4 An isolation buffer zone is to be established between the area used for sterilizing utensils and the office area (*).

19.5.5 An isolation buffer zone is to be established between the area used for bacterial culture and the office area (*).

19.5.6 Use obvious labels to distinguish the bacteria to be tested and tested areas (*).

19.5.7 Laboratories used for the analysis of organisms are to be separate from other areas (*).

19.5.8 The supplier is to ensure that the requirements of 5 and 6 of this Chapter are met when performing water sample analysis activities in locations or facilities other than the analytical laboratory (*).

19.5.9 The supplier is to have appropriate office space, storage space of spare parts and storage space of documents and materials.

19.6 Equipment

19.6.1 Laboratories, equipment, procedures and methods for detailed analysis and sample enumeration of ballast water samples are to be in accordance with relevant International standard and/or accepted industrial standards (*).

19.6.2 Ballast water sampling is to comply with the relevant requirements of IMO Guidance on Ballast Water Sampling and Analysis for Trial Use in accordance with the BWM Convention and Guidelines (G2) (BWM.2/Circ.42/Rev.2). Sampling devices and consumables to be provided by the supplier include but are not limited to:

Sampling link	Names of sampling devises and consumables	Specification	Number	Note
Sampling devices	Sampling tube	/	1	
	Diverter	/	1	
	Flow meter	/	1	

	Flange	DN50	1	
	Clasp	/	Several	
Viable organism≥10μm and < 50μm	Sampling bucket	10 L	1	
	Brown HDEP sampling bottle	1L	2	
	Plastic measuring cup	1L	1	
	Waterproof plaster	/	2	
	Label	/	2	
Viable organism ≥50 μm	Plankton filtering net	50 μm	1	Large net, to collect plankton in the discharged ballast water
	Plankton filtering net	50 μm	1	Small net, to collect plankton in the original water
	Sampling bucket	20 L	1	
	White polyethylene sampling bottle	1 L	2	
	Waterproof plaster	/	2	
	Label	/	2	
Enterococci, Escherichia coli, Vibrio cholerae	Sampling bucket	10 L	1	
	Sterilized glass bottle	500 ml	2	
	Sterilized glass bottle	1000 ml	1	
	Waterproof plaster	/	3	
	Label	/	3	
	Heat preservation box	/	1	
	Ice bag	/	Several	
	Thermometer	/	1	

19.6.3 Laboratories for detailed analysis and sample enumeration of ballast water

samples are to have access to equipment required for the correct performance of the laboratory activities. Equipment includes but is not limited to measuring instruments, software, measuring standards, reference materials, reference data, reagents, consumables or auxiliary apparatus or combination thereof necessary for laboratory activities and which can influence the result. The laboratory may be equipped with the following equipment according to the procedures and methods for carrying out detailed analysis and sample enumeration (*) :

Sampling link	Names of sampling devises and consumables	Specification	Number	Note
Viable organism ≥50 μm	Stereo microscope	Technical parameters: ① the zoom stereo is at least 16× / 10×; the zoom ratio is at least 16.4 (0.7× 11.5×); ② the multiplier is generally 0.7/0.8/1/1.25/1.6/2/2.5/3.2/4/5/6.3/8/10/11.5; ③ the zoom ratio is at least 10 (0.63× 6.3×); ④ focusing mechanism: the stroke of coarse adjustment knob is at least 80 mm, and the load bearing range is at least 0-10.0kg; the stroke of the fine-tuning knob is at least 80 mm, the load bearing range: 2.7-15.0 kg; with built-in gas, keep balance, load bearing range: 8.0-25.0kg; electric focusing device/focusing mode: stroke is at least 75 mm, load bearing range is at least 2.7-15.0 kg	1	
	Optical microscope	Technical parameters: ① there is to be an infinite optical path; ② magnification is 40 ~ 1000 times; ③ eyepiece diopter is to be adjustable; ④ with flat-field achromatic objective lens.	1	
	Snake count box	5 ml	2	

Sampling link	Names of sampling devises and consumables	Specification	Number	Note
	Count box	1 ml	1	
	Thermohygrometer	/	1	
	Counter	Single-row, double-row	1 for each	
	Dispette	5 ml	Several	
	Dissecting needle	/	2 boxes	
	Waste liquid bottle	/	1	
Viable organism ≥10μm and < 50μm	Positive fluorescence microscope	Technical parameters: ① magnification is 40 ~ 400 times ② equipped with swing achromatic condenser; ③ equipped with achromatic/achromatic condenser and universal condenser; ④ built-in Kohler or equivalent illuminator, halogen bulb power is not less than 100W; ⑤ equipped with UIS2 or equivalent optical system, the power of achromatic mercury lamp is not less than 100W, the power of ordinary mercury lamp is not less than 100W, the power of xenon lamp is not less than 75W.	1 set	
	Count box	1 ml	2	
	Thermohygrometer		1	May be shared with the testing link of viable organism ≥50 μm

Sampling link	Names of sampling devises and consumables	Specification	Number	Note
	Counter	Single-row, double-row	1 for each	May be shared with the testing link of viable organism ≥50 μm
	Centrifuge tube	1.5 ml	Several	
	Pipette	1000 μL	1	
	Pipette	10 μL	2	
	Pipette tip	1 ml	Several	
	Pipette tip	10 μL	Several	
	FDA colouring agent	5 μM/ml in concentration	1	
	CMFDA colouring agent	2.5 μM/ml in concentration	1	
	Light proof dyeing box	Opaque and of suitable size	1	
	Waste liquid bottle		1	May be shared with the testing link of viable organism ≥50 μm
	Ultrapure water	1 L	1	
Testing of Enterococci, Escherichia coli, Vibrio cholerae	Pumping and filtering device		1	
	Incubator		3	If the laboratory does not test for vibrio cholerae, 2 incubators can be provided
	Portable ultraviolet lamp	Ultraviolet wavelength: 254 nm, 365 nm	1	
	Capper	/	1	

Sampling link	Names of sampling devises and consumables	Specification	Number	Note
	Filler	/	1	
	97 hole plate	/	12	
	Positive control plate (standard edition)	/	1	
	Disposable sterile plastic bottle	/	12	
	Colilert/Colilert-18	/	6	
	Enterolert kit	/	6	
	Pipette	10 ml	1	
	Pipette	10 ml	12	
	Sterile water	1000 ml	2 bottles	
	Tweezers	/	2	
	Alcohol burner	/	1	
	Alcohol	/	Several	
	Cotton	/	Several	
	0.2 μm membrane	/	Several	
	TCBS plate	/	6	
	Alkaline peptone water	/	6 bottles	
	Inoculating loop	/	12	
	Ultraviolet lamp	/	1	
	High pressure steam sterilizer	Fully automatic, digital display	1	
	Biosafety cabinet		1	

19.6.4 Testing is be conducted using indicative analysis equipment accepted by CCS. The information of indicative analysis device is to be included in the final report. The information is to be include the following as a minimum;

(1) Equipment information - type, model, technology used, evidence of calibration, detection range, Organism type/size classes that can be analyzed.

(2) Test results conduct for the verification of accuracy, detection range and repeatability.

(3) Certificate of standards, if available.

19.6.5 Indicative analysis equipment acceptable to CCS are to comply with the following requirements:

(1) be capable of testing organisms for the two size classes, namely ≥ 50 μm and ≥ 10 μm to < 50 μm;

(2) separation or concentration of ballast water samples is not needed for detection of organisms ≥10μm to <50μm to avoid loss of organisms in samples;

(3) since there are both phytoplankton and zooplankton in ballast water, the indicative analysis equipment is to be able to detect both viable plankton at the same time;

(4) be provided with number display function, such as "number of organisms ≥10μm to <50μm: XX /ml and and number of organisms ≥50μm: XX /m^3"; ATP type indicative analysis equipment is not necessarily to be provided with number display function;

(5) be equipped with waterproof, quakeproof and anti-electromagnetic interference functions with optional portable power source;

(6) capable of uploading and printing test data;

(7) be provided with user interface and is capable of storing information of ballast water samples and automatically saving test data;

(8) detection sensitivity is to reach: organisms ≥10μm to <50μm: 2 viable organisms /ml; number of organisms ≥50μm: 1 viable organism/m^3;

(9) the repetitive error of test results for the same sample is not to exceed 20%.

19.6.6 The supplier is to be equipped with screens and strainers matching indicative analysis equipment so as to separate different sizes of microbes (≥10μm to <50μm, ≥50μm and indicative microbes) for indicative analysis equipment to analyze each

size of microbes.

19.6.7 The equipment used to analyze other physical and chemical water parameters is to meet the intended application.

19.6.8 The supplier is to be equipped with video monitoring device to carry out video monitoring to key processes including general condition of the BWMS, sampling process, pre-treatment of water samples and analysis and the monitoring video is to be kept for at least 5 years.

19.7 Commissioning test

19.7.1 The BWMS commissioning test is to include evaluation of BWMS self-monitoring parameters and sampling and analysis of ballast water.

19.7.2 The supplier is to evaluate BWMS self-monitoring parameters such as flow, pressure, total residual oxidant concentration, transmittance/intensity of ultraviolet light to confirm that the BWMS has been properly installed.

19.7.3 Where the operator (usually a seafarer) operates the BWMS beyond the design limits of the system, the supplier is to record the operations, display or alarm conditions of BWMS and abnormalities found by the operator (usually a seafarer).

19.7.4 Where the supplier is not on site during the ballast operation, the supplier is to visit the BWMS journal to evaluate the correct operations of the BWMS during the ballast operation.

19.7.5 The supplier is to comply with requirements for isokinetic sampling and in-tank sampling to ensure the representativeness of water samples.

19.7.6 Representative samples are to be able to be subject to indicative analysis of size classes of organisms based on the discharge standard in regulation D-2 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004. The samples are also subject to detailed analysis and sample counting of all organism types, size classes, or a combination of detailed analysis, sample counting and indicative analysis.

19.7.7 Selection, verification and confirmation of analytical methods

(1) the supplier is to use appropriate analytical methods and procedures for analysis;

(2) the supplier is to use analytical methods issued by international or national standards first;

(3) after seeking agreement by CCS surveyors, the supplier may also use analytical methods specified by the manufacturer or formulated or amended by the supplier. The supplier is to verify that this method can be correctly used prior to the use to ensure the performance of the method needed and save the verification records.

(4) Where non-standard method, method formulated in the lab, standard method beyond the prescribed scope or other method is used for analysis by the supplier, the method used is to be confirmed which is to be comprehensive to meet the intended purpose or demands of the application. The confirmation may include sampling, treatment and transportation of testing or calibration instrument. The following methods, alone or in combination, may be used for confirmation:

(a) use reference or standard substance for calibration or evaluation of bias and accuracy;

(b) systematic review of factors affecting results;

(c) control the robustness of test methods via changes such as temperature of incubator and adding volume of samples;

(d) result comparison with other confirmed methods;

(e) lab comparison;

(f) evaluate the degree of uncertainty of results based on the understanding of methods and principles and practical experience of sampling or test methods.

19.8 Documents

19.8.1 Equipment, procedures and methods for suppliers of category A for commissioning testing of the BWMS, where applicable, are to be in accordance with relevant International standard and /or accepted industrial standard, such as ISO9001 or CNAS standard or equivalent. The testing capability is to meet the lab's need to carry out detailed analysis and sample counting. Suppliers of category B for

commissioning testing of the BWMS are to pass certification of ISO9001 standard or equivalent.

19.8.2 The supplier is to be equipped with documents including international conventions, regulations, circulars, provisions by the Administrations, relevant CCS rules and international, national and industrial technical standards. See the Appendix for the detailed list of international conventions, regulations and circulars that the supplier is to be equipped with.

19.8.3 The supplier is to formulate procedure documents and instructions for maintenance of equipment. These documents include or refer to applicable manufacturer's maintenance manual, maintenance notice, instruction and training manual as well as international requirements.

19.8.4 The supplier is to have documented operational procedures, including sample collection, treatment, analysis, evaluation of proper BWMS operation as well as recording and reporting. The supplier is to have a ledger indicating each step of commissioning test and maintaining the integrity of test records. The supplier is to have operational procedures for suction of ballast water samples, sample collection, treatment and analysis equipment including the calibration and adjustment of equipment. The sampling procedure for discharged water prepared by the supplier is to comply with relevant requirements in IMO Guidelines for Ballast Water Sampling (G2).

19.8.5 The supplier is to establish a ledger for out-put and in-put of warehouse, listing the in-and-out time and actual inventory of each spare part and consumable.

19.8.6 The supplier is to have fixed formats for certificates, reports and records of BWMS commissioning test. The records are to include but not limited to:

(1) BWMS operations within the commissioning test, including abnormalities related to performance deviation, alarm or abnormal/accidental operations found by recorder or operator (usually the seafarer);

(2) BWMS self-monitoring parameters related to sampling.

19.8.7 The certificates, reports, records and video monitoring information are to be kept for at least five years.

19.8.8 All the measurement, counting and sterilizing equipment (such as pipette, microscope, indicative analysis equipment and high pressure steam sterilizer) owned by the supplier within Chinese territory (excluding Hong Kong, Macao and Taiwan) are to hold effective verification/calibration demonstrations or certificates issued by national statutory metrological organization or its authorized metrological technique organization. All the measurement, counting and sterilizing equipment owned by the supplier in Hong Kong, Macao, Taiwan and outside Chinese territory are to hold effective verification/calibration demonstrations or certificates.

19.8.9 The supplier is to prepare OEM instruction book for indicative analysis equipment, which is to include at least clear guidance on proper storage, handling, operation, maintenance, repair and calibration.

19.8.10 The supplier is to formulate an internal procedure for confidentiality of indicative test and provide the procedure to CCS surveyors.

19.8.11 The supplier is to prepare operation instructions for equipment to be used and offer the instructions to CCS surveyors for review.

19.8.12 The supplier is to develop relevant provisions for storage or transportation of indicative analysis equipment.

19.8.13 The supplier is to provide a commissioning test report, detailing the results of ballast water sampling and analysis, as well as the evaluation of self monitoring parameters during the commissioning test. The format and content of the report are to be with the consent of CCS. The report is at least to include the following contents:

(1) BWMS manufacturer name, model, and product serial number;

(2) BWMS processing technology, technical limitations, operating conditions, and system design limitations;

(3) nameplate capacity (TRC) of BWMS, unit: m^3/h;

(4) performance parameters related to BWMS (such as TRO, UV dose, UVI, flow rate,

or other related performance parameters);

(5) alarm generated in the process of BWMS operation;

(6) BWMS type approval agency and certificate number;

(7) analysis results;

(8) ballast pumps and ballast tanks used for commissioning test, including the flow rate and volume of ballast water injected/discharged;

(9) name, operator, and supervisor of the BWMS commissioning test supplier; and

(10) remark indicating the conditions of filter, process measurement, etc.

19.9 Other requirements

19.9.1 The supplier without qualification for detailed analysis and sampling counting of vibrio cholerae is to deliver the project to local disease control departments and sign consignment agreement.

19.9.2 Where BWMS commissioning test has to be carried out in hazardous area onboard the ship such as pump room on oil tanker, the supplier is to use explosion proof equipment.

19.9.3 The supplier is to prepare appropriate safety protection equipment (such as work clothes, goggles and latex gloves) for operators and supervisors.

19.9.4 Where the supplier only uses indicative analysis equipment for quick testing of ballast water, CCS surveyor is to be on site and witness it.

Appendix 1 List of documents

No.	Document No./name	Remark
1	IMO Resolution MEPC.300(72) — Code for Approval of Ballast Water Management Systems (BWMS Code)	
2	IMO Resolution MEPC.173(58) — Guidelines for Ballast Water Sampling (G2)	
3	IMO Circular BWM.2/Circ.42/Rev. 2 — Guidance on Ballast Water Sampling and Analysis for Trial Use in accordance with the BWM Convention and Guidelines (G2)	
4	IMO Circular BWM.2/Circ.70/Rev.1 - Guidance for the Commissioning Testing of Ballast Water Management Systems	
5	IMO Circular BWM.2/Circ.61 - Guidance on Methodologies that may be used for Enumerating Viable Organisms for Type Approval of Ballast Water Management Systems	
6	IMO Circular BWM.2/Circ.69 - Guidance on System Design Limitations of Ballast Water Management Systems and their Monitoring	
7	IMO Resolution MEPC.279(70) - 2016 Guidelines for Approval of Ballast Water Management Systems (G8)	
8	IMO Resolution A.1140(31) – Survey Guidelines under the Harmonized System of Survey and Certifications (HSSC), 2017 (for BWMS that were Type Approved to the 2016 G8)	
9	IACS Rec 180 – Recommendation for conducting commissioning testing of Ballast Water Management Systems	
10	CCS Technical Information No. 51, Total No. 485 Technical Information on Special Provisions of Partial Flag States for	

	Implementation of Ballast Water Sampling and Biological Commissioning Test for Ships Installed with BWMS	
11	CCS Technical Information No.28, Total No. 534 Technical Information on BWM.2-Circ.42-Rev.2 and BWM.2-Circ.70-Rev.1 issued by IMO	

Chapter 20 Suppliers Engaged in Tightness Testing of Primary and Secondary Barriers of Gas Carriers with Membrane Cargo Containment Systems for Vessels in Service

20.1 Application

This Chapter applies to suppliers engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service.

20.2 Definitions

20.2.1 Membrane cargo containment system means non-self-supporting cargo tank attached to double-hull structure, mainly of GTT NO.96 type, MARK III type and CS I type, with details in Appendix 1.

20.2.2 Primary barrier means the inner component used for loading when the membrane containment system contains 2 layers of perimeter.

20.2.3 Secondary barrier means the outer component that can temporarily contain liquid cargo that may leak from the primary barrier.

20.2.4 Global vacuum testing system means airtightness test to the primary and secondary barriers of the membrane containment system in accordance with test procedures approved by CCS.

20.2.5 Acoustic emission testing system means ultrasonic leak test of the secondary barrier of membrane containment system by using AE sensors according to recognized national or international industrial standards.

20.2.6 Thermographic testing system means infrared/thermal leak test of primary and secondary barriers of membrane containment system by using thermal cameras and sensors in accordance with recognized national or international industrial standards.

20.3 Personnel

20.3.1 The supplier's operator and supervisor are to have knowledge relating to tightness test of membrane containment system of gas carrier, be able to install and commissioning the test equipment according to the test procedures approved by CCS, and be responsible for carrying out tightness test, recording test data, evaluating the test and issuing tightness test report.

20.3.2 Operator

20.3.2.1 The operator carrying out global vacuum testing is to be certified to a recognized national or international industrial standard (e.g. ISO-9712 or ASNT SNT-TC-1A), at least with Level I leak testing qualification, with adequate knowledge of membrane containment system and tightness test procedures, and familiar with pressure control systems and other test equipment.

20.3.2.2 The operator carrying out acoustic emission testing is to be certified to a recognized national or international industrial standard (e.g. ISO-9712 or ASNT SNT-TC-1A), at least with Level I leak testing qualification and with adequate knowledge of ship structures sufficient to determine sensor placement.

20.3.2.3 The operator carrying out thermographic testing is to be certified to a recognized national or international industrial standard (e.g. ISO-9712 or ASNT SNT-TC-1A) and additional infrared/thermal testing, at least with Level I leak testing qualification, familiar with adequate knowledge of ship structures sufficient to determine image placement and with knowledge of membrane containment system to understand the basic principle of testing.

20.3.3 Supervisor

20.3.3.1 The supervisor carrying out global vacuum testing is to be certified to a recognized national or international industrial standard (e.g. ISO-9712 or ASNT SNT-TC-1A), at least with Level II or Level III leak testing qualification.

20.3.3.2 The supervisor carrying out acoustic emission (AE) testing is to be certified to a recognized national or international industrial standard (e.g. ISO-9712 or ASNT

SNT-TC-1A), at least with Level II leak testing qualification and one year experience at Level II.

20.3.3.3 The supervisor carrying out thermographic testing is to be certified to a recognized national or international industrial standard (e.g. ISO-9712 or ASNT SNT-TC-1A) and additional infrared/thermal testing, at least with Level II leak testing qualification.

20.3.3.4 The operator/supervisor is to be regularly trained on professional knowledge, practical operation and safe production according to the requirements of quality management system, and keep training records.

20.3.3.5 For the supplier engaged in global vacuum testing, the number of operators/supervisors is to be able to meet the needs of the supplier to provide services (at least one operator and two supervisors, of which one supervisor is to be qualified for Level III leak testing). At least one supervisor and one operator are manned to perform on-site management, supervision, operation and recording when global vacuum testing is carried out. The operator is responsible for preparing report, the supervisor is responsible for reviewing report, and the report is issued by the supervisor with Level III leak testing qualification.

For the supplier engaged in acoustic emission (AE) testing and thermographic testing, the number of operators/supervisors is to be able to meet the needs of the supplier to provide services (at least one operator and one supervisor). At least one supervisor and one operator are manned to perform on-site management, supervision, operation and recording when testing is carried out. The operator is responsible for preparing report, and the supervisor is responsible for reviewing report.

20.4 Site

20.4.1 The supplier is to have appropriate site, including:

(1) A warehouse for storing test equipment;

(2) Space to repair and maintain test equipment;

(3) A warehouse for storing test equipment and spare parts;

(4) Archives room for storing test report and records;

(5) Office of operator/supervisor.

20.5 Equipment

20.5.1 The supplier is to be provided with testing equipment compatible with the tightness testing procedure for the primary and secondary barriers of the membrane cargo containment system.

20.5.1.1 The supplier engaged in global vacuum testing of membrane cargo containment system is to be at least provided with testing equipment and testing pipelines, as shown in Table 1.

Table 1

Equipment name	Requirements (specification, quantity, etc.)
Pressure control system	Vacuum pump (air extracting)
Pressure monitoring system	Mercury U-pipe (-800mbar), several Water U-pipe (+20mbar), several Pressure sensor and transmitter Pressure display and recorder
Pressure gauge	For vacuum box, several
Thermometer	Measuring ambient temperature, several
Flowmeter	Several
Temperature recording system, temperature sensor	Measuring ambient temperature and cargo hold temperature, several
Pressure display and recorder	Recording temperature in global vacuum testing box, pressure changes between the insulation layers of the cargo hold, atmospheric pressure, temperature inside and outside the cargo hold, etc.
Temporary pipeline	The length and pressure resistance meet the on-site requirements, and the ships in service can use vacuum hose
Piping attachment	T-joint, flange, elbow, reducing joint, etc., several
Valve	Several
Gasket or seal ring	Gasket or seal ring of nitrile resin or equivalent material
Joint	Several, to be matched with pipelines

	onboard ship
Safety valve	One, with set pressure of 15mba

20.5.1.2 The supplier engaged in acoustic emission (AE) testing of membrane cargo containment system is to be at least provided with testing equipment, as shown in Table 2.

Table 2

Name	Requirements
AE sensor	Several

20.5.1.3 The supplier engaged in thermographic testing of membrane cargo containment system is to be at least provided with testing equipment, as shown in Table 3.

Table 3

Name	Requirements
Thermal camera and sensor	One camera and several sensors The sensitivity, accuracy and resolution of thermal cameras and sensors are to meet the requirements of the membrane cargo containment system designer

20.5.2 The supplier is to have appropriate facilities (e.g. transport vehicles) to complete testing on site.

20.6 Documents

20.6.1 The supplier is to be provided with the relevant international conventions, rules, circulars, Administration provisions, CCS rules and industrial technical standards, etc., as detailed in Annex 2.

20.6.2 The supplier carrying out global vacuum testing and thermographic testing is to obtain valid approval/authorization from the designer of corresponding structural type of the membrane cargo containment system.

20.6.3 The supplier is to have procedural and process documents to specify how to carry out tightness testing of primary and secondary barriers of the membrane cargo containment system. These documents include or refer to ship’s drawings, equipment manual, test procedureprocess approved by CCS and approval information of the

designer of membrane cargo containment system (suppliers engaged in acoustic emission testing do not need approval of designer of membrane cargo containment system), etc., and specify the responsibilities and qualifications of testing personnel, testing instruments, testing environment requirements, test preparation and methods, signal processing, evaluation and report contents, etc.

20.6.4 The personnel evaluating the results of tightness testing of primary and secondary barriers of the membrane cargo containment system is to meet following requirements:

(1) For the supplier engaged in global vacuum testing, the tightness testing of primary and secondary barriers of the membrane cargo containment system is to be evaluated by a supervisor with Level III leak testing qualification;

(2) For the supplier engaged in acoustic emission (AE) testing, the tightness testing of primary and secondary barriers of the membrane cargo containment system is to be evaluated by a supervisor or by a Level II personnel certified by a recognized national or international industrial standard (such as ISO-9712 or ASNT SNT-TC-1A) with at least one year's work experience;

(3) For the supplier engaged in thermographic testing, the tightness testing of primary and secondary barriers of the membrane cargo containment system is to be evaluated by a supervisor.

20.6.5 The supplier is to establish a work ledger, indicating the various stages of testing and maintaining integrity of testing records.

20.6.6 The supplier is to establish a warehouse ledger, indicating storage time and actual inventory of each equipment, pipeline and spare parts.

20.6.7 The supplier is to have testing certificates, reports and records in fixed format.

20.6.7.1 Global vacuum testing report is to include:

(1) Ship name, IMO No., cargo hold type and quantity, testing date, testing site and testing conclusion;

(2) Identity of testing personnel;

(3) Vacuum decay data of each cargo hold;

(4) Testing summary, etc.

20.6.7.2 Acoustic emission (AE) testing report is to include:

(1) Ship name, IMO No., cargo hold type and quantity, testing date, testing site and testing conclusion;

(2) Supervisor and operator certificate;

(3) Description of time and pressure for each testing cycle;

(4) List of potential defects and detailed location, etc.;

(5) Description of testing environment.

20.6.7.3 Thermographic testing report is to include:

(1) Ship name, IMO No., cargo hold type and quantity, testing date, testing site and testing conclusion;

(2) Supervisor and operator certificate;

(3) Different pressure values at all stages;

(4) Thermal indication list and detailed location;

(5) Infrared images at each stage by thermal indication testing;

(6) Thermographic assessment indicating potential leak, etc.

20.6.8 Testing certificates, reports and records are to be kept for at least five years.

20.6.9 The supplier is to maintain the testing instruments and equipment according to the recognized national or international industrial standards or the recommendations of the equipment manufacturer, and verify/calibrate them according to relevant provisions. All test equipment with metrological functions (such as pressure gauges, thermometers, sensors, etc.) are to have a valid verification/calibration certificate issued by metrological technical institution with national legal or metrological authorization .

20.7 Other requirements

20.7.1 The safety characteristics of thermographic testing equipment (such as

thermal cameras, sensors, etc.) used in hazardous areas (explosive gas environments) are to comply with the recognized standards (such as national standards or IEC). Thermographic testing equipment is to be maintained according to the manufacturer's requirements and obtain explosion-proof certificates or certifications.

20.7.2 The supplier is to provide appropriate safety protection equipment (e.g., oxygen meter, work clothes, gloves, work shoes, goggles, etc.) for the operator/supervisor.

Appendix 1 List of documents

No.	Document No./name	Remarks
1	CCS Rules for Classification of Seagoing Steel Ships	
2	CCS Rules for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk	
3	CCS Guidelines on Survey of Ships Carrying Liquefied Gases	
4	Membrane cargo containment system designer approval information	Suppliers engaged in acoustic emission testing do not need such information

PART TWO 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 certificate management system for capability certification 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 certificate management system for capability certification" 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 capability certification of the equipment owned by WTC are as follows:

(a) Number, type, model, manufacturer and storage location of welding equipment and test equipment;

(b) Equipment maintenance and calibration provisions;

(c) 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 certificate management system of capability certification.

1.4 Maintenance of capability

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 capability certification 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 certificate management system of capability certification".

1.4.4 CCS will disqualify the WTC if it finds the following problems in the welder capability certification 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 being reminded by CCS;

(2) If serious defects have been found in the welding equipment and experimental equipment, the equipment is still used for welder test after being reminded by CCS;

(3) Welders cheat in operating tests or verification;

(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 CAPABILITY CERTIFICATION

Chapter 1 Capability Certification for Welders of Ships and Marine Products, Offshore Installations and Steel Structures above Water

1.1 Application

This Chapter applies to the approval of welder capability certification of structures, machinery, boilers, pressure vessels and piping used in ships and mobile offshore units 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 Certificate Management of Capability Certification 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 capability certification testing 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 are to 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. For those who only operates the equipment and are not responsible for parameter setting and/or adjustment (such as those who only operates the start button in the automatic welding production line), the test is not needed if the personnel have relevant welding work experience and product welding joints meet the quality requirements.

1.4.3 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.

1.4.4 The welders or welding operators passing international or national standard examinations may also be engaged in welding of hull structures and relevant products if the examination items, application scope and relevant requirements equal to the requirements of this chapter subject to CCS agreement. Partial or cross use of different national or international standards is not allowed.

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 certificate or the period of effectiveness has lapsed, the welder is to be re-tested for his or her capability certification..

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 Certificate Management System of Capability Certification" and submit electronic documents and written materials to CCS to apply for Welder Capability Certificate. The following information is to be provided when submitting application:

a. Application for Capability Certification Test

b. Field Record of Capability Certification Tests of Welders

c. Sum-up List of Scores of Capability Certification 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 capability category (e.g., S for ship and mobile offshore units or B for marine boilers and pressure vessels), certificate number, application, term of validity, parent material, etc.

1.7 Maintenance of Capability

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 capability certificate when all the required inspections/tests are satisfactorily completed in the first welder test.

1.7.2 Maintenance of Capability1.7.2.1 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 capability certificate of welders engaged in tack welding is valid for long term, all the welders subject to 1.7.2.1 are to be periodically verified by CCS by one of the following methods in order to extend the validity of the welder's certificate:

(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 capability certificate is to be issued, valid from the date of issuing the new certificate.

(2) The capability 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 capability certificate is to be issued, and the tests re-validate the welder's capabilities 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: The welder’s certificate is valid for a long term as long as the following requirements are met subject to CCS agreement. The frequency of review and verification by CCS is to be no longer than 3 years and is to be agreed between CCS and the shipyards/manufacturers.

a) The shipyard/manufacturer where the welder is working is to be the same as the name of employer marked on the welder’s capability certificate. The shipyard/manufacturer is responsible for the welding quality 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 welder quality management system.
- List of welders and welding supervisors in shipyard/manufacturer
- List of outsourcing welders (if any)
- Capability certificate of welders and description of the associated management system
- Training requirements for welder capability examination

- Traceability system for welders and WPS used on specific welds
- Monitoring procedure for welding quality of specific welders. The monitoring is to be based on evaluation of quality inspection records of welds such as repair rate. The minimum standards to be reached for maintaining welder's capability certification are to be made clear if verification by (1) and (2) above is not needed for welders.

c) The shipyards/manufacturers are to periodically (at least once a year) arrange and submit documentary proof that the working quality of welders such as welding quality and repair rate complies with construction quality standards and CCS rules.

1.7.3.2 The capability certification 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 capability 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 capability 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 capability certificate is to be issued, and the tests re-validate the welding operator's capabilities for an additional 3 years. The certificate can be verified and renewed every 3 years in this way.

(3) The capability is to be re-verified in no more than 3 years: to be verified according to 1.7.3.1(3).

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 capability certificate is to be issued to extend the validity period after CCS on-site supervision and satisfactory verification.