



GUIDANCE NOTES
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China Classification Society
Guidelines for Approval of Marine Product
Test agencyAgency

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Part 1 General Rules

Chapter 1 General Requirements

1.1 Purpose

1.1.1 The approval of test agency refers to the approval by China Classification Society (CCS) of the capabilities and conditions of the specific inspection and test items of ship and related products of test agency by means of data review, on-site audit, approval test, etc. The approval refers to the evaluation of the capabilities and qualifications of test agency in a certain professional field, with a "body approval certificate" issued.

1.1.2 The purpose of the Guidelines is to provide guidance on the basic procedures and requirements of China Classification Society on the approval of marine product test agency for reference by CCS surveyors, applicants or approved test agency when conducting relevant approval activities.

1.1.3 The Guidelines is not applicable to application for approval as a CCS service supplier.

1.2 Equivalent Exemption

1.2.1 For test agency beyond the provisions of the Guidelines, if the application of any provisions of the Guidelines will seriously hinder their approval, they may be exempted from the corresponding requirements of the Guidelines with the consent of CCS headquarters.

1.2.2 If any test method specified in the Guidelines is not adopted, and the test agency can provide corresponding test, theoretical basis, application experience or effective recognized standard, such test can be accepted as an alternative and equivalent method with the consent of CCS headquarters.

1.2.3 For dated references in the Guidelines, all subsequent amendments (excluding corrigenda) or revisions do not apply. For undated references, the latest edition applies.

1.3 Terms and Definitions

1.3.1 For the purpose of the Guidelines, the definitions given in the *Rules for*

Classification of Sea-Going Steel Ships apply.

1.3.2 Test agency: an institution engaged in inspection and testing.

1.3.3 Service supplier: a company which provides measurement, test or maintenance services of, for example, safety systems and equipment on behalf of the shipowner or the owner of mobile offshore facility, with the service results affect the surveyor's decision on ship classification.

1.3.4 For other terms and definitions, please refer to relevant sections of the Guidelines.

1.4 Approval Conditions for Test agency

CCS only reviews the scope of approval applied by the applicant and makes an approval decision according to CCS rules, international conventions and relevant standards. For approval, the applicant:

(1) must be a registered legal entity or an institution authorized by a legal person, with a clear legal status and the ability to bear legal responsibilities,

(2) must fulfill relevant obligations in accordance with relevant provisions of the Guidelines,

(3) must comply with the provisions of relevant laws and regulations,

(4) must not engage in the design, manufacture and sales of similar products, and

(5) must comply with relevant confidentiality regulations.

1.5 Rights and Obligations

1.5.1 CCS shall be:

(1) Entitled to irregularly supervise the activities carried out by test agency and the use of approval certificates,

(2) Entitled to conduct on-site investigation and follow-up investigation on test agency according to complaints from interested parties, and put forward correction requirements accordingly,

(3) Entitled to make a decision to suspend, resume and cancel the approval qualification of any test agency in case of its non-compliance with CCS regulations,

(4) Obligated to make public the approval status information of accredited test agency on website and update such information in time, and

(5) Obligated to publish the latest version of approval requirements and other relevant documents, and solicit opinions before updating the version.

1.5.2 An accredited test agency shall be:

- (1) Entitled to obtain relevant public documents of CCS,
- (2) Entitled to make public within the prescribed scope that its corresponding technical capabilities have been accredited,
- (3) Entitled to issue test reports within its accredited scope,
- (4) Entitled to voluntarily terminate the approval qualification,
- (5) Obligated to understand relevant approval requirements and regulations of CCS,
- (6) Obligated to provide the application documents and relevant information as required by CCS, ensure the truthfulness and accuracy of such documents and information, regularly summarize relevant test information required by CCS according to the provisions of CCS and submit it to CCS for future reference,
- (7) Obligated to provide necessary support for the approval activities arranged by CCS, provide facilities for relevant personnel to access to the audited area, consult records, witness on-site activities and contact staff, etc., and not refuse the personnel sent by CCS to witness any approval activity (except when there is a conflict of interests between the review personnel and the approval activity), and
- (8) Obligated to pay the fees according to relevant provisions.

Chapter 2 General Requirements for Test agency

2.1 Management Requirements

2.1.1 A test agency shall establish a quality management system according to ISO/IEC 17025 (or equivalent standard, see 2.1.2), and obtain an approval certificate from CNAS or any equivalent certification authority with national certification & approval authority qualification. For other specific professional requirements, such as classification society rules, international conventions and international standards, please refer to each chapter.

2.1.2 For any test agency failing to obtain a certificate as described in 2.1.1 above, it shall at least have a documented quality management system including the following contents:

- (1) Rules of conduct for related activities; (2)
Equipment verification or calibration and maintenance;
- (3) Training plan for testing personnel, supervisory personnel and management personnel;
- (4) Supervision and verification of operations to ensure compliance with approved operating procedures;
- (5) Documentation, test records and test reports;
- (6) Quality management of branches and agents (if applicable);
- (7) Testing procedures and testing equipment operation guide;
- (8) Regular internal quality system audit and management review for distribution, preservation and control of working process, complaints, corrective measures and documents.

2.2 Technical Requirements

2.2.1 Personnel requirements

(1) The test agency shall have professional technical personnel and management personnel suitable for their testing activities. The test agency shall use formal personnel or contract personnel. When using contract personnel and other technical personnel and key support personnel, the test agency shall ensure that these personnel are competent and supervised, and work according to the requirements of the management system of the test agency.

(2) All personnel engaged in sampling, testing, evaluating results, issuing test reports, operating equipment, etc. shall be qualified according to the corresponding education, training, experience and/or proven skills as required, and be certified to work. For test agency engaged in testing activities of special products, the skills and qualifications of their professional technical personnel and management personnel shall also meet the requirements of relevant laws, conventions and specifications.

(3) The test agency shall determine training needs, establish and maintain personnel training programs and plans. Laboratory personnel should be educated and trained for their current and expected tasks, and have corresponding technical knowledge and experience.

(4) When the personnel in training are used, they should be properly supervised.

(5) The test agency shall keep records of the responsibilities, qualifications, training, skills and experience of all professional technical personnel and management personnel involved in testing activities.

(6) The technical director and authorized signatory of the test agency shall have the technical title of engineer or above, be familiar with the business, have worked in the professional field for more than 3 years, and pass the examination.

(7) The management shall authorize special personnel for sampling, testing, issuing test reports, giving opinions and explanations, and operating specific types of equipment, and keep records of relevant authorization and/or capability confirmation.

2.2.2 Equipment

(1) The test agency shall have testing equipment (including that for sampling, article preparation, data processing and analysis) suitable for the applied verification items and test capabilities, and maintain all equipment normally. Each testing equipment and device shall have the certification documents of the manufacturer and the verification certificate or calibration report issued by a qualified metering body, meet the use requirements and be used within the validity period. For special testing instruments and equipment without type approval, the verification certificate of relevant technical units shall be provided.

(2) The test agency shall have procedures for safe disposal, transportation, storage, use and planned maintenance of measuring equipment to ensure its normal function and prevent pollution or performance change.

(3) In case of overload or misoperation of instruments and equipment, or suspicious display results, or defects indicated by other means, they should be stopped immediately and clearly marked, and if possible, they should be stored in a specified place until repair. The repaired instruments and equipment must be verified and calibrated to prove that their functional indicators have been restored. The test agency shall check the influence of such defects on previous testing and/or calibration.

(4) The equipment shall be operated by authorized personnel. Technical data related to the use and maintenance of equipment shall be accessible to relevant laboratory personnel.

(5) Equipment for testing, calibration and sampling and its software shall reach the required accuracy and comply with corresponding specifications for testing and/or calibration. Calibration plans shall be made for key quantities or values of instruments that have important influence on the results. Equipment (including that for sampling) shall be calibrated or verified before being put into service, and the results shall be traceable to the national standard. If not, the laboratory shall provide satisfactory evidence of equipment comparison and capability verification results to prove that it can meet the requirements of laboratory specifications and corresponding standards.

(6) Records of each equipment and its software which have important influence on testing and/or calibration shall be kept, and shall at least include the following:

- a) Name of equipment and its software;
- b) Manufacturer name, type identification, serial number or other unique identification;
- c) Equipment check for compliance with specifications (if applicable);
- d) Current location (if applicable);
- e) Manufacturer's instructions (if any), or specifying its location;
- f) All verification/calibration reports or certificates and the scheduled date of the next verification/calibration;
- g) Equipment maintenance plan, and maintenance that has been carried out (when appropriate);
- h) Any damage, failure, modification or repair of the equipment.

(7) The test agency shall have the calibration status of all equipment indicated with labels, codes or other marks, including the date of last calibration, recalibration or expiration.

(8) For whatever reason, if the equipment is out of the direct control of the laboratory, the

laboratory shall ensure that the function and calibration status of the equipment returned are checked and satisfactory results can be displayed before use.

2.2.3 Standard substances

(1) The test agency shall be equipped with standard substances required for correct testing (including sampling, article preparation, data processing and analysis).

(2) The test agency shall list the information of the standard substances used, including the name of the standard substances, technical indicators, rating and appraisal bodies, batch numbers, validity periods and custodians.

(3) The test agency shall have procedures for safe disposal, transportation, storage and use of standard substances to prevent pollution or damage and ensure their effectiveness.

2.2.4 Testing methods

(1) The test agency shall implement testing and/or calibration activities by using appropriate methods and procedures in accordance with the provisions of the Guidelines and relevant technical standards or specifications, including sampling, handling, transportation, storage and preparation of the tested and/or calibrated items. If the lack of instructions may affect the testing and/or calibration results, the test agency shall formulate corresponding operation instructions.

(2) The test agency shall be able to confirm the correct use of a selected new method. If the method has changed, it should be reconfirmed. The laboratory shall ensure that the latest valid version of standard is used.

(3) Standards, manuals, instructions, etc. related to the testing work shall be valid and convenient for the staff to use. These documents shall at least include:

- a) CCS rules and guidelines related to testing activities;
- b) International conventions and product technical standards related to testing activities;
- c) Testing regulations, implementation rules, etc. related to testing activities.

(4) The test agency shall have appropriate calculation and data conversion & processing regulations, and effectively implement them. When using computer or automatic equipment to collect, process, record, report, store or retrieve test or calibration data, the test agency shall establish and implement a data protection procedures. This procedure shall include (but not be limited to) the integrity and confidentiality of data input or acquisition, data storage, data transfer and data processing.

2.2.5 Intermediate check

The reference standards, benchmarks, transfer standards or working standards and standard substances (reference substances) shall be checked according to the prescribed procedures and schedules, so as to maintain the confidence of their calibration status.

2.2.6 Facilities and environmental conditions

(1) The testing and/or calibration facilities of the test agency, including but not limited to energy, lighting and environmental conditions, shall be conducive to the correct implementation of testing and/or calibration, and special procedures shall be developed when necessary.

(2) The testing and calibration facilities and environmental conditions of the test agency shall meet the requirements of relevant laws, regulations, technical specifications or standards.

(3) When facilities and environmental conditions have an impact on the quality of results, the laboratory shall monitor, control and record the environmental conditions. Special attention should be paid to the influence of environmental conditions when testing in non-fixed places. Technical requirements for facilities and environmental conditions that affect the testing and calibration results shall be documented.

(4) The test agency shall establish and maintain safety operation management procedures to ensure the effective control of hazardous chemicals, drugs, harmful organisms, ionizing radiation, high temperature, high voltage, impact, water, gas, fire, electricity and other factors endangering safety and environment, and the adoption of corresponding emergency measures.

(5) The test agency shall establish and maintain environmental protection procedures and have corresponding facilities and equipment to ensure that the treatment of waste gas, waste liquid, dust, noise and solid waste generated by testing/calibration meets the environmental and health requirements, and that corresponding emergency measures are adopted.

(6) Where the work between testing activity areas has adverse effects mutually, effective isolation measures should be taken.

(7) Areas and facilities affecting work quality and involving safety shall be effectively controlled and correctly identified.

2.2.7 Sampling (if applicable) and sample disposal

(1) The test agency shall have procedures for taking, transporting, receiving, disposing, protecting, storing, keeping and/or removing test samples to ensure the integrity of test samples.

(2) The test agency shall carry out sample extraction, preparation, transportation, storage and disposal in accordance with relevant technical specifications or standards. In the absence of relevant technical specifications or standards, the laboratory shall develop a sampling plan according to appropriate statistical methods. During sampling, attention should be paid to the factors to be controlled to ensure the validity of the testing and/or calibration results.

(3) Sampling records of the test agency shall include the sampling plan used, sampling personnel, environmental conditions, graphic illustration (or other equivalent means) of sampling positions when necessary, and if possible, the statistical methods on which the sampling plan is based.

(4) The test agency shall record in detail the client's requirements for deviation, addition or deletion of the sampling plan, and inform relevant personnel.

(5) The test agency shall record the status of the received test samples, including deviation from normal (or specified) conditions.

(6) The test agency shall have an identification system for testing and/or calibrating samples to avoid confusion of samples or records.

(7) The test agency shall have appropriate equipment and facilities to store and process samples to ensure that the samples are not damaged. The laboratory shall keep the circulation records of samples.

2.2.8 Test results

The test agency shall have quality control procedures to monitor the effectiveness of testing and calibration, issue testing data and results in a timely manner, ensure that the data and results are accurate, objective and true, and be responsible for the issued testing results. The legal units of measurement shall be used for reporting.

(1) Original records and data processing

a) The format of original records shall be standardized. The original records are not allowed to be changed or deleted at will, and should not be filled in with pencil. There should be uniform rules for recording errors and the need to change the original records. The retention period of original records shall be specified.

b) The method of determining the effective digits of testing data and the method of determining the abnormal values of testing data should be specified, as well as the way to

distinguish the abnormal values that can be eliminated from those that cannot be eliminated should be clearly specified.

(2) Test report

A test report shall at least include the following information:

a) Title (such as "test report"), name and address of the test agency, and test place different from the address of the test agency;

b) Unique identification of the test report (such as serial number), identification on each page and clear identification of the end of the report;

c) Name and address of the client;

d) Identification of standards or methods used;

e) State description and identification of samples;

f) Sample receiving date and date of testing and/or calibration;

g) Sampling date, sampling position (including any schematic diagram, sketch or photo), sampling personnel, sampling plan used, detailed information of environmental conditions that may affect the interpretation of testing results during sampling, standards or specifications related to sampling methods or procedures, and deviations from, additions to or deletions from these specifications; (where applicable)

h) Test results;

i) Signature or equivalent identification of testing personnel and their report approver;

j) If necessary, the statement that the result is only related to the tested sample.

(3) Description of test report

If it is necessary to explain the testing results, the report may also include the following:

a) Deviation from, addition to or deletion from testing and/or calibration methods, and specific testing and/or calibration condition information;

b) Declaration of conformity (or non-conformity) with requirements and/or specifications;

c) When the uncertainty is related to the validity or application of the testing and/or calibration results, or the client has requirements, or the uncertainty affects the determination of the result conformity, the report also needs to include the information of uncertainty;

d) Additional information required by specific methods, clients or client groups;

e) Hard copies of a test report should indicate page numbers and total pages, and partial

use of a test report is not allowed.

(4) Modification of test report

Material modification of an issued report shall be implemented in the form of additional document or replacement report, and shall include the statement of "Supplement to the report, serial number ... (or other identification)", or any other equivalent written form. A report shall be modified in accordance with all requirements of the Guidelines. If it is necessary to issue a new report, it should have a unique identification and indicate the replaced original.

Chapter 3 Approval Procedure of Test agency

3.1 Applicant's Application

3.1.1 Initial approval

The applicant may express its approval intention to the approval execution unit of CCS in any way, such as visit, telephone, fax and other electronic communication methods. The approval execution unit of CCS shall provide the applicant with the latest version of notice of approval service of test agency and approval guide, or alternatively, the applicant may download the latest version of notice of approval service of test agency and approval guide directly from the official website of CCS.

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and materials for examination as required by the Guidelines.

3.2 Data Submitted for CCS Audit/Verification

The data submitted shall generally include the following:

(1) Name, address, business and capability profile of the body, qualification certificate or system certificate issued by other authorities, etc., and the history of relevant product testing and inspection work;

(2) Notarization statement, code of ethics, confidentiality commitment and other activity information that may cause conflicts of interest with marine product manufacturers or interested parties;

(3) List of inspection and test items and testing standards, which shall:

a) List the test items, including the product names, product types, test items and measurement ranges in detail;

b) List the technical documents such as applied product technical standards, procedures and specifications;

(4) List of testing instruments, equipment and standard gauging instruments, which shall

include: equipment name, model, specifications, name of manufacturer, verification/calibration period, verification/calibration status, responsible person, etc. of testing instruments;

(5) Competent positions and lists of testing personnel, metrological verification personnel and maintenance personnel, training and work experience of relevant personnel within the scope of approval application, and compliance with relevant international, domestic or industrial approval standards;

(6) Organization block diagram and responsibilities;

(7) Testing work procedure;

(8) Operation guide of testing equipment;

(9) Personnel training program;

(10) Quality manual or system and procedure documents formulated for effective quality control;

(11) Client complaints and corrective action records;

(12) Sample of formal inspection and test report;

(14) Body approval test program;

(14) Other documents and data deemed necessary by the surveyor in the approval process.

3.3 Data Review and On-site Preliminary Assessment

CCS surveyor shall review the quality management system documents and relevant data submitted by the applicant;

3.3.1 Contents of data review

(1) Whether the data submitted by the applicant is complete, clear and correct;

(2) Whether the test agency is within the jurisdiction of the approval execution unit;

(3) Whether there is a basic understanding of relevant requirements of CCS;

(4) Whether the quality management system has been established and maintained;

(5) Whether a complete internal audit and management review has been conducted;

(6) The quality management system documents submitted by multi-site laboratories should cover all sites applying for approval, the subordinate relationship and work interface between each site laboratory and the headquarters are clearly described with smooth communication channels, and the internal organization (when necessary) and personnel responsibilities of each site

laboratory are clear;

(7) Evidence of independence and impartiality of the test agency;

(8) When reviewing or drafting the field verification test program, a typical test item shall be selected from each test category proposed for approval for testing. When necessary, it may be required to carry out a comparative test of the proposed approval item with any other authority or a CCS approved agency.

3.3.2 On-site preliminary assessment (if necessary)

(1) Assess the testing items and conditions of the test agency;

(2) The use, maintenance and service of testing instruments, equipment and standard gauging instruments;

(3) Accuracy and normalization of report;

(4) Training and work experience of technical personnel;

(5) Compliance with quality management system;

(6) Confirm safe survey conditions according to *CCS Guidelines for Clients for Safety of Survey*.

3.4 On-site Audit

3.4.1 Our surveyor will conduct on-site audit on the technical capability and quality management activities within the application scope of the applicant according to CCS approval guidelines, specifications and requirements and relevant technical standards. During on-site audit, all other sites covered within the applicant's application scope, where one or more key activities are carried out shall be audited. The audit mainly covers the following:

(1) Checking implementation of documents such as management system document and operational procedure by the test agency;

(2) Checking and confirming training, experience, education level, qualification and other qualifications of the test agency;

(3) Verifying whether the facilities and environment of the test agency facilitate the correct implementation of inspection, testing and maintenance;

(4) Verifying whether suitable methods and procedures are used for carrying out the inspection, testing and maintenance subject to approval in a safe and efficient manner, and

whether the sampling, treatment and storage of specimens for inspection and testing are in compliance with relevant requirements;

(5) Verifying whether the test agency is provided with necessary inspection and testing equipment, whether the gauging instrument and software can reach the required accuracy, whether periodical calibration system has been established, and whether existing gauging equipment are within period of validity;

(6) Verifying the accuracy and traceability of inspection and testing results, quality records and reports, and whether the preparation, endorsement, review and issuance of reports are in compliance with relevant requirements;

(7) For the purpose of verifying inspection and testing capability of the test agency, the accuracy, safety and effectiveness of operator during implementation of inspection and testing are to be verified at the same time, and main applied test items are to be witnessed on site.

3.4.2 Approval test

According to the approved approval test program, participate in and witness the approval test to confirm:

(1) Whether the test agency can carry out testing work in accordance with the established regulations;

(2) Whether the test operator is familiar with the test procedures and operate correctly;

(3) Whether the test equipment is in good condition and meets the test requirements;

(4) Whether the process of issuing the test report meets the specified requirements and whether the conclusion is correct;

(5) When necessary, the test agency shall participate in the inter-laboratory comparison test.

3.5 Certification Requirements

3.5.1 Body approval certificate

(1) Upon data review, on-site audit and approval test as described in 3.2-3.4, CCS will issue an approval certificate of test agency with a validity period of 4 years.

(2) If a test agency accredited by CCS needs to provide external third-party testing services, the surveyor may directly accept its test report without on-site witness.

(3) Accredited test agency shall regularly summarize relevant testing information required

by CCS and submit it to CCS.

(4) Those having obtained the approval certificate of test agency will be posted on CCS website.

3.5.2 Periodic audit

(1) Within the validity period of the certification of test agency, a periodic audit shall be conducted. The scope of periodic audit may be all or part of the contents required by the approval field and the approval. The types of periodic audit include on-site supervision and review and data review, and the test agency shall provide relevant documents and records (such as testing records, internal quality control results, complaint records). For multi-site test agency, periodic audit shall cover all sites.

(2) The periodic audit shall be completed within three months before and after the second anniversary of the expiration date of the certificate. If the test agency fails to submit an application for periodic audit to CCS within three months after the expiration date of the periodic audit, CCS will suspend the approval certificate according to the provisions of 3.5.5.2. If within three months after the suspension of the approval certificate, the test agency still fails to submit an application for periodic audit to CCS, CCS will cancel the approval certificate according to the provisions of 3.5.5.3.

3.5.3 Renewal audit

(1) If the body approval certificate expires and needs to be renewed, the test agency shall submit a renewal application in writing within 3 months before the expiration date of the certificate, and notify CCS of any changes related to the approval certificate and quality system.

(2) Document review, on-site audit, approval test and issuance of body approval certificate shall be implemented with reference to 3.2 to 3.4.

3.5.4 Approval certificate change

In case of name change, address change, addition of test item or extension of scope within the validity period of the approval certificate of a test agency, an application for approval certificate change shall be made in accordance with relevant requirements of CCS.

3.5.5 Invalidation, suspension and revocation of approval certificate

3.5.5.1 In case of any of the following within the validity period of the approval certificate, the approval certificate will automatically become invalid:

- (1) The certificate holder alters the certificate without authorization;
- (2) The principles (specific requirements) of conventions, specifications and standards applicable to the original accredited test items change.

3.5.5.2 When CCS determines that any of the following occurs to the test agency within the validity period of the approval certificate, CCS will suspend the approval certificate:

- (1) The test agency fails to apply for the periodic audit of CCS on time;
- (2) During the periodic audit, the test agency is found to have serious nonconformities or fail to correct the nonconformities found according to specified requirements;
- (3) It is found that the test agency has quality problems in the testing work and fails to take timely corrective actions, or fails to cooperate with CCS investigation.

3.5.5.3 When any of the following occurs to the test agency within the validity period of the approval certificate, CCS will revoke the approval certificate:

- (1) The test agency fails to submit an application for periodic audit to CCS within three months after the date of periodic audit and the suspension of the approval certificate;
- (2) Significant changes have taken place in the inspection/test conditions, equipment or quality control and management system of the test agency, which no longer meet the original approval conditions of CCS;
- (3) The inspection/test is not carried out properly or the results are reported improperly;
- (4) There are serious defects in the management system of the test agency, and no proper corrective actions have been taken, thus the accuracy, reliability and fairness of the test results cannot be guaranteed;
- (5) It is confirmed that there is falsification of test results;
- (6) The test agency fails to inspect and test marine products in accordance with approved test procedures and standards;
- (7) The test agency fails to pay relevant fees to CCS.

Part 2 Metallic Materials

Chapter 1 Metallic Ship Materials

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval of test agency for metallic ship materials.

1.1.2 It is applicable to the part of "Metallic Materials" listed in the current effective version of the *CCS Rules for Materials and Welding*. For the metallic material test with special requirements and its institutional approval, reference should be made to corresponding specification requirements.

Relevant tests of metallic ship materials:

- (1) Tensile test of metallic ship materials;
- (2) Impact test of metallic ship materials;
- (3) Bend test of metallic ship materials;
- (4) Z-direction tensile test of metallic ship materials;
- (5) Ductility test of metallic ship material pipes;
- (6) Intergranular corrosion test of metallic ship material stainless steel;
- (7) Pitting corrosion test of metallic ship material duplex steel;
- (8) Fatigue test of ship metal;
- (9) Fracture toughness test of ship metal;
- (10) Physical property test of metallic ship materials;
- (11) Chemical composition analysis of metallic ship materials;
- (12) Metallographic structure analysis of metallic ship materials;
- (13) Analysis of nonferrous ship metal.

1.2 Basis of Approval

CCS Rules for Materials and Welding

ASTM A370 Standard Test Methods and Definitions for Mechanical Testing of Steel

Products;

GB/T228.1 Metallic Materials - Tensile Testing - Method of Test at Room Temperature

GB/T4338 Metallic Materials - Tensile Testing at Elevated Temperature

GB/T230.1 Metallic Materials - Rockwell Hardness Test

GB/T231.1 Metallic Materials - Brinell Hardness Test

GB/T4340.1 Metallic Materials - Vickers Hardness Test

GB/T229 Metallic Materials - Charpy Notch Impact Test

GB/T232 Metallic Materials - Bend Test

GB/T242 Metal Materials - Tube - Drift-expanding Test

GB/T224 Metallic Materials - Tube - Bend Test Method

GB/T245 Metallic Materials - Tube - Flanging Test Method

GB/T246 Metallic Materials - Tube - Flattening Test

GB/T6398 Metallic Materials - Fatigue Testing - Fatigue Crack Growth Method

GB/T4337 Metallic Materials - Fatigue Testing - Rotating Bar Bending Method

GB/T21143 Metallic Materials - Unified Method of Test for Determination of Quasistatic

Fracture Toughness

GB/T22315 Metallic Materials - Determination of Modulus of Elasticity and Poisson's

Ratio

GB/T6803 Test Method for Drop-weight Test to Determine Nil-ductility Transition

Temperature of Ferritic Steels

GB/T8363 Test Method for Drop-weight Tear Tests of Steel Products

GB/T 6396 Clad Steel Plates - Mechanical and Technological Test

GB/T 11354 Determination of Nitrided Case Depth and Metallographic Microstructure

Examination for Steel and Iron Parts

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination. Please refer to Section 3.2, Chapter 3, Part 1 of the Guidelines for details of the

documents and data submitted.

1.4 Quality Management System Requirements

1.4.1 The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.5 Management Requirements

1.5.1 For test agency having corresponding posts according to the inspection scope and departments for sampling and sample preparation, its management system shall cover relevant quality activities, including outdoor work and processing workshops.

1.5.2 When a test agency shall set up technical manager by discipline, corresponding personnel shall obtain corresponding qualifications and the test agency shall have corresponding personnel protection facilities and regulations.

1.5.3 Personnel records: The test agency shall keep records of accepted personnel, including age, education level, training records and experience records in the approval industry.

1.5.4 Equipment and facilities: The test agency shall equip and maintain the necessary test equipment and facilities suitable for the test services provided, and when necessary, formulate the equipment operation and maintenance instructions, and keep the original records and use records of the equipment, which shall include all maintenance and calibration information of the equipment. The safety facilities and environment shall be able to meet the needs of test services.

1.5.5 Test procedures: The test agency shall keep written test procedures and operation instructions. Such procedures shall cover the test services provided, include the following contents and meet relevant requirements:

- (1) Receipt, review and assignment of test service applications
- (2) Receipt, marking, storage and handling of samples;
- (3) Pre-operational inspection and preparation of test equipment, operation instructions or guidelines of equipment;
- (4) Inspection, analysis and determination;
- (5) Rules and measures for coordination and liaison between testing personnel and on-site surveyors (if necessary);

- (6) Test supervision and verification;
- (7) Relevant requirements (if any) for arrangement of testing records and submission of them to the on-site surveyor for signature and confirmation;
- (8) Provisions on preparation, review and approval of test reports;
- (9) Distribution and filing of reports.

1.5.6 Verification: The test agency shall verify whether the test service provided meets the requirements of the approval procedure.

1.5.7 The test agency shall ensure that the vibration caused by using large material testers and machining equipment shall not adversely affect the inspection environment, and impact testers shall not cause harm to other adjacent experimental areas.

1.5.8 The test agency shall have proper facilities and methods to deal with hazardous wastes.

1.6 Technical Requirements

According to the corresponding scope of approval, the test agency shall define the corresponding basis of approval, prepare corresponding experimental outline, and process test samples according to the experimental outline approved by CCS headquarters to comply with corresponding standards. The experimental process shall be strictly in accordance with the standards.

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
Mechanical properties of metallic materials	1	Tensile strength Yield strength Proof strength, non-proportional extension Elongation after fracture Reduction of area	GB/T228 Metallic Materials - Bend Test ASTM A370 Standard Test Methods and Definitions for Mechanical Testing of Steel Products ASTM E21 Standard Test Methods for Elevated Temperature Tension Tests of Metallic Materials CCS Rules for Materials and Welding ISO 6892-1 Metallic Materials - Tensile Testing - Part 1: Method of Test at Room Temperature ISO 6892-2 Metallic Materials - Tensile Testing - Part 2: Method of Test at Elevated Temperature
Mechanical properties of metallic materials	2	Impact absorbing energy	GB/T229 Metallic Materials - Charpy Notch Impact Test ASTM A370 Standard Test Methods and

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
			Definitions for Mechanical Testing of Steel Products ISO 148-1 Metallic Materials - Charpy Pendulum Impact Test - Part 1: Test Method EN 10045-1 Metallic Materials - Charpy Impact Test - Part 1: Test Method CCS Rules for Materials and Welding
	3	Brinell hardness	GB/T231.1~.3 Metallic Materials - Brinell Hardness Test EN ISO 6506-1 Metallic Materials - Brinell Hardness Test - Part 1: Test Method ASTM E10 Standard Test Method for Brinell Hardness of Metallic Materials
	4	Vickers hardness	GB/T 4340.1 Metallic Materials - Vickers Hardness Test - Part 1: Test Method EN ISO 6507-1 Metallic Materials - Vickers Hardness Test - Part 1: Test Method ASTM E384 Standard Test Method for Vickers Hardness of Metallic Materials
	5	Rockwell hardness	GB/T230.1 Metallic Materials - Rockwell Hardness Test EN ISO 6508-1 Metallic Materials - Rockwell Hardness Test - Part 1: Test Method ASTM E18-08b Standard Test Method for Rockwell Hardness of Metallic Materials
	6	Richter hardness	GB/T 17394 Metallic Materials - Leeb Hardness Test Method
	7	Bending experiment	GB/T232 Metallic Materials - Bend Test ASTM A370 Standard Test Methods and Definitions for Mechanical Testing of Steel Products ISO 7438 Metallic Materials - Bend Test CCS Rules for Materials and Welding
	8	Shear test	GB/T 13683 Pins and Grooved Pins - Shear Test
	9	Drift-expanding test	GB/T 242 Metal Materials - Tube - Drift-expanding Test ISO 8493 Metal Materials - Tube - Drift-expanding Test CCS Rules for Materials and Welding
	10	Flattening test	GB/T 246 Metallic Materials - Tube - Flattening Test ISO 8492 Metallic Materials - Tube - Flattening

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
			Test CCS Rules for Materials and Welding
	11	Flanging test	GB/T 245 Metallic Materials - Tube - Flanging Test Method ISO 8494 Metallic Materials - Tube - Flanging Test CCS Rules for Materials and Welding
Fatigue resistance of metallic materials	1	Axial fatigue	GB/T 3075 Metallic Materials - Fatigue Testing - Axial-force-controlled Method
	2	Crack growth rate	GB/T6398 Metallic Materials - Fatigue Testing - Fatigue Crack Growth Method
	3	Low-cycle fatigue	GB/T15248 Test Method for Axial Loading Constant-amplitude Low-cycle Fatigue of Metallic Materials
	4	Rotating bar bending fatigue	GB/T4337 Metallic Materials - Fatigue Testing - Rotating Bar Bending Method
Fracture toughness of metallic materials	1	Plane-strain fracture toughness	GB/T4161 Metallic Materials - Determination of Plane-strain Fracture Toughness (KIC)
	2	Ductile fracture toughness	GB/T21143 Metallic Materials - Unified Method of Test for Determination of Quasistatic Fracture Toughness
	3	Crack tip opening displacement (CTOD)	GB/T21143 Fracture Toughness Test Method
			BS7448.1 Fracture Mechanics Toughness Tests
	5	Nil-ductility (transition) temperature (NDT)	GB/T6803 Test Method for Drop-weight Test to Determine Nil-ductility Transition Temperature of Ferritic Steels ASTM_E_208 Standard Test Method for Conducting Drop-weight Test to Determine Nil-ductility Transition Temperature of Ferritic Steels
	6	Drop-weight tear test (DWTT)	GB/T8363 Test Method for Drop-weight Tear (Metallic Materials - Dynamic Tear) Tests of Steel Products
	7	Dynamic tear	GB/T 5482 Test method of Metallic Materials - Dynamic Tear
	8	Brittle crack arrest toughness test	IACS W31 Annex 3
Physical properties of metallic materials	1	Young's modulus, shear modulus and Poisson's ratio	GB/T22315 Metallic Materials - Determination of Modulus of Elasticity and Poisson's Ratio
	2	Density	GB/T3850 Impermeable Sintered Metal Materials and Hardmetals - Determination of

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
			Density
	3	Phase transition curve	YB/T130 Steel - Determination of Isothermal Transformation Diagram Method
	4	Quantitative phase analysis	YB/T5320 Metal Materials - Quantitative Phase Analysis - "Value K" Method of X-ray Diffraction
	5	Stress measurement	GB/T7704 Practice for Residual Measurement by X-ray
	6	Residual austenite	GB/T8362 Residual Austenite in Steel - Quantitative Determination
	7	Damping capacity	GB/T13665 Test Method for Damping Capacity of Metallic Damping Materials
	8	Critical point	YB/T5127 Steel - Determination of Critical Point
	9	Transus temperature	GB/T23605 Method of β Transus Temperature Determination of Titanium Alloys
	10	Thermal expansion	GB/T4339 Test Methods for Thermal Expansion Characteristic Parameters of Metallic Materials
	Corrosion resistance of metallic materials	1	Corrosion test
2		Corrosion weight loss	GB/T5776 Method for Surface Exposure Corrosion Tests of Metallic Materials
3		Stress corrosion	GB/T15970.1 Corrosion of Metals and Alloys - Stress Corrosion Testing - Part 1: General Guidance on Testing Procedures
4		Thickness measurement of metal coating and chemical treatment layer	GB/T 4677 Test Methods of Printed Boards GB/T 6462 Metallic and Oxide Coatings - Measurement of Coating Thickness - Microscopical Method GB/T 9450 Steels - Determination and Verification of the Depth of Carburized and Hardened Cases JB/T 5069 Metallographic Examination Method of Diffusion Metallized Layer of Steel Parts
Chemical composition of iron, steel and alloys	1	Chemical analysis of iron, steel and alloy	Method for Chemical Analysis of Iron, Steel and Alloys; Chemical Analysis Methods for Determination of Cu, Ni, P, Mn, Ti, Mo, N, Cr, Ni, Si, Al, C, S, V, Nb, Co; GB/T223,

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
			GB/T4336 ASTM E1019 Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys
	2	Phosphorus content	GB/T 223.59 Iron, Steel and Alloy - Determination of Phosphorus Content - Bismuth Phosphomolybdate Blue Spectrophotometric Method and Antimony Phosphomolybdate Blue Spectrophotometric Method
	3	Manganese content	GB/T 223.63 Methods for Chemical Analysis of Iron, Steel and Alloy - The Sodium (Potassium) Periodate Photometric Method for the Determination of Manganese Content
	4	Silicon content	GB/T 223.5 Steel and Iron - Determination of Acid-soluble Silicon and Total Silicon Content - Reduced Molybdosilicate Spectrophotometric Method
	5	Nickel content	GB/T 223.23 Iron, Steel and Alloy - Determination of Nickel Content - The Dimethylglyoxime Spectrophotometric Method GB/T 223.25 Methods for Chemical Analysis of Iron, Steel and Alloy - The Dimethylglyoxime Gravimetric Method for the Determination of Nickel Content
	6	Chromium content	GB/T 223.11 Iron, Steel and Alloy - Determination of Chromium Content - Visual Titration or Potentiometric Titration Method
	7	Molybdenum content	GB/T 223.26 Iron, Steel and Alloy - Determination of Molybdenum Content - The Thiocyanate Spectrophotometric Method
	8	Titanium content	GB/T 223.16 Methods for Chemical Analysis of Iron, Steel and Alloy - The Chromotropic Acid Photometric Method for the Determination of Titanium Content GB/T 223.17 Methods for Chemical Analysis of Iron, Steel and Alloy - The Diantipyrylmethane Photometric Method for the Determination of Titanium Content
	9	Carbon, sulfur, oxygen and nitrogen content	GB/T 14265 General Rule of Chemical Analysis for Hydrogen, Oxygen, Nitrogen, Carbon and Sulfur in Metallic Materials ASTM E1019 Standard Test Methods for

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
			Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel and Alloys
Microstructure of metals	1	Inspection of metal microstructure	GB/T 13298 Inspection Methods of Microstructure for Metals
	2	Nonmetallic inclusions in steel	GB/T10561 Steel - Determination of Content of Nonmetallic Inclusions - Micrographic Method Using Standards Diagrams
	3	Average grain size of metal	GB/T 6394 Determination of Estimating the Average Grain Size of Metal ASTM E112-96 Standard Test Methods for Determining Average Grain Size
	4	Microstructure determination of steel	GB/T13299 Steel - Determination of Microstructure
	5	Steel examination by sulphur print	GB/T4236 Steel Examination by Sulphur Print YB/T4003 Standard Diagrams for Microstructure and Defect in Continuous Casting Slab
	6	Macrostructure examination of steel	GB/T226 Test Method for Macrostructure and Defect of Steel by Etching GB/T1979 Standard Diagrams for Macrostructure and Defect of Structural Steels YB/T4002 Standard Diagrams for Macrostructure and Defects in Continuous Casting Billets ASTM E381-01 Standard Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings
Microstructure of metals	7	Metallographic test for cast iron	GB/T7216 Metallographic Test for Gray Cast Iron GB/T9441 Metallographic Test for Spheroidal Graphite Cast Iron
	8	Longitudinal microstructure of superalloy bars	GB/T 14999.1 Test Method for Superalloys - Verification of Longitudinal Macro-structures and Defect by Etch
	9	Transverse macrostructure of superalloys	GB/T 14999.2 Test Method for Superalloys - Verification of Transverse Macro-structures and Defect by Etch
	10	Determination of characterizing banding grains and primary carbides distribution of superalloys	GB/T 14999.4 Test Methods for Superalloys

Test Products and Categories	S/N	Test Items	Testing Basis and Standards
	11	Ferrite content	GB/T 1954 Methods of Measurement for Ferrite Content in Austenitic Cr-Ni Stainless Steel Weld Metals
	12	Determination of α -phase area content	GB/T 13305 Micrographic Method for Determining Area Content of the α -phases in Stainless Steel
	13	Decarburized layer	GB/T 224 Determination of the Depth of Decarburization of Steels ASTM E1077-01 Standard Test Methods for Estimating the Depth of Decarburization of Steel Specimens
Chemical composition of nonferrous metals	1	Chemical analysis of aluminum and aluminum alloys	GB/T20975 Methods for Chemical Analysis of Aluminum and Aluminum Alloys
	2	Chemical analysis of copper and copper alloy	Cu, Fe, Zn, Al, Mn, Ni, C, S, Pb, Cr, Ti, Si; GB/T5121 Methods for Chemical Analysis of Copper and Copper Alloys
	3	Methods for chemical analysis of titanium sponge, titanium and titanium alloys	GB/T4698 Methods for Chemical Analysis of Titanium Sponge, Titanium and Titanium Alloys
	4	Chemical analysis of magnesium and magnesium alloys	GB/T13748 Methods for Chemical Analysis of Magnesium and Magnesium Alloys
	5	Chemical analysis of zinc and zinc alloys	GB/T12689 Methods for Chemical Analysis of Zinc and Zinc Alloys
Microstructure of nonferrous metals	1	Microstructure inspection of aluminum alloys	GB/T 3246.1 Inspection Method for Structure of Wrought Aluminum and Aluminum Alloy Products - Inspection Method for Microstructure JB/T 7946.1~7946.4 Metallograph of Cast Aluminum Alloys
Diffusible hydrogen content in deposited metal	1	Diffusible hydrogen content in deposited metal	CCS Rules for Materials and Welding

Note: If any standard listed in the table above is updated, it is recommended to use the latest/current valid version of the standard.

1.7 Report Form and Requirements

1.7.1 The test report form accepted by CCS shall be used, and the report shall be prepared, reviewed and approved in accordance with specified requirements.

1.7.2 The report shall generally include name of the applicant, name of the client,

information of the test sample (number, model/specification), test method, technical requirements, test results and conclusions or determination results, etc.

Part 3 Non-metallic Materials

Chapter 1 Marine Coatings

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for marine coatings (hereinafter referred to as "test agency").

1.1.2 Marine coatings are classified as follows as per the position applied on the ship and the application: the shop primer for ship building, anti-corrosive paint for ship hull, anti-fouling paint for ship hull, anodic shielding coating, anti-corrosive paint for ship, boottopping paint for ship, topside paint, deck paint, cargo hold paint for ship, internal compartment finish coating, drinking water tank coating of ship building, ballast tank paint, oil tank paint for ship, engine room bottom coating, etc. The classification and application are given in Table 1.1.2:

Classification and Application of Marine Coatings Table 1.1.2

Classification and Name		Application
Shop primer for ship building		Suitable for the application to ship plates, sections and moulding parts after the surface treatment by shot blasting (grand blasting) to the required grade, as temporary protection for steel products.
Boottopping Ship coating below the	Anti-corrosive paint for ship hull	Applicable to the outer surface below the design boottopping of ships of various materials, including the waterline of the hull.
	Anti-fouling paint for ship hull	Applicable to the outer surface below the design boottopping of ships of various materials, including the waterline of the hull.
	Anodic shield coating	Suitable for shield coating of the impressed anode of the impressed current cathodic protection system in ships and marine works.
Ship coating above the boottopping	Anticorrosive paint for ship	Applicable to the parts and internal structures (except liquid tanks) above the design boottopping of ship hulls and offshore platforms.
	Boottopping paint for ship	Suitable for boottopping paint on the outer surface of hull between the full-load waterline and the light-load waterline, but not for boottopping paint with anti-fouling function.
	Topside paint	Applicable to the exterior of buildings above the full-load waterline, as well as masts, hoisting machinery, etc.
	Deck paint	Suitable for steel surface protection of ship decks, docks and other marine facilities.
	Cargo hold paint for ship	Suitable for protection of the ship dry cargo hold and steel structures in it, and some for cargo hold for bulk grain food.

	Internal compartment finish coating	Applicable to the exposed surface inside the engine room, superstructure and/or deckhouse.
Liquid tank coating for ship	Drinking water tank coating of shipbuilding	Applicable to the inner surface of ship drinking water tank.
	Ballast tank coating for ship	Applicable to the inner surface protection of dedicated seawater ballast tanks for all types of ships and the double-side skin spaces of bulk carriers.
	Oil tank paint for ship	Applicable to the inner surface of oil tanks for petroleum hydrocarbons except aviation gasoline, aviation kerosene and other special oil products.
	Paint for cargo oil tank of crude oil tanker	Applicable to the inner surface protection of cargo oil tanks of crude oil tankers.
	Engine room bottom coating	Applicable to the bottom of the main engine room, auxiliary engine room, and pump room.

1.2 Basis of Approval

Product Name		Main Applicable Standard
Shop primer for ship building		Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 2, Part 3 of <i>CCS Rules for Materials and Welding</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 6747 Shop Primer for Ship Building</i>
Ship coating below the Boottopping	Anti-corrosive paint for ship hull	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 6822 Antifouling and Anticorrosive Paint System for Ship Hull</i>
	Anti-fouling paint for ship hull	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>2001 International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention)</i> <i>GB/T 6822 Antifouling and Anticorrosive Paint System for Ship Hull</i>
	Anodic shield coating	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 7788 General Specification for Anodic Shield Coating of Ship and Ocean Engineering</i>
Ship coating above the boottopping	Anticorrosive paint for ship	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 6748 Anticorrosive Paint for Ship</i>
	Boottopping paint for ship	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 9260 Boottopping Paint for Ship</i>
	Topside paint	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 6745 Topside Paint</i>
	Deck paint	Chapter 1, Part 2 of <i>CCS Rules for Classification of Sea-Going Steel Ships</i> Chapter 3, <i>CCS Guidelines for Survey of Structure Anti Corrosion for Ships</i> <i>GB/T 9261 Deck Paint</i>

	Cargo hold paint for ship	Chapter 1, Part 2 of CCS Rules for Classification of Sea-Going Steel Ships Chapter 3, CCS Guidelines for Survey of Structure Anti Corrosion for Ships GB/T 9262 <i>Cargo Hold Paint for Ship</i>
	Internal compartment finish coating	Regulations 3, 5 and 6, Chapter II-2 of 1974 International Convention for the Safety of Life at Sea (SOLAS Convention) and its amendments IMO 2010 FTP Code Part 2 and Part 5
Liquid tank coating for ship	Drinking water tank coating of shipbuilding	Chapter 1, Part 2 of CCS Rules for Classification of Sea-Going Steel Ships Chapter 3, CCS Guidelines for Survey of Structure Anti Corrosion for Ships GB 5369 <i>General-specification for Drinking Water Tank Coating of Shipbuilding</i>
	Ballast tank coating for ship	IMO MSC.215(82) <i>Performance Standard for Protective Coatings for Dedicated Seawater Ballast Tanks in All Types of Ships and Double-side Skin Spaces of Bulk Carriers</i> GB/T 6823 <i>Ballast Tanks Paint for Ship</i>
	Oil tank paint for ship	Chapter 1, Part 2 of CCS Rules for Classification of Sea-Going Steel Ships Chapter 3, CCS Guidelines for Survey of Structure Anti Corrosion for Ships GB/T 6746 <i>Oil Tank Paint for Ship</i>
	Paint for cargo oil tank of crude oil tanker	IMO MSC.288(87) <i>Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Carriers</i> GB/T 31820 <i>Paints for Cargo Oil Tanks of Crude Oil Tankers</i>
	Engine room bottom coating	Chapter 1, Part 2 of CCS Rules for Classification of Sea-Going Steel Ships Chapter 3, CCS Guidelines for Survey of Structure Anti Corrosion for Ships GB/T 14616 <i>General Specifications for Engine-room Bottom Coating</i>

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.5 General Requirements

1.5.1 Personnel qualification requirements: The applicant shall be responsible for training its personnel according to the requirements of the national or international or industrial standards, and ensure that the testing personnel, technical experts and management personnel have relevant professional knowledge. In the absence of standards (such as new products), the applicant shall select the standards at its discretion and explain the reasons in the documents to prove that the requirements of its testing services are met. Personnel should have appropriate experience and be familiar with the operation of equipment. Testing personnel should have received junior college

education or above, and have at least 1-year working experience or internship experience in related positions. The person in charge of quality supervision should have the title of engineer or above, and have at least 2-year working experience in related positions or testing service experience in related positions. The PSPC coating inspector shall hold the qualification certificates of NACE Level 2 Inspector or above, or FROSIO Level III Inspector or CCMCIC Level II Inspector or above. The report issuing personnel shall have the title of engineer or above, and have at least 3-year working experience in related positions or testing service experience in related positions.

1.5.2 Supervision (quality control): The test agency shall designate personnel to supervise the testing services provided, and shall develop quality supervision procedures or operation instructions.

1.5.3 Personnel records: The test agency shall keep records of accepted personnel, including age, education level, training records and experience records in the approval industry.

1.5.4 Equipment and facilities: The test agency shall equip and maintain the necessary test equipment and facilities suitable for the test services provided, and when necessary, formulate the equipment operation and maintenance instructions, and keep the original records and use records of the equipment, which shall include all maintenance and calibration information of the equipment. The safety facilities and environment shall be able to meet the needs of test services. See 1.6.2 for details.

1.5.5 Test procedures: The test agency shall keep written test procedures. Such procedures shall cover the test services provided, include the following contents and meet relevant requirements:

- (1) Receipt, review and assignment of test service applications
- (2) Receipt, marking, storage and handling of samples;
- (3) Pre-operational inspection and preparation of test equipment, operation instructions or guidelines of equipment, including safety protection;
- (4) Inspection, analysis and determination;
- (5) Rules and measures for coordination and liaison between testing personnel and on-site surveyors (if necessary);
- (6) Test supervision and verification;

(7) Relevant requirements (if any) for arrangement of testing records and submission of them to the on-site surveyor for signature and confirmation;

(8) Provisions on preparation, review and approval of test reports;

(9) Distribution and filing of reports.

1.5.6 Verification: The test agency shall verify whether the test service provided meets the requirements of the approval procedure.

1.6 Technical Requirements

1.6.1 Test items of ship coatings

Product Name		Test Item	Testing methods	
Shop primer for ship building		Drying time	GB/T 1728	
		Adhesion	GB/T 1720	
		Film thickness	GB/T 13452.2, Appendix A.1 to GB/T 6747	
		Metallic zinc content in non-volatile matters	HG/T 3668	
		Weather resistance	GB/T 9276	
		Welding and cutting	CCS Rules for Materials and Welding GB/T 6747	
Ship coating below the Boottopping	Anti-corrosive paint for ship hull	Non-volatile matter	GB/T 9272	
		Density	GB/T 6750	
		Viscosity	GB/T 1723 或 GB/T 9269 或 GB/T 9751	
		Flash point	GB/T 5208	
		Drying time	GB/T 1728	
		Adhesion	GB/T 5210	
		Immersion resistance	GB/T 10834	
		Blister resistance	GB/T 10834	
		Resistance to cathodic disbonding	GB/T 7790	
	Anti-fouling paint for ship hull	Non-volatile matter	GB/T 9272	
		Density	GB/T 6750	
		Color	GB/T 9761	
		Viscosity	GB/T 1723 或 GB/T 9269 或 GB/T 9751	
		Flash point	GB/T 5208	
		Drying time	GB/T 1728	
		Package stability	GB/T 6753.3	
		Antifouling agent	Total copper	ASTM D6632
			Total tin	GB/T 26085, MEPC.104(49)
			DDT	GB/T 25011
		In shallow submergence	GB/T 5370	

Product Name		Test Item	Testing methods
		Polishability (or abrasability) of antifouling coating	GB/T 7789
		Dynamic simulation test	GB/T 7789
		Compatibility with cathodic protection	GB/T 7790
	Anodic shield coating	Color appearance	Visual inspection
		Density	GB/T 6750
		Drying time	GB/T 1728
		Adhesion	GB/T 5210
		Impact resistance	ASTM D2794
		Salt spray resistance	GB/T 1771
		Potential test resistance	GB/T 7788
Ship coating above the boottopping	Anticorrosive paint for ship	Solid content	GB/T 1725
		Density	GB/T 6750
		Viscosity	GB/T 1723 或 GB/T 9269 或 GB/T 9751
		Flash point	GB/T 5208
		Drying time	GB/T 1728
		Adhesion	GB/T 5210
		Flexibility	GB/T 1731
		Resistance to salt water	GB/T 10834
		Salt spray resistance	GB/T 1771
		Adaptability to finishing coating	GB/T 1727
	Boottopping paint for ship	Paint film appearance	Visual inspection
		Drying time	GB/T 1728
		Impact resistance	GB/T 20624.1
		Adhesion	GB/T 5210
		Resistance to salt water	GB/T 10834
		Oil resistance	GB/T 9274
		Salt spray resistance	GB/T 1771
		Artificial weathering resistance	GB/T 14522 或 GB/T 1865
		Weather resistance	GB/T 9276
		Water flow resistance	Appendix A to GB/T 9260
	Topside paint	Paint film appearance	Visual inspection
		Fineness	GB/T 6753.1
		Solid content	GB/T 1725
		Drying time	GB/T 1728
		Impact resistance	GB/T 20624.1
		Flexibility	GB/T 1731
		Gloss	GB/T 9754

Product Name		Test Item	Testing methods
ship		Adhesion	GB/T 5210
		Resistance to salt water	GB/T 10834
		Salt spray resistance	GB/T 1771
		Artificial weathering resistance	GB/T 14522 or GB/T 1865
		Weather resistance	GB/T 9276
	Deck paint	Paint film appearance	Visual inspection
		Solid content	GB/T 1725
		Drying time	GB/T 1728
		Impact resistance	GB/T 20624.1
		Adhesion	GB/T 5210
		Abrasion resistance	GB/T 1768
		Resistance to salt water	GB/T 10834
		Oil resistance	GB/T 9274
		Resistance to sodium dodecyl benzene sulfonate	GB/T 9274
		Salt spray resistance	GB/T 1771
		Artificial weathering resistance	GB/T 14522 or GB/T 1865
		Weather resistance	GB/T 9276
		Slip resistance	GB/T 9263
	Cargo hold paint for ship	Paint film appearance	Visual inspection
		State in container	GB/T 9262
		Drying time	GB/T 1728
		Adhesion	GB/T 5210
		Abrasion resistance	GB/T 1768
		Pot life	GB/T 9262
		Flexibility	GB/T 1731
		Impact resistance	GB/T 1732
		Salt spray resistance	GB/T 1771
		Hygienic property (when loading bulk grain)	Food Hygiene Law of the People's Republic of China
	Internal compartment finish coating	Appearance and color	Visual inspection
		Fineness	GB/T 6753.1
		Low flame-spread characteristics	IMO 2010 FTP Code Part 5
		Smoke and toxicity	IMO 2010 FTP Code Part 2
	Liquid tank coating for shipbuilding	Drinking water tank coating of shipbuilding	Fineness
Adhesion			GB/T 5210
Drying time			GB/T 1728
Flexibility			GB/T 1731
Salt spray resistance			GB/T 1771
Water resistance			GB/T 1733

Product Name	Test Item	Testing methods
	Hygienic requirements	Appendix A to GB 5369
Ship ballast tank paint	Non-volatile matter	GB/T 1725
	Specific gravity or density	GB/T 6750, ISO 2811-1/4
	Component determination of base and curing agent	Fourier-transform infrared spectroscopy (FT-IR)
	Package stability	GB/T 6753.3
	Appearance and color	Visual inspection
	Nominal dry film thickness	GB/T 13452.2, SSPC-PA2
	Ballast tank condition simulation test	IMO MSC.215(82)
	Condensation chamber test	IMO MSC.215(82), ISO 6270-1
	Cross-over test	IMO MSC.215(82)
Paint for cargo oil tank of crude oil tanker	Component determination of base and curing agent	Fourier-transform infrared spectroscopy (FT-IR)
	Specific gravity or density	GB/T 6750, ISO 2811-1/4
	Nominal dry film thickness	GB/T 13452.2, SSPC-PA2
	Air-tight tank test	IMO MSC.288(87)
	Immersion test	IMO MSC.288(87)
	Cross-over test	IMO MSC.288(87)
Oil tank paint for ship	Drying time	GB/T 1728
	Paint film appearance	Visual inspection
	Adhesion	GB/T 5210
	Salt spray resistance	GB/T 1771
	Resistance to salt water	GB/T 10834
	Oil resistance	GB/T 9274
Engine room bottom coating	Fineness	GB/T 1724
	Solid content	GB/T 1725
	Drying time	GB/T 1728
	Adhesion	GB/T 5210
	Salt spray resistance	GB/T 1771
	Resistance to hot salt water	GB/T 10834
	Diesel resistance	GB/T 9274

1.6.2 Specific requirements for test items of marine coatings

1.6.2.1 Conventional coating properties

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
1	Viscosity	Outflow viscosity (GB/T 1723)	Qualified coating inspector	Viscosity Cup #1 or Viscosity Cup #4	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
		Stormer viscosity (GB/T 9269)	Qualified coating inspector	Stormer viscometer	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
		Rotational viscosity (ASTM D2196)	Qualified coating inspector	Brookfield rotational viscometer	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
		Shear viscosity (GB/T 9751.1)	Qualified coating inspector	Shear viscometer	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
		Flow time (GB/T 6753.4)	Qualified coating inspector	ISO flow cup	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
		Rotational viscosity (GB/T 2794)	Qualified coating inspector	NDJ viscometer	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
2	Fineness	Coating fineness (GB/T 1724)	Qualified coating inspector	Q1D scraper fineness gauge	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
		Fineness of grind (GB/T 6753.1)	Qualified coating inspector	ISO scraper fineness gauge	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
3	Flash point (GB/T 5208)	Qualified coating inspector	Closed flash point tester	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH	
4	Paint sampling (GB/T 3186)	Qualified coating inspector	Paint mixer, etc.	None	To be developed	(23±2)°C ≤85%RH	(23±2)°C ≤85%RH	

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
5	Non-volatile matter content (solid content) (GB/T 1725, ISO 3251)	Qualified coating inspector	Analytical balance, oven	None	To be developed	(23±2)°C (50±5)%RH	(105±2)°C
6	Pigment content (ash)	Qualified coating inspector	Analytical balance, high-temperature oven	None	To be developed	(23±2)°C (50±5)%RH	600°C-900°C
7	Drying time (GB/T 1728)	Qualified coating inspector	Drying time meter	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH
8	Component identification	Qualified coating inspector	Fourier-transform infrared spectrometer	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH
9	Covering power (GB/T 1726)	Qualified coating inspector	Covering power board, analytical balance	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH
10	Density (GB/T 6750, ISO 2811-1)	Qualified coating inspector	Specific gravity cup, analytical balance	None	To be developed	(23±2)°C (50±5)%RH	(23±0.5)°C, (50±5)%RH
11	Non-volatile matter by volume (GB/T 9272, ISO 3233)	Qualified coating inspector	Analytical balance	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH
12	Sag resistance (GB/T 9264)	Qualified coating inspector	Sag resistance measuring plate	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH
13	Constructability	Qualified coating inspector	Brush, roller, airless/pneumatic sprayer	None	To be developed	(23±2)°C ≤85%RH	(23±2)°C, ≤85%RH
14	Airless coatability	Qualified coating inspector	Airless sprayer	None	To be developed	(23±2)°C ≤85%RH	(23±2)°C, ≤85%RH
15	Recoatibility	Qualified coating inspector	Sprayer, paint film scribe	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
16	Brushability	Qualified coating inspector	Brush	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH	
17	Pot life (ISO 9514)	Qualified coating inspector	1L container, timer	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH	
18	Package stability (GB/T 6753.3)	Qualified coating inspector	Indoor dark environment or oven	None	To be developed	Indoor environment	Indoor environment or (50±2)°C	
19	Settlement degree	Qualified coating inspector	Paint spatula	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C, (50±5)%RH	
20	Volatile organic compound (VOC) content	Difference method (ISO 11890-1)	Qualified coating inspector	Oven, analytical balance	None	To be developed	(23±2)°C (50±5)%RH	(105±2)°C
		Gas-chromatographic method (ISO 11890-2)	Qualified coating inspector	Analytical balance, gas chromatograph	Standard solution of each VOC	To be developed	(23±2)°C (50±5)%RH	Injection port: 250°C Column oven: 200°C Detector: 280°C Split/splitless injection
21	Contents of benzene, toluene, ethylbenzene and xylene (GB/T 23990)	Qualified coating inspector	Analytical balance, high-speed centrifuge, gas chromatograph, etc.	Standard solutions of benzene, toluene, ethylbenzene and xylene	To be developed	(23±2)°C (50±5)%RH	Injection port: 250°C Column oven: 200°C Detector: 280°C	

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
							Split/splitless injection
22	Chlorhydrocarbon (GB/T 23992)	Qualified coating inspector	Analytical balance, high-speed centrifuge, gas chromatograph, etc.	Standard solution of chlorhydrocarbon	To be developed	(23±2)°C (50±5)%RH	Injection port: 250°C Column oven: 200°C Detector: 280°C Split/splitless injection
23	Glass transition temperature (GB/T 19466.2, ISO 16805)	Qualified coating inspector	Differential scanning calorimeter	None	To be developed	(23±2)°C (50±5)%RH	150°C
24	DDT (GB/T 25011)	Qualified coating inspector	Analytical balance, high-speed centrifuge, gas chromatograph, etc.	Standard solution of DDT	To be developed	(23±2)°C (50±5)%RH	Injection port: 250°C Column oven: 200°C Detector: 280°C Split/splitless injection
25	Soluble harmful elements content (GB/T 23991)	Qualified coating inspector	Analytical balance, microwave digestion system, atomic absorption spectroscopy, plasma emission spectroscopy,	Standard solution of each element	To be developed	(23±2)°C (50±5)%RH	Ashing temperature: 800°C; Digestion: 170°C;

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
			etc.				
26	Total tin (GB/T 26085)	Qualified coating inspector	Analytical balance, microwave digestion system, atomic absorption spectroscopy, etc.	Standard solution of tin	To be developed	(23±2)°C (50±5)%RH	Ashing temperature: 800°C; Digestion: 170°C;
27	Total copper (ASTM D6632)	Qualified coating inspector	Analytical balance, microwave digestion system, atomic absorption spectroscopy, etc.	Standard solution of copper	To be developed	(23±2)°C (50±5)%RH	Digestion: 170°C;
28	Total lead (IEC 62321)	Qualified coating inspector	Analytical balance, microwave digestion system, atomic absorption spectroscopy, etc.	Standard solution of lead	To be developed	(23±2)°C (50±5)%RH	Ashing temperature: 800°C; Digestion: 170°C;
29	Total cadmium (IEC 62321)	Qualified coating inspector	Analytical balance, microwave digestion system, atomic absorption spectroscopy, etc.	Standard solution of cadmium	To be developed	(23±2)°C (50±5)%RH	Ashing temperature: 800°C; Digestion: 170°C;
30	Hexavalent chromium content (IEC 62321)	Qualified coating inspector	Analytical balance, ultraviolet-visible spectrophotometer, etc.	Standard solution of hexavalent chromium	To be developed	(23±2)°C (50±5)%RH	Ashing temperature: 800°C; Digestion: 170°C;
31	Chromium content	Qualified coating	Analytical balance,	Standard solution of	To be developed	(23±2)°C	Ashing

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	(IEC 62321)	inspector	microwave digestion system, atomic absorption spectroscopy, etc.	lead		(50±5)%RH	temperature: 800°C; Digestion: 170°C;
32	Mercury content (IEC 62321)	Qualified coating inspector	Analytical balance, microwave digestion system, atomic absorption spectroscopy, etc.	Standard solution of mercury	To be developed	(23±2)°C (50±5)%RH	Ashing temperature: 800°C; Digestion: 170°C;
33	Asbestos (ISO 22262-1, ISO 22262-3 NIOSH 9000, GB/T 23263)	Qualified coating inspector	Polarization microscope (PLM), X-ray diffractometer (XRD), SEM+EDS	6 asbestos standard samples	To be developed	(23±2)°C (50±5)%RH	PLM eyepiece: 101 1RD scanning range (2θ): 5-70
34	Molecular weight and molecular weight distribution (GB/T 27810)	Qualified coating inspector	Gel permeation chromatograph (GPC)	Standard solution of polystyrene	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
35	Paint color (GB/T 1722)	Qualified coating inspector	Chromometer	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
36	Appearance and transparency (GB/T 1721)	Qualified coating inspector	Visual inspection	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
37	Metallic zinc content in non-volatile matters (HG/T 3668)	Qualified coating inspector	Analytical balance, high-speed centrifuge, etc.	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH

1.6.2.2 Conventional properties of paint film

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Paint film preparation (GB/T 1727)		Qualified coating inspector	Paint film preparation, spraying, brushing or roller coating equipment	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C ≤85%RH
2	Film hardness (GB/T 6739)		Qualified coating inspector	6B-6H pencil	6B-6H pencil	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
3	Adaptability to finishing coating (GB/T 1727)		Qualified coating inspector	Visual inspection	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
4	Resistance to heat and humidity (GB/T 1740)		Qualified coating inspector	Heat and humidity test chamber	None	To be developed	室内环境	(47±1)°C (96±2)%RH
5	Film thickness (GB/T 13452.2, ISO 2808)		Qualified coating inspector	Magnetic thickness gauge, eddy current thickness gauge, ultrasonic thickness gauge, comb gauge, optical microscope, etc.	Standard thickness sheet	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
6	Flexibility (GB/T 1731)		Qualified coating inspector	Flexibility tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
7	Impact resistance	Ordinary impact (GB/T 1732)	Qualified coating inspector	Impact tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
		Rapid deformation	Qualified coating inspector	Impact tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	impact (ASTM D2794)						
	Large-area indenter (GB/T 20624.1)	Qualified coating inspector	Impact tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
8	Circle-drawing test (GB/T 1720)	Qualified coating inspector	Electric adhesion tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
	Cross cut test (GB/T 9286)	Qualified coating inspector	Paint film scribe	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
	Pull-off test (GB/T 5210)	Qualified coating inspector	Material tester, portable adhesion tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
	Pull-off test (ISO 4624)	Qualified coating inspector	Material tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
9	Gloss (GB/T 9754)	Qualified coating inspector	Glossmeter	Gloss calibration plate	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
10	Paint film color (GB/T 11186)	Qualified coating inspector	Color measuring instrument, colorimetric card	Black and white calibration plate	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
11	Aberration of paint film (GB/T 9761)	Qualified coating inspector	Colorimeter	Black and white calibration plate	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
12	Bendability (GB/T 6742)	Qualified coating inspector	Bending meter	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
13	Abrasion resistance (GB/T 1768)		Qualified coating inspector	Abrasiometer, analytical balance	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
14	Weathering resistance (GB/T 1768)		Qualified coating inspector	Natural atmospheric exposure field, colorimeter, etc.	None	To be developed	Outdoor environment	Outdoor environment
15	Salt spray resistance (GB/T 1771)		Qualified coating inspector	Salt spray tester	None	To be developed	Indoor environment	Temperature: (35±2)°C; Solution concentration: 5%; pH: 6.8-7.2 Settlement: 1.8-2.2ml/h;
16	Oil resistance (GB/T 9274)		Qualified coating inspector	Constant-temperature water tank	None	To be developed	(23±2)°C	Per test requirements
17	Resistance to salt water (GB/T 10834)		Qualified coating inspector	Salt water tank, constant-temperature water tank	None	To be developed	(23±2)°C	Per test requirements
18	Water resistance (GB/T 1733)		Qualified coating inspector	Constant-temperature water tank	None	To be developed	(23±2)°C	Per test requirements
19	Degradation rating (GB/T 1766)		Qualified coating inspector	Colorimeter, visual inspection, glossmeter, etc.	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
20	Resistance to accelerated artificial weathering	UV weathering	Qualified coating inspector	UV weathering test chamber	None	To be developed	Indoor environment	Drying at 60°C/4h + condensing at 50°C/4h; Irradiance: 0.71W/m ² ;
		Xenon arc	Qualified coating	Xenon arc lamp test	None	To be developed	Indoor environment	Drying for 102min+

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	(GB/T 1865)	lamp	inspector	chamber				spraying for 18min; Black panel temperature 63°C; Air temperature in chamber: 38°C Irradiance: 0.51W/m ² ;
21	Resistance to liquids (GB/T 9274)		Qualified coating inspector	Constant-temperature water tank, constant-temperature oil bath	None	To be developed	(23±2)°C	Per test requirements
22	Heat resistance (GB/T 1735)		Qualified coating inspector	Oven, high-temperature oven	None	To be developed	Indoor environment	Per test requirements
23	Condensation test (GB/T 13893, ISO 6270-1)		Qualified coating inspector	Condensation test chamber	None	To be developed	Indoor environment	(38±2)°C or per test requirements
24	Resistance to cathodic disbonding (GB/T 7790)		Qualified coating inspector	Cathodic disbonding test chamber, potentiostat, etc.	None	To be developed	Indoor environment	Potential-1050mv(SCE), 182d
25	AC impedance spectroscopy of coatings (ISO 16773-2, 3)		Qualified coating inspector	Electrochemical workstation	None	To be developed	(23±2)°C (50±5)%RH	Frequency 0.01Hz-100KHz; Amplitude of sine wave signal 10mv; Three-electrode system

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
26	Contact angle (DIN EN 14370)	Qualified coating inspector	Contact angle/surface tension tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
27	Wetting tension (DIN EN 14370)	Qualified coating inspector	Contact angle/surface tension tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
28	Visual color comparison (GB/T 9761)	Qualified coating inspector	colorimetric card	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
29	Soluble salt content (GB/T 18570.9, ISO 8502-9)	Qualified coating inspector	Conductivity tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
30	Solvent rub resistance (ASTM D4752, D5402)	Qualified coating inspector	MEK solvent, etc.	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
31	Resistivity (ISO 16773)	Qualified coating inspector	Resistivity tester	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
32	Cleanliness (ISO 8502-3)	Qualified coating inspector	ISO standard picture	Standard picture	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
33	Porosity (SY/T 0063)	Qualified coating inspector	Wet sponge pinhole detector and electric spark pinhole detector	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
34	Volume resistivity, surface resistivity (GB/T 1410)	Qualified coating inspector	Megger	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
35	Roughness (ISO 8502-2)	Qualified coating inspector	ISO comparison specimen and stylus roughness meter	ISO comparison specimen, standard glass plate	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
36	Volume resistance, surface resistance (HG/T 3331)	Qualified coating inspector	Megger	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
37	Slip resistance (GB/T 9263)	Qualified coating inspector	Slip resistance measuring device	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH

1.6.2.3 Special coating properties

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	PSPC test of ship ballast tank protective coating	Ballast tank simulation test IMO MSC.215(82)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Ballast tank swing test chamber	None	To be developed	Indoor environment	Roof: (50±2)°C/12h+(20±2)°C/12h; Cooling side plate: (15±2)°C; Bottom plate: (35±2)°C; 14d seawater Ballasting +7d de-ballasting as a cycle, totally 180d
		Condensation chamber test IMO MSC.215(82)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Condensation test chamber	None	To be developed	Indoor environment	(38±2)°C, 100%RH, 180d

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
		Cross-over test IMO MSC.215(82)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Static ballast tank test chamber	None	To be developed	Indoor environment	(35±2)°C; 14d seawater Ballasting +7d de-ballasting as a cycle, totally 180d
2	PSPC test of protective coating for cargo oil tanks of crude oil tankers	Air-tight tank test IMO MSC.288(87)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Air-tight tank test chamber	None	To be developed	Indoor environment	(60±2)°C、100%RH; N ₂ : (83±2)% CO ₂ : (13±2)% O ₂ (4±1)% SO ₂ (300±20)ppm; H ₂ S : (200±20)ppm; Totally 90d
		Immersion test IMO MSC.288(87)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Immersion test chamber	None	To be developed	Indoor environment	1. Add naphthenic acid to DMA marine fuel to an acid number of 2.5±0.1 mg KOH/g; 3. Adding benzene/toluene (v/v 1:1) to a total of 8.0±0.2% of the DMA; 4. Add artificial seawater up to a total of 5.0±0.2% to the mixture;

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
								5. Add H ₂ S dissolved in a liquid carrier (in order to get 5±1 ppm H ₂ S in the total test liquid); Immersion temperature: (60±2)°C; Duration: 180d
		Cross-over test IMO MSC.288(87)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Immersion test chamber	None	To be developed	Indoor environment	Same as immersion test
3	Fire protection test of compartment finish coating	Low flame-spread characteristics test IMO 2010 FTP Code Part 5	Test operator	Low fire spreading test furnace	None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
		Smoke and toxicity test IMO 2010 FTP Code Part 2	Test operator		None	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH
4	Welding and cutting test of shop primer	Welding performance test (CCS Rules)	CCS welder certificate CCS NDT personnel	Manual arc welder Semi-automatic shielded welder Material tester, impact	Steel plate, electrode	To be developed	(23±2)°C (50±5)%RH	(23±2)°C (50±5)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
		certificate Test operator of metallic materials	tester, hardness tester					
	Cutting performance test (GB/T 6747)		Semi-automatic cutting machine	Steel plate	To be developed	Indoor environment	Indoor environment	
5	Performance test of antifouling coatings	Abrasion rate of antifouling paint (GB/T 7789)	Qualified coating inspector	Rotor tester, laser displacement sensor	None	To be developed	Indoor environment	Speed: (18±2) knots
		Compatibility with cathodic protection (GB/T 7790)	Qualified coating inspector	Cathodic disbonding test chamber	None	To be developed	Indoor environment	Magnesium test anode; Duration: 30d
		Dynamic simulation of antifouling paint (GB/T 7789)	Qualified coating inspector	Dynamic rotor, offshore floating raft	None	To be developed	Indoor seawater tank + real sea environment	(18±2) knots /200h + shallow submergence for 1 month as a cycle
		In shallow submergence (GB/T 5370)	Qualified coating inspector	Offshore floating raft	None	To be developed	Real sea environment	At least for one complete growth season of marine life
		Water flow resistance (GB/T 9260)	Qualified coating inspector	Rotor tester	None	To be developed	Indoor sea tank	21 knots /8h+ shutdown for 16h as a cycle, totally 3 cycles
		Barnacle adhesion strength	Qualified coating	Offshore floating raft, hand-held shear force	None	To be developed	Real sea environment	Test barnacle size: 5-20mm

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	(ASTM D 5618)	inspector	tester				
	Release rate of copper-ion (GB/T 6824, ISO 15181-2)	Qualified coating inspector	Release rate device, atomic absorption spectroscopy	Standard solution of copper	To be developed	(23±2)°C (50±5)%RH	(23±2)°C
	Release rate of zineb (ISO 15181-3)	Qualified coating inspector	Release rate device, high performance liquid chromatograph	Standard solution of zineb	To be developed	(23±2)°C (50±5)%RH	(23±2)°C
	Release rate of pyridine-triphenylborane (PTPB) (ISO 15181-4)	Qualified coating inspector	Release rate device, high performance liquid chromatograph	Standard solution of pyridine-triphenylborane	To be developed	(23±2)°C (50±5)%RH	(23±2)°C
	Release rate of tralopyril (ISO 15181-6)	Qualified coating inspector	Release rate device, high performance liquid chromatograph	Standard solution of tralopyril	To be developed	(23±2)°C (50±5)%RH	(23±2)°C
	Test method for performance of reducing frictional resistance of antifouling coatings (GB/T 7791)	Qualified coating inspector	Frictional resistance reduction test device	Standard PTFE plate	To be developed	(23±2)°C	(23±2)°C
	Blister resistance (GB/T 6822, GB/T 10834)	Qualified coating inspector	Constant-temperature water tank	None	To be developed	Indoor environment	(88±2)°C/14d+(38±2)°C/14d

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
	Immersion resistance (GB/T 6822, GB/T 10834)	Qualified coating inspector	Constant-temperature water tank, adhesion tester	None	To be developed	(23±2)°C	(23±2)°C/140d	
6	Coatings for marine engineering	Weathering resistance cycle (ISO 20340)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Salt spray test chamber, UV weathering test chamber, high- and low-temperature test chamber, etc.	None	To be developed	Indoor environment	UV weathering for 72h + salt spray for 72h + low temperature for 24 as a cycle, totally 25 cycles
		Resistance to cathodic disbonding (ISO 20340)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Potentiostat	None	To be developed	Indoor environment	Potential-1050mv(SCE), 180d
		Seawater immersion resistance (ISO 20340)	FROSIO Level III or NACE Level 2 or CCMCIC Level II	Constant-temperature water tank	None	To be developed	Indoor environment	40°C/180d

1.7 Report Form and Requirements

1.7.1 The test report form accepted by CCS shall be used, and the PSPC report shall meet the requirements of IACS Rec.101 and IACS Rec. 102. The report shall be prepared, reviewed and approved in accordance with specified requirements.

1.7.2 The report shall generally include name of the applicant, name of the client, information of the test sample (production batch number, model/specification), test method, technical requirements, test results and conclusions or determination results, etc.

Chapter 2 Other Non-metallic Materials

2.1 Scope of Application

2.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for non-metallic materials (hereinafter referred to as "test agency").

2.1.2 Non-metallic materials: lifeboat core materials (rigid cellular plastics), plastic pipes and fittings (thermoplastic resin), marine epoxy seat gasket, thermosetting resin (epoxy resin, unsaturated resin, phenolic resin), life jacket core material, life raft adhesive tape (rubber products and fabrics).

2.2 Basis of Approval

CCS Rules for Materials and Welding (2012) and its amendments

2.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

2.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

2.5 General Requirements

2.5.1 Personnel qualification requirements: The applicant shall be responsible for training its personnel according to the requirements of the national or international or industrial standards, and ensure that the testing personnel, technical experts and management personnel have relevant professional knowledge. In the absence of standards (such as new products), the applicant shall select the standards at its discretion and explain the reasons in the documents to prove that

the requirements of its testing services are met. Personnel should have appropriate experience and be familiar with the operation of equipment. Testing personnel should have received junior college education or above, and have at least 1-year working experience or internship experience in related positions. The person in charge of quality supervision should have the title of engineer or above, and have at least 2-year working experience in related positions or testing service experience in related positions. The report issuing personnel shall have the title of engineer or above, and have at least 3-year working experience in related positions or testing service experience in related positions.

2.5.2 Supervision (quality control): The test agency shall designate personnel to supervise the testing services provided, and shall develop quality supervision procedures or operation instructions.

2.5.3 Personnel records: The test agency shall keep records of accepted personnel, including age, education level, training records and experience records in the approval industry.

2.5.4 Equipment and facilities: The test agency shall equip and maintain the necessary test equipment and facilities suitable for the test services provided, and when necessary, formulate the equipment operation and maintenance instructions, and keep the original records and use records of the equipment, which shall include all maintenance and calibration information of the equipment. The safety facilities and environment shall be able to meet the needs of test services. See 2.6.2 for details.

2.5.5 Test procedures: The test agency shall keep written test procedures. Such procedures shall cover the test services provided, include the following contents and meet relevant requirements:

- (1) Receipt, review and assignment of test service applications
- (2) Receipt, marking, storage and handling of samples;
- (3) Pre-operational inspection and preparation of test equipment, operation instructions or guidelines of equipment, including safety protection;
- (4) Inspection, analysis and determination;
- (5) Rules and measures for coordination and liaison between testing personnel and on-site surveyors (if necessary);
- (6) Test supervision and verification;

(7) Relevant requirements (if any) for arrangement of testing records and submission of them to the on-site surveyor for signature and confirmation;

(8) Provisions on preparation, review and approval of test reports;

(9) Distribution and filing of reports.

2.5.6 Verification: The test agency shall verify whether the test service provided meets the requirements of the approval procedure.

2.6 Technical Requirements

2.6.1 Test items of non-metallic materials

Test Item	Test Standards
Lifeboat core materials (rigid cellular plastics)	
1. Density	GB/T 6343 Cellular Plastics and Rubbers - Determination of Apparent (Bulk) Density
2. Thickness	GB/T 8811 Rigid Cellular Plastics - Test Method for Dimensional Stability
3. Dimensions	GB/T 6342 Cellular Plastics and Rubbers - Determination of Linear Dimensions
4. Water absorption	GB/T 8810 Determination of Water Absorption of Rigid Cellular Plastics
5. Compression strength	GB/T 8813 Rigid Cellular Plastics - Determination of Compression Properties
6. Modulus of compression	GB/T 8813 Rigid Cellular Plastics - Determination of Compression Properties
7. Tensile strength	GB/T 9641 Test Method for Tensile Properties of Rigid Cellular Plastics
8. Tensile modulus	GB/T 9641 Test Method for Tensile Properties of Rigid Cellular Plastics
9. Bending strength	GB/T 8812 Test Method for Bending of Rigid Cellular Plastics
10. Bending modulus	GB/T 8812 Test Method for Bending of Rigid Cellular Plastics
11. Heat deflection	GB/T 1634 Plastics - Determination of Temperature of Deflection under Load

Test Item	Test Standards
temperature	
12. Softening temperature	GB/T 1633 Plastics - Thermoplastic Materials - Determination of Vicat Softening Temperature
13. Thermal weathering	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
14. Shear strength	GB/T 10007 Rigid Cellular Plastics - Determination of Shear Strength
15. Shear modulus	GB/T 10007 Rigid Cellular Plastics - Determination of Shear Strength
16. Material analysis	GB/T 6040 General Rules of Infrared Analysis
17. Weathering test	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
Fiber-reinforced plastic specimen	
1. Density	GB/T 1033 Test Method for Density and Relative Density of Plastics
2. Tensile strength	GB/T 1447 Fiber-reinforced Plastics Composites - Determination of Tensile Properties
3. Tensile modulus	GB/T 1447 Fiber-reinforced Plastics Composites - Determination of Tensile Properties
4. Bending strength	GB/T 1449 Fiber-reinforced Plastics Composites - Determination of Flexural Properties
5. Bending modulus	GB/T 1449 Fiber-reinforced Plastics Composites - Determination of Flexural Properties
6. Compression strength	GB/T 1448 Fiber-reinforced Plastics Composites - Determination of Compressive Properties
7. Modulus of compression	GB/T 1448 Fiber-reinforced Plastics Composites - Determination of Compressive Properties
8. Barcol hardness	GB/T 3854 Test Method for Hardness of Reinforced Plastics by Means of a Barcol Impresser
9. Resin content	GB/T 2577 Test Method for Resin Content of Glass Fiber Reinforced Plastics

Test Item	Test Standards
10. Water resistance	GB/T 10703 Test Method Accelerated for Resistance of Glass Fiber Reinforced Plastics to Water
11. High and low temperature weathering	GB/T 9979 Guide Rule of Test for Mechanical Properties of Fiber-reinforced Plastics at Elevated and Reduced Temperatures
12. Material analysis	GB/T 6040 General Rules of Infrared Analysis
13. Weathering test	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
14. Thermal conductivity test	GB/T 3139 Fiber-reinforced Plastics Composites - Determination of Thermal Conductivity
15. Performance test	GB/14190 Test Methods of Fiber Grade Polyester Chip
16. Dielectric dissipation	GB/T 1409 Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies Including Meter Wavelengths
17. Insulation resistance	GB/T 1408.1 Insulating Materials - Test Methods for Electric Strength - Part 1: Test at Power Frequencies
18. Shear strength	GB/T 1405.1 Fiber-reinforced Plastic Composites - Determination of Interlaminar Shear Strength
19. Shear strength	GB/T 1405.2 Fiber-reinforced Plastic Composites - Determination of the Punch-type Shear Strength
Plastic pipes and fittings (thermoplastic resin)	
1. Melt index	GB/T3682 Plastics - Determination of the Melt Mass-flow Rate and Melt Volume-flow Rate of Thermoplastics GB/T 9643 Polyethylene (PE) Pipes and Fittings - Test Method for Melt Mass-flow Rate
2. Volume density or specific volume	GB/T 1033 Test Method for Density and Relative Density of Plastics GB/T 7155 Determination of Density of Thermoplastic Pipes and Fittings

Test Item	Test Standards
3. Fire resistance	GB/T 2408 Plastics - Determination of the Burning Behaviour of Horizontal and Vertical Specimens in Contact with a Small-flame Ignition Source
4. Heat deflection temperature	GB/T 1634 Plastics - Determination of Temperature of Deflection under Load
5. Softening temperature	GB/T 8802 Thermoplastics Pipes and Fitting - Determination of Softening Temperature
6. UV weathering	GB/T 16585 Test Method of Resistance to Artificial Weathering (Fluorescent UV Lamp)
7. Temperature and humidity weathering	GB/T 12000 Plastics - Determination of the Effects of Exposure to Damp Heat, Water Spray and Salt Mist
8. Hardness test	GB 2411 Plastics - Shore Hardness Test
9. Tensile strength	GB/T 8804 Thermoplastic Pipes - Determination of Tensile Properties
10. Tensile test	GB/T 8804 Thermoplastic Pipes - Determination of Tensile Properties
11. Longitudinal tensile properties	GB/T 5349 Fiber-reinforced Thermosetting Plastic Composites Pipe - Determination of Longitudinal Tensile Properties
12. Determination of melting point	GB/T 19466 Plastics - Differential Scanning Calorimetry (DSC)
13. Thermal stability	GB/T 13464 Thermal Analysis Test Methods for Thermal Stability of Materials
14. Conductivity test	GB/T 1410 Methods of Test for Volume Resistivity and Surface Resistivity of Solid Electrical Insulating Materials
15. Water absorption	GB/T 9644 Unplasticized Polyvinyl Chloride (PVC-U) Pipes - Determination of Water Absorption
16. Impact strength	GB/T18743 Thermoplastics Pipes for the Transport of Fluids - Determination of Impact by the Charpy Method GB/T 1843 Plastics - Determination of Izod Impact Strength GB-T 1043.1 Plastics - Determination of Charpy Impact Properties - Part 1: Non-instrumented Impact Test

Test Item	Test Standards
17. Thermal expansion coefficient	ASTM E831 Standard Test Method for Linear Expansion Coefficient of Plastics
18. Material analysis	GB/T 6040 General Rules of Infrared Analysis
19. Weathering test	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
20. Thermal conductivity test	GB/T 3399 Test Method for Thermal Conductivity of Plastics by Means of the Guarded Hot Plate
21. Bending test	GB/T 5565 Rubber or Plastics Hoses or Tubing - Bending Tests
22. Suction resistance test	GB/T 5567 Rubber and Plastics Hoses and Hose Assemblies - Determination of Suction Resistance
23. Performance test	GB/14190 Test Methods of Fiber Grade Polyester Chip
24. Viscosity number test	GB/T 12006.1 Plastics - Polyamides - Part 1: Determination of Viscosity Number
25. Monomer determination	GB/T 16867 Determination of Residual Styrene Monomer in Polystyrene and Acrylonitrile-butadiene-styrene Resins by Gas Chromatography
Marine epoxy seat gasket	
1. Compression strength	GB/T 1041 Plastics - Determination of Compressive Properties
2. Modulus of compression	GB/T 1041 Plastics - Determination of Compressive Properties
3. Tensile strength	GB/T 1040 Plastics - Determination of Tensile Properties
4. Tensile modulus	GB/T 1040 Plastics - Determination of Tensile Properties
5. Izod impact strength	GB/T 1843 Plastics - Determination of Izod Impact Strength
6. Density	GB/T 1033 Test Method for Density and Relative Density of Plastics
7. Oxygen index	GB/T 2406 Plastics - Determination of Flammability by Oxygen Index

Test Item	Test Standards
method	
8. Heat deflection temperature	GB/T 1634 Plastics - Determination of Temperature of Deflection under Load
9. Barcol hardness	GB/T 3854 Test Method for Hardness of Reinforced Plastics by Means of a Barcol Impresser
10. Linear shrinkage	GB/T 15585 Determination of Shrinkage for Injection Moulding Thermoplastics
11. Water absorption	GB/T 1034 Plastics - Determination of Water Absorption
12. Combustibility	GB/T 2408 Plastics - Determination of the Burning Behaviour of Horizontal and Vertical Specimens in Contact with a Small-flame Ignition Source
13. Temperature and humidity weathering	GB/T 12000 Plastics - Determination of the Effects of Exposure to Damp Heat, Water Spray and Salt Mist
14. Expansion coefficient	ASTM E831 Standard Test Method for Linear Expansion Coefficient of Plastics
15. Material analysis	GB/T 6040 General Rules of Infrared Analysis
16. Coefficient of friction	GB/T 3960 Plastics - Test Method for Friction and Wear by Sliding
17. Scar width	GB/T 3960 Plastics - Test Method for Friction and Wear by Sliding
18. Wear rate	GB/T 3960 Plastics - Test Method for Friction and Wear by Sliding
19. Monomer determination	GB/T 16867 Determination of Residual Styrene Monomer in Polystyrene and Acrylonitrile-butadiene-styrene Resins by Gas Chromatography
20. Viscosity number determination	GB/T 12006.1 Plastics - Polyamides - Part 1: Determination of Viscosity Number
21. Dielectric dissipation	GB/T 1409 Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies

Test Item	Test Standards
	Including Meter Wavelengths
22. Insulation resistance	GB/T 1408.1 Insulating Materials - Test Methods for Electric Strength - Part 1: Test at Power Frequencies
23. Oil absorption (Immersion in diesel oil and lubricating oil for 7d)	GB/T 11547 Plastics - Methods of Test for the Determination of the Effects of Immersion in Liquid Chemicals
24. Creep	ASTM D2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
Bearing material	
1. Density	GB/T 1033 Test Method for Density and Relative Density of Plastics
2. Tensile strength	GB/T 1040 Plastics - Determination of Tensile Properties
3. Tensile modulus	GB/T 1040 Plastics - Determination of Tensile Properties
4. Impact strength	GB/T 1043 Plastics - Determination of Charpy Impact Strength of Rigid Materials
5. Compression strength	GB/T 1041 Plastics - Determination of Compressive Properties
6. Modulus of compression	GB/T 1041 Plastics - Determination of Compressive Properties
7. Shore hardness	GB 2411 Plastics - Shore Hardness Test
8. Linear expansion coefficient	ASTM E831 Standard Test Method for Linear Expansion Coefficient of Plastics
9. Thermal conductivity	GB/T 3139 Fiber-reinforced Plastics Composites - Determination of Thermal Conductivity GB/T 3399 Test Method for Thermal Conductivity of Plastics by Means of the Guarded Hot Plate
10. Softening	GB/T 1633 Plastics - Thermoplastic Materials - Determination of Vicat Softening Temperature

Test Item	Test Standards
point temperature	
11. Heat deflection temperature	GB/T 1634.1 Plastics - Determination of Temperature of Deflection under Load
12. Water absorption	GB 1034 Plastics - Determination of Water Absorption
13. Coefficient of friction	GB/T 3960 Plastics - Test Method for Friction and Wear by Sliding
14. Scar width	GB/T 3960 Plastics - Test Method for Friction and Wear by Sliding
15. Wear rate	GB/T 3960 Plastics - Test Method for Friction and Wear by Sliding
16. Resistivity	GB/T 1410 Methods of Test for Volume Resistivity and Surface Resistivity of Solid Electrical Insulating Materials
17. Temperature and humidity weathering	GB/T 12000 Plastics - Determination of the Effects of Exposure to Damp Heat, Water Spray and Salt Mist
18. Material analysis	GB/T 6040 General Rules of Infrared Analysis
19. Monomer determination	GB/T 16867 Determination of Residual Styrene Monomer in Polystyrene and Acrylonitrile-butadiene-styrene Resins by Gas Chromatography
20. Viscosity number determination	GB/T 12006.1 Plastics - Polyamides - Part 1: Determination of Viscosity Number
21. Dielectric dissipation	GB/T 1409 Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies Including Meter Wavelengths
22. Insulation resistance	GB/T 1408.1 Insulating Materials - Test Methods for Electric Strength - Part 1: Test at Power Frequencies
23. Seawater	GB/T 11547 Plastics - Methods of Test for the Determination of the Effects of Immersion in

Test Item	Test Standards
resistance	Liquid Chemicals
24. Oil absorption	GB/T 11547 Plastics - Methods of Test for the Determination of the Effects of Immersion in Liquid Chemicals
Thermosetting resin (epoxy resin, unsaturated resin, phenolic resin, resin casting)	
1. Material analysis	GB/T 6040 General Rules of Infrared Analysis
2. Tensile test	GB/T 2568 Test Method for Tensile Properties of Resin Casting Body
3. Bending test	GB/T 2570 Test Method for Flexural Properties of Resin Casting Body
4. Density test	GB/T 12007.5 Eposide Resins - Determination of Density - Pyknometer Method
5. Viscosity test	GB/T 12007.4 Eposide Resins - Determination of Viscosity GB/T 7193.1 Test Methods for Unsaturated Polyester Resins - Determination of Viscosity Number
6. Acid value test	GBT 2895 Plastics - Polyester Resin - Determination of Partial Acid Value and Total Acid Value
7. Determination of hydroxyl value	GB 7193.2 Unsaturated Polyester Resin - Determination of Hydroxyl Value
8. Solid content	GB 7193.3 Unsaturated Polyester Resin - Determination of Solid Content
9. Reactivity	GB/T 7193.4 Unsaturated Polyester Resin - Determination of Reactivity at 80°C
10. Thermal stability test	GB/T 7193.5 Unsaturated Polyester Resin - Determination of Heat Stability at 80°C
11. Gel time	GB/T 7193.6 Unsaturated Polyester Resin - Determination of Gel Time at 25°C
12. Inorganic content	GB/T 9345.1 Plastics - Determination of Ash - Part 1: General Methods
13. Density	GB/T 1033.1 Plastics - Methods for Determining the Density of Non-cellular Plastics - Part 1: Immersion Method, Liquid Pyknometer Method and Titration Method
14. Volume shrinkage	ISO 3521-1997 Plastics - Polyester and Epoxy Casting Resins - Determination of Total Volume Shrinkage
15. Barcol hardness	GB/T 3854 Test Method for Hardness of Reinforced Plastics by Means of a Barcol Impresser

Test Item	Test Standards
16. Tensile strength	GB/T 2567 Test Methods for Properties of Resin Casting Body
17. Elongation at break	GB/T 2567 Test Methods for Properties of Resin Casting Body
18. Water absorption	GB/T 1034 Plastics - Determination of Water Absorption
19. Heat deflection temperature	GB/T 1634.1 Plastics - Determination of Temperature of Deflection under Load
FRP reinforced materials (glass fiber cloth, glass fiber felt and glass fiber fabric)	
1. Density	GB/T 1033 Test Method for Density and Relative Density of Plastics
2. Tensile strength	GB/T 1447 Fiber-reinforced Plastics Composites - Determination of Tensile Properties
3. Tensile modulus	GB/T 1447 Fiber-reinforced Plastics Composites - Determination of Tensile Properties
4. Bending strength	GB/T 1449 Fiber-reinforced Plastics Composites - Determination of Flexural Properties
5. Bending modulus	GB/T 1449 Fiber-reinforced Plastics Composites - Determination of Flexural Properties
6. Compression strength	GB/T 1448 Fiber-reinforced Plastics Composites - Determination of Compressive Properties
7. Modulus of compression	GB/T 1448 Fiber-reinforced Plastics Composites - Determination of Compressive Properties
8. Barcol hardness	GB/T 3854 Test Method for Hardness of Reinforced Plastics by Means of a Barcol Impresser
9. Resin content	GB/T 2577 Test Method for Resin Content of Glass Fiber Reinforced Plastics
10. Water resistance	GB/T 10703 Test Method Accelerated for Resistance of Glass Fiber Reinforced Plastics to Water
11. High and low	GB/T 9979 Guide Rule of Test for Mechanical Properties of Fiber-reinforced Plastics at

Test Item	Test Standards
temperature weathering	Elevated and Reduced Temperatures
12. Material analysis	GB/T 6040 General Rules of Infrared Analysis
13. Weathering test	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
14. Thermal conductivity test	GB/T 3139 Fiber-reinforced Plastics Composites - Determination of Thermal Conductivity
15. Performance test	GB/14190 Test Methods of Fiber Grade Polyester Chip
16. Moisture content test	GB/T 9914.1 Test Method for Reinforcement Products - Part 1: Determination of Moisture Content
17. Combustible-matt er content	GB/T 9914.2 Test Method for Reinforcement Products - Part 2: Determination of Combustible-matter Content of Glass Fiber
18. Unit mass	GB/T 9914.3 Test Method for Reinforcement Products - Part 3: Determination of Mass per Unit Area
19. Tensile test	GB-T7689.5 Reinforcements - Test Method for Woven Fabrics - Part 5: Determination of Glass Fiber Tensile Breaking Force
20. Dielectric dissipation	GB/T 1409 Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies Including Meter Wavelengths
21. Insulation resistance	GB/T 1408.1 Insulating Materials - Test Methods for Electric Strength - Part 1: Test at Power Frequencies
Life jacket core materials	
1. Density	GB/T 6343 Cellular Plastics and Rubbers - Determination of Apparent (Bulk) Density
2. Thickness	GB/T 8811 Rigid Cellular Plastics - Test Method for Dimensional Stability
3. Dimensions	GB/T 6342 Cellular Plastics and Rubbers - Determination of Linear Dimensions

Test Item	Test Standards
4. Water absorption	GB/T 8810 Determination of Water Absorption of Rigid Cellular Plastics
5. Compression strength	GB/T 8813 Rigid Cellular Plastics - Determination of Compression Properties
6. Modulus of compression	GB/T 8813 Rigid Cellular Plastics - Determination of Compression Properties
7. Tensile strength	GB/T 9641 Test Method for Tensile Properties of Rigid Cellular Plastics
8. Tensile modulus	GB/T 9641 Test Method for Tensile Properties of Rigid Cellular Plastics
9. Bending strength	GB/T 8812 Test Method for Bending of Rigid Cellular Plastics
10. Bending modulus	GB/T 8812 Test Method for Bending of Rigid Cellular Plastics
11. Heat deflection temperature	GB/T 1634 Plastics - Determination of Temperature of Deflection under Load
12. Softening temperature	GB/T 1633 Plastics - Thermoplastic Materials - Determination of Vicat Softening Temperature
13. Thermal weathering	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
14. Shear strength	GB/T 10007 Rigid Cellular Plastics - Determination of Shear Strength
15. Shear modulus	GB/T 10007 Rigid Cellular Plastics - Determination of Shear Strength
16. Material analysis	GB/T 6040 General Rules of Infrared Analysis
17. Weathering test	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
Life raft tape (rubber products and fabrics)	

Test Item	Test Standards
1. Dimensions test	GB/T 6342 Cellular Plastics and Rubbers - Determination of Linear Dimensions
2. Material analysis	GB/T 6040 General Rules of Infrared Analysis
3. Weathering test	GB/T 7141 Plastics - Methods of Exposure to Thermal Air
4. Determination of properties	GB/T 12834 Rubber, Vulcanized - Preferred Gradations of Properties GB/T 528 Rubber, Vulcanized or Thermoplastic - Determination of Tensile Stress-strain Properties
5. Flexion test	GB/T 13934 Rubber Vulcanized or Thermoplastic - Determination of Flex Cracking and Crack Growth
6. Electrical properties	GB/T 2439 Conducting and Dissipative Rubbers, Vulcanized or Thermoplastic - Measurement of Resistivity GB/T 1692 Vulcanized Rubber - Determination of the Insulation Resistivity
7. Combustion test	GB/T 10707 Rubber - Determination of Flammability by Oxygen Index
8. Tear test	GB/T 12833 Rubber and Plastics - Analysis of Multipeak Traces Obtained in Determinations of Tear Strength and Adhesion Strength GB/T 529 (ISO 34-1) Rubbers, Vulcanized or Thermoplastic - Determination of Tear Strength
9. Liquid resistance test	GB/T 1690 Rubbers, Vulcanized - Determination of the Effect of Liquids
10. Bending test	GB/T 1696 Ebonite - Determination of Cross Breaking Strength GB/T 5565 Rubber or Plastics Hoses or Tubing - Bending Tests
11. Impact test	GB/T 1697 Ebonite - Determination of Impact Strength
12. Hardness testing	GB/T 1698 Ebonite - Determination of Hardness GB/T 6031 (ISO48) International Rubber Hardness
13. Shear test	GB/T 1700 Ebonite - Determination of Shearing Strength
14. Tensile test	GB/T 1701 Ebonite - Determination of Tensile Strength and Elongation at Break
15. Ultraviolet	GB/T 18950 Rubber and Plastics Hoses - Determination of Ultra-violet Resistance under Static

Test Item	Test Standards
test	Conditions
16. Weathering test	GB/T 3512 Rubber, Vulcanized or Thermoplastic - Accelerated Aging and Heat Resistance Tests - Air-oven Method
17. Ash test	GB/T 4498 Rubber - Determination of Ash
18. Adhesion test	GB/T 532 Rubber, Vulcanized or Thermoplastic - Determination of Adhesion to Textile Fabric
19. Suction resistance test	GB/T 5567 Rubber and Plastics Hoses and Hose Assemblies - Determination of Suction Resistance
20. Low-temperature brittleness	GB/T 1682 Rubber, Vulcanized - Determination of Low-temperature Brittleness (Single Test Piece Method)
21. Density test	GB/T 533 Rubber, Vulcanized or Thermoplastic - Determination of Density

2.6.2 Specific requirements for test items of non-metallic materials

2.6.2.1 Properties of non-metallic materials

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Apparent density GB/T 6343	Qualified physical property inspector	Vernier caliper, electronic balance	None	Density Test Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Density GB/T 1033.1	Qualified physical property inspector	Electronic balance	None	Density Test Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Density of plastic pipes GB/T 7155	Qualified physical property inspector	Electronic balance	None	Density Test Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Resin density GB/T 12007.5	Qualified physical property inspector	Pyknometer, electronic balance	None	Density Test Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Rubber density	Qualified physical	Electronic balance	None	Density Test	(23±2)°C,	(23±2)°C,

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
		GB/T 533	property inspector			Instructions	(50±10)%RH	(50±10)%RH
2	Thickness GB/T 8811		Qualified physical property inspector	Vernier caliper	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
3	Dimensions GB/T 6342		Qualified physical property inspector	Vernier caliper	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
4	Water absorption	Cellular materials GB/T 8810	Qualified physical property inspector	Oven, electronic balance	None	Water Absorption Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Water absorption of PVC GB/T 9644	Qualified physical property inspector	Electric oven, electronic balance	None	Water Absorption Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Plastics GB 1034	Qualified physical property inspector	Oven, electronic balance	None	Water Absorption Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
5	Rigid cellular plastics GB/T 9641	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Glass fiber reinforced plastics GB/T 1447	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Tensile properties of pipes GB/T 8804	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Tensile properties of resin casting	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
	body GB/T 2568							
	Ebonite GB/T 1701	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	
	Tensile properties of plastics GB/T 1040	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	
6	Compressive properties	Rigid cellular plastics GB/T 8813	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Glass fiber reinforced	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
7	Bending property	plastics GB/T 1448				Tester		
		Plastics GB/T 1041	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Rigid cellular plastics GB/T 8812	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Glass fiber reinforced plastics GB/T 1449	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Plastics GB/T 9341	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
					Tester			
	Rubber or plastics hoses GB/T 5565	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	
	Resin casting body GB/T 2570	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	
8	Shear properties	Rigid cellular plastics GB/T 10007	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Ebonite GB/T 1700	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Glass fiber	Qualified physical	Universal material	None	Operation Instructions	(23±2)°C,	(23±2)°C,

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions	
	reinforced plastic plate GB/T 1450.1	property inspector	tester		for Universal Material Tester	(50±10)%RH	(50±10)%RH	
	Glass fiber reinforced plastic plate GB/T 1450.1	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	
9	Impact properties	Thermoplastic pipes GB/T18743	Qualified physical property inspector	Izod impact tester	None	Operation Instructions for Impact Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Izod impact strength of plastics GB/T 1843	Qualified physical property inspector	Izod impact tester	None	Operation Instructions for Impact Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	Ebonite GB/T 1697	Qualified physical property inspector	Izod impact tester	None	Operation Instructions for Impact Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Charpy impact properties of plastics GB-T 1043.1	Qualified physical property inspector	Charpy impact tester	None	Operation Instructions for Impact Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
10	Barcol hardness GB/T 3854	Qualified physical property inspector	Barcol impressor	None	Operation Instructions for Barcol Impressor	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Shore hardness GB 2411	Qualified physical property inspector	Shore durometer	None	Operation Instructions for Shore Durometer	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Ebonite hardness GB/T 1698	Qualified physical property inspector	Shore durometer	None	Operation Instructions for Shore Durometer	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	International	Qualified physical	Shore durometer	None	To be developed	(23±2)°C,	(23±2)°C,

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
		rubber hardness GB/T 6031	property inspector				(50±10)%RH	(50±10)%RH
11	Heat deflection temperature GB/T 1634		Qualified physical property inspector	Heat deflection temperature tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
12	Softening temperature	Plastics - thermoplastic materials - Vicat softening temperature GB/T 1633	Qualified physical property inspector	Heat deflection temperature tester	None	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Thermoplastics pipes and fitting - softening temperature	Qualified physical property inspector	Heat deflection temperature tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
		GB/T 8802-2001						
13	Melt index	Thermoplastics GB/T3682	Qualified physical property inspector	Melt indexer	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Polyethylene GB/T 9643	Qualified physical property inspector	Melt indexer	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
14	Friction properties GB/T 3960		Qualified physical property inspector	Friction tester, electronic balance, vernier caliper	None	Operation Instructions for Friction Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
15	Resin content GB/T 2577		Qualified physical property inspector	Electronic balance, muffle furnace	None	Operation Instructions for Muffle Furnace	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
16	Thermal conductivity	Fiber-reinforced plastics GB/T 3139	Qualified physical property inspector	Thermal conductivity tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
		Plastics GB/T 3399	Qualified physical property inspector	Thermal conductivity tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
17	Linear expansion coefficient ASTM E831		Qualified physical property inspector	Thermal mechanical analyzer	SiO ₂	TMA Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
18	Determination of melting point GB/T 19466		Qualified physical property inspector	Differential scanning calorimeter	Series melting point standard samples	DSC Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
19	Thermal stability GB/T 13464		Qualified physical property inspector	Thermogravimetric analyzer	TGA standard samples	TGA Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
20	Thermal weathering test GB/T 7141		Qualified physical property inspector	Hot air weathering chamber	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
21	Rubber, vulcanized - hot air weathering GB/T 3512		Qualified physical property inspector	Hot air weathering chamber	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
22	High and low temperature weathering GB/T 9979	Qualified physical property inspector	High/low temperature alternating damp heat test chamber	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
23	Temperature and humidity weathering GB/T 12000	Qualified physical property inspector	High/low temperature alternating damp heat test chamber	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
24	UV weathering GB/T 16585	Qualified physical property inspector	UV weathering chamber	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
25	Ultraviolet test GB/T 18950	Qualified physical property inspector	UV weathering chamber	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
26	Liquid resistance test GB/T 1690-1992	Qualified physical property inspector	Oven, balance	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
27	Water resistance GB/T 10703		Qualified physical property inspector	Oven, balance	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
28	Low-temperature brittleness GB/T 1682		Qualified physical property inspector	Refrigerator	None	Operation Instructions for Weathering Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
29	Tear properties	Rubber and plastics GB/T 12833	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Rubber, vulcanized GB/T 529	Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
30	Flexion test GB/T 13934		Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
31	Ash test GB/T 4498		Qualified physical	Muffle furnace,	None	Operation Instructions	(23±2)°C,	(23±2)°C,

S/N	Test Items		Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
			property inspector	balance		for Muffle Furnace	(50±10)%RH	(50±10)%RH
32	Adhesion test GB/T 532		Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
33	Property test GB/14190		Qualified physical property inspector	Universal material tester	None	Operation Instructions for Universal Material Tester	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
34	Linear shrinkage GB/T 15585		Qualified physical property inspector	Balance, vernier caliper	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
35	Electrical properties	Insulation resistance GB/T 1408.1	Qualified physical property inspector	Insulation resistance meter	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Electrical conductivity	Qualified physical property inspector	Electrical tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	GB/T 2439						
	Resistivity GB/T 1692	Qualified physical property inspector	Volume resistivity meter	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Resistivity GB/T 1410	Qualified physical property inspector	Volume resistivity meter	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
	Dielectric dissipation GB/T 1409	Qualified physical property inspector	Electrical tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
36	Monomer determination GB/T 16867	Qualified chemical analysis inspector	Infrared spectroscopy	Polystyrene standard sample	Operation Instructions for Infrared Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
37	Material analysis GB/T 6040	Qualified chemical analysis inspector	Infrared spectroscopy	Polystyrene standard sample	Operation Instructions for Infrared Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
38	Viscosity number test GB/T 12006.1	Qualified chemical analysis inspector	Ubbelohde viscometer	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
39	Hardness test	Eposide resins - viscosity GB/T 12007.4	Ubbelohde viscometer	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
		Unsaturated polyester resin GB/T 7193.1	Ubbelohde viscometer	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
40	Acid value test GBT 2895	Qualified chemical analysis inspector	pH meter	NaOH	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
41	Determination of hydroxyl value GB 7193.2	Qualified chemical analysis inspector	Burette	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
42	Solid content	Qualified chemical	Oven, balance	None	To be developed	(23±2)°C,	(23±2)°C,

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	GB 7193.3	analysis inspector				(50±10)%RH	(50±10)%RH
43	Reactivity GB/T 7193.4	Qualified chemical analysis inspector	Burette	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
44	Gel time GB/T 7193.6	Qualified chemical analysis inspector	Hot plate, stopwatch	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
45	Oxygen index method GB/T 2406	Qualified physical property inspector	Oxygen index instrument	None	Operation Instruction for Oxygen Index Test	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
46	Combustibility GB/T 2408	Qualified physical property inspector	Horizontal and vertical burning tester	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
47	Combustion test GB/T 10707	Qualified physical property inspector	Oxygen index instrument, horizontal and vertical burning	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
			tester				
48	Oil absorption GB/T11547	Qualified physical property inspector	Electronic balance	None	Oil Absorption Operation Instructions	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
49	Inorganic content GB/T 9345.1	Qualified physical property inspector	Muffle furnace, balance	None	Operation Instructions for Muffle Furnace	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
50	Volume shrinkage ISO 3521	Qualified physical property inspector	Balance, pycnometer	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH

2.7 Report Form and Requirements

2.7.1 The test report form accepted by CCS shall be used, and the report shall be prepared, reviewed and approved in accordance with specified requirements.

2.7.2 The report shall generally include name of the applicant, name of the client, information of the test sample (number, model/specification), test method, technical requirements, test results and conclusions or determination results, etc.

Part 4 Life-saving Appliances

Chapter 1 Life-saving Appliances

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for life-saving appliances (hereinafter referred to as "test agency").

1.1.2 Life-saving appliances: lifebuoys, lifejackets (children's lifejackets), immersion suits, visible signals, inflatable liferafts, lifeboats, rescue boats, survival craft and rescue boats light; lifejacket light; lifebuoy light, hydrostatic release units.

1.2 Basis of Approval

Product Name	Main Applicable Standard
Lifebuoys	<ol style="list-style-type: none"> 1. Regulations 4, 7 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and II, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, and MSC207(81) 3. Section 1, Part 1, and Section 3, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.200(80), MSC.226(82)
Lifejackets (children's lifejackets)	<ol style="list-style-type: none"> 1. Regulations 4, 7, 22 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and II, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, MSC207(81), MSC.218(82) and MSC.368(93) 3. Section 2, Part 1, and Section 2, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.200(80), MSC.226(82), MSC.323(89) and MSC.368(93)

Product Name		Main Applicable Standard
Immersion suits		<ol style="list-style-type: none"> 1. Regulations 4, 7, 22, 32 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and II, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, MSC.207(81), and MSC.218(82) 3. Section 3, Part 1, and Section 2, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.226(82), and MSC.323(89)
Visible signals	Rocket parachute flare signal	<ol style="list-style-type: none"> 1. Regulations 4, 6 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and III, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, and MSC.218(82) 3. Section 4, Part 1, and Section 4, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, and MSC.226(82)
	Hand flares	<ol style="list-style-type: none"> 1. Regulations 4 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and III, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, and MSC.218(82) 3. Section 4, Part 1, and Section 4, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, and MSC.226(82)
	Buoyant smoke signals	<ol style="list-style-type: none"> 1. Regulations 4 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and III, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, and MSC.218(82) 3. Section 4, Part 1, and Section 4, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.226(82), and MSC.323(89)
Inflatable liferafts		<ol style="list-style-type: none"> 1. Regulations 4, 13, 21, 26, 31 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and IV, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, MSC.218(82), and MSC.293(87) 3. Section 5, Part 1, and Section 5, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.226(82), MSC.295(87), and MSC.323(89)
Lifeboats		<ol style="list-style-type: none"> 1. Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and IV, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, MSC.207(81), MSC.218(82), MSC.272(85), and MSC.320(89) 3. Section 6, Part 1, and Section 5, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.226(82), MSC.274(85), MSC.321(89), and MSC.323(89)

Product Name	Main Applicable Standard
Rescue boats	<ol style="list-style-type: none"> 1. Regulations 4, 13, 21, 26, 31 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and V, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code, MSC.218(82), and MSC.272(85) 3. Section 7, Part 1, and Section 5, Part 2, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.226(82), MSC.274(85), and MSC.323(89)
Survival craft and rescue boats light; lifejacket light; lifebuoy light	<ol style="list-style-type: none"> 1. Regulations 4, 7, 22, 26, 32 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and IV, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code 3. Section 10, Part 1, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, MSC.200(80), MSC.226(82), and MSC.323(89)
Hydrostatic release units	<ol style="list-style-type: none"> 1. Regulations 4, 13, 26 and 34, Chapter III, 1974 International Convention for the Safety of Life at Sea and its Amendments 2. Chapters I and VI, MSC.48(66) Adoption of the International Life-saving Appliance (LSA) Code 3. Section 11, Part 1, MSC.81(70) Revised Recommendation on Testing of Life-saving Appliances, and MSC.226(82)

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.5 General Requirements

1.5.1 Personnel qualification requirements: The applicant shall be responsible for training its personnel according to the requirements of the national or international or industrial standards, and ensure that the testing personnel, technical experts and management personnel have relevant professional knowledge. In the absence of standards (such as new products), the applicant shall select the standards at its discretion and explain the reasons in the documents to prove that

the requirements of its testing services are met. Personnel should have appropriate experience and be familiar with the operation of equipment. Testing personnel should have received junior college education or above, and have at least 1-year working experience or internship experience in related positions. The person in charge of quality supervision should have the title of engineer or above, and have at least 2-year working experience in related positions or testing service experience in related positions. The PSPC coating inspector shall hold the qualification certificates of NACE Level 2 Inspector or FROSIO Level III Inspector. The report issuing personnel shall have the title of engineer or above, and have at least 3-year working experience in related positions or testing service experience in related positions.

1.5.2 Supervision (quality control): The test agency shall designate personnel to supervise the testing services provided, and shall develop quality supervision procedures or operation instructions.

1.5.3 Personnel records: The test agency shall keep records of accepted personnel, including age, education level, training records and experience records in the approval industry.

1.5.4 Equipment and facilities: The test agency shall equip and maintain the necessary test equipment and facilities suitable for the test services provided, and when necessary, formulate the equipment operation and maintenance instructions, and keep the original records and use records of the equipment, which shall include all maintenance and calibration information of the equipment. The safety facilities and environment shall be able to meet the needs of test services. See 1.6.2 for details.

1.5.5 Test procedures: The test agency shall keep written test procedures. Such procedures shall cover the test services provided, include the following contents and meet relevant requirements:

- (1) Receipt, review and assignment of test service applications
- (2) Receipt, marking, storage and handling of samples;
- (3) Pre-operational inspection and preparation of test equipment, operation instructions or guidelines of equipment, including safety protection;
- (4) Inspection, analysis and determination;
- (5) Rules and measures for coordination and liaison between testing personnel and on-site surveyors (if necessary);

- (6) Test supervision and verification;
 - (7) Relevant requirements (if any) for arrangement of testing records and submission of them to the on-site surveyor for signature and confirmation;
 - (8) Provisions on preparation, review and approval of test reports;
 - (9) Distribution and filing of reports.
- 1.5.6 Verification: The test agency shall verify whether the test service provided meets the requirements of the approval procedure.

1.6 Technical Requirements

1.6.1 Test items of life-saving appliances

Product Name	Test Item	Testing methods
Lifebuoys	Dimensions	Clause 5.2, GB4302, and Clause 1.1, IMO MSC.81(70)
	Weight	Clause 5.3, GB4302, and Clause 1.1, IMO MSC.81(70)
	Temperature cycling	Clause 5.5, GB4303, and Clause 1.2, IMO MSC.81(70)
	Drop	Clause 5.6, GB4303, and Clause 1.3, IMO MSC.81(70)
	Oil resistance	Clause 5.7, GB4303, and Clause 1.4, IMO MSC.81(70)
	Fire	Clause 5.8, GB4303, and Clause 1.5, IMO MSC.81(70)
	Flotation	Clause 5.9, GB4303, and Clause 1.6, IMO MSC.81(70)
	Strength	Clause 5.10, GB4303, and Clause 1.7, IMO MSC.81(70)
Lifejackets (children's lifejackets)	Appearance inspection	Clauses 5.2-5.4, GB 4303
	Temperature cycling	Clause 5.5, GB 4303, and Clause 2.1, IMO MSC.81(70)
	Strength	Clause 5.9, GB 4303, and Clause 2.5, IMO MSC.81(70)
	Donning	Clause 5.10, GB 4303, and Clause 2.7, IMO MSC.81(70)
	Buoyancy	Clause 5.6, GB 4303, and Clause 2.2, IMO MSC.81(70)
	Water performance	Clause 5.11, GB 4303, and Clause 2.8, IMO MSC.81(70)

Product Name	Test Item	Testing methods
	Fire	Clause 5.8, GB 4303, and Clause 2.3, IMO MSC.81(70)
	Oil resistance	Clause 5.7, GB 4303
Inflatable lifejackets	Temperature cycling	Clause 2.1, IMO MSC.81(70)
	Buoyancy	Clause 2.2, IMO MSC.81(70)
	Fire	Clause 2.3, IMO MSC.81(70)
	Strength	Clause 2.5, IMO MSC.81(70)
	Donning test	Clauses 2.7 and 2.10.2, IMO MSC.81(70)
	Water performance	Clauses 2.8 and 2.10.3, IMO MSC.81(70)
	Inflation test	Clause 2.11.1, IMO MSC.81(70)
	Adhesion of coated fabrics	ISO 2411:2000
	Tear resistance of coated fabrics	ISO 4674:2003
	Resistance to damage by flexing of coated fabrics	ISO 7854:1995
	Tensile strength of coated fabrics	ISO 1421:1998
	Elongation at break of coated fabrics	ISO 1421:1998
	Test for fastness to light of coated fabrics	ISO 105-B02:1994
Lifejacket buoyancy material	Stability	Clause 5.1.3, GB 4303, and Clause 2.6, IMO MSC.81(70)
	Compression and water absorption	Clause 5.1.3, GB 4303, and Clause 2.6, IMO MSC.81(70)
	Tensile strength	ISO 12402-7:2006
Lifejacket fabrics	Tensile strength	ISO 13934-2:1999
	Elongation at break	ISO 13934-1:1999
	Tear resistance	ISO-13937-2:2000
	Slippage resistance of yarns	ISO 12402-7 2006 Clause 4.3.2.6
Lifejacket fastenings	Tensile strength	Clause 4.7.1.2.1, ISO 12402-7 2006
	Strength/slippage resistance	Clause 4.7.1.2.2, ISO 12402-7 2006
	Misrelease	Clause 4.7.1.2.3, ISO 12402-7 2006
Lifejacket stitches	Single-end breaking force	ISO 2062:1993
	Loop breaking strength	Clause 4.2.3, ISO 12402-7 2006
Lifejacket strap	Tensile strength	ISO 13934-1:1999
Immersion suits	Temperature cycling	Clause 3.1.16, IMO MSC.81(70)
	Donning	Clauses 3.1.3-4, IMO MSC.81(70)
	Ergonomics	Clause 3.1.5, IMO MSC.81(70)
	Field of vision	Clause 3.1.6, IMO MSC.81(70)
	Flotation	Clause 3.1.7, IMO MSC.81(70)
	Righting	Clause 3.1.8, IMO MSC.81(70)

Product Name		Test Item	Testing methods
		Water ingress and jump	Clauses 3.1.9-10, IMO MSC.81(70)
		Leak test	Clause 3.1.11, IMO MSC.81(70)
		Swimming and water emergence	Clause 3.1.12, IMO MSC.81(70)
		Oil resistance	Clause 3.1.13, IMO MSC.81(70)
		Fire	Clause 3.1.15, IMO MSC.81(70)
		Buoyancy	Clause 3.1.17, IMO MSC.81(70)
		Strength	Clause 3.1.18, IMO MSC.81(70)
		Thermal protection	Clause 3.2, IMO MSC.81(70)
Retro-reflective materials on life-saving appliances		Photometric requirements	Clause 3.1, Res.A.658(16) Technical Specifications for Retro-reflective Materials on Life-saving Appliances
		Accelerated weathering	Clause 3.2, Res.A.658(16)
		Seawater immersion	Clause 3.3, Res.A.658(16)
		Flexibility	Clause 3.4, Res.A.658(16)
		Tensile strength	Clause 3.5, Res.A.658(16)
		Adhesive strength	Clause 3.6, Res.A.658(16)
		Blocking	Clause 3.7, Res.A.658(16)
		Salt spray resistance	Clause 3.8, Res.A.658(16)
		Temperature resistance	Clause 3.9, Res.A.658(16)
		Fungus resistance test	Clause 3.10, Res.A.658(16)
		Abrasion resistance	
		Soil resistance and cleanability	Clause 3.11, Res.A.658(16)
V i s i b l e s i g n a l s	Rocket parachute flare signal	Safety inspection	Clause 4.5, IMO MSC.81(70)
		Vertical rocket firing	Clause 4.6.1, IMO MSC.81(70)
	Hand flares	Burning luminous intensity	Clause 4.6.2, IMO MSC.81(70)
		Burning luminous color	Clause 4.6.2, IMO MSC.81(70)
	Buoyant smoke signals	Burning safety	Clause 4.8.2, IMO MSC.81(70)
		Smoke concentration	Clause 4.8.3, IMO MSC.81(70)
Inflatable liferafts		Drop test	Clause 5.1, IMO MSC.81(70)
		Jump test	Clause 5.2, IMO MSC.81(70)
		Weight test	Clause 5.3, IMO MSC.81(70)
		Towing test	Clause 5.4, IMO MSC.81(70)
		Mooring out test	Clause 5.5, IMO MSC.81(70)
		Painter system test	Clause 5.6, IMO MSC.81(70)
		Loading and seating test	Clause 5.7, IMO MSC.81(70)
		Boarding and closing arrangement test	Clause 5.8, IMO MSC.81(70)
		Stability test	Clause 5.9, IMO MSC.81(70)
		Maneuverability test	Clause 5.10, IMO MSC.81(70)

Product Name	Test Item	Testing methods
	Swamp test	Clause 5.11, IMO MSC.81(70)
	Canopy closure test	Clause 5.12, IMO MSC.81(70)
	Buoyancy of float-free liferafts	Clause 5.13, IMO MSC.81(70)
	Detailed inspection	Clause 5.14, IMO MSC.81(70)
	Weak link test	Clause 5.15, IMO MSC.81(70)
	Impact test	Clause 5.16, IMO MSC.81(70)
	Damage test	Clause 5.17.1, IMO MSC.81(70)
	Righting test	Clause 5.17.2, IMO MSC.81(70)
	Pressure test	Clauses 5.17.7~5.17.8, IMO MSC.81(70)
	Seam strength test	Clause 5.17.9, IMO MSC.81(70)
	Davit-launched inflatable liferafts - strength test	Clauses 5.17.10~5.17.12, IMO MSC.81(70)
	Tensile strength	ISO 1421:1998
	Tear resistance	ISO 1421:1998
	Surface acceptability and adhesion of surface coating	ISO 2411:2000
	Weathering effect	ISO 4892-2:2006
	Low-temperature flexing	ISO 4675:1990
	Flex cracking	ISO 7854:1995
	Porosity	ISO TR 6065:1991
	Oil resistance test	ISO TR 6065:1991
	Webt distortion	Clause 5.17.13.2.2.9, IMO MSC.81(70)
Ozone resistance	Clause 5.17.13.2.2.9, IMO MSC.81(70)	
Blocking resistance	ISO 5978:1990	
Lifeboats	Overload	Clause 6.3, IMO MSC.81(70)
	Impact and drop	Clause 6.4, IMO MSC.81(70)
	Free fall	Clause 6.5, IMO MSC.81(70)
	Seating strength	Clause 6.6, IMO MSC.81(70)
	Seating space	Clause 6.7, IMO MSC.81(70)
	Immersion stability and freeboard	
	Release mechanism	Clause 6.9, IMO MSC.81(70)
	Operations	Clause 6.10, IMO MSC.81(70)
	Towing and painter release	Clause 6.11, IMO MSC.81(70)
	Canopy erection	Clause 6.13, IMO MSC.81(70)
	Additional	Clause 6.14, IMO MSC.81(70)
Fire-protected lifeboats	Clause 6.10, IMO MSC.81(70)	
Rescue boats	Overload	Clauses 7.1.4 and 7.2.12~13, IMO MSC.81(70)
	Impact and drop	Clauses 6.4 and 7.2.2~3, IMO MSC.81(70)
	Seating	Clause 7.1.3, IMO MSC.81(70)
	Stability	Clauses 7.2.6~7, IMO MSC.81(70)

Product Name	Test Item	Testing methods
	Freeboard	Clauses 7.2.4-5, IMO MSC.81(70)
	Release mechanism	Clause 6.9, IMO MSC.81(70)
	Operations	Clauses 7.1.5~6 and 7.4.2, IMO MSC.81(70)
	Towing and painter release	Clause 6.11, IMO MSC.81(70)
	Righting	Clause 7.1.7, IMO MSC.81(70)
	Manoeuvrability	Clause 7.1.8, IMO MSC.81(70)
	Additional	Clause 6.14, IMO MSC.81(70)
	Towing	Clause 7.1.2, IMO MSC.81(70)
	Damage	Clauses 7.2.8~9 and 7.3.2, IMO MSC.81(70)
	Simulated heavy weather	Clause 7.2.10, IMO MSC.81(70)
	Swamp	Clause 7.2.11, IMO MSC.81(70)
	Mooring	Clause 7.2.15, IMO MSC.81(70)
Survival craft and rescue boats light; lifejacket light; lifebuoy light	Temperature cycling test	Clause 1.2.1, IMO MSC.81(70)
	Vibration test	Clause 8.7, IEC945 Third Edition (Nov.1996)
	Fungus resistance test	Clause 10.4.2, IMO MSC.81(70)
	Switch arrangement test	Clause 10.4.3, IMO MSC.81(70)
	Corrosion and seawater resistance test	Clause 8.12, IEC945 Third Edition (Nov.1996)
	Solar radiation test	Clause 8.12, IEC945 Third Edition (Nov.1996)
	Oil resistance test	Clause 8.11, IEC945 Third Edition (Nov.1996)
	Temperature cycling test	Clause 1.2.1, IMO MSC.81(70)
	Rain test and watertightness test	Clause 8.8, IEC945 Third Edition (Nov.1996)
	Fire test	Clause 10.4.8, IMO MSC.81(70)
	Flashing frequency	Clause 10.3.5, IMO MSC.81(70)
	Measurement of luminous intensity	Clause 10.4.9, IMO MSC.81(70)
	Chromaticity	Clause 10.4.10, IMO MSC.81(70)
	Drop test	Clause 10.2.3, IMO MSC.81(70)
	Immersion test	Clause 10.2.5, IMO MSC.81(70)
	Low-temperature drop test	Clause 10.2.6, IMO MSC.81(70)
	Impact test	Clause 10.2.7, IMO MSC.81(70)
	Tensile test	Clause 10.2.8, IMO MSC.81(70)
Hydrostatic release units	Corrosion resistance test	Clause 11.2.1, IMO MSC.81(70)
	Temperature cycling test	Clause 11.2.2, IMO MSC.81(70)
	Submergence and manual release tests	Clause 11.2.3, IMO MSC.81(70)

Product Name	Test Item	Testing methods
	Strength test	Clause 11.2.4, IMO MSC.81(70)
	Test of resistance to cold/heat	Clause 11.2.5.1, IMO MSC.81(70)
	Test for surface resistance to oil	Clause 11.2.5.3, IMO MSC.81(70)
	Seawater resistance test	Clause 11.2.5.4, IMO MSC.81(70)
	Test for resistance to detergents	Clause 11.2.5.5, IMO MSC.81(70)
	Performance test	Clause 11.3, IMO MSC.81(70)

1.6.2 Specific requirements for test items of life-saving appliances

1.6.2.1 Lifejackets

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Appearance inspection Clauses 5.2-5.4, GB 4303	Qualified life-saving appliance inspector	Steel ruler Vernier caliper	None	To be developed	/	/
2	Temperature cycling Clause 5.5, GB 4303, and Clause 2.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
3	Strength Clause 5.9, GB 4303, and Clause 2.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
4	Donning Clause 5.10, GB 4303, and Clause 2.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
5	Buoyancy Clause 5.6, GB 4303, and Clause 2.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic balance	None	To be developed	/	/
6	Water performance Clause 5.11, GB 4303, and Clause 2.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch Steel ruler Protractor	None	To be developed	/	/
7	Fire Clause 5.8, GB 4303, and Clause 2.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	No wind	No wind

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
8	Oil resistance Clauses 5.7, GB 4303	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/

1.6.2.2 Inflatable lifejackets

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Temperature cycling Clause 2.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
2	Buoyancy Clause 2.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic balance	None	To be developed	/	/
3	Fire Clause 2.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler Stopwatch	None	To be developed	No wind	No wind
4	Strength Clause 2.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
5	Donning test Clauses 2.7 and 2.10.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
6	Water performance Clauses 2.8 and 2.10.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Protractor Steel tape	None	To be developed	/	/
7	Inflation test Clause 2.11.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
8	Adhesion of coated fabrics	Qualified life-saving	Steel ruler	None	To be developed	70°C±2°C	70°C±2°C

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	ISO 2411:2000	appliance inspector	Universal tester				
10	Tear resistance of coated fabrics ISO 4674:2003	Qualified life-saving appliance inspector	Steel ruler Universal tester	None	To be developed	/	/
11	Resistance to damage by flexing of coated fabrics ISO 7854:1995	Qualified life-saving appliance inspector	Steel ruler Folding instrument	None	To be developed	/	/
12	Tensile strength of coated fabrics ISO 1421:1998	Qualified life-saving appliance inspector	Steel ruler Universal tester	None	To be developed	Room temperature	Room temperature
13	Elongation at break of coated fabrics ISO 1421:1998	Qualified life-saving appliance inspector	Steel ruler Universal tester	None	To be developed	Room temperature	Room temperature
14	Test for fastness to light of coated fabrics ISO 105-B02:1994	Qualified life-saving appliance inspector	Xenon arc lamp weathering test chamber	None	To be developed	/	/

1.6.2.3 Lifejacket buoyancy material

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Stability Clause 5.1.3, GB 4303, and Clause 2.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
2	Compression and water absorption Clause 5.1.3, GB 4303, and Clause 2.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler Vernier caliper Electronic balance	None	To be developed	/	/
3	Tensile strength ISO 12402-7:2006	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH

1.6.2.4 Lifejacket fabrics

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Tensile strength ISO 13934-2:1999	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH
2	Elongation at break ISO 13934-1:1999	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH
3	Tear resistance ISO-13937-2:2000	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH
4	Slippage resistance of yarns ISO 12402-7 2006 Clause 4.3.2.6	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH

1.6.2.5 Lifejacket fastenings

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Tensile strength Clause 4.7.1.2.1, ISO 12402-7 2006	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
2	Strength/slippage resistance Clause 4.7.1.2.2, ISO 12402-7 2006	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	(23±2)°C, (50±5)%RH	(23±2)°C, (50±5)%RH
3	Misrelease Clause 4.7.1.2.3, ISO 12402-7 2006	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/

1.6.2.6 Lifejacket stitches

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Single-end breaking force ISO 2062:1993	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH
2	Loop breaking strength Clause 4.2.3, ISO 12402-7	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH

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1.6.2.7 Lifejacket strap

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Tensile strength ISO 13934-1:1999	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(20±2)°C, (65±5)%RH	(20±2)°C, (65±5)%RH

1.6.2.8 Immersion suits

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Temperature cycling Clause 3.1.16, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
2	Donning Clauses 3.1.3-4, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch Walk-in test chamber	None	To be developed	Room temperature and -30°C	Room temperature and -30°C
3	Ergonomics Clause 3.1.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape Vernier caliper	None	To be developed	/	/
4	Field of vision Clause 3.1.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape Vernier caliper	None	To be developed	/	/
5	Flotation Clause 3.1.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler Protractor	None	To be developed	/	/
6	Righting Clause 3.1.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
7	Water ingress and jump Clauses 3.1.9-10, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic platform scale	None	To be developed	/	/
8	Leak test Clause 3.1.11, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic platform scale	None	To be developed	/	/
9	Swimming and water emergence Clause 3.1.12, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/
10	Oil resistance Clause 3.1.13, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/
11	Fire Clause 3.1.15, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch Steel ruler	None	To be developed	No wind	No wind
12	Buoyancy Clause 3.1.17, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape Electronic balance	None	To be developed	/	/
13	Strength Clause 3.1.18, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
14	Thermal protection Clause 3.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Mercury thermometer (Grade-II standard)	None	To be developed	0°C	0°C

1.6.2.9 Retro-reflective materials on life-saving appliances

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard	Method (Operation	Environment (Environmental	Test Conditions
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				Substance)	Instruction)	Condition)	
1	Photometric requirements Clause 3.1, Res.A.658(16) Technical Specifications for Retro-reflective Materials on Life-saving Appliances	Qualified life-saving appliance inspector	Weak light photometer	None	To be developed	/	/
2	Accelerated weathering Clause 3.2, Res.A.658(16)	Qualified life-saving appliance inspector	Xenon arc lamp weathering test chamber	None	To be developed	63°C ±3°C	63°C ±3°C
3	Seawater immersion Clause 3.3, Res.A.658(16)	Qualified life-saving appliance inspector	Electronic balance	None	To be developed	/	/
4	Flexibility Clause 3.4, Res.A.658(16)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C	-30°C
5	Tensile strength Clause 3.5, Res.A.658(16)	Qualified life-saving appliance inspector	Universal tester Steel ruler	None	To be developed	/	/
6	Adhesive strength Clause 3.6, Res.A.658(16)	Qualified life-saving appliance inspector	Universal tester Steel ruler	None	To be developed	/	/
7	Blocking Clause 3.7, Res.A.658(16)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber Steel ruler	None	To be developed	65°C	65°C
8	Salt spray resistance Clause 3.8, Res.A.658(16)	Qualified life-saving appliance inspector	Air-flow salt spray corrosion test chamber	None	To be developed	35±2°C 95% RH	35±2°C 95% RH
9	Temperature resistance Clause 3.9, Res.A.658(16)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	65±2°C -30±2°C	65±2°C -30±2°C
10	Fungus resistance test Clause 3.10, Res.A.658(16)	Qualified life-saving appliance inspector	Fungus test chamber Steel ruler	None	To be developed	/	/
11	Abrasion resistance	Qualified life-saving appliance inspector	Friction machine Steel ruler	None	To be developed	/	/
12	Soil resistance and cleanability Clause 3.11, Res.A.658(16)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/

1.6.2.10 Inflatable liferafts

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Drop test Clause 5.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch Steel tape	None	To be developed	Natural environment	/
2	Jump test Clause 5.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/
3	Weight test Clause 5.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic platform scale	None	To be developed	Natural environment	/
4	Towing test Clause 5.4, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S	None	To be developed	Natural environment	/
5	Mooring out test Clause 5.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/
6	Painter system test Clause 5.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	Tautness meter	None	To be developed	Natural environment	/
7	Loading and seating test Clause 5.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	Natural environment	/
8	Boarding and closing arrangement test Clause 5.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	Natural environment	/
9	Stability test Clause 5.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/
10	Maneuverability test Clause 5.10, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	Natural environment	/
11	Swamp test Clause 5.11, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/
12	Canopy closure test Clause 5.12, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	Natural environment	/
13	Buoyancy of float-free liferafts Clause 5.13, IMO	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	MSC.81(70)						
14	Detailed inspection Clause 5.14, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/
15	Weak link test Clause 5.15, IMO MSC.81(70)	Qualified life-saving appliance inspector	Tautness meter	None	To be developed	Natural environment	/
16	Impact test Clause 5.16, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S	None	To be developed	Natural environment	/
17	Damage test Clause 5.17.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	Natural environment	/
18	Righting test Clause 5.17.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	Natural environment	/
19	Pressure test Clauses 5.17.7~5.17.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch Pressure gage	None	To be developed	Natural environment	/
20	Seam strength test Clause 5.17.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	Universal tester Steel ruler	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
21	Davit-launched inflatable liferafts - strength test Clauses 5.17.10~5.17.12, IMO MSC.81(70)	Qualified life-saving appliance inspector	Walk-in test chamber Steel tape	None	To be developed	Natural environment	/
22	Tensile strength ISO 1421:1998	Qualified life-saving appliance inspector	Universal tester Steel ruler	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
23	Tear resistance ISO 1421:1998	Qualified life-saving appliance inspector	Universal tester Steel ruler	None	To be developed	(23±2)°C, (50±10)%RH	(23±2)°C, (50±10)%RH
24	Surface acceptability and	Qualified life-saving	Universal	None	To be	(23±2)°C,	(23±2)°C,

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
	adhesion of surface coating ISO 2411:2000	appliance inspector	tester Steel ruler		developed	(50±10)%RH	(50±10)%RH
25	Weathering effect ISO 4892-2:2006	Qualified life-saving appliance inspector	Xenon arc lamp weathering test chamber	None	To be developed	(23±2)°C, (50±10)%RH	/
26	Low-temperature flexing ISO 4675:1990	Qualified life-saving appliance inspector	Folding instrument	None	To be developed	(23±2)°C, (50±10)%RH	/
27	Flex cracking ISO 7854:1995	Qualified life-saving appliance inspector	Folding instrument	None	To be developed	(23±2)°C, (50±10)%RH	/
28	Porosity ISO TR 6065:1991	Qualified life-saving appliance inspector	/	None	To be developed	(23±2)°C, (50±10)%RH	/
29	Oil resistance test ISO TR 6065:1991	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	(23±2)°C, (50±10)%RH	/
30	Weft distortion Clause 5.17.13.2.2.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	(23±2)°C, (50±10)%RH
31	Ozone resistance Clause 5.17.13.2.2.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	Ozone weathering test chamber Vernier caliper	None	To be developed	/	(23±2)°C, (50±10)%RH
32	Blocking resistance ISO 5978:1990	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	/	(23±2)°C, (50±10)%RH

1.6.2.11 Position-indicating lights for life-saving appliances

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Temperature cycling test Clause 1.2.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
2	Vibration test Clause 8.7, IEC945 Third Edition (Nov.1996)	Qualified life-saving appliance inspector	Vibration table	None	To be developed	/	/
3	Fungus resistance test Clause 10.4.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Fungus test chamber	None	To be developed	29±1°C 95% RH	29±1°C 95% RH
4	Switch arrangement test Clause 10.4.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
5	Corrosion and seawater resistance test Clause 8.12, IEC945 Third Edition (Nov.1996)	Qualified life-saving appliance inspector	Air-flow salt spray corrosion test chamber	None	To be developed	40°C±2°C 90%-95%	40°C±2°C 90%-95%
6	Solar radiation test Clause 8.12, IEC945 Third Edition (Nov.1996)	Qualified life-saving appliance inspector	Xenon arc lamp weathering test chamber	None	To be developed	/	/
7	Oil resistance test Clause 8.11, IEC945 Third Edition (Nov.1996)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/
8	Rain test and watertightness test Clause 8.8, IEC945 Third Edition (Nov.1996)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
9	Fire test Clause 10.4.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	No wind	No wind
10	Flashing frequency Clause 10.3.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
11	Measurement of luminous intensity Clause 10.4.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	Illuminometer	None	To be developed	/	/

12	Chromaticity Clause 10.4.10, IMO MSC.81(70)	Qualified life-saving appliance inspector	Spectral photometer	None	To be developed	/	/
13	Drop test Clause 10.2.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
14	Immersion test Clause 10.2.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
15	Low-temperature drop test Clause 10.2.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C	-30°C
16	Impact test Clause 10.2.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
17	Tensile test Clause 10.2.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic balance	None	To be developed	/	/

1.6.2.12 Smoke signals

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Safety inspection Clause 4.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
2	Vertical rocket firing Clause 4.6.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
3	Burning luminous intensity Clause 4.6.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Illuminometer	None	To be developed	/	/
4	Burning luminous color Clause 4.6.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Spectral photometer	None	To be developed	/	/
5	Burning safety Clause 4.8.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/

6	Smoke concentration Clause 4.8.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Illuminometer	None	To be developed	/	/
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1.6.2.13 Hydrostatic release units

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Corrosion resistance test Clause 11.2.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	Air-flow salt spray corrosion test chamber	None	To be developed	35±3°C	35±3°C
2	Temperature cycling test Clause 11.2.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
3	Submergence and manual release tests Clause 11.2.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Precision pressure gauge	None	To be developed	/	/
4	Strength test Clause 11.2.4, IMO MSC.81(70)	Qualified life-saving appliance inspector	Universal tester	None	To be developed	(23±2)°C ≤85%RH	(23±2)°C ≤85%RH
5	Test of resistance to cold/heat Clause 11.2.5.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	-30°C minimum, and +65°C maximum	-30°C minimum, and +65°C maximum
6	Test for surface resistance to oil Clause 11.2.5.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/
7	Seawater resistance test Clause 11.2.5.4, IMO MSC.81(70)	Qualified life-saving appliance inspector	Air-flow salt spray corrosion test chamber	None	To be developed	/	/

8	Test for resistance to detergents Clause 11.2.5.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	/	/
9	Performance test Clause 11.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	/	/

1.6.2.14 Lifebuoys

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Dimensions Clause 5.2, GB4302, and Clause 1.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape Vernier caliper	None	To be developed	/	/
2	Weight Clause 5.3, GB4302, and Clause 1.1, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic balance	None	To be developed	/	/
3	Temperature cycling Clause 5.5, GB4303, and Clause 1.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	High/low temperature alternating damp heat test chamber	None	To be developed	To be developed	(23±2)°C, (50±5)%RH
4	Drop Clause 5.6, GB4303, and Clause 1.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
5	Oil resistance Clause 5.7, GB4303, and Clause 1.4, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler	None	To be developed	Room temperature	Room temperature

6	Fire Clause 5.8, GB4303, and Clause 1.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch Steel ruler	None	To be developed	No wind	No wind
7	Flotation Clause 5.9, GB4303, and Clause 1.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	Electronic balance	None	To be developed	/	/
8	Strength Clause 5.10, GB4303, and Clause 1.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/

1.6.2.15 Lifeboats

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Overload Clause 6.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
2	Impact and drop Clause 6.4, IMO MSC.81(70)	Qualified life-saving appliance inspector	Accelerometer Steel tape	None	To be developed	/	/
3	Free fall Clause 6.5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Protractor Accelerometer Steel tape	None	To be developed	/	/
4	Seating strength Clause 6.6, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
5	Seating space Clause 6.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/

6	Immersion stability and freeboard	Qualified life-saving appliance inspector	Protractor Steel tape	None	To be developed	/	/
7	Release mechanism Clause 6.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	Tautness meter	None	To be developed	/	/
8	Operations Clause 6.10, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S Steel tape Stopwatch Tautness meter	None	To be developed	/	/
9	Towing and painter release Clause 6.11, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S	None	To be developed	/	/
10	Canopy erection Clause 6.13, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
11	Additional Clause 6.14, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
12	Fire-protected lifeboats Clause 6.10, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel ruler Protractor Pressure gauge Thermometer Stopwatch	None	To be developed	/	/

1.6.2.16 Rescue boats

S/N	Test Items	Man (Testing Personnel)	Machine (Test Equipment)	Material (Standard Substance)	Method (Operation Instruction)	Environment (Environmental Condition)	Test Conditions
1	Overload Clauses 7.1.4 and 7.2.12~13, IMO MSC.81(70)	Qualified life-saving appliance inspector	Tautness meter	None	To be developed	/	/

2	Impact and drop Clauses 6.4 and 7.2.2~3, IMO MSC.81(70)	Qualified life-saving appliance inspector	Protractor Steel tape	None	To be developed	/	/
3	Seating Clause 7.1.3, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
4	Stability Clauses 7.2.6~7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Steel tape	None	To be developed	/	/
5	Freeboard Clauses 7.2.4~5, IMO MSC.81(70)	Qualified life-saving appliance inspector	Protractor Steel tape	None	To be developed	/	/
6	Release mechanism Clause 6.9, IMO MSC.81(70)	Qualified life-saving appliance inspector	Protractor Steel tape Tautness meter	None	To be developed	/	/
7	Operations Clauses 7.1.5~6 and 7.4.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S Steel tape Stopwatch Tautness meter	None	To be developed	/	/
8	Towing and painter release Clause 6.11, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S	None	To be developed	/	/
9	Righting Clause 7.1.7, IMO MSC.81(70)	Qualified life-saving appliance inspector	Stopwatch	None	To be developed	/	/
10	Manoeuvrability Clause 7.1.8, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
11	Additional Clause 6.14, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
12	Towing Clause 7.1.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	G P S Stopwatch	None	To be developed	/	/

			Tautness meter				
13	Damage Clauses 7.2.8~9 and 7.3.2, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
14	Simulated heavy weather Clause 7.2.10, IMO MSC.81(70)	Qualified life-saving appliance inspector	Pressure gauge	None	To be developed	/	/
15	Swamp Clause 7.2.11, IMO MSC.81(70)	Qualified life-saving appliance inspector	/	None	To be developed	/	/
16	Mooring Clause 7.2.15, IMO MSC.81(70)	Qualified life-saving appliance inspector	Pressure gauge	None	To be developed	/	/

1.7 Report Form and Requirements

1.7.1 The test report form accepted by CCS shall be used, and the report shall be prepared, reviewed and approved in accordance with specified requirements.

1.7.2 The report shall generally include name of the applicant, name of the client, information of the test sample (number, model/specification), test method, technical requirements, test results and conclusions or determination results, etc.

Part 5 Fire-proof Materials and Fire-proof Structures

Chapter 1 Fire-proof Materials and Fire-proof Structures

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for fire-proof materials and fire-proof structures (hereinafter referred to as "test agency").

1.1.2 Table 1.1.2 gives the test items of fire-proof materials and fire-proof structures for ships:

Test Items of Fire-proof Materials and Fire-proof Structures

Table 1.1.2

Name of Test Item	Applicable Products
Non-combustibility test	Fire-proof materials (non-combustible materials), such as marine mineral wool products (ceramic wool products, rock wool products, glass wool products), calcium silicate board, inorganic fire-proof board, and fire-resistant deck covering.
Smoke and toxicity test	Flame-retardant materials, such as facing decorative materials, primary deck coverings, floor coverings, and plastic pipes.
Test for A, B and F Class divisions	Fire divisions, such as decks, bulkheads, fire doors, ceilings, lining boards, fire windows, fire dampers, pipelines and conduit penetrations, and cable penetration devices.
Test for fire door control systems	Fire door control systems
Test for surface flammability	Finish materials of bulkheads, lining boards and ceilings, primary deck coverings and floor coverings, PVC plastic floor, rubber floor, carpet and adhesive, etc.
Test for vertically supported textiles and films	Curtains, draperies and other supported textiles
Test for upholstered furniture	Covers and fillers for upholstered seats
Test for bedding components	Bedding components
Test for fire retardant materials for high speed crafts	Fire-restricting materials for high-speed crafts
Test for fire divisions for high-speed crafts	Test for fire-restricting divisions for high-speed crafts
Fire endurance test of marine L3 plastic pipes	Marine plastic pipes
Determination of the gross heat of combustion	Surface combustible materials

1.2 Basis of Approval

Product Name	Main Applicable Standard
Non-combustibility test	IMO 2010 FTP Code Part 1
Smoke and toxicity test	IMO 2010 FTP Code Part 2
Test for A, B and F Class divisions	IMO 2010 FTP Code Part 3
Test for fire door control systems	IMO 2010 FTP Code Part 4
Test for surface flammability	IMO 2010 FTP Code Part 5
Test for vertically supported textiles and films	IMO 2010 FTP Code Part 7
Test for upholstered furniture	IMO 2010 FTP Code Part 8
Test for bedding components	IMO 2010 FTP Code Part 9
Test for fire-restricting materials for high-speed crafts	IMO 2010 FTP Code Part 10
Test for fire-restricting divisions for high-speed crafts	IMO 2010 FTP Code Part 11
Fire endurance test of marine L3 plastic pipes	IMO A.753(18) IMO MSC.313(88)
Determination of the gross heat of combustion	ISO 1716:2010

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.5 Technical Requirements

S/N	Test Items	Test Criteria	Qualification of Testing Personnel	Test Equipment Required	Required Materials (Standard Substances)	Operation Instruction	Environmental Conditions
1	Non-combustibility test	IMO 2010 FTP Code Part 1	Pass the technical assessment according to the competency conditions and training programs for the personnel of the test agency, and obtain the internal qualification certificate issued by the test agency	Non-combustibility test Cronometro Electronic balance Electronic balance Steel ruler Electric drying oven on forced convection High temperature box resistance furnace	None	1. Detailed rules for implementation; 2. Equipment operation procedures;	Condition the specimen in the electric drying oven on forced convection at 60±5°C for 20h to 24h before the test;
2	Smoke and toxicity test	IMO 2010 FTP Code Part 2	Same as above	Smoke density chamber Fourier-transform infrared spectrometer	None	Same as above	Condition the specimen at 23±2°C, 50±5%RH to a constant mass;
3	Test for A, B and F Class divisions	IMO 2010 FTP Code Part 3	Same as above	Vertical structure test furnace Horizontal structure test furnace Scientific research structure test furnace (small test furnace) Gap gauges φ6, φ12 and φ25 Cronometro Electric drying oven on forced convection High temperature box resistance furnace Electronic balance	None	Same as above	Conduct the test in the laboratory basically without wind at an ambient temperature of 10~35°C; Condition the specimen under normal laboratory conditions to a constant mass;
4	Test for fire door control	IMO 2010	Same as above	Vertical structure test	None	Same as above	Condition the main insulation

	systems	FTP Code Part 4		furnace Gap gauges $\phi 6$, $\phi 12$ and $\phi 25$ Cronometro			materials in the system to balance at 23°C , 50%RH before the test;
5	Test for surface flammability	IMO 2010 FTP Code Part 5	Same as above	Low fire spreading test furnace Cronometro Electric drying oven on forced convection High temperature box resistance furnace Electronic balance	None	Same as above	Precondition the specimen at $23\pm 2^{\circ}\text{C}$, $50\pm 10\%$ RH to a constant state;
6	Test for vertically supported textiles and films	IMO 2010 FTP Code Part 7	Same as above	Test device for determining flame retardant properties of vertically supported textiles and films Constant temperature and humidity drying oven Stopwatch Electronic balance Steel ruler	None	Same as above	Precondition the specimen at $20\pm 5^{\circ}\text{C}$, $65\pm 5\%$ RH for at least 24h
7	Test for upholstered furniture	IMO 2010 FTP Code Part 8	Same as above	Test device for upholstered furniture Stainless steel ruler Cronometro	None	Same as above	Condition the specimen in an atmospheric environment basically without wind at $20\pm 5^{\circ}\text{C}$, $20\%\sim 70\%$ RH for 16h, with a specimen temperature of $23\pm 2^{\circ}\text{C}$ and relative humidity of $50\pm 5\%$;
8	Test for bedding components	IMO 2010 FTP Code Part 9	Same as above	Test device for bedding components Stainless steel ruler Cronometro	None	Same as above	Same as Part 8
9	Test for fire-restricting materials for high-speed crafts	IMO 2010 FTP Code Part 10	Same as above	Test device for full-scale room fire test for surface materials Test device for heat release rate of materials Steel ruler	None	Same as above	The room temperature is $20\pm 10^{\circ}\text{C}$ from the installation of specimen to start of test; Before the test, the specimen should be preconditioned to a balanced state at $23\pm 2^{\circ}\text{C}$, $50\pm 5\%$ RH.
10	Test for fire-restricting	IMO 2010	Same as above	Same as Part 3	None	Same as above	Same as Part 3

	divisions for high-speed crafts	FTP Code Part 11					
11	Fire endurance test of marine plastic pipes	IMO A.753(18) IMO MSC.313(88)	Same as above	Test device for fire endurance of marine plastic pipes Heat flux meter Pressure transmitter Vibration-resisting pressure gauge Electronic balance	None	Same as above	Precondition the specimen at 23±2°C, 50±10%RH to a balanced state.
12	Determination of the gross heat of combustion	ISO 1716:2010	Same as above	Bomb calorimeter Electronic analytical balance Electronic balance	None	Same as above	Condition the specimen at 23±2°C, 50±5%RH to a constant mass.

1.6 Report Form and Requirements

1.6.1 The test report shall comply with relevant requirements of ISO/IEC 17025:2005 and IMO 2010 FTP Code, and the form accepted by CCS shall be used. The report shall be prepared, reviewed and approved in accordance with specified requirements.

Part 6 Marine Electrical Equipment Environment

Chapter 1 Marine Electrical Equipment Environment

(Environmental, Electromagnetic Compatibility, Explosion Protection) Test agency

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for marine electrical equipment environment (environmental, electromagnetic compatibility, explosion protection) (hereinafter referred to as "test agency").

1.1.2 The field involves environmental testing of instruments, devices, components and materials. This chapter is a further explanation of the "General Rules" of the Guidelines according to the characteristics of electrical testing, and does not increase or decrease the requirements of the "General Rules". This chapter should be used in conjunction with the "General Rules" of the Guidelines.

1.1.3 This chapter does not apply to the requirements of test agency for shipborne communication & navigation equipment environment and shipboard non-electrical products. For the requirements of test agency for shipborne communication & navigation equipment environment, please refer to the chapter on the test agency for shipboard communications & navigation equipment environment.

1.2 Basis of Approval

Please refer to 1.6.1.

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.4 Quality Management System Requirements

1.4.1 The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.4.2 The laboratory shall have a policy of maintaining independence of testing

personnel, for example, not be responsible for sample changes.

1.4.3 The laboratory shall specify the scope and types of external documents (including those provided by the client) to be controlled, and the control procedures and methods.

1.4.4 The test shall provide a standard identification method for the replaced but still valid version.

1.4.5 Technical records

The record control procedure shall include the records of leaving fixed facilities or sites, or work in related temporary or mobile facilities. Technical records shall include the process, status and corresponding test results of sample changes.

1.5 General Requirements

1.5.1 Personnel qualification requirements:

1.5.1.1 Personnel qualification requirements of EMC test agency:

The laboratory inspector shall have corresponding basic theory and professional knowledge of EMC, and have relevant practical experience. The proportion of technical personnel engaged in this field for more than 3 years shall be not less than 50% of the total number of EMC inspectors.

Each inspector should go through necessary professional training and examination, and can only take up their posts after passing the examination.

1.5.2 Facilities and environmental conditions:

1.5.2.1 Facilities and environmental conditions of EMC test body:

According to the business scope and corresponding standards for approval, the laboratory shall have test sites that meet the requirements of corresponding indicators:

----An open test field and/or anechoic chamber shall be provided for radiated disturbance measurement;

----A shielded room shall be provided for the measurement of disturbance power;

----An open test field or anechoic chamber or TEM cell or strip line, etc. shall be provided for the radiated immunity test;

----A shielded room shall be provided for the conducted immunity test. Alternatively, the radiated disturbance introduced by the atmosphere shall meet the requirements of corresponding standards.

Anechoic chamber:

----The minimum size of the anechoic chamber shall meet the requirements of 3m test.

----For radiated disturbance measurement, the site electrical performance and effectiveness of the anechoic chamber shall meet the requirements of GB/T 9254 Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement.

----For the measurement above 1GHz, the site confirmation method specified in Chapter 8, CISPR16-1-4 shall be used, and the site VSWR obtained shall be $S \text{ VSWR}, \text{ dB} \leq 6\text{dB}$.----The shielding effectiveness of the anechoic chamber shall meet the shielding effectiveness requirements of shielded room, and the shielding effectiveness shall be $> 80\text{dB}$ in the frequency range of 1~6GHz (or 10GHz).

-----For the radiated spurious measurement, the fully anechoic chamber shall have a deviation of free-space normalized transmission loss within $\pm 4\text{dB}$ in the specified full band according to the site confirmation method specified in YD/T 1483 Technical Requirement and Measurement Method of Spurious Emission of Radio Equipment Radio Equipment.

---For the radiated immunity test, the distribution uniformity of the test plane field in the anechoic chamber shall meet the requirements of GB/T 17626.3, and shall be checked and confirmed regularly.

---The normalized site attenuation of the anechoic chamber shall be measured and verified at least every 3~5 years according to the appendix to GB/T 9254, and the normalized site attenuation shall be ensured to meet the $\pm 4\text{dB}$ site acceptance criterion.

Shielded room:

——The shielding effectiveness of the shielded room shall reach the levels as indicated below:

	Range of Frequency	Shielding Efficiency
	0.014-1MHz	>60dB
	1 – 1000MHz	>90dB

----The shielding effectiveness of the shielded room shall be measured and verified at least

every 3~5 years.

---The insulation resistance of the incoming power line to the metal wall of the shielded room and the insulation resistance between wires shall be greater than $2M\Omega$.

----The ground resistance of shielded room shall be less than 4Ω .

1.5.3 Equipment: The testing instruments and auxiliary equipment of the EMC test agency shall also meet the requirements of CISPR16-1 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods (GB6113.), and the requirements of business scope for approval and corresponding standards.

1.6 Technical Requirements

1.6.1 Test items of marine electrical equipment environment

Because there are many equipment test items and standards, the body may submit an application according to its actual conditions for the number of test items and the scope of capabilities, and increase, decrease and adjust the standards. The scope of test capabilities should be indicated in the remarks column:

Table 1

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Electrical products	EMC test	Conducted disturbance measurements	Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Methods of Measurement of Disturbances and Immunity - Conducted Disturbance Measurements GB/T 6113.201 CISPR16-2-1	
		Measurement of disturbance power	Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Methods of Measurement of Disturbances and Immunity - Measurement of Disturbance Power GB/T 6113.202 CISPR16-2-2	
		Enclosure port radiated emission measurements	Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Methods of Measurement of Disturbances and Immunity - Radiated Disturbance Measurements GB/T 6113.203 CISPR16-2-3	
		Electrostatic discharge immunity test	Electromagnetic Compatibility - Testing and Measurement Techniques - Electrostatic Discharge Immunity Test IEC61000-4-2 GB/T17626.2	
		Radiated, radio-frequency, electromagnetic field immunity test	Electromagnetic Compatibility - Testing and Measurement Techniques - Radiated, Radio-frequency, Electromagnetic Field Immunity Test IEC61000-4-3 GB/T17626.3	
		Electrical fast transient/burst immunity test	Electromagnetic Compatibility - Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test IEC61000-4-4 GB/T17626.4	
		Surge immunity	Electromagnetic Compatibility - Testing and Measurement Techniques - Surge (Impact) Immunity Test IEC61000-4-5 GB/T17626.5	
		Immunity to conducted disturbances, induced by radio-frequency fields	Electromagnetic Compatibility - Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields IEC61000-4-6 GB/T 17626.6	
		Low-frequency conducted immunity	Guidelines for Type Approval Test of Electric and Electronic Products GB/T 17626.16 and IEC 61000-4-16 Electromagnetic Compatibility - Testing and Measurement Techniques - Test for Immunity to Conducted, Common Mode Disturbances in the Frequency Range 0 Hz to 150 kHz	

Table 2

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Electrical products	Environmental testing	Cold	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests A: Cold GB/T 2423.1 IEC 60068-2-1	
		Dry heat	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests B: Dry Heat GB/T 2423.2 IEC 60068-2-2	
		Damp heat, steady state	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests B: Damp Heat, Steady State GB/T 2423.3 IEC 60068-2-3	
		Damp heat, cyclic	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Db: Damp Heat, Cyclic (12h + 12h Cycle) GB/T 2423.4 IEC 60068-2-30	
		Vibration	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Fc: Vibration (Sinusoidal) GB/T 2423.10 IEC 60068-2-6	
		Salt mist	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Ka: Salt Mist GB/T 2423.17 IEC 60068-2-11	
		Salt mist, cyclic	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Kb: Salt Mist, Cyclic (Sodium Chloride Solution) GB/T 2423.18 IEC 60068-2-52	
		Needle flame	Fire Hazard Testing for Electric and Electronic Products - Part 5: Test Flames - Needle-flame Test Method - Apparatus, Confirmatory Test Arrangement and Guidance GB/T 5169.5 IEC 60695-11-5	
		Comparative tracking indices	Method for the Determination of the Proof and the Comparative Tracking Indices of Solid Insulating Materials GB/T 4207 IEC 60112	
		Mold growth	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test J and Guidance: Mold Growth IEC 60068-2-10	
		Inclination and swing	Electrical Installations in Ships - Special Features - Control and Instrumentation IEC 60092-504	
Degrees of protection provided by enclosure	Degrees of Protection Provided by Enclosure (IP Code) GB/T 4208 IEC 60529			

Table 3

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Electrical products	Explosion proof performance test	Marine flameproof electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 2: Equipment Protection by Flameproof Enclosures "D" GB/T 3836.2 IEC 60079-1	
		Marine increased safety electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 3: Equipment Protection by Increased Safety "E" GB/T 3836.3 IEC 60079-7	
		Marine intrinsically safe electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 4: Equipment Protection by Intrinsic Safety "I" GB/T 3836.4 IEC 60079-11	
		Marine pressurized electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 5: Equipment Protection by Pressurized Enclosures "P" GB/T 3836.5 IEC 60079-2	

Table 4

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Illumination	Environmental testing	Cold	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests A: Cold GB/T 2423.1 IEC 60068-2-1	
		Dry heat	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests B: Dry Heat GB/T 2423.2 IEC 60068-2-2	
		Damp heat, steady state	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests B: Damp Heat, Steady State GB/T 2423.3 IEC 60068-2-3	
		Damp heat, cyclic	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Db: Damp Heat, Cyclic (12h + 12h Cycle) GB/T 2423.4 IEC 60068-2-30	
		Vibration	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Fc: Vibration (Sinusoidal) GB/T 2423.10 IEC 60068-2-6	
		Salt mist	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Ka: Salt Mist GB/T 2423.17 IEC 60068-2-11	
		Salt mist, cyclic	Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Kb: Salt Mist, Cyclic (Sodium Chloride Solution) GB/T 2423.18 IEC 60068-2-52	
		Needle flame	Fire Hazard Testing for Electric and Electronic Products - Part 5: Test Flames - Needle-flame Test Method - Apparatus, Confirmatory Test Arrangement and Guidance GB/T 5169.5 IEC 60695-11-5	
		Horizontal and vertical flames	Fire Hazard Testing for Electric and Electronic Products - Part 16: Test Flames - 50W Horizontal and Vertical Flame Test Methods GB/T 5169.16 IEC 60695-11-10	
		Comparative tracking indices	Method for the Determination of the Proof and the Comparative Tracking Indices of Solid Insulating Materials GB/T 4207 IEC 60112	
		Glow wire	Fire Hazard Testing - Part 2-10: Glowing/Hot-wire Based Test Methods - Glow-wire Apparatus and Common Test Procedure IEC 60695-2-10	
		Degrees of protection provided by enclosure	Degrees of Protection Provided by Enclosure (IP Code) GB/T 4208 IEC 60529	

Table 5

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Illumination	EMC test	Radio disturbance characteristics of electrical lighting and similar equipment	Limits and Methods of Measurement of Radio Disturbance Characteristics of Electrical Lighting and Similar Equipment GB/T 17743 CISPR 15 EN 55015 SANS 215	
		Harmonic	Electromagnetic Compatibility - Limits - Limits for Harmonic Current Emissions (Equipment Input Current \leq 16A per Phase) GB/T 17625.1 IEC 61000-3-2	
		Voltage changes, voltage fluctuations and flicker	Electromagnetic Compatibility (EMC) - Limits - Limitation of Voltage Changes, Voltage Fluctuations and Flicker in Public Low-voltage Supply Systems, for Equipment with Rated Current \leq 16A per Phase and Not Subject to Conditional Connection GB/T 17625.2 IEC 61000-3-3	
		Immunity	Equipment for General Lighting Purposes - EMC Immunity Requirements IEC 61547 GB/T 18595	
		Electrostatic discharge immunity test	Electromagnetic Compatibility - Testing and Measurement Techniques - Electrostatic Discharge Immunity Test IEC 61000-4-2 GB/T 17626.2	
		Electrical fast transient/burst immunity test	Electromagnetic Compatibility (EMC) - Part 4-4: Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test IEC 61000-4-4 GB/T 17626.4	
		Surge (impact) immunity	Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques - Surge Immunity Test IEC 61000-4-5 GB/T 17626.5	
		Immunity to conducted disturbances, induced by radio-frequency fields	Electromagnetic Compatibility (EMC) - Part 4-6: Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields IEC 61000-4-6 GB/T 17626.6	
		Power frequency magnetic field immunity	Electromagnetic Compatibility (EMC) - Part 4-8: Testing and Measurement Techniques - Power Frequency Magnetic Field Immunity Test IEC 61000-4-8 GB/T 17626.8	
		Voltage dips, short interruptions and voltage variations immunity	Electromagnetic Compatibility (EMC) - Part 4-11: Testing and Measurement Techniques - Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests IEC 61000-4-11 GB/T 17626.11	
Electromagnetic emissions from electronic ballasts for single- and double-capped fluorescent lamps	Test Method on Electromagnetic Emissions from Electronic Ballasts for Single- and Double-capped Fluorescent Lamps GB/T 22148 IEC CISPR/TR 30-1			

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
		Assessment of lighting equipment related to human exposure to electromagnetic fields	Assessment of Lighting Equipment Related to Human Exposure to Electromagnetic Fields IEC 62493	
		Electronic control gear for discharge lamps excluding fluorescent lamps	Test Method on Electromagnetic Emissions - Part 2: Electronic Control Gear for Discharge Lamps Excluding Fluorescent Lamps CISPR TR 30-2	

Table 6

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Explosion-proof lamps	Explosion proof performance test	Explosion-proof lamps	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0	
		Flameproof explosion-proof lamp	Explosive Atmospheres - Part 2: Equipment Protection by Flameproof Enclosures "D" GB/T 3836.2 IEC 60079-1	
		Increased safety explosion-proof lamp	Explosive Atmospheres - Part 3: Equipment Protection by Increased Safety "E" GB/T 3836.3 IEC 60079-7	
		"N" type explosion-proof lamp	Electrical Apparatus for Explosive Gas Atmospheres - Part 8: Type of Protection "N" GB/T 3836.8	
		Encapsulated explosion-proof lamp	Electrical Apparatus for Explosive Gas Atmospheres - Part 9: Encapsulated Electrical Apparatus "M" GB/T 3836.9	
		Marine explosion-proof light	Specifications of Marine Explosion-proof Light GB/T 12045	
		Explosion-proof lamps	Safety Requirement for Flameproof Luminaries QB 1417	
		Dust explosion-proof lamp	Electrical Apparatus for Use in the Presence of Combustible Dust - Part 1-1: Electrical Apparatus Protected by Enclosures and Surface Temperature Limitation - Specifications for Apparatus GB/T 12476.1	

1.7 Report Form and Requirements

1.7.1 The test report form accepted by CCS shall be used. The report shall be prepared, reviewed and approved in accordance with specified requirements.

1.7.2 The report shall generally include name of the applicant, name of the client, information of the test sample (number, model/specification), test method, technical requirements, test results, relevant test photos and conclusions or determination results, etc.

1.7.3 The test certificate and report shall also include:

- Name, model and calibration status of measuring equipment;
- Name, model and calibration status of auxiliary equipment;
- Name, model and connection mode of auxiliary equipment related to the tested equipment;
- Connection diagram of the tested equipment;
- Inspection layout;
- Test data (including test curves if necessary).

Part 7 Electrical Apparatus

Chapter 1 Marine Electrical Apparatus

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for electrical appliances (hereinafter referred to as "electrical test agency").

1.1.2 The field involves electrical and safety performance tests of instruments, devices, components and materials. This chapter is a further explanation of the "General Rules" of the Guidelines according to the characteristics of electrical testing, and does not increase or decrease the requirements of the "General Rules". This chapter should be used in conjunction with the "General Rules" of the Guidelines.

1.2 Basis of Approval

Please refer to 1.6.1.

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.4 Quality Management System Requirements

1.4.1 The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.4.2 The laboratory shall have a policy of maintaining independence of testing personnel, for example, not be responsible for sample changes.

1.4.3 The laboratory shall specify the scope and types of external documents (including

those provided by the client) to be controlled, and the control procedures and methods.

1.4.4 The test shall provide a standard identification method for the replaced but still valid version.

1.4.5 Technical records

The record control procedure shall include the records of leaving fixed facilities or sites, or work in related temporary or mobile facilities.

Technical records shall include the process, status and corresponding test results of sample changes.

1.5 General Requirements

1.5.1 Personnel qualification requirements:

All laboratory personnel who operate special equipment, engage in testing, evaluate results and sign test reports shall have corresponding basic theory and professional knowledge of electrical test.

Internal training management procedures shall involve personnel who leave fixed facilities or sites, or work in relevant temporary or mobile facilities.

Such personnel shall also be adequately supervised.

1.5.2 Equipment and facilities: The laboratory shall be equipped with all the equipment for the main items specified in the test standards. According to the characteristics of test items in the accredited sub-fields and projects and the required measurement accuracy, measures shall also be taken for facilities and environmental conditions to prevent invalid test results or adverse influence on the test quality for environmental reasons. Such measures shall include (but not be limited to):

——Provide and maintain appropriate grounding measures to the common ground bus of all branches, and if necessary, to each electrical apparatus or equipment ground.

——If the test items and/or the test equipment used are sensitive to background electromagnetic radiation, install, monitor and maintain appropriate facilities for electromagnetic shielding, absorption, grounding, isolation or filtering.

——If the test items and/or the test equipment used are sensitive to background audio, install appropriate facilities for audio shielding, sound attenuation or isolation.

—If the test items and/or the test equipment used are sensitive to static electricity, install appropriate anti-static work surface, conductive floor, ground facilities and other anti-static products.

—If the test items and/or the test equipment used are sensitive to the climate environment or have special requirements, such as humidity and atmospheric pressure, provide special environmental facilities or measures meeting the special requirements.

The laboratory shall be provided with sufficient power capacity, and ensure that the test power supply properties, such as voltage rating, frequency rating, voltage stability, frequency stability and harmonic distortion, meet the requirements of test specifications, or ensure that the uncertainty of test results is within the expected range. If it is not specified in the test standards and specifications, the voltage should be kept at $\pm 3\%$ of the rated voltage, the frequency $\pm 2\%$ of the rated frequency, and the total harmonic distortion not more than 5%.

The A/C power, test power and lighting power of the laboratory shall be supplied by independent circuits.

The area of the laboratory shall meet the test needs, and a storage space should be reserved for the working equipment and all necessary auxiliary equipment and appliances. Enough space should also be provided for the required number of testing personnel and management personnel.

For test equipment under high voltage, a room or enclosed area with sufficient safety protection and a safe distance shall be provided according to the voltage class, and two operators are required for step-up operation.

In order to ensure staff health and safety, the laboratory shall establish and implement safety protection measures. For high-voltage test areas, areas with potential explosion or high-energy ray leakage shall be provided with safety isolation measures, and obvious and remarkable warning signs.

Gas for flame burning test shall be isolated from the test area. A protective cover shall be provided for the specimen rotating at high speed during the test.

If the test items produce gases harmful to staff, the test area shall be provided with exhaust measures. For example, material test at high temperature should be carried out in a properly constructed test box that provides sufficient exhaust to disperse flammable gases (such as toxic gases) and eliminate irritating gases.

If the test items produce excessive noise, sound attenuation measures should be provided in the test area, and protection measures for staff.

The fault item test area of the laboratory shall be arranged with a safety isolation area and equipped with sufficient fire extinguishing measures.

The laboratory shall be provided with emergency exits which are clearly marked.

1.6 Technical Requirements

1.6.1 Test items of marine electrical apparatus

Because there are many equipment test items and standards, the body may submit an application according to its actual conditions for the number of test items and the scope of capabilities, and increase, decrease and adjust the standards. The scope of test capabilities should be indicated in the remarks column:

Table 1

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Low-voltage apparatus	Performance test	Appearance inspection	Guidelines for Type Approval Test of Electric and Electronic Products	
		Measurement of insulation resistance		
		Energy fluctuation test		
		Energy failure test		
		Withstand voltage test		
	All type test items required by product standards	General Specifications for Low-voltage Apparatus in Ships GB/T 3783 Electrical Installation in Ships - Definitions and General Requirements IEC 60092-101 GB/T 6994		
		Low-voltage Switchgear and Controlgear: General Rules IEC 60947-1 GB/T 14048.1 Low-voltage Switchgear and Controlgear: Circuit-breakers IEC 60947-2 GB/T 14048.2		
		Low-voltage Switchgear and Controlgear: Switches, Disconnectors, Switch-disconnectors and Fuse-combination Units IEC 60947-3 GB/T 14048.3		
		Low-voltage Switchgear and Controlgear: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters (Including Motor Protector) IEC 60947-4-1 GB/T 14048.4		
		Low-voltage Switchgear and Controlgear: Control Circuit Devices and Switching Element - Electromechanical Control Circuit Devices IEC 60947-5-1 GB/T 14048.5		
Low-voltage Fuses: General Requirements IEC 60269-1 GB/T 13539.1 Low-voltage Fuses: Supplementary Requirements for Fuses for Use by Authorized Persons (Fuses Mainly for Industrial Application) - Examples of Standardized Systems of Fuses A to I IEC 60269-2 GB/T 13539.2				
High-voltage	Performance test	Appearance inspection	Guidelines for Type Approval Test of Electric and Electronic Products	

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
apparatus		Measurement of insulation resistance		
		Energy fluctuation test		
		Energy failure test		
		Withstand voltage test		
		All type test items required by product standards	High-voltage Alternating-current Circuit-breakers IEC 62271-100 GB/T 1984	
	Alternating-Current Metal-enclosed Switchgear and Controlgear for Rated Voltages above 3.6kV and up to and Including 40.5kV IEC 62271-200 GB/T 3906			
High-voltage apparatus	Performance test	All type test items required by product standards	Alternating-Current High-voltage Fuses - Terminology IEC 60291 GB/T 15166.1 High-voltage Alternating-current Fuses: Current-limiting Fuses IEC 60282-1 GB/T 15166.2 High-voltage Alternating-current Fuses: Specification for High-voltage Fuse-links for Motor Circuit Applications IEC 60644 GB/T 15166.5	
			Power Transformers: General IEC 60076-1 GB/T 1094.1 Power Transformers: Temperature Rise IEC 60076-2 GB/T 1094.2 Power Transformers: Insulation Levels, Dielectric Tests and External Clearances in Air IEC 60076-3 GB/T 1094.3 Power Transformers: Ability to Withstand Short Circuit IEC 60076-5 GB/T 1094.5	
Electrical apparatus	Performance test	All type test items required by product standards	Ocean Platform Transformer CB/T 3528 Marine Transformer CB/T 1001	
Electrical machines	Rotating electrical machines	All type test items required by product standards	Rotating Electrical Machines - Rating and Performance GB755 IEC60034-1	
	Three-phase induction motor	All type test items required by product standards	Test Procedure for Three-phase Induction Motors GB/T1032	

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
		All type test items required by product standards	Method for Determining Losses and Efficiency of Three-Phase Cage Induction Motors GB/T 20137 IEC 60034-2-1	
		All type test items required by product standards	Cage Induction Motors When Fed from Converters - Application Guide GB/T 20161 IEC 60034-17	
		All type test items required by product standards	Test Procedures for Converter-fed Three Phase Cage Induction Motors GB/T 22670	
	Single-phase induction motor	All type test items required by product standards	Test Procedure for Single-phase Induction Motors GB/T9651	
	Three-phase synchronous machine	All type test items required by product standards	Test Procedure for Three-phase Synchronous Machines GB/T 1029	
	Single-phase synchronous generator	All type test items required by product standards	Test Procedure for Single-phase Synchronous Machines GB/T14481	
	Direct current machine	All type test items required by product standards	Test Procedure for Direct Current Machines GB/T 1311	

Table 2

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Cables	Low smoke naval ship cable and cord	All type test items required by product standards	General Specification for Low Smoke Naval Ship Cable and Cord GJB 1916	

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
	Shipboard cables	All type test items required by product standards	<p>Shipboard Power Cables of Rated Voltages up to and Including 0.6/1kV JB/T 8140</p> <p>Shipboard Control Cable JB/T 8141</p> <p>Shipboard Cables with Symmetrical Conductors JB/T 8142</p> <p>Electrical Installations in Ships - Part 3: Cables (Construction, Testing and Installations) IEC 60092-3</p> <p>Electrical Installations in Ships - Part 350: General Construction and Test Methods of Power, Control and Instrumentation Cables for Shipboard and Offshore Applications IEC 60092-350</p> <p>Electrical Installations in Ships - Part 352: Choice and Installation of Electrical Cables IEC 60092-352</p> <p>Electrical Installations in Ships - Part 353: Power Cables with Rated Voltages of 1kV and 3kV IEC 60092-353</p> <p>Electrical Installations in Ships - Part 376: Cables for Control and Instrumentation Circuits 150/250V(300V) IEC 60092-376</p> <p>Electrical Installations in Ships - Shipboard Telecommunication Cables and Radio-frequency Cables - General Instrumentation, Control and Communication Cables GB/T 9333</p> <p>Electrical Installations in Ships - Part 354: Single- and Three-core Power Cables with Extruded Solid Insulation for Rated Voltages 6kV ($U_m = 7.2 \text{ kV}$) up to 30kV ($U_m = 36 \text{ kV}$) IEC 60092-354</p> <p>Electrical Installations in Ships - Shipboard Telecommunication Cables and Radio-frequency Cables - Shipboard Flexible Coaxial Cables IEC 60092-373</p> <p>Electrical Installations in Ships - Part 374: Shipboard Telecommunication Cables and Radio-frequency Cables - Telephone Cables for Non-essential Communication Services IEC 60092-374</p> <p>Electrical Installations in Ships - Part 375: Shipboard Telecommunication Cables and Radio-frequency Cables - General Instrumentation, Control and Communication Cables IEC 60092-375</p>	

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
	Materials for shipboard cables	All type test items required by product standards	Electrical Installations in Ships - Part 351: Insulating Materials for Shipboard and Offshore Units, Power, Control, Instrumentation, Telecommunication and Data Cables IEC 60092-351 Electrical Installations in Ships - Part 359: Sheathing Materials for Shipboard Power and Telecommunication Cables IEC 60092-360	
	Wires, cables, optical cables	All type test items required by product standards	Test Method on Wire or Cable under Fire Conditions GB/T 12666.1,2&3 Test on Gases Evolved during Combustion of Materials from Cables - Part 1: Determination of the Halogen Acid Gas Content IEC 60754-1 Test on Gases Evolved during Combustion of Materials from Cables - Part 2: Determination of Acidity (by pH Measurement) and Conductivity IEC 60754-2 Measurement of Smoke Density of Cables Burning under Defined Conditions - Part 1: Test Apparatus IEC 61034-1 IEC 61034-2 Tests on Electric and Optical Fibre Cables under Fire Conditions Test for Vertical Flame Propagation for a Single Insulated Wire or Cable IEC 60332-1-1~-1-3 Test for Vertical Flame Propagation for a Single Small Insulated Wire or Cable IEC 60332-2-1~-2-2 Test for Vertical Flame Spread of Vertically-mounted Bunched Wires or Cables IEC 60332-3-10 IEC 60332-3-21~-3-25 Tests for Electric Cables under Fire Conditions - Circuit Integrity IEC 60331-11,-21,-23&-25 Test Method for Determining Electrical Properties of Electric Cables and Wires GB/T 3048	

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
	Wires and cables	All type test items required by product standards	<p>Tests for Electric Cables under Fire Conditions - Circuit Integrity</p> <p>Part 12: Apparatus - Fire with Shock at a Temperature of at Least 830 °C IEC 60331-12</p> <p>Part 31: Procedures and Requirements for Fire with Shock - Cables of Rated Voltage up to and Including 0.6/1kV IEC 60331-31</p> <p>Part 1: Test Method for Fire with Shock at a Temperature of at Least 830°C for Cables of Rated Voltage up to and Including 0.6/1kV and with an Overall Diameter Exceeding 20mm IEC 60331-1</p> <p>Part 2: Test Method for Fire with Shock at a Temperature of at Least 830°C for Cables of Rated Voltage up to and Including 0.6/1kV and with an Overall Diameter Not Exceeding 20mm IEC 60331-2</p> <p>Part 1: Test Method for Fire with Shock at a Temperature of at Least 830°C for Cables of Rated Voltage up to and Including 0.6/1kV Tested in a Metal Enclosure IEC 60331-3</p>	

Table 3

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
Illumination	Performance test	Lamp cap temperature rise	Standard Method of Measurement of Lamp Cap Temperature Rise QB/T 2512	
		Touch current	IEC 60360	
		Color rendering properties of light sources	Methods of Measurement of Touch Current and Protective Conductor Current IEC 60990	
		Electrical and photometric characteristics of light sources	Method of Measuring the Color Rendering Properties of Light Sources GB/T 5702	
		Electrical and photometric characteristics for discharge lamps (excluding fluorescent lamps)	Method of Measuring Electrical and Photometric Characteristics for Incandescent Lamps GB/T 15043	
		Center beam intensity and beam angle(s) of reflector lamps	Methods of Measuring Characteristics for Discharge Lamps (Excluding Fluorescent Lamps) GB/T 13434	
			Method of Measurement of Center Beam Intensity and Beam Angle(s) of Reflector Lamps GB/T 19658	
		Luminaires	Luminaires - Application of the IK Code IEC 62262 IEC/TR 62696	
		Luminaires (semi-luminaires)	Luminaires - Part 1: General Requirements and Tests GB/T 7000.1 IEC 60598-1	
		Luminaire performance	Luminaire Performance - Part 1: General Requirements IEC/PAS 62722-1	
		Aids to navigation lights	General specification for Aids to Navigation Lights JT/T 761	
		Aerodrome aid to navigation lights	Annex 14 Volume 1 - Aerodrome Design and Operations (Fifth Edition) to the Convention on International Civil Aviation	
Maritime buoyage system, China	Maritime Buoyage System, China GB/T 4696			
Aids to navigation on inland waterways	Aids to Navigation on Inland Waterways GB/T 5863			

Test Product	Test Type	Test Items	Testing Basis and Standards	Remarks
		Lamp controlgear	Lamp Controlgear - Part 1: General and Safety Requirements GB/T 19510.1 IEC 61347-1	
		Starting devices (other than glow starters)	Lamp Controlgear - Part 2-1: Particular Requirements for Starting Devices (Other Than Glow Starters) GB/T 19510.2 IEC 61347-2-1	
		Marine incandescent lights	Marine Incandescent Illumination Lights GB/T 3027	
		Marine fluorescent lights	Marine Fluorescent Lights CB/T 3857	
		Water craft electrical filament lamps	Water Craft Electrical Filament Lamps QB/T 2056	
Life-saving appliance lamps	Performance test	Self-igniting light for lifebuoy	Self-igniting Light for Lifebuoy GB/T 4541-2008	
		Lifejacket lights	Lifejacket Lights GB/T 5869-2010	

1.7 Report Form and Requirements

1.7.1 The test report form accepted by CCS shall be used. The report shall be prepared, reviewed and approved in accordance with specified requirements.

1.7.2 The report shall generally include name of the applicant, name of the client, information of the test sample (number, model/specification), test method, technical requirements, test results, relevant test photos and conclusions or determination results, etc.

1.7.3 The test certificate and report shall also include:

- Name, model and calibration status of measuring equipment;
- Name, model and calibration status of auxiliary equipment;
- Name, model and connection mode of auxiliary equipment related to the tested equipment;
- Connection diagram of the tested equipment;
- Inspection layout;
- Test data.

Part 8 Communication & Navigation Equipment

Chapter 1 Marine Communication & Navigation Equipment

1.1 Scope of Application

1.1.1 This chapter is applicable to the application for CCS approval certificate of inspection and test agency for shipborne communication & navigation equipment (hereinafter referred to as "communication & navigation test agency").

1.1.2 The field involves electrical and safety performance tests and environmental test of instruments, devices, components and materials. This chapter is a further explanation of the "General Rules" of the Guidelines according to the characteristics of electrical testing, and does not increase or decrease the requirements of the "General Rules". This chapter should be used in conjunction with the "General Rules" of the Guidelines.

1.2 Basis of Approval

Please refer to 1.6.1.

1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.4 Quality Management System Requirements

1.4.1 The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.4.2 The laboratory shall have a policy of maintaining independence of testing personnel, for example, not be responsible for sample changes.

1.4.3 The laboratory shall specify the scope and types of external documents (including

those provided by the client) to be controlled, and the control procedures and methods.

1.4.4 The test shall provide a standard identification method for the replaced but still valid version.

1.4.5 Technical records

The record control procedure shall include the records of leaving fixed facilities or sites, or work in related temporary or mobile facilities.

Technical records shall include the process, status and corresponding test results of sample changes.

1.5 General Requirements

1.5.1 Personnel qualification requirements:

All laboratory personnel who operate special equipment, engage in testing, evaluate results and sign test reports shall have corresponding basic theory and professional knowledge of electrical test.

Internal training management procedures shall involve personnel who leave fixed facilities or sites, or work in relevant temporary or mobile facilities.

Such personnel shall also be adequately supervised.

1.5.2 Equipment and facilities: The laboratory shall be equipped with all the equipment for the main items specified in the test standards. According to the characteristics of test items in the accredited sub-fields and projects and the required measurement accuracy, measures shall also be taken for facilities and environmental conditions to prevent invalid test results or adverse influence on the test quality for environmental reasons.

1.6 Technical Requirements

1.6.1 Test items of shipborne communication & navigation equipment

Because there are many equipment test items and standards, the body may submit an application according to its actual conditions for the number of test items and the scope of capabilities, and increase, decrease and adjust the standards. The scope of test capabilities should be indicated in the remarks column:

Table 1

S/N	Test Product	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
1	Shipborne radio communication equipment	1.	Performance test of survival craft portable two-way VHF radiotelephone apparatus	<p>IEC 61097-12 Global Maritime Distress and Safety System (GMDSS) - Part 12: Survival Craft Portable Two-way VHF Radiotelephone Apparatus - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution MSC.149(77) Adoption of the Revised Performance Standards for Survival Craft Portable Two-way VHF Radiotelephone Apparatus</p> <p>Resolution A.694(17) General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	
		2.	Performance test of NAVTEX receiver	<p>IEC 61097-6 Global Maritime Distress and Safety System (GMDSS) - Part 6: Narrowband Direct-printing Telegraph Equipment for the Reception of Navigational and Meteorological Warnings and Urgent Information to Ships (NAVTEX)</p> <p>Resolution MSC.199(80) Amendments to Provision of Radio Services for the Global Maritime Distress and Safety System (GMDSS)</p>	
		3.	Performance test of satellite emergency position indicating radio beacon	<p>IEC 61097-2 Global Maritime Distress and Safety System (GMDSS) - Part 2: COSPAS-SARSAT EPIRB - Satellite Emergency Position Indicating Radio Beacon Operating on 406MHz - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution A.810(19) Performance Standards for Float-free Satellite Emergency Position-indicating Radio Beacons (EPIRBs) Operating on 406MHz</p>	
		4.	Performance test of VHF radio installations	<p>IEC 61097-7 Global Maritime Distress and Safety System (GMDSS) - Part 7: Shipborne VHF Radiotelephone Transmitter and Receiver - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution MSC.68(68) Adoption of Amendments to Performance Standards for Shipborne Radio Communication Equipment</p> <p>Resolution A.803(19) Performance Standards for Shipborne VHF Radio Installations Capable of Voice Communication and Digital Selective Calling</p>	
		5.	Performance test of MF	IEC 61097-8 Global Maritime Distress and Safety System (GMDSS) - Part 8: Shipborne	

S/N	Test Product	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
			radio installations	<p>Watchkeeping Receivers for the Reception of Digital Selective Calling (DSC) in the Maritime MF, MF/HF and VHF Bands - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution MSC.68(68) Adoption of Amendments to Performance Standards for Shipborne Radio Communication Equipment</p> <p>Resolution A.804(19) Performance Standards for Shipborne MF Radio Installations Capable of Voice Communication and Digital Selective Calling</p>	
		6.	Performance test of MF/HF radio installations	<p>IEC 61097-9: Global Maritime Distress and Safety System (GMDSS) - Part 9: Shipborne Transmitters and Receivers for Use in MF and HF Bands Suitable for Telephony, Digital Selective Calling (DSC) and Narrow Band Direct Printing (NBDP) - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution MSC.68(68) Adoption of Amendments to Performance Standards for Shipborne Radio Communication Equipment</p> <p>Resolution A.806(19) Performance Standards for Shipborne MF/HF Radio Installations Capable of Voice Communication, Narrow-Band Direct Printing and Digital Selective Calling</p>	
1	Shipborne radio communication equipment	7.	Performance test of Inmarsat-C ship earth station	<p>IEC 61097-4 Global Maritime Distress and Safety System (GMDSS) - Part 4: Inmarsat-C Ship Earth Station and Inmarsat Enhanced Group Call (EGC) Equipment - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution A.807(19) Performance Standards for Inmarsat-C Ship Earth Stations Capable of Transmitting and Receiving Direct-Printing Communications</p> <p>Resolution A.808(19) Performance Standards for Ship Earth Stations Capable of Two-Way Communications</p> <p>Resolution A.663(16) Performance Standards for Inmarsat Standard-C Ship Earth Stations Capable of Transmitting and Receiving Direct-Printing Communications</p>	
		8.	Performance test of enhanced group call (EGC) receiver	<p>IEC 61097-4 Global Maritime Distress and Safety System (GMDSS) - Part 4: Inmarsat-C Ship Earth Station and Inmarsat Enhanced Group Call (EGC) Equipment - Operational and Performance Requirements, Methods of Testing and Required Test Results</p> <p>Resolution A.664(16) Performance Standards for Enhanced Group Call Equipment</p> <p>Resolution A.694(17) General Requirements for</p>	

S/N	Test Product	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
				Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids	
		9.	Performance test of digital selective calling (DSC) equipment	IEC 61097-3 Global Maritime Distress and Safety System (GMDSS) - Part 3: Digital Selective Calling (DSC) Equipment - Operational and Performance Requirements, Methods of Testing and Required Test Results Resolution A.694(17) General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids	
		10.	Performance test of radar transponder for marine search and rescue	IEC 61097-1 Global Maritime Distress and Safety System (GMDSS) - Part 1: Radar Transponder - Marine Search and Rescue (SART) - Operational and Performance Requirements, Methods of Testing and Required Test Results Resolution MSC.247(83) Amendments to Performance Standards for Survival Craft Radar Transponders for Use in Search and Rescue Operations Resolution A.802(19) Performance Standards for Survival Craft Radar Transponders for Use in Search and Rescue Operations	
2	Shipborne navigation systems and equipment	1.	Performance test of shipborne navigation radar	IEC 62388 Maritime Navigation and Radio Communication Equipment and Systems - Shipborne Radar - Operational and Performance Requirements, Methods of Testing and Required Test Results Resolution MSC.64(67) Recommendation on Performance Standards for Radar Equipment Resolution MSC.192(79) Revised Recommendation on Performance Standards for Radar Equipment Resolution A.477(12) Performance Standards for Radar Equipment	
2	Shipborne navigation systems and equipment	2.	Performance test of electronic chart display and information system	IEC 62376 Maritime Navigation and Radio Communication Equipment and Systems - Electronic Chart System (ECS) - Operational and Performance Requirements, Methods of Testing and Required Test Results Resolution A.817(19) Performance Standards for Electronic Chart Display and Information System (ECDIS) Resolution MSC.64(67) Recommendation on Performance Standards for Electronic Chart Display and Information System (ECDIS) IEC 61174 Maritime Navigation and Radio Communication Equipment and Systems -	

S/N	Test Product	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
				Electronic Chart Display and Information System (ECDIS) - Operational and Performance Requirements, Methods of Testing and Required Test Results	
		3.	Performance test of shipborne universal automatic identification system (AIS)	IEC 61993-2 Maritime Navigation and Radio Communication Equipment and Systems - Automatic Identification Systems (AIS) - Part 2: Class A Shipborne Equipment of the Universal Automatic Identification System (AIS) - Operational and Performance Requirements, Methods of Testing and Required Test Results Resolution MSC.74(69) Recommendation on Performance Standards for Universal Automatic Identification System (AIS)	
		4.	Performance tests of automatic tracking aids (ATA) and automatic radar plotting aids (ARPA)	IEC 60872-2 Maritime Navigation and Radio Communication Equipment and Systems - Radar Plotting Aids - Part 2: Automatic Tracking Aids (ATA) - Methods of Testing and Required Test Results IEC 60872-1 Maritime Navigation and Radio Communication Equipment and Systems - Radar Plotting Aids - Part 3: Automatic Radar Plotting Aids (ARPA) - Methods of Testing and Required Test Results	
		5.	Performance test of global positioning system (GPS)	IEC 61108-1 Maritime Navigation and Radio Communication Equipment and Systems - Global Navigation Satellite Systems (GNSS) - Part 1: Global Positioning System (GPS) - Receiver Equipment - Performance Standards, Methods of Testing and Required Test Results Resolution A.819(19) Performance Standards for Shipborne Global Positioning System (GPS) Receiver Equipment Resolution MSC.112(73) Revised Performance Standards for Shipborne Global Positioning System (GPS) Receiver Equipment	
		6.	Performance test of global navigation satellite system (GLONASS)	IEC 61108-2 Maritime Navigation and Radio Communication Equipment and Systems - Global Navigation Satellite Systems (GNSS) - Part 2: Global Navigation Satellite System (GLONASS) - Receiver Equipment - Performance Standards, Methods of Testing and Required Test Results Resolution MSC.53(66) Performance Standards for Shipborne GLONASS Receiver Equipment Resolution MSC.113(73) Adoption of the Revised Performance Standards for Shipborne GLONASS Receiver Equipment	
		7.	Performance test of marine	ISO 9875 Ships and Marine Technology - Marine Echo-sounding Equipment	

S/N	Test Product	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
			echo-sounding equipment	Resolution A.224(7) Performance Standards for Echo-sounding Equipment	
2	Shipborne navigation systems and equipment	8.	Log performance test	IEC 61023-2 Maritime Navigation and Radio Communication Equipment and Systems - Marine Speed and Distance Measuring Equipment (SDME) - Performance Requirements Resolution A.824(19) Performance Standards for Devices to Indicate Speed and Distance Resolution MSC.96(72) Adoption of Amendments to Performance Standards for Devices to Measure and Indicate Speed and Distance (Resolution A.824(19)) Resolution MSC.334(90) Adoption of Amendments to Performance Standards for Devices to Measure and Indicate Speed and Distance (Resolution MSC.96(72))	
		9.	Performance test of shipborne voyage data recorder (VDR)	IEC 61996 Shipborne Voyage Data Recorder (VDR) - Performance Requirements, Methods of Testing and Required Test Results Resolution A.861(20) Performance Standards for Shipborne Voyage Data Recorders (VDRs) Resolution MSC.163(78) Performance Standards for Shipborne Simplified Voyage Data Recorders (S-VDRs) Resolution MSC.333(90) Adoption of Revised Performance Standards for Shipborne Voyage Data Recorders (VDRs) Resolution MSC.214(81) Adoption of Amendments to the Performance Standards for Shipborne Voyage Data Recorders (VDRs)(Resolution A.861(20)) and Performance Standards for Shipborne Simplified Voyage Data Recorders (S-VDRs) (Resolution MSC.163(78))	
		10.	Performance test of transmitting heading devices	ISO 22090-3 Ships and Marine Technology - Transmitting Heading Devices (THDs) - Part 3 Annex 2 to Resolution MSC.86(70) Recommendation on Performance Standards for Marine Transmitting Heading Devices Resolution MSC.166(78) Application of Performance Standards for Transmitting Heading Devices (THDs) to Marine Transmitting Magnetic Heading Devices (TMHDs)	
		11.	Performance test of magnetic compasses	ISO 11606 Ships and Marine Technology - Marine Electromagnetic Compasses Resolution A.382(10) Recommendation on Performance Standards for Magnetic Compasses	
		12.	Performance test of heading control devices	ISO 16329 Ships and Marine Technology - Heading Control Devices for High-speed Craft Resolution A.822(19) Performance Standards for	

S/N	Test Product	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
				Automatic Steering Aids (Automatic Pilots) for High-speed Craft Resolution MSC.64(67) Amendments to Performance Standards for Automatic Pilots (Resolution A.342(9)) Resolution MSC.74(69) Recommendation on Performance Standards for Track Control Systems	
		13.	Marine electric signal lights	GB/T 3028 Marine Electric Signal Lights 1972 Convention on the International Regulations for Preventing Collisions at Sea (COLREG)	

Table 2

S/N	Test Object	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
1	Environmental tests of shipborne radio communication equipment and shipborne navigation systems and equipment	1.	Dry heat test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		2.	Damp heat test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		3.	Low temperature test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		4.	Thermal shock test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		5.	Drop test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		6.	Vibration test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		7.	Rain and spray test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		8.	Diving test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		9.	Immersion test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		10.	Solar radiation	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		11.	Oil resistance test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		12.	Salt mist test	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	

Table 3

S/ N	Test Object	Item/Parameter		Testing Basis and Standards	Remarks
		S/ N	Item/Parameter		
1	EMC tests of shipborne radio communication equipment and shipborne navigation systems and equipment	1	Conducted emissions measurements	<p>CISPR 16-2-1 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Methods of Measurement of Disturbances and Immunity - Conducted Disturbance Measurements</p> <p>CISPR 16-2-2 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Methods of Measurement of Disturbances and Immunity - Measurement of Disturbance Power</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	
		2	Radiated emissions from enclosure port	<p>CISPR 16-2-3 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Methods of Measurement of Disturbances and Immunity - Radiated Disturbance Measurements</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	
		3	Immunity to conducted radio-frequency disturbances	<p>IEC61000-4-6 Electromagnetic Compatibility - Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	
		4	Immunity to radiated radio-frequency disturbances	<p>IEC61000-4-3 Electromagnetic Compatibility - Testing and Measurement Techniques - Radiated, Radio-frequency, Electromagnetic Field Immunity Test</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	
		5	Electrical fast transient/burst immunity test	<p>IEC61000-4-4 Electromagnetic Compatibility - Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	
		6	Surge immunity	<p>IEC61000-4-5 Electromagnetic Compatibility - Testing and Measurement Techniques - Surge (Impact) Immunity Test</p> <p>IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results</p>	

S/ N	Test Object	Item/Parameter		Testing Basis and Standards	Remarks
		S / N	Item/Parameter		
				Results	
		7	Electrostatic discharge immunity test	IEC61000-4-2 Electromagnetic Compatibility - Testing and Measurement Techniques - Electrostatic Discharge Immunity Test IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
2	Power supply tests of shipborne radio communication equipment and shipborne navigation systems and equipment	1	Immunity to power supply failure	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		2	Immunity to power supply short-term variation	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
3	Special purpose tests of shipborne radio communication equipment and shipborne navigation systems and equipment	1	Acoustic noise and signals	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		2	Compass safe distance	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
4	Safety precautions tests of shipborne radio communication equipment and shipborne navigation systems and equipment	1	Protection against accidental access to dangerous voltages	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		2	Electromagnetic radio frequency radiation	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		3	Emission from visual display unit	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	
		4	X-radiation	IEC 60945 Maritime Navigation and Radio Communication Equipment and Systems - General Requirements - Methods of Testing and Required Test Results	

Table 4

S/N	Test Object	Test Items		Testing Basis and Standards	Remarks
		S/N	Test Items		
1	Explosion proof performance test of shipborne radio communication equipment and shipborne navigation systems and equipment	1.	Marine flameproof electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 2: Equipment Protection by Flameproof Enclosures "D" GB/T 3836.2 IEC 60079-1	
		2.	Marine increased safety electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 3: Equipment Protection by Increased Safety "E" GB/T 3836.3 IEC 60079-7	
		3.	Marine intrinsically safe electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 4: Equipment Protection by Intrinsic Safety "I" GB/T 3836.4 IEC 60079-11	
		4.	Marine pressurized electronic equipment testing and verifying	Explosive Atmospheres - Part 1: Equipment - General Requirements GB/T 3836.1 IEC 60079-0 Explosive Atmospheres - Part 5: Equipment Protection by Pressurized Enclosures "P" GB/T 3836.5 IEC 60079-2	

1.7 Report Form and Requirements

1.7.1 The test report form accepted by CCS shall be used. The report shall be prepared, reviewed and approved in accordance with specified requirements.

1.7.2 The report shall generally include name of the applicant, name of the client, information of the test sample (number, model/specification), test method, technical requirements, test results, relevant test photos and conclusions or determination results, etc.

1.7.3 The test certificate and report shall also include:

- Name, model and calibration status of measuring equipment;
- Name, model and calibration status of auxiliary equipment;
- Name, model and connection mode of auxiliary equipment related to the tested equipment;
- Connection diagram of the tested equipment;
- Inspection layout;
- Test data.

Part 9 Special Capabilities

Chapter 1 Test of Hazardous Materials

1.1 Purpose

The regulations below are formulated in accordance with the specifications of CCS and with reference to relevant requirements in order to better regulate the test of hazardous materials in new shipbuilding and marine products, strengthen the qualification approval of hazardous material test agency, and improve the quality of inspection.

These regulations refine the specific requirements for qualification approval and certification of hazardous material test agency of CCS, and can also provide general methods and guides for test agency to apply for CCS qualification approval of hazardous material test agency.

1.2 Scope of Application

This chapter is applicable to the approval and management of agency that provide hazardous material testing services for products approval or inspection by CCS.

1.3 Definitions and Abbreviations

1.3.1 Hazardous material: Refer to the hazardous materials listed in Appendix 1 and Appendix 2 to the *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009* (hereinafter referred to as the "Hong Kong Convention"), and the 2 new hazardous materials in Regulation (EU) No.1257/2013 adopted by the European Parliament and the Council on November 23, 2013.

1.3.2 Table 1 gives the 4 hazardous materials listed in Appendix 1 to Hong Kong Convention:

Table 1 Four Hazardous Materials Listed in Appendix 1 to Hong Kong Convention and Their Limits

S/N	Hazardous Material	Threshold
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		Requirements
A-1	Asbestos	0.1%
A-2	Ozone depleting substances(ODS)	No threshold
A-3	Polychlorinated biphenyls(PCBs)	50mg/kg
A-4	Anti-fouling systems containing organotin compounds as a biocide(TBT, TPT, TBTO)	Total tin in dry paint film: 2500 mg/kg

1.3.3 Table 2 gives the 9 hazardous materials listed in Appendix 2 to Hong Kong Convention:

Table 2 Nine Hazardous Materials Listed in Appendix 2 to Hong Kong Convention and Their Limits

S/N	Hazardous Material	Threshold Requirements
B-1	Cadmium and cadmium compounds	100mg/kg
B-2	Hexavalent chromium and hexavalent chromium compounds	1000mg/kg
B-3	Lead and lead compounds	1000mg/kg
B-4	Mercury and mercury compounds	1000mg/kg
B-5	Polybrominated biphenyl (PBBs)	50mg/kg
B-6	Polybrominated diphenyl ethers (PBDEs)	1000mg/kg
B-7	Polychlorinated naphthalenes (more than 3chlorine atoms)	50mg/kg
B-8	Radioactive substances	No threshold
B-9	Certain shortchain chlorinated paraffins(alkanes, C10-C13, chloro)	1%

1.3.4 Table 3 gives the 2 new hazardous materials in Regulation (EU) No.1257/2013:

Table 3 Two New Hazardous Materials in Regulation (EU) No.1257/2013 and Their Limits

S/N	Hazardous Material	Threshold Requirements
A-5	Perfluorooctane sulfonic acid (PFOS)and its derivatives	The concentration of PFOS in substances or

		<p>preparations exceeds 10 mg/kg (0.01% by weight); or the concentration of PFOS in semi-product, substances or parts equals or is more than 0.1% by weight; the concentration of PFOS in textiles or other cover materials equals or is more than 1 $\mu\text{g}/\text{m}^2$</p>
B-10	Brominated flame retardant (HBCDD)	100 mg/kg

1.4 Basis of Approvalapproval

1.4.1 Asbestos

(1) Supplementary notice on Implementation of MSC.282(86) relating prohibition of new installation of materialscontaining asbestos

(2) MEPC.269(68), 2015 Guidelines forthe development of the Inventory of Hazardous Materials

(3) MSC.282(86), Adoption of Amendments to the InternationalConvention for the Safety of Life at Sea,1974, as Amended(adopted on 5June 2009)

(4) ISO 22262-1 Air quality-Bulk materials-Part 1: Sampling and qualitative determination of asbestos in commercial bulk materials

(5) NIOSH 9000 Asbestos, chrysotile by XRD

(6) ISO 22262-3 Air quality-Bulk materials-Part 3: Quantitative determination of asbestos by X-ray diffraction method

(7) GB/T 23263 Determination of asbestos in products

1.4.2 Ozone depleting substances(ODS)

(1) MEPC.269(68), 2015 Guidelines for the development of the Inventory of Hazardous Materials

(2) EPA 8260D:2018 , Volatile organic compounds by gas chromatography/mass spectrometry (GC/MS)

1.4.3 Polychlorinated biphenyls(PCBs)

(1) MEPC.269(68), 2015 Guidelines for the development of the Inventory of Hazardous Materials

(2) EPA 8082A Polychlorinated biphenyls(PCBs) by chromatography

1.4.4 Anti-fouling systems containing organotin compounds as a biocide (TBT, TPT, TBTO)

(1) The International Convention on control of harmful anti-fouling system on ships

(2) MEPC.104(49), Guidelines for brief sampling of anti-fouling systems

(3) MEPC.269(68), 2015 Guidelines for the development of the Inventory of Hazardous Materials

(4) ISO 17353 Water quality- Determination of selected organotin compounds-Gas chromatographic method

(5) ISO 11885 Water quality — Determination of selected elements by inductively coupled plasma optical emission spectrometry(ICP-OES)

(6) GB/T26085 Test method and determination of total tin in antifouling paints for ship

1.4.5 **Nine Hazardous Materials Listed in Appendix 2 to Hong Kong Convention**

(1) MEPC.269(68), 2015 Guidelines for the development of the Inventory of Hazardous Materials

(2) IEC 62321-4 Determination of certain substances in electrotechnical products –Part 4: Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS

(3) EPA 8270E Semivolatile organic compounds by gas chromatography/mass spectrometry (GC/MS)

(4) EPA 8081B, Organochlorine Pesticides by Gas Chromatography

(5) GB 18871 Basic Standards for Radiation Protection and Safety of Radiation Sources

(6) IAEA NO.GSR Part 3 Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (INTERIM EDITION) -General Safety Requirements Part 3

(7) IEC 62321-5 Determination of certain substances in electrotechnical products –Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS

(8) IEC 62321-6 Determination of certain substances in electrotechnical products –Part 6: Polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatography – mass spectrometry

(9) IEC 62321-7-1 Determination of certain substances in electrotechnical products –Part 7-1: Hexavalent chromium – Presence of hexavalent chromium (Cr(VI)) in colourless and coloured corrosion-protected coatings on metals by the colorimetric method

(10) IEC 62321-7-2 Determination of certain substances in electrotechnical products –Part 7-2: Hexavalent chromium – Determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method

1.4.6 《欧盟 1257/2013 号法规》新增的 2 种有害物质/ **Two New Hazardous Materials in Regulation (EU) No.1257/2013**

(1) Regulation (EU) No.1257/2013 of The European Parliament and of The Council of 20 November 2013 on ship recycling and amending Regulation and its Amendments

(2) ISO 25101 Water quality-Determination of perfluorooctanesulfonate (PFOS) and perfluorooctanoate (PFOA) — Method for unfiltered samples using solid phase extraction and liquid chromatography/mass spectrometry

(3) EPA 537 Determination of selected perfluorinated alkyl acids in drinking water by solid phase extraction and liquid chromatography/tandem mass spectrometry(LC/MS/MS)

(4) EPA 8270E Semivolatile organic compounds by gas chromatography/mass spectrometry (GC/MS)

1.5 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

1.6 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

1.7 Technical Requirements

1.7.1 General Requirements

(1) Personnel training requirements: The applicant shall be responsible for training its personnel according to the requirements of the national or international or industrial standards, and ensure that the testing personnel, technical experts and management personnel have relevant professional knowledge. In the absence of standards, the applicant shall select the standards at its discretion and explain the reasons in the documents to prove that the requirements of its testing services are met. Personnel should have appropriate experience and be familiar with the operation of equipment. Testing personnel should have received technical secondary school education or high school education or above, and have at least 1-year working experience or internship experience in related positions.

(2) Supervision: The test agency shall designate personnel for supervision of the testing services provided. The person in charge of supervision should have received junior college education or above, and have at least 2-year working experience in related positions or testing service experience in related positions.

(3) Personnel records: The test agency shall keep records of accepted personnel, including age, education level, training records and experience records in the approval industry.

(4) Equipment and facilities: The test agency shall equip and maintain the necessary test equipment and facilities suitable for the test services provided, and keep the original records and use records of the equipment, which shall include all maintenance and calibration information of the equipment. The safety facilities and environment shall be able to meet the needs of test services. See 1.7.2 for details.

(5) Test procedures: The test agency shall keep written test procedures. Such procedures shall cover the test services provided, include the following contents and meet relevant requirements:

- a) Receipt, review and assignment of inspection service applications
- b) Receipt, marking, storage and handling of samples;
- c) Pre-operational inspection and preparation of test equipment, operation instructions or guidelines of equipment, including safety protection;
- d) Inspection, analysis and determination;
- e) Rules and measures for coordination and liaison between testing personnel and on-site surveyors (if necessary);
- f) Test supervision and verification;
- g) Relevant requirements (if any) for arrangement of testing records and submission of them to the on-site surveyor for signature and confirmation;
- h) Provisions on preparation, review and approval of test reports;
- i) Distribution and filing of reports.

(6) Verification: The test agency shall verify whether the test service provided meets the requirements of the approval procedure.

(7) Report: The test report form accepted by CCS shall be used.

1.7.2 Special requirements

1.7.2.1 Table 4 below gives the testing appliances, methods of testing and required test results.

Table 4 Testing Appliances, Methods of Testing and Required Test Results for 15 Hazardous

Materials

S/N	Item	Test Standards	Testing Appliances	Required Test Results
A-1	Asbestos*	NIOSH 9000 ISO 22262-3 GB/T 23263	XRD	1. Variety 2. Content range (%)
		ISO 22262-1	PLM 和 SEM/EDS	
A-2	Polychlorinated biphenyls (PCBs)	EPA 8082A	GC-MS 或 GC-ECD 或 GC-ELCD	1. Variety 2. Content (mg/kg)
A-3	Ozone-depleting substances	EPA 8260D	GC-MS	1. Variety 2. Content (mg/kg)
A-4	Organotin compounds (TBT, TPT, TBTO)	Total tin <i>GB/T26085</i> 或 <i>ISO 11885</i>	ICP-OES 或 ICP-MS 或 AAS	1. Total tin in dry paint film (mg/kg) 2. Type and content of organotin (mg/kg) (when exceeding threshold)
		Organotin ISO 17353	GC-MS	
A-5	Perfluorooctane sulfonic acid (PFOS)	ISO 25101 或 EPA 537	LC-MS/MS	1. Variety 2. Content (mg/kg)
B-1	Cadmium and cadmium compounds	IEC 62321-5	ICP-OES 或 ICP-MS 或 AAS	Cadmium content (mg/kg)
B-2	Hexavalent chromium and hexavalent chromium compounds	IEC 62321-5	UV-VIS	Hexavalent chromium content (mg/kg)
B-3	Lead and lead compounds	IEC 62321-5	ICP-OES 或 ICP-MS 或 AAS	Lead content (mg/kg)
B-4	Mercury and mercury compounds	IEC 62321-4		Mercury content (mg/kg)
B-5	Polybrominated biphenyl (PBBs)	IEC 62321-6	GC-MS	1. Variety 2. Content (mg/kg)
B-6	Polybrominated diphenyl ethers (PBDEs)			
B-7	Polychlorinated naphthalenes	EPA 8270E	GC-MS	1. Variety 2. Content (mg/kg)
		EPA 8081B	GC-ECD/GC-ELCD	
B-8	Radioactive substances	IAEA NO.GSR Part 3 Or GB 18871-2002	γ ray dosimeter α , β ray surface contamination meter	1. α value (Bq/cm ²) 2. β value (Bq/cm ²) 3. γ value (μ Sv/h)
B-9	Short-chain chlorinated paraffins	EPA 8270E	GC-MS	1. Variety 2. Content (mg/kg)
		EPA 8081B	GC-ECD/GC-ELCD	
B-10	Brominated flame retardant (HBCDD)	EPA 8270E	GC-MS	1. Variety 2. Content (mg/kg)

* Note: For the testing of asbestos, the laboratory should have at least two testing technologies including PLM, XRD and SEM/EDS.

1.7.2.2 Screening capability of hazardous materials in samples of unknown components

- (1) The test agency shall be able to screen the hazardous materials in samples of unknown components, and the appliances and methods for screening shall meet the requirements of the regulatory limits. Generally, X-ray fluorescence (XRF) spectrometry and/or ion chromatograph (IC) should be equipped according to IEC 62321, among which XRF can be used for the screening of heavy metal elements and halogens (total bromine and total chlorine), while IC for the screening of halogens (total bromine and total chlorine).
- (2) Other screening methods or means shall be used only after being assessed and approved by CCS.
- (3) For hazardous materials without threshold requirements, the screening method cannot be used.
- (4) Screening results cannot be used instead of test results.

1.7.2.3 Testing of organotin: The method of determining total tin can be used first to determine whether it meets the requirements. If the total tin does not exceed the standard, it is not necessary to test organotin, but only to indicate the total tin content.

1.7.2.4 Testing of hexavalent chromium and hexavalent chromium compounds: The total chromium may be determined first. If the total chromium does not exceed 800mg/kg, it is not necessary to use UV-VIS to test hexavalent chromium and hexavalent chromium compounds, but only to indicate the total chromium content, and it must be explicitly indicated that the test value is the total chromium.

1.7.2.5 Product disassembly and pretreatment requirements

- (1) The test agency shall be able to disassemble complex materials into homogeneous materials, and select appropriate pretreatment methods and appliances/equipment according to the characteristics of materials and target hazardous materials. Specific pretreatment methods include but are not limited to those given in Table 5.

Table 5 Reference Standards and Appliances for Common Pre-extraction Treatment Methods

Pretreatment Methods	Reference Standard	Appliance	Applicable Sample Type
Soxhlet extraction	EPA 3540	Soxhlet extractor	Solid
Solid phase extraction	EPA 3535	Solid phase extraction column	Liquid
Microwave digestion	EPA 3052	Microwave digestion system	Liquid, solid
Microwave extraction	EPA 3546	Microwave extractor	Liquid, solid
Ultrasonic extraction	EPA 3550	Ultrasonic extractor	Liquid, solid
Static headspace	EPA 5021	Headspace equipment	Liquid, solid
Closed system purge and trap	EPA 5035	Purge and trap device	Liquid, solid
Oxygen bomb combustion	EPA 5050	Oxygen bomb combustion device	Solid

(2) Soxhlet extraction is basically required for the extraction pretreatment of common solid samples. If other pretreatment methods are used, the recovery rate should be equivalent to that of Soxhlet extraction.

(3) For pre-extraction treatment of target harmful materials, the test agency shall specify the suitable solvent or solvent selection method in the operation procedures, and must indicate it in the report.

1.7.2.6 Personnel requirements

(1) Acquisition of qualification

1) Testing personnel are required to receive theoretical and practical training of relevant test items, and finally pass theoretical and practical examinations to obtain the testing qualification.

2) Asbestos testing personnel should be trained by expert parties.

3) Personnel who independently carry out asbestos testing should have considerable testing experience, have the ability to analyze sample components and select suitable pretreatment methods through a large number of exercises, and have the ability to classify and select fibers

under a stereomicroscope when using a polarizing microscope and to determine whether the selected immersion oil is suitable according to other optical characteristics such as Becke line.

(2) Maintenance of qualification

The test agency shall formulate regular assessment procedures for testing personnel, and require testing personnel to receive assessment of testing ability regularly (monthly or quarterly).

1.7.2.7 Environmental requirements

(1) The testing laboratory shall provide a suitable environment for the testing of related hazardous materials, and fully consider the impact of hazardous materials produced by testing on personnel health.

(2) For the testing of asbestos, measures of ventilation, isolation, filtration, etc. shall be taken to control fibers in the environment. Ventilation equipment of independent system should be provided. The ventilation equipment should be provided with HEPA-rating filter membrane and regularly replaced and cleaned, and its minimum air speed is required to be 0.5m/s. The air in the laboratory must be sampled and tested every month to ensure that the fiber content in the laboratory is lower than 0.01 f/ml. Light sources meeting the requirements of optical equipment such as PLM shall be used. Attention should be paid to the influence of light in the room where microscope equipment such as PLM is placed, and visual fatigue of operators caused by direct sunlight and other background light sources should be avoided.

1.7.2.8 The test agency shall be provided with and use relevant standard substances required by CCS, as shown in Table 6.

Table 6 Provision Requirements of Standard Substances for Testing of Hazardous Materials

Hazardous Material	Classification	Standard substances	CAS No.
Asbestos	Serpentine	Chrysotile	12001-29-5
	Amphibole	Amosite (Grunerite)	12172-73-5
		Crocidolite	12001-28-4
		Anthophyllite	77536-67-5
		Tremolite	77536-68-6
		Actinolite	77536-66-4
Polychlorinated	/	7 homologous substances required in	/

biphenyls (PCBs)		Appendix 9 to MEPC.269(68)	
Organotin compounds (TBT, TPT, TBTO)	Total tin	Standard solution of tin	/
	Organotin	Standard TBT solution Standard TPT solution	/
Ozone depleting substances (ODS)	CFCs	Trichlorofluoromethane(CFC11)	75-69-4
	Halon (halogen extinguishing agent)	Bromochlorodifluoromethane(Halon1211)	353-59-3
		Dibromotetrafluoroethane(Halon 2402)	124-73-2
	Other fully halogenated CFC	Pentachlorofluoroethane(CFC111)	354-56-3
		Tetrachlorodifluoroethane(CFC112)	76-12-0
	Carbon tetrachloride	Carbon tetrachloride(Tetrahlormethane)	56-23-5
	1,1,1-trichloroethane (methyl chloroform)	1,1,1,-Trichloroethane(methyl chloroform)and its isomers except 1,1,2-trichloroethane	71-55-6
	Hydrochlorofluorocarbon	1,2,2-trichloro-1,1-difluoroethane	354-21-2
		1,1-dichloro-1-fluoroethane(HCFC-141b)	1717-00-6
	Hydrobromofluorocarbon	Bormodifluoromethane and isomers(HBFC's)	1511-62-2
Bromomethane	Bromomethane(Methyl bromide)	74-83-9	
Bromochloromethane	Bromochloromethane	74-97-5	
Perfluorooctane sulfonic acid (PFOS)	/	Perfluorooctane sulfonic acid	/
Cadmium and cadmium compounds	/	Standard solution of cadmium	/
Hexavalent chromium and hexavalent chromium compounds	/	Standard solution of hexavalent chromium	/
Lead and lead compounds	/	Standard solution of lead	/
Mercury and mercury compounds	/	Standard solution of mercury	/
Polybrominated biphenyl (PBBs)	/	23 standard substances required by IEC	/

Polybrominated diphenyl ethers (PBDEs)	/	62321-6	/
Polychlorinated naphthalenes (PCNs)	Trichloronaphthalene	1,2,3-Trichloronaphthalene	50402-52-3
	Tetrachloronaphthalene	1,2,3,4-Tetrachloronaphthalene	20020-02-4
	Pentachloronaphthalene	1,2,3,4,6-Pentachloronaphthalene	67922-26-3
	Hexachloronaphthalene	1,2,3,4,6,7-Hexachloronaphthalene	/
	Heptachloronaphthalene	1,2,3,4,5,6,7-Heptachloronaphthalene	/
	Octachloronaphthalene	Octachloronaphthalene	2234-13-1
Radioactive materials	/	No standard substances required	/
Short-chain chlorinated paraffins	/	55.5% chlorine content standard substance	/
Brominated flame retardant (HBCDD)	/	HBCDD	/

1.7.2.9 The detection limit of each hazardous material should meet the basic requirements of CCS, as shown in Table 7.

Table 7 Required Detection Limits of Hazardous Materials

Item		Detection Limit
石棉(Asbestos)		0.1%
Polychlorinated biphenyls (PCBs)		0.5mg/kg
Ozone depleting substances (ODS)		1mg/kg
Organotin compounds (TBT, TPT, TBTO)	Total tin	10mg/kg
	Organotin	0.3mg/kg
Perfluorooctane sulfonic acid (PFOS)		1mg/kg
Cadmium and cadmium compounds		2mg/kg
Hexavalent chromium and hexavalent chromium compounds		2mg/kg
Lead and lead compounds		2mg/kg

Item	Detection Limit
Mercury and mercury compounds	2mg/kg
Polybrominated biphenyl (PBBs)	5mg/kg
Polybrominated diphenyl ethers (PBDEs)	
Polychlorinated naphthalenes	5mg/kg
Radioactive substances	α value = 0.04 Bq/cm ² ; β value = 0.4 Bq/cm ² ; γ value = 1 μ Sv/h
Short-chain chlorinated paraffins	0.01%
Brominated flame retardant (HBCDD)	5mg/kg

1.7.2.10 Comparison test

- (1) In order to ensure that the detection ability of the approval body meets the basic requirements of CCS, the laboratory accredited by the primary hazardous material test agency needs to accept one or more comparison tests (such as asbestos testing) organized by CCS.
- (2) The body accredited by CCS shall also accept the comparison tests organized by CCS from time to time within the validity period of the certificate.

1.7.3 Test report

In addition to the requirements of 2.2.7, Chapter 2, Part 1 of the Guidelines, the test report should at least indicate:

- (1) the client and sealing unit of the test sample;
- (2) the information of the tested sample [name, model/specification, appearance, serial/batch number (if applicable), manufacturer (if necessary)], with the photos of the tested sample attached;
- (3) the troubleshooting methods;
- (4) the test standards, which are filled in according to the testing appliances actually used;
- (5) testing appliances;
- (6) the detection limit of hazardous materials;
- (7) the test graphs (such as those of asbestos, if applicable).

Chapter 2 Expert Party Engaged in Visual/Sampling Checks of Hazardous Materials

2.1 Purpose

This chapter specifies the specific requirements and practices of CCS approval and certification of expert party engaged in the visual/sampling checks of hazardous materials on ships (hereinafter referred to as "expert party"), and also provides general methods and guides for application for CCS approval of expert party engaged in visual/sampling checks of hazardous materials.

2.2 Scope of Application

2.2.1 The requirements of this chapter are applicable to CCS approval of expert party engaged in visual and/or sampling checks for preparation of inventory of hazardous materials.

2.2.2 The expert party may be an independent corporate agency or test agency, or an organization belonging to a special test agency, and it shall be as independent, impartial and honest as follows:

(1) The expert party shall be independent of all parties involved. The expert party and the testing personnel shall not be the designer of test items, manufacturer, supplier, installer, purchaser, owner, user or repairer, nor shall they be authorized representatives of any of the above parties.

(2) The expert party and its personnel shall not be engaged in any activities that may violate the independence and honesty of determination. In particular, they shall not directly participate in the design, production, supply, installation, use or maintenance of test items or similar competitive items.

(3) All interested parties should have access to expert party services, and there should be no improper financial or other conditions. The operating procedures of expert party should be managed in a non-discriminatory manner.

2.2.3 The business scope of the expert party includes: as employed by the shipowner or

interested parties, conducting visual/sampling check and testing of 15 hazardous materials that have been installed on ships as stipulated in Resolution IMO MEPC.269(68) *2015 Guidelines for the Development of the Inventory of Hazardous Materials*, Appendix 1 and Appendix 2 to Annex to *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009* and Regulation (EU) No.1257/2013, including recommendations on the number and location of samples taken, and the preparation of report of the number, location and estimation of hazardous materials.

2.2.4 The results of visual/sampling check (check report or records) of hazardous materials by an approval expert party may be used as the basis of CCS surveyor for issuing certificates and reports.

2.3 Basis of Approvalapproval

(1) Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009

(2) IMO MEPC.269(68) *2015 Guidelines for the Development of the Inventory of Hazardous Materials*

(3) IACS Rec.113 Expert Parties Engaged in Visual and/or Sampling Checks for Preparation of Inventory of Hazardous Materials

(4) Regulation (EU) No.1257/2013

Definitions and Abbreviations

Expert parties engaged in visual/sampling checks of hazardous materials: bodies or organizations with expertise in licensed visual/sampling checks of hazardous materials. They are trained and equipped experts, especially for sampling and assessment of the following hazardous materials or containing hazardous materials:

4 Hazardous Materials Listed in Appendix 1 to Hong Kong Convention Table 2.3.1A

S/N	Hazardous Material	Threshold Level
A-1	Asbestos	0.1%
A-2	Ozone-depleting substances	No

		threshold
A-3	Polychlorinated biphenyl	50 mg/kg
A-4	Anti-fouling systems containing organotin compounds as a biocide [TBTs, TPT, TBTO]	Total tin in dry paint film 2500 mg/kg

9 Hazardous Materials Listed in Appendix 2 to Hong Kong Convention Table 2.3.1B

S/N	Hazardous Material	Threshold Level
B-1	Cadmium and cadmium compounds	100 mg/kg
B-2	Hexavalent chromium and hexavalent chromium compounds	1000 mg/kg
B-3	Lead and lead compounds	1000 mg/kg
B-4	Mercury and mercury compounds	1000 mg/kg
B-5	Polybrominated biphenyl	50 mg/kg
B-6	Polybrominated diphenyl ethers (PBDEs)	1000 mg/kg
B-7	Polychlorinated naphthalenes (more than 3 chlorine atoms) (PCN)	50 mg/kg
B-8	Radioactive substances	No threshold
B-9	Certain shortchain chlorinated paraffins (alkanes, C10-C13, chloro)	1%

2 New Hazardous Materials in Regulation (EU) No.1257/2013 Table 2.3.1C

S/N	Hazardous Material	Threshold Level
A-5	Perfluorooctane sulfonic acid (PFOS) and its derivatives	The concentration of PFOS in substances or preparations exceeds 10 mg/kg (0.01% by weight); or the

		concentration of PFOS in semi-product, substances or parts equals or is more than 0.1% by weight; the concentration of PFOS in textiles or other cover materials equals or is more than 1 $\mu\text{g}/\text{m}^2$
B-10	Brominated flame retardant (HBCDD)	100 mg/kg

2.4 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit relevant documents and data. In addition to the requirements of 3.2, Chapter 3, Part 1 of the Guidelines, the documents and data submitted shall also include the following:

- (1) List of visual/sampling checkers (name, gender, age, academic career, professional title/position, training and work experience related to the approval services);
- (2) Sampling tools and materials;
- (3) List of test agency entrusted to carry out sample testing (subject to CCS approval approval);
- (4) Personal protection requirements of sampling and check personnel;
- (5) Plan of visual/sampling checks of hazardous materials on ships (i.e. approval agency approval test program).

2.5 Quality Management System Requirements

For the quality management system, the quality management system certificate based on ISO 9000 or equivalent standard issued by the approval agency shall be obtained and kept valid.

2.6 Technical Requirements

2.6.1 Basic personnel requirements

(1) Academic career or educational status

a) The checkers should have received technical secondary school education or above in water transportation tools, water facilities, ship handling, marine engineering management, shipping, ship equipment, ship materials or related majors.

b) The supervisors and technical supervisors should have received junior college education or above in water transportation tools, water facilities, ship handling, marine engineering management, shipping, ship equipment, ship materials or related majors.

(2) Work experience

Experts (checkers, supervisors and technical supervisors) engaged in the work of expert parties should have working experience in ship management, ship and ship equipment manufacturing, technical services of ship and water facilities, material design, material manufacturing, ship handling, marine engineering management or industries related to ships or water facilities. Checkers should have 1-year or longer working experience, and supervisors and technical supervisors should have 2-year or longer working experience.

(3) Training requirements: The applicant shall train its personnel according to the requirements of the national or international or industrial standards, and ensure the following:

a) Checkers: Those engaged in the visual/sampling checks of hazardous materials shall be qualified through training or certified, and when necessary, be trained according to the recognized national or international or industrial standards and obtain the required qualification certificates related to hazardous materials. They should master expertise in ship structures, equipment and hazardous materials and the hazardous materials used in ship structures and equipment, which are sufficient for sampling and treatment when necessary. They should also be familiar with sampling techniques, necessary personal protection knowledge and personal protection equipment knowledge, and relevant test standards.

b) Supervisors: They should be qualified, and when necessary, obtain the required qualification certificates related to hazardous materials according to the recognized national or international or industrial standards. They should master expertise in ship structures, equipment and hazardous materials and the hazardous materials used in ship structures and equipment, and be familiar with check methods, procedures and purposes, and evaluate the check results.

Note: It is not expected that all supervisors or checkers are qualified for all hazardous materials applied for by the company, but there must be enough supervisors and checkers qualified for all hazardous materials applied for.

c) Technical supervisors: The expert party shall appoint a technical supervisor regardless of the title. The technical supervisor shall have corresponding qualifications and experience in operation and be fully responsible for the quality system. The technical supervisor should be a regular ong-term employee.

(4) The expert party should have enough checkers and at least one supervisor to meet the needs of check business.

(5) Personnel records: The applicant shall keep records of accepted personnel, including age, education level, academic career, professional title/position, qualification, training records and experience records in the approval industry.

2.6.2 Sampling tools and materials: The applicant shall be equipped with necessary sampling tools and materials for packaging samples suitable for the check services provided.

2.6.3 Sampling and check procedures or operation instructions

(1) The applicant shall maintain written work procedures or operation instructions, which shall cover all relevant activities, including the following contents and meet relevant requirements:

- a) Receipt, review and assignment of service applications
- b) Test preparation information
- c) Safety procedures for hazardous materials
- d) Selection and identification of positions of visual/sampling checks
- e) Sampling tools and material preparation
- f) Sampling and immediate recovery of safe working conditions after sampling
- g) Sample storage, identification and transportation requirements
- h) Methods and requirements for notifying CCS surveyor and other interested parties when

sampling

i) Methods and requirements for entrusting test agency (test agency approved by CCS) to carry out testing

j) Preparation and content of report

k) Distribution and filing of reports

2.6.4 Verification: The applicant shall verify whether the service provided meets the requirements of the approval procedure.

2.7 Report Form and Requirements

The report shall include information about the shipowner/ship manager and the ship, usually including the following:

(1) Information of the target ship (such as ship name, ship number, ship type, gross tonnage, LxBxD, IMO No., ship class, flag country, ship call sign, shipyard and shipowner)

(2) Information of the expert party

(3) Scope of check

(4) Normative references (regulatory requirements)

(5) Check (investigation) methods, procedures and limitations:

a) Collection of necessary drawings and data

a) Assessment of drawings and data collected

b) Development of visual/sampling check plan

c) Visual and sampling checks on board

d) Analysis and testing by approval laboratory and development of the inventory of hazardous materials (IHM)

(6) Statement of the inventory of hazardous materials (IHM): findings of check (investigation), types of hazardous materials (HM) and potentially containing hazardous materials (PCHM), location of hazardous materials, and the estimation algorithm for determining the estimated quantity of hazardous materials on board (if applicable)

(7) Signature of the responsible issuing personnel (checker and issuing personnel)

(8) Appendices:

a) Visual/sampling check plan of hazardous materials

- b) Sample test report
- c) Visual/sampling check (investigation) records
- d) Photos of checkpoints

Chapter 3 Testing of Diesel Engine NOx Emission

3.1 Scope of Application

This chapter is applicable to the application for CCS approval of test agency for marine diesel engine NOx emission. The test agency applying for GB15097 emission tests shall be accredited in accordance with the requirements of Chapter 8 of *Limits and Measurement Methods for Exhaust Pollutants from Marine Engines (CHINA I, II)*.

3.2 Basis of Approval/Reference Standards

(1) Annex VI to IMO *International Convention for the Prevention of Pollution from Ships* (MARPOL)

(2) Resolution MEPC.176(58) of the International Maritime Organization (IMO), *Amendments to the Annex of the Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto* (Revised MARPOL Annex VI)

(3) Resolution MEPC.177(58) of the International Maritime Organization (IMO), *Amendments to the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines* (NOx Technical Code)

(4) CCS Guidelines for Testing and Survey of Emission Nitrogen Oxides from Marine Diesel Engines

3.3 Data Submitted by the Applicant

In addition to the requirements of 3.2, Chapter 3, Part 1 of the Guidelines, the data below shall also be submitted:

- (1) Relevant emission calculation software and programming instructions (if applicable);
- (2) Emission test programs;
- (3) List of relevant technical data.

3.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

3.5 Technical Requirements

(1) Personnel qualification

There shall be enough technical management personnel and operators competent for testing. Relevant technical personnel should be trained and have basic knowledge of diesel engine emissions: familiar with emission testing techniques and equipment, and proficient in using test equipment.

(2) Equipment requirements

The test equipment shall meet the requirements of Appendix 7 and Appendix 8 to the Guidelines for Testing and Survey of Emission Nitrogen Oxides from Marine Diesel Engines.

(3) Testing methods

The testing methods shall be in accordance with the requirements of Chapter 5 of the Guidelines for Testing and Survey of Emission Nitrogen Oxides from Marine Diesel Engines.

3.6 Report Form and Requirements

The test shall be carried out in strict accordance with the test scope, test procedures and technical requirements approved by CCS. The test agency shall be responsible for the test results issued, and shall prepare the test report with reference to Appendix 9 to the Guidelines for Testing and Survey of Emission Nitrogen Oxides from Marine Diesel Engines.

Chapter 4 Noise of Marine Noise Source Products and Airborne Sound Insulation Index of Sound Insulation Structures

Section 1 Testing of Airborne Radiated Noise and Structure-borne Noise of Marine Noise Source Products

4.1.1 Scope of Application

This chapter is applicable to the application for CCS approval of test agency for testing of airborne radiated noise and structure-borne noise of marine noise source products (hereinafter referred to as "test agency"). Noise source products include but are not limited to low-speed two-stroke diesel engines, medium and high-speed diesel engines, gearboxes, generator sets, air compressors, oil separators, fans and pumps.

4.1.2 Basis of Approval

- (1) SOLAS II-1/36 Protection Against Noise
- (2) IMO MSC.337(91) "Adoption of the Code on Noise Levels on Board Ships"
- (3) CCS Guidelines for Noise Control and Testing of Ships and Products

4.1.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

4.1.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

4.1.5 Technical Requirements

4.1.5.1 For the purpose of this section, the terminologies and definitions set forth in GB/T 3947 Acoustical Terminology, GB/T 2298 Mechanical Vibration, Shock and Condition Monitoring – Vocabulary (ISO 2041) and IMO MSC.337(91) Adoption of the Code on Noise Levels on Board Ships shall apply.

4.1.5.2 Personnel requirements

(1) Personnel engaged in noise and vibration testing shall have at least the following experience and receive necessary training to ensure that they master relevant expertise and meet the requirements for noise and vibration test services:

- a) having bachelor degree or above in acoustics or related major;
- b) being familiar with IMO MSC.337(91) "Adoption of the Code on Noise Levels on Board Ships" and the requirements of relevant standards;
- c) being trained in noise and vibration measurement and equipment operation and maintenance, and capable of processing relevant test data;
- d) having at least 1 year of relevant working experience.

(2) Supervision: The test agency shall establish a system to supervise the noise and vibration test services provided, and appoint personnel to supervise accordingly. The person in charge of supervision shall have at least 2 years of experience in noise and vibration test services.

(3) Personnel records: The test agency shall keep the experience records of personnel engaged in noise and vibration testing, including age, education level, training records and experience records in noise and vibration test services.

4.1.5.3 Testing equipment and facilities

The test agency shall be equipped with testing equipment and facilities necessary for providing test services, and shall keep records of verification and maintenance of relevant equipment. Facilities and environmental conditions can meet the needs of testing business. The necessary testing equipment shall meet the following requirements:

- (1) Free-field microphone: meet the requirements of IEC 61094;
- (2) Sound level meter: meet Class 1 requirements in IEC61672-1;
- (3) Acoustic calibrator: meet the requirements of Class 1 in IEC 60942 and pass annual verification or calibration;
- (4) 1/3-octave-band filter: meet the requirements of Class 0 or Class 1 in IEC 61260-1, and

pass annual verification or calibration;

(5) Vibration measuring instrument: meet the requirements of the frequency response characteristics of equipment under test and the test environment.

4.1.5.4 Test procedures

The test agency shall keep written test procedures. Such procedures shall cover the noise test services provided, include the following contents and meet relevant requirements:

- (1) Review of test service contract;
- (2) Receipt, marking, storage and handling of equipment under test;
- (3) Inspection and calibration of test equipment before operation;
- (4) Test process and data processing;
- (5) Test supervision and verification;
- (6) Organization of test process records;
- (7) Provisions on the preparation, review and issuance of test reports;
- (8) Report distribution, data uploading and filing.

4.1.5.5 Verification

The authorized special personnel in the test agency shall confirm whether the noise test services provided meet the requirements of the specified standards.

4.1.6 Report format and data processing

4.1.6.1 Report: The test report form accepted by CCS shall be used. Appendix 1 to this chapter gives the report forms for low-speed two-stroke diesel engines, medium and high-speed diesel engines, gearboxes, generator sets, air compressors, oil separators, fans and pumps.

4.1.6.2 Data processing: In order to facilitate data collation and statistics in the future, CCS has established the noise subsystem of the test data management system of marine product test agency. According to the data items specified by CCS, the test agency can upload relevant noise data and reports to the CCS noise data management system through the online self-service module. CCS can collate and analyze these noise data in the later period, and query and quote them when generating certificates. After obtaining the qualification for airborne radiated noise and structure-borne noise test of marine noise source products, the test agency may apply for the user name and password of the system to the approval execution branch. The test agency shall ensure

the consistency of the data uploaded with the test report data provided to the client, and submit the data only after confirming that the data are correct.

Section 2 Test of Airborne Sound Insulation Index for Bulkheads and Decks within the Ship Accommodation

4.2.1 Scope of Application

This chapter is applicable to the application for CCS approval certificate of test agency for test of airborne sound insulation index for bulkheads and decks within the ship accommodation (hereinafter referred to as "test agency").

4.2.2 Basis of Approval

- (1) SOLAS II-1/36 Protection Against Noise
- (2) IMO MSC.337(91) "Adoption of the Code on Noise Levels on Board Ships"
- (3) ISO 10140-2: 2010 Acoustics - Laboratory Measurement of Sound Insulation of Building Elements - Part 2: measurement of Airborne Sound Insulation
- (4) CCS Guidelines for Noise Control and Testing of Ships and Products

4.2.3 Application and Data Submission

The applicant shall submit a notice of approval service of test agency or a formal written application letter to the approval execution unit of CCS, and submit documents and data for examination as required by 3.2, Chapter 3, Part 1 of the Guidelines.

4.2.4 Quality Management System Requirements

The management system of the test agency shall meet the requirements of Section 2.1, Chapter 2, Part 1 of the Guidelines.

4.2.5 Technical Requirements

4.2.5.1 For the purpose of this section, the terminologies and definitions set forth in GB/T 3947-1996 Acoustical Terminology, ISO 10140-2: 2010 and IMO MSC.337(91) Adoption of the Code on Noise Levels on Board Ships shall apply.

4.2.5.2 Personnel requirements

(1) Personnel engaged in noise and vibration testing shall have at least the following experience and receive necessary training to ensure that they master relevant expertise and meet the requirements for noise and vibration test services:

- a) having bachelor degree or above in acoustics or related major;
- b) being familiar with IMO MSC.337(91) "Adoption of the Code on Noise Levels on Board Ships", ISO 10140-2 and the requirements of relevant standards;
- c) being trained in noise and acoustical measurement and equipment operation and maintenance, and capable of processing relevant test data and preparing test reports;
- d) having at least 1 year of experience in acoustical measurement.

(2) Supervision: The test agency shall designate personnel for supervision of the noise (airborne sound insulation) testing services provided. The person in charge of supervision shall have at least 2 years of experience in acoustical measurement.

(3) Personnel records: The test agency shall keep records of accepted personnel, including age, education level, training records and experience records in acoustical measurement.

4.2.5.3 Testing equipment and facilities

Equipment and facilities: The test agency shall equip and maintain the necessary test equipment and facilities suitable for the airborne sound insulation test services, and keep the original records and use records of the equipment, which shall include all maintenance and verification or calibration information of the equipment. The safety facilities and environment shall be able to meet the needs of test services. The necessary testing equipment shall meet the following requirements:

(1) Measuring system (including microphone and cable): meet the Class 1 requirements of IEC 61672-1 and pass annual verification or calibration;

(2) Sound equipment: used in accordance with the requirements of ISO 10140-5;

(3) Acoustic calibrator: meet the requirements of Class 1 in IEC 60942 and pass annual verification or calibration;

(4) 1/3-octave-band filter: meet the requirements of Class 0 or Class 1 in IEC 61260-1, and pass annual verification or calibration;

(5) Reverberation time test equipment: meet the requirements of ISO 3382-2.

4.2.5.4 Environmental conditions

(1) The laboratory temperature and humidity shall be recorded.

(2) No person shall be allowed to enter the source room and receiving room during the test.

(3) Necessary safety protection facilities (such as personal hearing protectors and fire safety

facilities) shall be provided.

4.2.5.5 Test procedures

The test agency shall keep written test procedures. Such procedures shall cover the airborne sound insulation test services provided, include the following contents and meet relevant requirements:

- (1) Receipt, review and assignment of inspection service applications
- (2) Receipt, marking, storage and handling of samples;
- (3) Pre-operational inspection and preparation of test equipment, operation instructions or guidelines of equipment, including safety protection;
- (4) Test implementation, result analysis and determination;
- (5) Rules and measures for coordination and liaison between testing personnel and on-site surveyors (if necessary);
- (6) Test supervision and verification;
- (7) Relevant requirements (if any) for arrangement of testing records and submission of them to the on-site surveyor for signature and confirmation;
- (8) Provisions on preparation, review and approval of test reports;
- (9) Report distribution, data uploading and filing.

4.2.5.6 Verification

The test agency shall verify whether the airborne sound insulation test service provided meets the requirements of the approval procedure.

4.2.5.7 Special requirements

- (1) Test rooms:

The volumes and corresponding sizes of the two test rooms should not be completely the same. The difference between the volumes or linear dimensions (length, width and height) of the rooms should be at least 10%, and the volume of each test room should be at least 50m³. Proper room size scale should be selected to make the normal frequency of low frequency band distributed as uniformly as possible. For the test of bulkhead and deck constructions, the specimen should cover the whole wall or ceiling of the test room, that is, the opening of the specimen extends from one side of the wall to the other and from the ceiling to the ground.

If the sound pressure level in the room changes greatly, it shows that there is a strong

standing wave which plays a leading role. At this time, it is necessary to install diffusers in the room, and determine the location and necessary number of diffusers by experimental method, so as to achieve the goal that the measurement of sound insulation index will not be affected after installing more diffusers.

The reverberation time of the room should not be too long or too short under normal test conditions (the sound absorption of the specimen is negligible). When the reverberation time at 100Hz or above exceeds 2s or is less than 1s, check whether the measured sound insulation index varies with the reverberation time. If it is found that this dependence still exists even if the diffuser is installed in the room, the room still needs to be treated to adjust the reverberation time T(s) to meet the requirements of the following equation:

$$1s \leq T \leq 2 \left(\frac{V}{50} \right)^{\frac{2}{3}}$$

Where:

V— room volume, in cubic meter

Considering the power output of the source room and the sound insulation properties of the specimen under test, the background noise of the receiving room should be as low as enough to measure the sound transmitted from the source room.

In the laboratory facilities for measuring sound insulation index, any indirect transmission should be negligible compared with the transmission through the specimen. One way to achieve this goal is to provide sufficient structure-borne sound insulation between the source room and the receiving room, and the other way is to cover all the interfaces between the two rooms with lining walls sufficient to reduce lateral sound transmission.

(2) Sound field of source room:

The source room shall be the larger of the two rooms, and the sound generated by the source room shall be steady and have a continuous spectrum in the frequency range considered. If a filter is used, its broadband needs at least 1/3 octave. If broadband noise is used, its spectrum shape should ensure that the receiving room has appropriate signal-to-noise ratio in high frequency band (white noise is recommended). In any case, the differences between the sound pressure levels in the adjacent 1/3 octave bands of the sound spectrum of 100Hz and above in the source room should not be greater than 6dB.

Indoor sound field is greatly influenced by the type and position of the sound source. The sound source should be placed at the position where a diffused sound field can be provided as much as possible. The position and directivity of the loudspeaker should make the microphone outside the direct sound field, and ensure that the sound directly radiated by the sound source is not dominant on the surface of the specimen. It is allowed to use multiple sound sources, and it is necessary to ensure that these sound sources are of the same type, driven at the same level, and emit irrelevant signals. When a single sound source is used, it must have at least two positions. A continuously moving sound source can also be used. Technical requirements and arrangement of sound sources shall meet the requirements of ISO10140-5 Annex D.

(3) Microphone position:

The microphone shall be placed outside the direct sound field of the sound source. The position of each fixed microphone should be arranged outside the area where the sound pressure level obviously decreases with the increase of the distance from the sound source. For a moving microphone, the measured sound pressure level shall not rise significantly when it is close to the sound source. Technical requirements and arrangement of microphones shall meet the requirements of ISO10140-4.

(4) Environmental conditions:

- a) The laboratory temperature and humidity shall be recorded.
- b) No person shall be allowed to enter the source room and receiving room during the test.
- c) Necessary safety protection facilities (such as personal hearing protectors and fire safety facilities) shall be provided.

4.2.5.8 Test procedures and assessment (as per ISO 10140-2:2010)

- (1) Test arrangement: as per ISO 10140-2:2010.
- (2) Performance limitation: as per ISO 10140-2:2010.
- (3) Precision: as per ISO 140-2.

4.2.6 Report format and data processing

4.2.6.1 Report: The test report form used shall be the unified form accepted by CCS, and the report form is shown in Appendix 2 to this chapter.

4.2.6.2 Data processing: In order to facilitate data collation and statistics in the future, CCS

has established the noise subsystem of the test data management system of marine product test agency. According to the data items specified by CCS, the test agency can upload relevant noise data and reports to the CCS noise data management system through the online self-service module. CCS can collate and analyze these noise data in the later period, and query and quote them when generating certificates. After obtaining the qualification for test of airborne sound insulation index for bulkheads and decks within the ship accommodation, the test agency may apply for the user name and password of the system to the approval execution branch. The test agency shall ensure the consistency of the data uploaded with the test report data provided to the client, and submit the data only after confirming that the data are correct.

Appendix 1

Name of Test agency (Chinese)

检测报告

Test Report

型号/规格

Model/Specification

样品编号

Sample No.

测试项目

Test item

Item Name test of radiated noise and structure-borne noise

测试标准

Test standard

CCS *Guidelines for Noise Control and Testing of Ships and Products, 2013*

委托单位

Client

委托单位地址

Client address

测试日期

Test date

MM/DD/YYYY

(Special Seal for

测 试
Ratified by _____

审核
Checked by _____

批准
Tested by _____

Test Report No.

Name of Testing Body (English)

试验机构 CCS 认 可证书号 CCS approval No.	
--	--

Name of Testing Body (English)

测试地点 Test place					
委托日期 Entrust time					
测试日期 Test time					
测试所用设施和设备： Test facilities and equipment					
仪器名称 Designation	型号 Type	序列号 Serial No.	生产商 Manufacturer	检定日期 Test date	有效期至 POV.
地点及环境： Address and environments					
地点： Address					
环境： Environments	环境温度 Temperature				°C
	相对湿度 Relative humidity				%RH

1 Test Purpose

2 Test Standard

The noise test method shall be implemented according to relevant provisions of CCS *Guidelines for Noise Control and Testing of Ships and Products*, 2013.

3 Test Object and Test Environment

3.1 The table below gives specific parameters and installation conditions of the test object:

Item	Specific Parameters	Installation Conditions
<p>Low-speed two-stroke diesel engines</p>	<p>Manufacturer; outline dimensions; output power, kW, rated speed, r/min; speed at common service power or 80% MCR (whichever is greater), r/min; load specified in the contract (if any), kw; load speed (if any) specified in the contract, r/m; diesel engine weight, kg; injection advance angle of diesel engine; type of fuel; model of diesel engine; diesel engine number, etc.</p>	<p>Description of installation mode of diesel engine (elastic or rigid, for example, the diesel engine is elastically installed on the engine base. The elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber); "for example, installed auxiliary equipment, such as hydraulic dynamometer" added in other descriptions of installation mode; other installation descriptions of diesel engine (for example, indoor air intake is adopted for diesel engine and exhaust gas is discharged to the atmosphere through exhaust silencer)</p>
<p>Medium and high-speed diesel engines</p>	<p>Load specified in the contract (if any) Other parameters are the same as those of low-speed two-stroke diesel engines.</p>	<p>Description of installation mode of diesel engine (elastic or rigid, for example, the unit is elastically installed on the common base, the common base is rigidly connected with the support, and the support is fixed with the guide rail on the ground. The elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product</p>

Test Report No.

Name of Testing Body (English)

		type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber); other installation descriptions of diesel engine (for example, indoor air intake is adopted for the unit and exhaust gas is discharged to the atmosphere through exhaust silencer)
Gear box	Type of gearbox; outline dimensions; input power; input/output speed; reduction ratio; center distance; lubrication mode of pitch circle linear speed gearbox; lubricating oil model; working temperature of gearbox; manufacturer	Description of installation mode of gearbox (elastic or rigid. The elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber)
Generator sets	Manufacturer; outline dimensions; rated power; rated speed; 75% rated power; speed at 75% rated power; diesel engine model; diesel engine number: fuel type; weight of generator set; generator manufacturer; type of generator; generator No.	Description of installation mode of generator set (elastic or rigid, for example, the set is elastically installed on the common base, the common base is rigidly connected with the support, and the support is fixed with the guide rail on the ground. The elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber); other installation descriptions of the set (for example, indoor air intake is adopted for the set and exhaust gas is discharged to the atmosphere through exhaust silencer)
Oil separators	Manufacturer; outline dimensions; rated oil separation; rated speed; model of oil separator; product No.	Description of installation mode of oil separator (elastic or rigid. The elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static

Name of Testing Body (English)

		rigidity, damping and natural frequency of a single shock absorber) Other instruction instructions for oil separator
Air compressors	Manufacturer; model; outline dimensions; No.; number of stages; displacement; discharge pressure; model of prime mover; prime mover power	Description of installation conditions of air compressor (in case of elastic connection, the elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber)
Fans	Manufacturer; model; outline dimensions; No.; delivery; full pressure speed; model of prime mover; prime mover power; prime mover voltage; prime mover frequency	Description of installation conditions of fan (in case of elastic connection, the elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber)
Pump (set)	Manufacturer; outline dimensions: length x width x high; rated flow; rated pressure; rated speed; pump product No.; medium; medium temperature, °C; model of prime mover; prime mover No.; rated output power of prime mover, kw; prime mover sound pressure level (if any)	Description of installation mode of pump (set) (elastic or rigid. For example, in case of elastic installation, the elastic shock absorber used for equipment shall be described as follows: manufacturer, model, number used by the equipment, approximate position at the bottom of the equipment under test, CCS product type approval certificate number or dynamic/static rigidity, damping and natural frequency of a single shock absorber); other installation descriptions of pump set (for example, rigid or elastic connection of the inlet and outlet pipelines of the pump. In case of rigid pipeline connection, additional test point should be provided for structure-borne noise test as required by the Guidelines)

3.2 Test Environment

Dimensions of test shop (L×W×H):

Name of Testing Body (English)

50												
63												
80												
100												
125												
160												
200												
250												
315												
400												
500												
630												
800												
1000												
1250												
1600												
2000												
2500												
3150												
4000												
5000												
6300												
8000												
10000												

4.3.2 The table below lists the calculation results of sound power level.

Table 2 Calculation Results of Sound Power Level (may be calculated according to different conditions)

	Frequency/Hz	Background Noise	Average Sound Pressure Level on Measuring Surface $\overline{L_p}$	A-weighted Correction	Corrected Value	Background Noise Correction K1	Environmental Correction K2	Weighted Sound Power Level L_w
1	25							

Name of Testing Body (English)

2	31.5							
3	40							
4	50							
5	63							
6	80							
7	100							
8	125							
9	160							
10	200							
11	250							
12	315							
13	400							
14	500							
15	630							
16	800							
17	1000							
18	1250							
19	1600							
20	2000							
21	2500							
22	3150							

Name of Testing Body (English)

2	4000						
3							
2	5000						
4							
2	6300						
5							
2	8000						
6							
2	10000						
7							

In the table: (the following equations may be selected according to the requirements of different products in the Guidelines)

5 Structure-borne Noise Test

5.1 Test Point Arrangement

Provide necessary descriptions. For example, for rigidly installed equipment, the acceleration test point should be located at the mounting leg of the equipment. For elastically installed equipment, the acceleration test point shall be located at the mounting leg of the equipment close to the equipment foot installed on the shock absorber, and as close as possible to the installation bolt. It is also specified in the Guidelines that additional test point should be provided in case of rigid connection between the equipment under test and the pipeline. In this case, the report should indicate it and provide the test results. The layout of test points should be given. For specific requirements, please refer to *CCS Guidelines for Noise Control and Testing of Ships and Products*.

5.2 Test Conditions

The test conditions are the same as those of the airborne radiated noise test, and the test conditions of the equipment under test should be described.

5.3 Test Results

The reference value of vibration acceleration level is 10^{-6}m/s^2 , and the acceleration dimension is m/s^2 .

5.3.1 Vibration acceleration test in the frequency band of 10Hz~8kHz (1/3 octave)

The leg vibration acceleration is measured, and the test frequency range is 1/3 octave center frequency 10Hz~8kHz. The measuring directions include X (transverse), Y (axial) and Z (vertical).

Name of Testing Body (English)

(The directions may be determined according to the structure-borne noise test section of CCS Guidelines for Noise Control and Testing of Ships and Products, and the directions represented by X/Y/Z should be clearly stated.)

Table 3 Background Vibration Data (dB/1.0u m/s²)

1/3 Octave Center Freque ncy (Hz)	Measured Values of Each Test Point in Different Directions								
	1X	1Y	1Z	2X	2Y	2Z	3X	3Y	3Z
10.0									
12.5									
16.0									
20.0									
25.0									
31.5									
40.0									
50.0									
63.0									
80.0									
100.0									
125.0									
160.0									
200.0									
250.0									
315.0									
400.0									
500.0									
630.0									
800.0									
1000.0									
1250.0									
1600.0									
2000.0									
2500.0									
3150.0									
4000.0									
5000.0									
6300.0									
8000.0									

Note: The table may be continued according to the number of test points.

Name of Testing Body (English)

Note: The table may be continued according to the number of test points.

Table 5 Average Vibration Acceleration Level in Three Directions (dB/1.0u m/s²)

Frequency (Hz)	Average Acceleration Level in X Direction	Average Acceleration Level in Y Direction	Average Acceleration Level in Z Direction
10.0			
12.5			
16.0			
20.0			
25.0			
31.5			
40.0			
50.0			
63.0			
80.0			
100.0			
125.0			
160.0			
200.0			
250.0			
315.0			
400.0			
500.0			
630.0			
800.0			
1000.0			
1250.0			
1600.0			
2000.0			
2500.0			
3150.0			
4000.0			
5000.0			
6300.0			
8000.0			
Total acceleration level			

Note: The table may be continued according to the number of test points.

6 Field Test Photos

Including airborne radiated noise test and structure-borne noise test (photos should be dated)

(End of Report)

Appendix 2

Name of Test agency (Chinese)

检测报 告

TestReport

Product name

Model/Specification

Sample No.

Manufacturer

Test item

Client

Client address

Report date

Tested by _____

(Special Seal for Checked by _____

Ratified by _____

I. Test Standards

As required by IMO MSC 337(91) *Adoption of the Code on Noise Levels on Board Ships* and CCS *Guidelines for Noise Control and Testing of Ships and Products, 2013*, test according to ISO 10140-2 *Acoustics - Laboratory Measurement of Sound Insulation of Building Elements - Part 2: Measurement of Airborne Sound Insulation*, and evaluate single values with reference to ISO 717-1 *Acoustics - Laboratory*

<p>Specimen description</p>	<p>The structural composition of the specimen: the first layer (name + thickness + areal density) facing the source room, the second layer (name + thickness + areal density), ..., and the last layer (name + thickness + areal density) facing the receiving room. Description of the coupling mode between layers, such as welding, glue bonding, rivet connection, and free status. In the presence of any intermediate elastic layer, the vibration isolation coefficient of the elastic layer should be provided if possible. For non-dense materials, the areal density in the brackets may be replaced by the unit weight of material, with the unit indicated.</p> <p>Maximum outline dimensions, effective test area, dimensions of installation areas reserved at four sides</p>
<p>Installation description</p>	<p>The installation mode between the specimen and wall surfaces of the source room, and the sealing materials used between the specimen and wall surfaces</p>

Measurement of Sound Insulation of Building Elements – Part 1: Airborne Sound Insulation.

II. Arrangement of test points and sound sources

For the determination of reverberation time, different illustrations of two source positions, with the coordinates of the sources and each microphone position indicated (illustrations may be used in conjunction with text for explanation)

For the determination of sound insulation index, different illustrations of multiple source positions, with the coordinates of the sources and each microphone position indicated (illustrations may be used in conjunction with text for explanation)

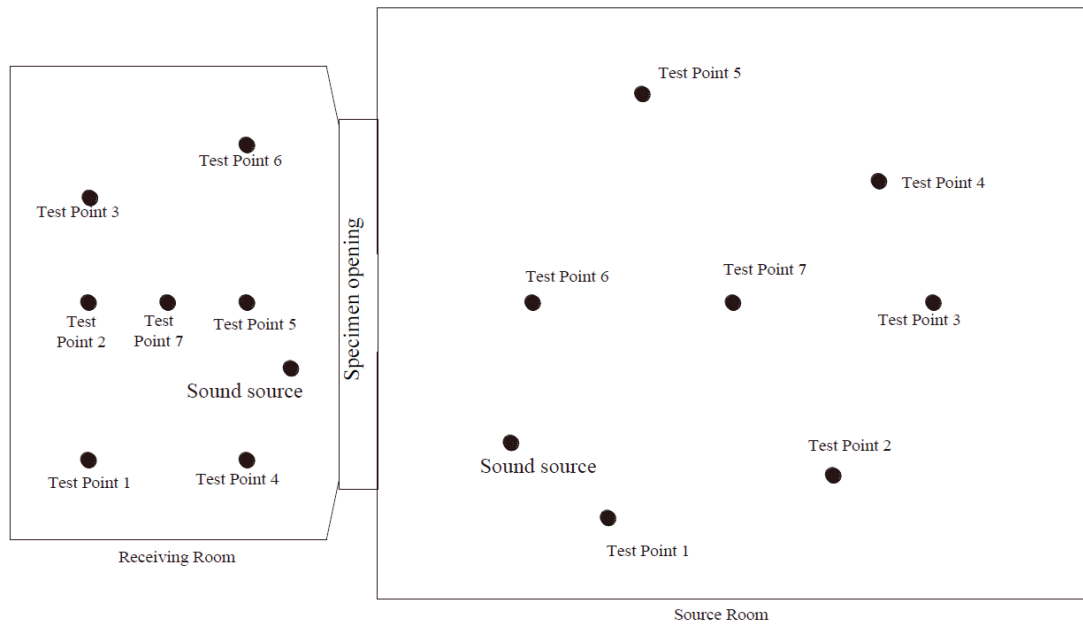
The geometric center of the ground of the source or receiving room can be taken as the origin of coordinates, and the direction in the ground plane perpendicular to and pointing to the specimen is X axis, that pointing to the specimen is +Y and that perpendicular to the ground is +Z. The positive directions of the three directions XYZ

Name of Testing Body (English)

conform to the right hand screw rule.

Indicate the three-coordinate position of microphones and sound sources

The figure below is provided for reference only.



Name of Testing Body (English)

III. Measured Data

Table 1. Measured Data of Sound Pressure Level in Source Room and Receiving Room in Sound Insulation Test (Source Located at Source Room Position 1)

Frequency (Hz)	Source Room Background Noise (dB)	Source Room (Source Position 1) dB				
		Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5
100						
125						
160						
200						
250						
315						
400						
500						
630						
800						
1000						
1250						
1600						
2000						
2500						
3150						
4000						
5000						
Frequency (Hz)	Receiving Room Background Noise (dB)	Receiving Room (Source Position 1) dB				
		Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5
100						
125						
160						
200						
250						
315						
400						
500						
630						
800						
1000						
1250						
1600						

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2000						
2500						
3150						
4000						
5000						

Table 1. Measured Data of Sound Pressure Level in Source Room and Receiving Room in Sound Insulation Test (Source Located at Source Room Position 2)

Frequency (Hz)	Background noise of source room (dB)	Source Room (Source Position 2) dB				
		Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5
100						
125						
160						
200						
250						
315						
400						
500						
630						
800						
1000						
1250						
1600						
2000						
2500						
3150						
4000						
5000						
Frequency (Hz)	Receiving Room Background Noise (dB)	Receiving Room (Source Position 2) dB				
		Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5
100						
125						
160						
200						
250						
315						
400						
500						
630						

Test Report No.

Name of Testing Body (English)

800						
1000						
1250						
1600						
2000						
2500						
3150						
4000						
5000						

Table 3 Determination of Reverberation Time in Receiving Room (Source Located at Receiving Room Position 1)

(Test with 6 Microphones Arranged for Two Source Positions)

Frequency (Hz)	Receiving Room (Source Position 1) (s)						Receiving Room Reverberation Time T(s)
	Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5	Test Point 6	
100							
125							
160							
200							
250							
315							
400							
500							
630							
800							
1000							
1250							
1600							
2000							
2500							
3150							
4000							
5000							

Table 4 Determination of Reverberation Time in Receiving Room (Source Located at Receiving Room Position 2)

(Test with 6 Microphones Arranged for Two Source Positions)

Frequency	Receiving Room (Source Position 2) (s)	Receiving
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Test Report No.**Name of Testing Body (English)**

(Hz)	Test Point 1	Test Point 2	Test Point 3	Test Point 4	Test Point 5	Test Point 6	Room Reverberation Time T(s)
100							
125							
160							
200							
250							
315							
400							
500							
630							
800							
1000							
1250							
1600							
2000							
2500							
3150							
4000							
5000							

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Test Report No.

Name of Testing Body (English)

630								
800								
1000								
1250								
1600								
2000								
2500								
3150								
4000								
5000								

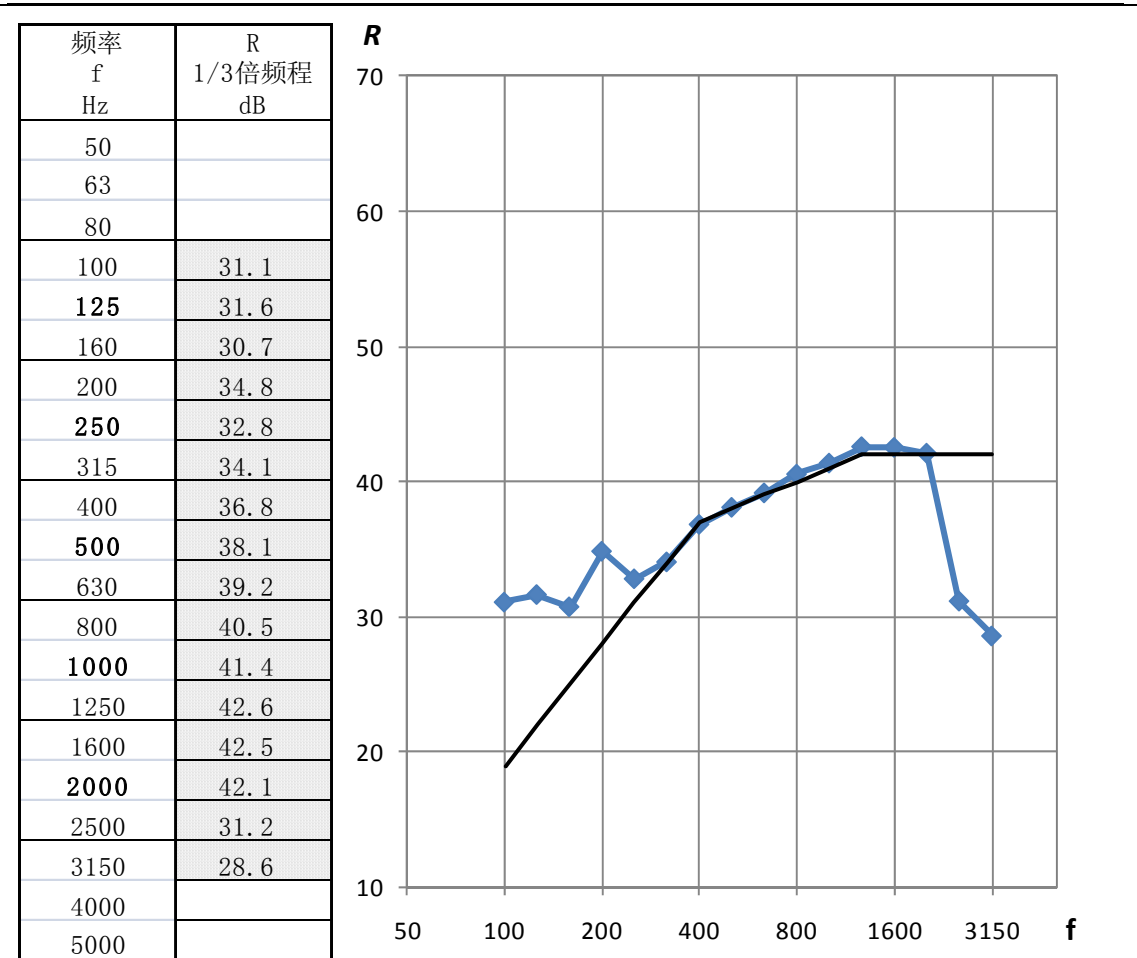
Name of Testing Body (English)

V. Measurement Report

Measurement Report of Airborne Sound Insulation Index R, as per ISO 10140-2			
Manufacturer		Product identification	
Client		Laboratory certification No.	
Specimen installation unit		Test date	
Test facility description		Specimen and its installation description	
Test specimen area		Areal density	
Laboratory temperature		Relative humidity	
Atmospheric pressure		Receiving room volume	

Test Report No.

Name of Testing Body (English)



$R(\text{dB})$ is the sound insulation index (dB), and $f(\text{Hz})$ is frequency (Hz).

The black broken lines in the figure represent the reference value curve specified in ISO 717-1.

According to ISO 717-1, weighted sound insulation index: **$R_w = \text{dB}$**

Report No.		Body name	
Report date		Signature	

VI. Test photos (with date indicated)

VII. Specimen photos and drawings (with date indicated)

Test Report No.

Name of Testing Body (English)

(End of Report)