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Z-12

GUIDELINES FOR CARBON FOOTPRINT SURVEY OF MARINE PRODUCTS

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Foreword

The *Guidelines for Survey of Carbon Footprint of Marine Products* by China Classification Society (hereinafter referred to as "the Society") stipulate the applicable technical requirements for marine castings and forgings applying for the Society's green additional mark for carbon footprint of marine castings and forgings.

These Guidelines do not restrict users from adopting other requirements, provided that such requirements are not less stringent than those of these Guidelines.

These Guidelines are compiled and updated by the Society and are published at http://www.ccs.org.cn.Relevant stakeholders may send feedback on the Society's guidelines to service@ccs.org.cn.

Version and Release Date of the History: Newly Compiled

Main changes in this version: None

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1 General

The Guidelines for Survey of Carbon Footprint of Marine Products (hereinafter referred to as "these Guidelines") apply to the approval and survey for manufacturers applying for the Society's additional notation for the carbon footprint of marine products.

This guideline is based on a comprehensive life-cycle carbon footprint assessment of ships, aiming to enhance the design and manufacturing of marine products to achieve higher environmental and ecological standards while complying with national regulations on ship safety and environmental protection.

The application for the additional notation for the carbon footprint of marine products is voluntary. This notation can be applied for separately or in conjunction with the Society's works approval or type approval for product.

2 Normative Reference Document

The content of the following documents constitutes the essential provisions of this guideline through their normative references. For dated references, only the version corresponding to that date applies to this guideline; for undated references, their latest version (including all amendments) applies to this guideline.

2.1 ISO 14067: 2018 "Requirements and Guidelines for Quantifying the Carbon Footprint of Greenhouse Gas Products".

2.2 ISO 14064-3: 2019 "Standard Guide for the Verification and Validation of Greenhouse Gas Statements".f

2.3 ISO14044: 2006 "Requirements and Guidelines for Life Cycle Assessment in Environmental Management".

2.4 National standards and standards accepted by the Society.

3 Terms and Definitions

3.1 Term

3.1.1 Product System

A collection of unit processes that possess both a basic flow and a product flow, incorporate one or more specific functions, and can simulate the product life cycle.

3.1.2 Carbon Footprint of a Product; CFP

The total sum of greenhouse gas emissions and removals within the product system, expressed in carbon dioxide equivalents, is subjected to a life cycle assessment based on climate change as the sole environmental impact category.

3.1.3 Greenhouse Gases (GHGs)

Gaseous components naturally present in the atmosphere or generated by human activities that absorb and emit radiation within the infrared spectrum originating from the Earth's surface, atmosphere, and cloud layers.

Note: Greenhouse gases are mainly those included in the Kyoto Protocol, such as Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF_6), and Nitrogen Trifluoride (NF_3).

3.1.4 System Boundary

Determine which unit processes constitute part of the product system using a set of criteria.

3.1.5 Cut-off Criteria

The provisions regarding whether the quantities of material and energy flows or the significance of their environmental impacts associated with unit processes or product systems are excluded from the scope of the study.

3.1.6 Primary Data

The quantitative value of a process or activity obtained through direct measurement or calculations based on direct measurement.

Note

①: Primary data do not necessarily have to originate from the system under study, as they may also be obtained from other systems comparable to the target system.

②: Primary data may include greenhouse gas emission factors or greenhouse gas activity data.

3.1.7 Secondary Data

Data that does not meet the requirements for primary data.

Note

①: Secondary data refers to verified and credible information from authoritative sources, including databases, open-access literature, national emission factors, computational estimates, or other representative datasets. Localized databases are recommended.

② : Secondary data may include information obtained from alternative processes or estimates.

3.1.8 Life Cycle

The product system comprises a series of interconnected stages, ranging from sourcing raw materials from nature or natural resources to their final disposal.

3.1.9 Uncertainty

The parameters associated with the quantification results can be used to reasonably reflect the degree of data dispersion in the quantified outcomes.

Note

①: Uncertainty may include:

— Parameter uncertainty, such as greenhouse gas emission factors and activity data;

— Scenario uncertainty, such as usage-phase scenarios and end-of-life scenarios;
—Model uncertainty.

②: Uncertain information typically provides quantitative estimates of possible discrete values and qualitative descriptions of potential discrete causes.

3.1.10 Marine products

Refers to the materials and equipment supplied for ship construction, repair, or outfitting, as well as the raw materials and components used for operating, assembling, or complementing said materials and equipment.

3.1.11 Gas emission factor (GHG): A coefficient associated with activity data and greenhouse gas emissions.

3.1.12 Functional unit Functional unit

The benchmark unit used to quantify the functionality of a product system.

3.1.13 Declared unit

A benchmark unit used to quantify the partial carbon footprint of a product.

4 Notation for Carbon Footprint of Marine Products

4.1 Upon application and successful completion of our organization's document review and on-site verification, the followin g notation for carbon footprint of marine products may be granted:

Notation **Table 4.1**

Notation	Description
GPC0	The carbon footprint assessment report for marine products submitted by the manufacturer fully complies with recognized standards in terms of methodology, procedures, and data quality, and has been verified as valid by our institution.
GPC1	The manufacturing plant possesses comprehensive carbon management capabilities, a well-defined green strategic plan, and has obtained the corresponding management system certification. The submitted carbon footprint evaluation report for marine products fully complies with recognized standards in terms of methodology, processes, and data quality, and has been validated as valid by our organization.

Specifically:GPC(Green Product Carbon Footprint) indicates that the carbon footprint calculation results for marine products have been verified by our organization and comply with the requirements of this guideline.

4.2 The granting, maintenance, suspension, cancellation, and restoration of The assignment of the notation for the carbon footprint of marine products shall comply with the provisions of Part 1 of the Society's "Classification Code for Steel Marine Vessels" or other applicable regulations.

5 Implementation

5.1 General Requirements

5.1.1 Division of Approval Units

In principle,the same manufacturing enterprise,the same product type, the same specification/model, or the same process/production line shall be treated as a single unit for accreditation. However, if the production sites differ despite sharing the same manufacturer, product type, specification/model, or process/production line, they shall be treated as separate accreditation units. The detailed scope of accreditation for each unit shall be specified in the accreditation certificate or its appendix.

5.1.2 Boundaries

The system boundaries referred to in this guide typically encompass a "cradle-to- gate" approach (covering the entire process from the procurement of raw materials/ components, production, and transportation until the completion of marine product manufacturing). The temporal boundary should span a complete production cycle of the product, generally representing the most recent consecutive calendar year.

5.1.3 The assignment of the notation for the carbon footprint of marine products Consists of the Following Three Components:

(1) Documents review;

(2) On-site audit, including:

① Carbon verification and validation of carbon footprint assessments;

② Manufacturing Process Audit.

(3) Assignment of the notation for the carbon footprint of marine products.

5.1.4 The Manufacturing Plant Must Establish Transportation Data Coverage Extending from the Shipment of Marine Products to Their Downstream Recipients (e. g., Shipyards).

The management mechanism collects and stores key parameters such as transportation modes and distance.

5.2 Inspection of Documents

5.2.1 Product Manufacturers Applying for the notation for GPC0 and GPC1 Certification Shall Submit at Least the Following Documents for Review:

(1) Information regarding the manufacturing plant and products, including: product purpose, production process, industry status, scope of production site, boundary conditions (system boundaries, temporal boundaries), and functional or declarative units.

(2) For accreditation units seeking recognition, a carbon footprint assessment must be conducted, covering the following items:

① Data Sources and Deviation Statement: The data sources are clear and reliable, with comprehensive and reasonable deviation analysis.

② Quantitative Models and Methods: The quantitative models are scientifically sound, and the quantitative methods comply with established standard.

③ System and temporal boundaries: The system boundaries and temporal boundaries shall comply with the requirements specified in Section 5.1.2 of this guideline.

④ Evaluation criteria: Implement according to currently effective standards, such as ISO 14067:2018 "Greenhouse gases – Carbon footprint of products – Requirements and guidance for quantification and communication", GB/T 24067-2024 "Requirements and guidance for quantifying the carbon footprint of greenhouse gas products", and PAS 2050:2011 "Specification for the life-cycle assessment of greenhouse gas emissions from goods and services ”.

⑤ Data selection criteria: During carbon footprint quantification, processes contributing less than 1% to the carbon footprint may be excluded, provided that the total impact of excluded processes does not exceed 5% of the total carbon footprint. Raw materials, energy, direct greenhouse gas emissions, or removals that substantially contribute to the carbon footprint must not be excluded.

⑥ Distribution Principle: Allocation shall be based on physical or economic relationships, ensuring process consistency and overall coherence; Priority shall be given to allocation according to physical quantities, with enterprises selecting methods from highest to lowest priority based on their respective allocation approaches; When physical quantity allocation is impractical, distribution shall follow the proportion of product economic value; For alternative methods, a parameter basis and calculation rationale must be provided.

⑦ Database information: Includes raw material ledgers, emission factor database names and version numbers; the data is verifiable and traceable.

⑧ Data quality: Meets the requirements for reliability, completeness, consistency, and representativeness (in terms of time, geography, and technology).

⑨ Process decomposition and procedure identification:The process flow is complete and there is no omission in the identification of emission sources;

⑩ Environmental impact indicators: Calculated using transparent methods based on the current effective assessment report of the IPCC (Intergovernmental Panel on Climate Change), the United Nations' specialized intergovernmental body on climate change.

⑪ Primary data: Includes energy consumption, raw material usage, process emissions, and waste generation data, sourced from authentic and reliable sources.

⑫ Secondary data: If primary data is unavailable, secondary data may be used; the data source must be specified and verified to ensure its suitability.

⑬ Greenhouse gas emission factors: In order of priority, the following sources should be used sequentially: carbon footprint emission factors published by national authorities or recommended by relevant regulatory bodies, commercial databases, literature/research reports/industry statistical data, and technical data from similar foreign technologies.

⑭ Uncertainty Analysis: Identify the sources of deviation in the analysis results and assess the overall level of uncertainty.

If the recognized unit already holds the Carbon Footprint Evaluation Report covering the above items ① to ⑩, and the institution issuing the "Carbon Footprint Evaluation Report" has been confirmed by the Society to possess the qualification for product carbon footprint certification, there is no need to conduct duplicate carbon footprint evaluation.

The issuance date of the Carbon Footprint Assessment Report submitted to the headquarters must not exceed two years from the application date for The assignment of the notation for the carbon footprint of marine products, and the most recent report shall prevail.

If the Carbon Footprint Assessment Report fails to meet the requirements of this guideline, the manufacturer shall clarify the relevant issues or conduct a new carbon footprint assessment and submit the corresponding results until its conclusions are approved by the organization.

5.2.2 Product Manufacturers applying for GPC1 approval shall also submit the following additional documentation:

(1) Green Strategic Planning: Regulatory documents pertaining to green strategic planning, supporting documentation for implementing green and low-carbon measures, etc.

(2) System Certification Certificate: A valid environmental management system certification certificate based on ISO 14001 or equivalent standards; an energy management system certification certificate based on ISO 50001 or equivalent standards (or supporting documentation proving the establishment, implementation, and maintenance of an energy management system that meets the requirements); and a carbon management system certification certificate (if applicable).

(3) Carbon Emission Report: The carbon emission report for the manufacturing plant from the previous year.

(4) The documentation and procedures pertaining to the certification requirements for the Green Additional Label of marine products 'carbon footprint include: identification, evaluation, and control procedures for key factors influencing the product's carbon footprint throughout its life-cycle; relevant critical documents and information maintained for key components and critical processes; responsibilities, authorities, and interrelationships of all personnel involved in the certification requirements; and details of the responsible individuals designated by the organizational management.

(5) List of Key Influencing Factors: These factors include, but are not limited to, the selection and use of critical components, energy and resource consumption, transportation modes and distances, as well as greenhouse gas emissions during product manufacturing processes.

(6) Equipment and its calibration records: Testing and monitoring equipment required for quantifying essential energy consumption, resource consumption, and carbon footprint, along with corresponding calibration or verification records.

(7) Other:Any other valid documents, reports, or certificates that demonstrate the applicant's capabilities.

5.2.3 If third-party certification has been obtained (such as Being Recognized as a Provincial-Level or Higher Green Factory or Zero-Carbon Factory), Upon our assessment, only the relevant certification documents and carbon footprint calculation results may be submitted, without the need to provide the materials listed in items (1) to (7) of item 5.2.2.

5.2.4 The headquarters reviews the documents and materials submitted by the applicant, including the "List of Significant Influencing Factors." If applicable, the document shall be stamped with a reference seal and returned to the applicant for retention.

5.3 On-Site Audit

5.3.1 The on-site audit focuses on the consistency verification of Marine Products. Manufacturers applying for GPC1 must also conduct an enterprise guarantee capability assessment. Where other provisions are specified in the guidelines, such provisions shall prevail.

5.3.2 The on-site audit shall cover all accredited units and production sites for which accreditation is sought.

The notation for Product Carbon Footprint pertains to facilities and departments other than the actual production sites of manufacturing enterprises, with on-site inspections potentially conducted as appropriate. During on-site inspections, the manufacturing enterprise must be operating normally for one or more products within the scope of the application for recognition.

5.3.3 Consistency Inspection of Marine Products

The consistency check includes, but is not limited to, the following items to ensure that the notation for the carbon footprint of marine products continues to meet the accreditation requirements:

(1) Verify that the product name, model, manufacturer, and relevant markings are consistent with the application documents or certificates;

(2) Confirm the consistency between the carbon footprint data and information applicable to product design, raw materials/ components, energy and resources, and production processes with the Carbon Footprint Assessment Report. During the initial on-site inspection, the product consistency verification should cover all accredited units.

5.3.4 Enterprise Guarantee Capability Inspection

The consistency between the green strategic plans formulated by enterprises, procedural documents covering the requirements for the notation for the carbon footprint of marine products, and the list of key influencing factors, and their actual implementation on-site; the focus is on verifying the implementation of the division of carbon management responsibilities, the availability of relevant human resources and inspection/monitoring equipment,the enforcement of control measures for key influencing factors, and the execution of carbon footprint-related provisions during internal audits.

5.4 Maintenance of Approval

5.4.1 When the manufacturer's corresponding product approval certificate from the Society becomes invalid, is suspended, withdrawn, or canceled, the notation for the carbon footprint of the marine product will automatically become invalid.

5.4.2 The manufacturer of marine products shall periodically confirm the carbon footprint quantification and product conformity, and take necessary measures to prevent the unintended use or delivery of approved products. In case of non-conformity in the carbon footprint quantification or product conformity of an approved product, the manufacturer shall promptly provide feedback to

the Society with information on cause analysis, disposition, and corrective actions. If necessary, an application for an additional audit shall be made to the Society.

5.4.3 The manufacturer shall apply for a periodical audit for the notation for the carbon footprint of marine products annually to maintain the validity of the approval certificate. The audit should be conducted within three months before or after the anniversary date of the approval certificate and can be combined with the periodical audit for the relevant marine product approval during the audit window.

5.4.4 When Necessary, Our Ship Surveyors May Conduct Additional Audits and Verifications of Marine Product Manufacturers to Ensure Compliance. The production and inspection of products comply with the control requirements established upon approval by the organization, and marine product manufacturers shall cooperate accordingly.

5.4.5 The Manufacturing Plant Shall Implement Measures to Ensure Effective Management of Design, Procurement, Production, Inspection, and Quality Control Processes. All data collected during the process are reliable, complete, consistent, and representative.

5.4.6 The Manufacturer Shall Identify and Retain All Critical Documentation Pertaining to the notation for the Carbon Footprint of Marine Products. The documents and information include carbon emission reports, carbon footprint assessment reports, third-party environmental monitoring reports, corporate production statements, material balance sheets, inventories of inspection and monitoring equipment, purchased critical components, invoices and vouchers for energy and resources, statistical reports, status information of product carbon footprint labeling certification certificates (valid, suspended, revoked, canceled, etc.), certification modification approval records, product quality data, environmental complaints and their resolution outcomes, as well as other materials relevant to the approval of the notation for the carbon footprint of marine products.

5.5 Certificate and Notation

5.5.1 For Manufacturing Plants That Have Obtained Certification for the notation for the carbon footprint of marine products,the Society will either issue a separate long-term Certificate for the notation for the Carbon Footprint of Marine Products, or add the notation for the carbon footprint of marine products to the original approval certificate, with the validity period remaining consistent with the original certificate.

5.5.2 For Manufacturers That Have Obtained Certification for the Green Additional Label for Marine Product Carbon Footprint, the Certified Unit Product Carbon Footprint Value Shall Be Specified in the Certification Details.

5.6 Regular review and additional review, approval of changes

5.6.1 After the approval of the notation for the carbon footprint of marine products, a periodical audit shall be conducted at least once a year. For specific requirements, refer to the requirements for periodical audits for approvals in the Society's Rules for Classification of Sea-Going Steel Ships, Part 1, Chapter 3. At the same time, special attention should be paid to carbon footprint-related content, such as verifying whether the approved emission reduction technologies and measures are continuously implemented and operating effectively.

5.6.2 When the Society deems it necessary, it may, by prior agreement or at its own discretion, conduct an additional audit of the manufacturer of the approved green marine product.

5.6.3 If planned changes① result in a quantified increase of more than 5% in the product's carbon footprint, and this situation persists for more than three months; or if unplanned changes② result in a quantified increase of more than 10% in the product's carbon footprint, and this situation persists for more than three months, an additional audit shall be conducted, and an approved change shall be implemented if necessary.

① Planned changes: These refer to modifications independently determined and controllable by the product manufacturer, such as adjustments to production processes or alterations to production equipment.

② Unplanned changes: These refer to changes that occur outside the planned scope, such as adjustments to administrative policies or changes arising from force majeure.

5.7 Inspection of the Carbon Footprint of Marine Products

5.7.1 The product survey (individual/batch survey) after approval for the notation for the carbon footprint of marine products shall include the following specific items to ensure the stability and traceability of the product's carbon footprint:

(1) Consistency Verification of Production Process Flow: Confirm that the actual production process is consistent with the process approved at the time of the approval for the notation for the carbon footprint of the marine product.

(2) Key raw material supply compliance assessment: Verify that no changes have occurred among raw material suppliers with a significant impact on carbon emissions.

(3) Carbon footprint data compliance verification: Upon approval by the surveyor during on-site inspection, the certified unit product carbon footprint value may be included in the product certificate.

5.7.2 When a product requires a survey for the notation for the carbon footprint of marine products but has not obtained the approval described in these guidelines, the survey shall be conducted in accordance with the relevant requirements of Section “5. Implementation” of these guidelines.