MARITIME REGULATION SAFETY

Comprehensive Guide to the 2011 ESP Code: Enhanced Survey Programme for Bulk Carriers and Oil Tankers

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The maritime industry operates under a rigorous framework of safety and structural integrity standards, designed to prevent catastrophic failures at sea. Among the most critical of these frameworks is the **International Code on the Enhanced Programme of Inspections during Surveys of Bulk Carriers and Oil Tankers**, commonly known as the **2011 ESP Code**. Adopted by the International Maritime Organization (IMO) through **Resolution A.1049(27)**, this code serves as a mandatory instrument under the International Convention for the Safety of Life at Sea (SOLAS), Chapter XI-1, Regulation 2. It represents a systematic and rigorous approach to the hull structural integrity of ships that are most susceptible to corrosion, fatigue, and structural stress.

The Historical Context and Evolution of the ESP Code

The genesis of the Enhanced Survey Programme (ESP) dates back to the late 1980s and early 1990s, following a series of high-profile maritime disasters involving bulk carriers and tankers. These vessels, often carrying heavy cargoes or volatile hydrocarbons, experienced sudden structural failures that led to significant loss of life and massive environmental damage. In response, the IMO initially introduced Resolution A.744(18), which established the first iterations of enhanced inspections.

As shipping technology evolved and vessel sizes increased, the need for a more comprehensive and legally binding document became apparent. This led to the creation of the **2011 ESP Code**, which consolidated previous amendments and provided a unified, clear set of requirements for surveyors, shipowners, and flag state administrations. The 2011 version effectively transitioned the program into a mandatory code, ensuring that all bulk carriers and oil tankers of a certain age and configuration undergo uniform, high-intensity inspections.

Core Technical Objectives of the 2011 ESP Code

The primary objective of the 2011 ESP Code is to ensure that the hull structure of bulk carriers and oil tankers is maintained in a condition that complies with the applicable requirements of the Classification Societies and the Flag State. The code focuses on the detection of three primary types of structural degradation:

- General and Localized Corrosion: Both uniform wastage and pitting corrosion that can thin the plating beyond safe limits.
- Fatigue Cracking: Often found at structural intersections or high-stress areas like hatch corners and side shell frames.
- Deformation and Mechanical Damage: Physical buckling or indentation caused by cargo operations or heavy weather.

Applicability and Scope

The 2011 ESP Code is not a one-size-fits-all regulation. Its application is meticulously categorized based on vessel type and hull configuration. Specifically, it applies to:

- Bulk Carriers: Single-side skin and double-side skin bulk carriers of 500 gross tonnage and above.
- Oil Tankers: Single-hull and double-hull oil tankers of 500 gross tonnage and above.
- Combination Carriers: Ships designed to carry either oil or solid cargoes in bulk.

The Survey Cycle: Understanding Frequency and Intensity

Under the 2011 ESP Code, surveys are organized into a five-year cycle, aligning with the ship's Special Survey (Renewal Survey) schedule. The intensity of the survey increases as the vessel ages, reflecting the higher risk of structural fatigue in older ships.

1. Renewal Survey (Special Survey)

The Renewal Survey is the most comprehensive inspection within the ESP framework. It occurs every five years and involves an exhaustive examination of the hull structure, including the internal spaces, tanks, and voids. The goal is to ensure the ship remains fit for another five-year period of operation.

2. Intermediate Survey

Held approximately half-way through the five-year cycle (usually between the second and third anniversary), the Intermediate Survey serves as a progress check. For ships over 15 years of age, the scope of the Intermediate Survey is often expanded to match the previous Renewal Survey.

3. Annual Survey

While less intrusive than the Renewal or Intermediate surveys, the Annual Survey includes a general inspection of the ship's exterior and a selection of internal spaces to ensure the vessel remains in a satisfactory condition between major audits.

Technical Classification of Surveys: Close-Up vs. Overall

The 2011 ESP Code distinguishes between two primary methods of inspection, each requiring different levels of access and lighting.

Overall Survey

An **Overall Survey**is intended to report on the general condition of the hull structure and the state of the protective coatings. It typically involves a visual walkthrough of tanks and spaces from a distance (e.g., from the bottom of the tank or from permanent walkways).

Close-Up Survey

A **Close-Up Survey**is a much more rigorous requirement. It mandates that the surveyor must be within a distance of "arm's reach" from the structural members being inspected. This often requires the use of temporary staging, cherry pickers, or rafting (filling a tank with water to float the surveyor to the top).

Survey Type	Bulk Carrier Requirements (Renewal)	Oil Tanker Requirements (Renewal)
Close-Up	All hatch covers and coamings; selected transverse bulkheads; side shell frames.	Selected web frames in ballast tanks; all web frames in one cargo tank.
Thickness Measurement	Mandatory for all areas susceptible to corrosion; extensive for ships >15 years.	Systematic measurement of deck, bottom, and side shell plating.
Tank Testing	Representative ballast tanks and all fuel oil tanks (boundaries).	All cargo tank boundaries and ballast tanks.

Thickness Measurement (TM) Protocols

Thickness Measurement is the quantitative backbone of the 2011 ESP Code. It involves the use of ultrasonic equipment to measure the remaining thickness of steel plates. These measurements are then compared against the original "as-built" thickness and the "allowable diminution" limits set by the Classification Society.

Substantial Corrosion Criteria

The code defines **substantial corrosion**as an extent of corrosion such that the assessment of the corrosion pattern indicates a wastage in excess of 75% of the allowable margin, but within the acceptable limits. When substantial corrosion is found, the frequency of inspection for those specific areas is increased to an annual basis until the area is repaired.

The Role of the Certified TM Firm

Thickness measurements must be carried out by a firm certified by the Classification Society. The TM operator must work under the direct supervision of the attending surveyor, who determines which areas require the most scrutiny based on visual findings during the Close-Up Survey.

Procedural Requirements: The Survey Planning Process

A successful ESP survey requires months of preparation. The 2011 ESP Code mandates a documented planning process to ensure all safety and technical requirements are met before the surveyor steps on board.

1. Survey Programme

The owner, in cooperation with the Classification Society, must develop a **Survey Programme**. This document outlines the schedule of inspections, the specific tanks to be entered, the methods of access, and the safety procedures for confined space entry.

2. Survey Planning Questionnaire (SPQ)

The SPQ is a pre-survey document where the owner provides technical data regarding the ship’s history, including previous repairs, known areas of corrosion, and the status of protective coatings (e.g., epoxy paint or anodes). This allows the surveyor to identify "suspect areas" that require enhanced attention.

3. On-Board Documentation (The Survey Report File)

Every ship subject to the ESP Code must maintain a **Survey Report File**. This file contains previous survey reports, thickness measurement records, and a condition evaluation report. This historical data is vital for tracking

the rate of structural decay over time.

Technical Mechanics: Corrosion and Structural Analysis

The 2011 ESP Code relies on engineering principles to assess the safety of a vessel. One of the critical assessments involves the **Section Modulus**of the hull girder. As deck and bottom plating thin due to corrosion, the ship's ability to resist longitudinal bending (hogging and sagging) decreases.

Mathematical Representation of Diminution

The rate of corrosion is often modeled as follows:

t_current = t_original - (Cr * Y)

Where:**t_current:** Measured thickness.**t_original:** Original thickness as per the building plan.**Cr:** Corrosion rate (mm per year).**Y:** Age of the vessel in years.

If the **t_current** falls below the **t_limit**(original thickness minus the maximum allowable diminution, typically 15-25% depending on the location), the steel must be renewed.

Practical Implementation: Challenges in the Field

Implementing the 2011 ESP Code presents significant operational challenges for ship managers and crew. The sheer scale of a VLCC (Very Large Crude Carrier) or a Capesize Bulk Carrier means that thousands of square meters of steel must be inspected.

Access and Safety

The primary hurdle is providing safe access. In massive cargo tanks, the "under-deck" areas are dozens of meters high. The ESP Code requires the surveyor to be at arm's length, which means expensive scaffolding or the use of **Rope Access Technicians**(RATs). Furthermore, confined space entry protocols are strictly enforced to prevent asphyxiation from inert gas or oxygen depletion.

Cleaning and Descaling

Surveyors cannot inspect steel that is covered in mud, scale, or cargo residue. For bulk carriers, this requires high-pressure washing. For oil tankers, it requires rigorous tank cleaning and gas-freeing to ensure the atmosphere is safe and the surfaces are clean enough to reveal cracks or pits.

Comparison: Bulk Carrier vs. Oil Tanker Requirements

While the administrative framework is similar, the technical focus areas differ significantly between the two ship types due to their different loading patterns and structural risks.

Feature	Bulk Carriers (ESP)	Oil Tankers (ESP)
Primary Stress Area	Hatch corners, side frames, and lower brackets.	Deck transverse, bottom longitudinals, and bulkhead stringers.
Cargo Impact	High impact from grabs; corrosive nature of cargoes like coal/sulfur.	Internal corrosion from sour crude (H_2S) and MIC (Microbiologically Influenced Corrosion).
Ballast Risk	Upper and lower wing tanks are prone to cyclic stress.	Dedicated seawater ballast tanks (DBT) are highly susceptible to coating failure.
Structural Criticality	Single skin bulkers are at risk of side shell failure and rapid flooding.	Double hull integrity is critical for preventing oil spills during groundings.

Amendments and Modern Updates (The 2020 Edition)

The IMO continues to refine the 2011 ESP Code. Recent amendments, such as those adopted by the Maritime Safety Committee (MSC) in resolutions like **MSC.461(101)**, have introduced more stringent requirements for the thickness measurement of certain areas and updated the requirements for the condition evaluation report. These updates often incorporate feedback from accident investigations and advancements in non-destructive testing (NDT) technology.

Digitalization and Drone Inspections

While the 2011 ESP Code traditionally relies on human surveyors, the industry is moving toward **Remote Inspection Techniques (RIT)**. Drones (UAVs) equipped with high-definition cameras and ultrasonic sensors are increasingly being used to perform Close-Up surveys. However, the ESP Code remains strict: RIT can only be used if it provides the same level of assurance as a physical survey, and the surveyor must always have the final say on the structural integrity assessment.

Case Study: The Consequences of ESP Non-Compliance

Consider a theoretical 20-year-old single-hull bulk carrier. During an ESP Renewal Survey, the owner fails to provide adequate cleaning in the lower hopper tanks. The surveyor, unable to conduct a proper Close-Up survey, marks the area as "partially inspected." Within six months, the ship encounters a Force 9 storm. The undetected corrosion in the lower brackets leads to a fatigue crack, resulting in the failure of Side Frame No. 4. The side shell plates unzip, the hold floods, and the ship sinks within minutes.

This scenario underscores why the **Executive Hull Summary**—a mandatory part of the ESP report—is so vital. It provides a transparent, high-level overview of the ship's condition, ensuring that shore-based management and charterers are aware of the risks before the vessel sails.

The Condition Evaluation Report (CER)

At the conclusion of every ESP survey, the surveyor issues a **Condition Evaluation Report**. This document is a technical synthesis of all findings. It includes:

- A summary of the survey scope.
- The status of protective coatings.

- A list of all identified structural deficiencies.
- A record of all repairs carried out during the survey.
- A clear statement on whether the ship’s hull structural integrity is maintained.

This report remains on the ship as part of its permanent record, providing a "medical history" of the hull that follows the vessel throughout its operational life.

Summary of Global Maritime Implications

The 2011 ESP Code is more than just a regulatory hurdle; it is a fundamental pillar of maritime safety. By mandating a proactive and high-intensity inspection regime, the IMO has successfully reduced the frequency of structural failures in bulk carriers and oil tankers. For the maritime professional—whether a shipowner, surveyor, or engineer—mastering the nuances of the ESP Code is essential for ensuring both commercial viability and the protection of life and the environment at sea.

As the industry moves toward greener fuels and new structural designs, the 2011 ESP Code will continue to adapt, ensuring that the legacy of rigorous inspection remains the standard for the global fleet. The meticulous documentation, the precision of thickness measurements, and the uncompromising nature of Close-Up surveys collectively ensure that the world’s largest vessels remain resilient against the unforgiving forces of the ocean.

Tags: #2011 ESP Code #IMO Regulations #Ship Survey #Bulk Carrier Safety #Oil Tanker Inspection