भारत सरकार / GOVERNMENT OF INDIA
पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
MINISTRY OF PORTS, SHIPPING AND WATERWAYS
नौवहन महानिदेशालय, मुंबई
DIRECTORATE GENERAL OF SHIPPING,MUMBAI

DGS (Engineering) Circular No. 09 of 2025

File No. 13-37012/1/2025-engg-dgs	Date: 12-03-2025

Subject: Recommended Standards for Shore to Ship Power Supply (SPS) at Indian Ports and Ships

References:	(1) DGS Standard Operating Procedures (SOP) for SPS in Indian Ports (2018) (2) DGS Circular No. 2 of 2020: Shore Power Supply at Indian Ports (3) DGS Engineering Circular No. 9 of 2024: Interim Guidelines for Onshore Power Supply

1. Background

1.1. Shore to Ship Power (SPS), also known as Cold Ironing or Onshore Power Supply (OPS), enables ships to connect to shore-side electrical power, allowing them to shut down their diesel generators, which are traditionally used to power the vessels at port. This significantly reduces harmful emissions such as CO_2, NO_x, SO_x, and particulate matter by up to 90%, directly contributing to improved air quality in port cities and advancing India's environmental objectives.

1.2 The Directorate General of Shipping (DGS), recognizing the need for reducing greenhouse gas (GHG) emissions and improving air quality at Indian ports, issues this circular to recommend standards for the implementation of Shore to Ship Power Supply (SPS) systems at Indian ports and on-board ships.

2. Scope

2.1. This circular applies to all major and non-major ports in India and to all ships calling at these ports, irrespective of their flag.

2.2. It includes technical, safety, and operational standards necessary for the implementation of SPS systems.

3. Objectives

3.1. To align with international standards and practices for SPS as prescribed by the International Maritime Organization (IMO), including guidelines in MEPC Resolutions 207(62) and 377(79).

3.2. To promote the use of SPS systems to achieve India's decarbonization targets under the "Harit-Sagar" Guidelines 2023, Maritime India Vison-2030 (MIV2030) and the Maritime Amrit Kaal Vision 2047 (MAKV-2047), which emphasize transforming ports into carbon-neutral entities and achieving widespread use of shore power systems by 2035.

4. Uniform Standards and Guidelines

To ensure seamless implementation and operation of SPS systems, the following integrated standards and guidelines are prescribed:

4.1. **Technical Standards:** SPS systems must adhere to recommended standards of IEC/IEEE 80005-1 for High Voltage Shore Connection (HVSC) systems and IEC/IEEE 80005-3 for Low Voltage Shore Connection (LVSC) systems. Ports must ensure compatibility by implementing universal connectors aligned with IEC/IEEE 80005 standards for both HVSC and LVSC systems. Renewable energy sources are encouraged for SPS operations to maximize environmental benefits.

4.2. **Safety Standards:** Proper earthing mechanisms, insulation monitoring systems, and IEC 62613(HVSC) and IEC 60309 (LVSC) compliant connectors must be installed to ensure safe operation. Emergency shutdown systems should be maintained in compliance with safety protocols, particularly for ships carrying hazardous cargoes where additional safety layers, such as explosion-proof equipment and gas detection systems, are mandatory.

4.3. **Operational Guidelines:** Ports must develop and establish port-specific Standard Operating Procedures (SOPs) tailored to their operational conditions. These SOPs should detail protocols for pre-connection compatibility checks, real-time monitoring during power transfer, emergency scenarios and safe disconnection procedures. Regular inspection and maintenance schedules must be part of the SOPs to ensure reliability.

4.4. **Risk Assessment:** Ports are required to conduct comprehensive risk assessments covering all phases of SPS implementation, including design, construction, and operation. The assessment should identify potential hazards, safety protocols, and mitigation measures, ensuring compliance with international safety standards such as IMO's Interim Guidelines (MSC.1/Circ.1675).

5. Advisory to Ports and Ships

A. Ports and ships are hereby advised to diligently follow the detailed recommendatory standards outlined in the **Appendix-1** to this circular. The Appendix provides comprehensive technical, safety, operational, and risk assessment guidelines to ensure uniformity, compatibility, and efficiency in the implementation of SPS systems across all

Indian ports and vessels. Stakeholders are encouraged to integrate these standards into their operational frameworks to align with national and international decarbonisation goals.

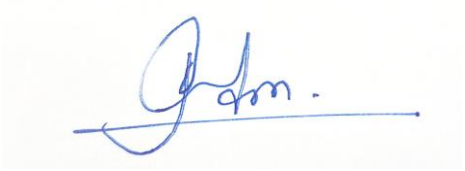
The Maritime Vision 2030 is the flagship policy framework guiding the development of India's ports and shipping sector, providing a clear roadmap is established for the implementation of SPS systems across Indian ports in a phased manner. Key Targets for OPS (Onshore Power Supply) under Maritime Vision 2030 and MKV 2047 are as below:

- **Phase 1 (2023):** Shore power for port crafts and small vessels.
- **Phase 2 (2025):** Extension of shore power to Indian-flag vessels involved in coastal operations.
- **Phase 3 (2030):** Full implementation for foreign-flag vessels and international cargo ships, making shore power mandatory in all Indian ports by 2030.
- **2030-2035:** Complete use of shore power on all vessels in all Indian ports

B. Carbon certification is a global practice for ensuring the credibility and authenticity of emissions reduction in the maritime sector. It verifies that ships using onshore power supply (OPS) achieve real and measurable carbon savings, preventing unverified claims. Certification enhances transparency by ensuring that carbon credits are traceable and prevent double counting, while maintaining integrity in emissions reporting.

A structured certification process not only supports compliance with environmental regulations but also facilitates the recognition of emissions reductions under future carbon credit schemes in the shipping sector. The detailed procedure for carbon certification is outlined in **Appendix-2** of this circular, providing guidance for ports to implement and evolve their certification frameworks while maintaining alignment with standardized verification protocols.

6. This issues with the the approval of the competent authority.



(Mahesh Korade)
Engineer & Ship Surveyor cum Dy.DG(Tech)

To,

1. The Principal Officers, Mercantile Marine Department, Mumbai/Kolkata/Chennai/Kandla/Kochi.
2. The Surveyor-in-Charge, Mercantile Marine Department, Goa/Jamnagar/Port Blair/Visakhapatnam/Tuticorin/Noida/Haldia/Paradip/Mangalore
3. Indian National Shipowner's Association (INSA), Mumbai.
4. Foreign Owner and Ship-Managers Association (FOSMA)
5. The Maritime Association of Ship Owners, Ship Managers and Agents (MASSA)
6. Indian Coastal Conference Shipping Association (ICCSA), Mumbai
7. Institute of Marine Engineers (India)
8. Hindi cell
9. Computer cell

Copy to:

10. PS to DG (S)
11. PS to the Chief Surveyor with the Govt.of India
12. PS to the Nautical Advisor (i/c) to the Govt.of India
13. PS to the Chief Ship Surveyor (i/c)
14. DDG (SD)
15. DDG (Admin).

Appendix -1
DGS (Engineering) Circular No. 09 Of 2025

Recommendatory Standards for Shore to Ship Power Supply (SPS) on Shore Power Supply (OPS) Systems

1. Objective

1.1 The implementation of Onshore Power Supply (OPS) systems at ports is a crucial initiative to reduce greenhouse gas (GHG) emissions and improve air quality. By replacing shipboard diesel generators with shore-based power during berthing, OPS systems contribute significantly to advancing a low-carbon and environmentally friendly shipping sector.

1.2 However, the lack of standardization in OPS technology presents challenges, such as fragmented regulations across countries and ports, complicating compliance for international shipping companies. To address this, Directorate General of Shipping issues these recommendatory standards to establish uniformity across Indian ports, ensuring seamless adoption, operational efficiency, and alignment with global sustainability goals.

1.3 These standards aim to provide a detailed framework for the adoption and operation of OPS systems to ensure compatibility, efficiency, and safety across all ports and vessels in India. This Recommendatory Standards align with the IMO's GHG Strategy and India's Maritime Vision 2030 and Amrit Kaal Vision 2047.

2. Technical Standards.

2.1 OPS systems in India must comply with globally recognized standards to ensure uniformity and facilitate international trade. Key standards include IEC/IEEE 80005-1 for HVSC systems and IEC/IEEE 80005-3 for LVSC systems. The IEC 62613 and IEC 60309 standards detail requirements for plugs, sockets, and connectors, ensuring compatibility and operational safety. IMO's guidelines, including MSC.1/Circ.1675 and MEPC Resolution 377(79), emphasize the importance of OPS in achieving global emission reduction targets.

2.2 The Directorate recommends the adoption of International Electrotechnical Commission (IEC) standards as the global benchmark for electrical, electronic, and related technologies used in Shore to Ship Power (OPS) systems. These standards address the technical, safety, and interoperability aspects of OPS, ensuring compatibility across systems worldwide.

2.1 IEC/IEEE 80005 Series

The IEC/IEEE 80005 series is the primary standard for OPS systems, addressing the technical and safety requirements for both high-voltage and low-voltage systems and their communication protocols. The series includes:

Part 1: High Voltage Shore Connection (HVSC) systems.

Part 2: Data communication between ship and shore.

Part 3: Low Voltage Shore Connection (LVSC) systems.

2.2 IEC/IEEE 80005-1: High Voltage Shore Connection (HVSC) Systems

Scope: The IEC/IEEE 80005-1 standard, published in 2019 (amended in 2022), provides comprehensive guidelines for the design, installation, and operation of High Voltage Shore Connection (HVSC) systems. These systems are typically used by large vessels such as container ships, cruise liners, and tankers, which require **more than 1 MVA** of power or have high-voltage main supply systems.

Key Features:

2.2.1 Safety Considerations: The standard mandates that any loss of continuity in the equipotential bonding circuit must result in a shutdown of the HVSC system. Ships should be capable of performing a standard restart after a blackout.

2.2.2 Corrosion Mitigation: Special arrangements, such as detecting corrosion currents, are recommended to prevent electrochemical corrosion, particularly for aluminium ships.

2.2.3 Application Scope: HVSC systems are designed to meet the specific needs of high-power-consuming vessels, enhancing energy efficiency and reducing emissions.

2.3 IEC/IEEE 80005-3: Low Voltage Shore Connection (LVSC) Systems

Scope: This standard covers the technical and safety requirements for low-voltage shore connection systems, which are primarily used by smaller vessels such as ferries and coastal ships.

Key Features:

2.3.1 Capacity: LVSC systems are suitable for vessels requiring **up to 1 MVA** of power.

2.3.2 Applicability: The standard ensures seamless compatibility between ship and shore systems, with guidelines tailored to smaller vessels and their unique operational

requirements.

2.3.3 Reference Annex: Additional vessel-specific requirements are detailed in the IEC annexes.

2.4 IEC 62613 and 60309-5 Series: Plugs, Socket-Outlets, and Connector Systems

This series focuses on the design and compatibility of connectors used in both high-voltage and low-voltage OPS systems.

2.4.1 General Requirements (IEC 62613-1):

2.4.1.1 Focus: Specifies general requirements for connectors, ensuring durability, safety, and compatibility across a wide range of installations.

2.4.1.2 Importance: Reduces risks of electrical faults and ensures operational reliability in challenging port environments.

2.4.2 Dimensional Compatibility (IEC 62613-2):

2.4.2.1 Focus: Defines dimensional standards for plugs and sockets to ensure interoperability across systems and manufacturers.

2.4.2.2 Importance: Facilitates seamless connections between shipboard equipment and port-side power supply systems, promoting global standardisation.

2.4.3 IEC 60309-5: Plugs, Socket-Outlets, and Couplers

2.4.3.1 Provides guidelines for the use of plugs, socket outlets, and couplers in industrial settings, adapted for marine environments where electrical safety is paramount

2.4.3.2 This standard ensures that the equipment used in SPS is robust, reliable,and suitable for the harsh conditions of port and ship environments, maintainingoperational integrity and safety

Table 1 Global Standards for Onshore Power Systems

SSE Type	Interconnectivity	Interoperability	Data Communication
High-Voltage Shore Connection (HVSC)	IEC 62613-1:2016 (General), IEC 62613-2:2016 (Connector geometry/dimensions)	IEC/IEEE 80005-1 (HVSC)	IEC/IEEE 80005-2
Low-Voltage Shore Connection (LVSC)	IEC 60309-5	IEC/IEEE 80005-3	IEC/IEEE 80005-2

Table 2 Applicability of OPS Standards

Standard	Scope	Key Features	Application
IEC/IEEE 80005 Series	Comprehensive standards for OPS systems, covering HVSC, LVSC, and communication protocols.	- Part 1: HVSC systems - Part 2: Data communication protocols - Part 3: LVSC systems	Provides technical and safety requirements for interoperability between shore and ship power systems.
IEC/IEEE 80005-1	High Voltage Shore Connection (HVSC) systems.	- Guidelines for design, installation, and operation of HVSC systems. - typically for vessels requiring more than 1 MVA or with HV main supplies.	Designed for large vessels like container ships, cruise liners, and tankers.
IEC/IEEE 80005-3	Low Voltage Shore Connection (LVSC) systems.	- Guidelines for low-voltage systems tailored to smaller vessels. -typically for smaller vessels requiring up to 1 MVA.	Primarily used by ferries, coastal ships, and other smaller vessels.
IEC 62613 Series (HVSC)	Standards for plugs, socket-outlets, and ship-to-shore connector systems.	- General requirements (IEC 62613-1): Ensures durability, safety, and compatibility. -Dimensional compatibility (IEC 62613-2): Standardizes dimensions for seamless connections.	Ensures interoperability and reduces electrical faults across various ship and port installations.
IEC 60309-5 (LVSC)	Guidelines for industrial plugs, socket-outlets, and couplers adapted for marine environments.	- Focused on robust and reliable equipment for harsh port conditions. - Ensures operational integrity and electrical safety.	Suitable for marine environments, maintaining safety and reliability of OPS installations.

3. Infrastructure Requirements

3.1 The effective implementation of OPS requires robust infrastructure at both shore and ship ends. Shore-side installations must incorporate standardized plugs, sockets, and connector systems compliant with IEC 62613 (HVSC) and IEC 60309 (LVSC). These installations should include power transformers, grounding mechanisms, and protective circuit breakers to ensure operational safety. Ships must be equipped with compatible onboard connectors and

reception facilities designed in alignment with IEC 62613 (HVSC) and IEC 60309 (LVSC) standards.

3.2 It is also necessary for the infrastructure to be capable of providing scalable solutions to support future technological advancements and increasing power demands.

4. Operational Standards

4.1 Ports are advised to develop and establish port-specific Standard Operating Procedures (SOPs) for the implementation and operation of Onshore Power Supply (OPS) systems. These SOPs should be tailored to address the unique requirements and operational conditions of each port while incorporating the general protocols outlined in these recommendatory standards.

4.2 The SOPs must ensure compatibility assessments, synchronization processes, and safe connection and disconnection procedures, along with real-time monitoring and emergency response protocols. By adhering to these guidelines, ports can enhance the safety, reliability, and efficiency of OPS operations, contributing to a sustainable maritime sector.

4.3 To ensure the smooth operation of OPS systems, standardized operational protocols must be followed. Before connection, pre-operational checks should verify the compatibility between the shore-side and shipboard systems. The connection and disconnection processes must adhere to stringent safety measures to prevent electrical faults. Real-time monitoring during power transfer is mandatory to identify and rectify anomalies, ensuring uninterrupted power supply. Regular inspection and maintenance schedules must be implemented for both shipboard and shore-side systems to sustain reliability and longevity of operations.

5. Risk Assessment

5.1 Risk assessment is an essential and continuous process in the lifecycle of Onshore Power Supply (OPS) projects, aimed at ensuring operational safety, reliability, and environmental compliance. It involves identifying and mitigating risks associated with complex multi-interface electrical systems, including utility grids, port grids, and ship systems. By addressing potential hazards such as electrical faults, system incompatibility, and human error, especially for ships handling hazardous cargoes, risk assessment minimizes the chances of catastrophic outcomes.

5.2 Effective risk assessment also includes evaluating failure modes through Failure Mode Analysis (FMA) and addressing blackout scenarios to maintain continuity and safety. This ensures robust mitigation strategies are in place, safeguarding passengers, crew, and the environment, while aligning with international safety and operational standards.

5.3 A robust risk assessment is essential at every stage of OPS projects to ensure safety, reliability, and operational compliance. The complexity of OPS installations, involving high-voltage systems and multi-interface operations, necessitates a comprehensive evaluation of potential hazards and risks.

6. Summary

6.1 This document outlines the recommendatory standards for the implementation of Onshore Power Supply (OPS) systems at Indian ports and on ships. OPS is a critical strategy for reducing greenhouse gas emissions and improving air quality by replacing shipboard diesel generators with shore-based power during berthing. The standards emphasize the adoption of globally recognized technical and safety benchmarks, including IEC/IEEE protocols, to ensure compatibility, efficiency, and operational safety across all ports and vessels.

6.2 A phased implementation plan is proposed, aligning with India's Maritime Vision 2030 and Amrit Kaal Vision 2047, to transform Indian ports into carbon-neutral hubs. Ports are advised to develop specific Standard Operating Procedures (SOPs) for seamless integration and operation, while risk assessment guidelines ensure safety and resilience in diverse operational environments.

6.3 The document also underscores compliance with international standards to facilitate global trade and strengthen India's position in sustainable maritime practices. These measures aim to create a robust framework that supports India's decarbonization goals and enhances the sustainability of the maritime sector.

Appendix -2
DGS (Engineering) Circular No. 09 Of 2025

Procedure for Issuance of Carbon Certification for Shore Power Supply (SPS)

1. Objective

1.1 To establish a structured procedure for the issuance of carbon certification, providing transparent and verifiable metrics on the environmental benefits of using shore power at Indian ports.

1.2 The carbon certification will include the total kilowatt-hours (kWh) of shore power supplied and the associated carbon emissions in grams per megajoule (gm/MJ), drawing parallel to the Bunker Delivery Note (BDN) issued to vessels, facilitating the acquisition of carbon credits in compliance with potential economic measures implemented by the International Maritime Organization (IMO).

2. Scope

This procedure applies to all ports in India providing Onshore Power Supply (OPS) systems to berthed vessels and includes:

2.1 Monitoring and recording the shore power supplied.

2.2 Calculating carbon emissions based on energy sources.

2.3 Issuing certifications to vessels utilizing OPS.

3. Monitoring and Recording Shore Power Supplied

3.1 Installation of Meters: Each OPS system must have calibrated meters to measure the total kWh supplied to vessels.

3.2 Data Logging: Ports must log the kWh supplied to each vessel during berthing in a secure and auditable system.

3.3 Verification: The recorded data must be verified by authorized personnel to ensure accuracy.

4. Carbon Emission Calculation

4.1 Emission Factors: Ports must use standardized emission factors for the electricity supplied, accounting for the grid mix (renewable and non-renewable sources).

4.2 Calculation Formula: Carbon Emissions (gm/MJ) = [(Emission Factor (g/kWh) ×

kWh supplied) ÷ Energy Content of Electricity (MJ/kWh)].

4.3 Validation: The calculated emissions must be validated against national or international guidelines.

5. Certification Process

5.1 Certification Format: The certification must include:

5.1.1 Vessel name and IMO number.

5.1.2 Total kWh of shore power supplied.

5.1.3 Carbon emissions in gm/MJ.

5.1.4 Certification issuance date and validity period.

5.2 Issuance Authority: The port authority or an authorized third-party agency shall issue the carbon certification.

5.3 Digital Access: Ports must maintain a digital platform for vessels to access their certifications.

6. Responsibilities

6.1 Port Authorities: Responsible for implementing the monitoring system, ensuring data accuracy, and issuing certifications.

6.2 Directorate General of Shipping (DGS): Overseeing compliance with the procedure and providing technical guidance.

6.3 Third-Party Auditors: Conducting periodic audits to ensure adherence to the standards.

7. Reporting and Review

7.1 Annual Reporting: Ports must submit annual reports to the DGS detailing the total shore power supplied, carbon emissions avoided, and certifications issued.

7.2 Periodic Review: The procedure will be reviewed periodically to incorporate advancements in OPS technology and emission calculation methodologies.

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