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Standard Operating Procedures: Shore Electric Power Supply to Ships in Indian Ports

1. Maritime transport emits about 1 billion tonnes of carbon dioxide annually (UNCTAD) and is responsible for about 2.5% of global greenhouse gas emissions apart from NO_x and SO_x emissions. As per various estimates, the share of shipping in global nitrogen oxides and sulphur oxides emissions from anthropogenic sources is about 15% and 7% respectively.
2. Ships normally use some base-load electricity levels for essential services (hoteling, unloading and loading activities) all the time, including while at berth. While in port, these ships use their own diesel engines to produce electricity. For a typical mid-size tanker, the electric load required is about 400 kW (excluding the electricity needed for cargo operations and ballast operations) at any given time. For such a tanker staying at port for 30 hours, it would require 12 MWh of electricity. Generating this power on-board, apart from creating noise pollution, pollute the ports, coastal and hinterland regions by emitting sulphur dioxide, nitrogen oxides and particulate matter along with black carbon. The pollution can be significant considering the number of ships in a port at any given time.
3. In 2016-2017 about more than 22,000 ships berthed at 12 major ports across India. The average size of ships which touched major ports was 36000 GT and with an average turn around time of 3.43 days, that is, about 80 hrs.
4. India has 12 major and 200 intermediate ports under various state governments. Cargo traffic in India is expected to rise to 2500MT by 2024-25 from about 1100MT in 2015-16 and accordingly the number of ships touching Indian ports is expected to double by 2025. The recent thrust on coastal cargo movement will be a further addition to this number of ships touching Indian ports. This projected growth of ships visiting Indian ports is an indicator of the socio-economic cost to be borne by India in future, if no measures to control pollution in ports is undertaken on an urgent basis.
5. The Ministry of Shipping “Green Port” project is an initiative in reducing air and noise pollution in major ports of India. To add to this initiative, the Honorable Minister of Shipping has directed the directorate general of shipping to explore the possibility of providing shore power from national grid to visiting ships in Indian ports.

6. Shore power is normally supplied to ships at high voltage rather than low voltage in order to keep the physical size of related electrical equipment such as shore connection cables manageable.
7. To provide ships with electricity, a shore-side electricity supply arrangement is required. The electricity frequency from the shore grid in India is available at 50 Hz. However, the frequency used onboard ships can be either 50 or 60 Hz. A ship designed for 60 Hz may be able to use 50 Hz for some equipment, such as lighting and heating, but this is a small fragment of the total power demand on the ship. Motor driven equipment, such as pumps and cranes, will not be able to run on their design speed, which will lead to damaging effects on the equipment. Therefore, a ship using 60 Hz electricity will require a convertor to convert 50Hz to 60 Hz by a frequency before being connected.
8. As the ships move around the world, there is a need for a common/uniform technical standard addressing the connection between ship and shore and the procedure for safe operation for such a shore electric power supply. The IEC, ISO and IEEE have developed international standard such as " ISO/IEC/IEEE 80005-1:2012 ISO/IEC/IEEE 80005-1 Utility Connections in Ports - Part 1: High Voltage Shore Connection (HVSC) Systems -- General requirements" in order to address this need. However, International Maritime Organization is yet to finalize international standards to be adopted by various ports and ships to facilitate shore power supply at various ports across the world through standardized equipment and components on ships and in ports.
9. The directorate held extensive meetings with representatives from Indian ports, Indian National Ship Owners Association and Indian Coastal Ship Owners Association and it was decided to implement the project in phases so that ports are able to develop necessary infrastructure and standardization of high voltage supply to visiting ships can be achieved internationally.
10. In phase I, all Indian ports will be supplying shore power to as far as possible all visiting ships with a maximum on-shore power demand of 150KW at 50Hz with necessary protection at shore end. The electric power will be supplied as a 3-Phase, 415V and 50Hz supply.
11. All ships visiting Indian ports with equipment running on 50Hz and shore power demand of 150KW and less are required to comply with the following procedures:
 - To declare their shore power demand to the port well in advance.
 - To have on board a certified 4-core Copper XLPE un-armoured power cable of about 50m length with P-66 protection enclosure and a 5-pin plug socket to be fitted at shore supply side. Necessary safety protections will be fitted at supply side by ports.
12. All Indian ports are required to comply with the following in order to facilitate such a shore power supply:
 - Identification of a single point contact persons for receipt of shore power request from visiting ships.
 - Preparation of procedures for shore power supply and publication of the same on their web-site.
 - Ships-ports interface forms indicating safety precautions to be undertaken by both sides to be developed. Filled up forms signed by Master/Chief Engineer of the ship and the responsible person from the port shall be kept as a record both on ships and port facility.
 - Ensure that neither do cargo discharge is delayed due to shore power connection nor do ship departure is delayed due to shore supply disconnection.