The Swedish Transport Agency's Code of Statutes

THE SWEDISH TRANSPORT AGENCY

TSFS 2024:[No]

Published
on [Select a date]

MARITIME

Swedish Transport Agency’s regulations and general advice on shore-side electricity supply for vessels;

Contents

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Swedish Transport Agency's regulations and general advice on shore-side electricity supply for vessels;

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The Swedish Transport Agency lays down[1] the following by virtue of Chapter 2, Section 1, Chapter 3, Section 2 and Chapter 6, Section 7 of Ordinance (2003:438) on vessel safety, and adopts the following general advice.

Application

Section 1 These Regulations apply to systems for shore-side electricity supply to Swedish vessels and shall apply to such systems that are put into service from the entry into force of the draft regulations.

In the case of shore-side electricity supply systems put into service before the entry into force, the Regulations shall apply from the date of its renewal.

For vessels with a date of construction on or after 1 January 2001, the requirements set out in the Annex shall apply until the renewal of the system.

Section 2 The regulations do not apply to:

1. vessels engaged in national maritime navigation;
2. inland waterway vessels;
3. pleasure vessel;
4. vessels owned or operated by the Armed Forces or under military command; or
5. other vessels, with the exception of passenger vessels, of a hull length less than 15 metres.

Section 3 As regards high-voltage shore connection systems, further provisions follow from Regulation (EU) 2023/1804 of the European

[1] See Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services.

Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU.

General advice
In the case of low-voltage shore connection systems, the standard IEC/PAS 80005-3:2014[2] should be applied.

Section 4 Provisions on working environment are contained in the Swedish Transport Agency's regulations and general guidelines (TSFS 2019:56) on the working environment on ships, and in the Swedish Maritime Administration's regulations and general guidelines (SJÖFS 2005:25) on protective devices and security measures on vessels.

Definitions

Section 5 For the purposes of these Regulations, the following definitions shall apply:

connectors	sockets outlets, socket intakes, free coupler connector or similar devices for connecting *connecting cables;*
connecting cable	cable with good flexible properties for connection to *electrical installations;*
date of construction	date on which the keel was laid or ship was at a *similar stage of construction;*
electrical installation	an installation for the production, conversion, distribution or use of electricity;
inland waterway vessel	craft subject to the Swedish Transport Agency's regulations and general advice (TSFS 2018:60) on inland waterway vessels;
national maritime vessel	vessel subject to the Swedish Transport Agency's regulations and general advice (TSFS 2017:26) on national maritime vessels;
pleasure vessel	vessels used exclusively for recreational purposes and carrying no more than 12 *passengers;*
main switchboard	switchboard that gets power directly from the *main power source* and is intended to distribute electrical power to the ship's system;

[2] IEC/PAS 80005-3:2014, Utility connections in port - Part 3: Low Voltage Shore Connection (LVSC) Systems - General requirements.

main power source	source of electrical power supplying the *main switchboard* with current for the normal operating and living conditions on the ship;
high voltage	*nominal voltage* exceeding 1000 V alternating current voltage or 1500 V direct voltage;
isolating transformer	transformer with galvanic separation between primary and secondary windings,
soil	conductive mass of the earth, of which the electric potential at each point is set to zero;
ingress protection rating	classification of the enclosure of electrotechnical equipment, where the enclosure is capable of protecting the equipment in question against water, dust, penetrating objects and touch;
shore-side electricity supply	the transmission of shore-side electrical power through a standardised interface to vessels moored at the quayside;
low voltage	nominal voltage not exceeding 1000 V alternating current voltage or 1500 V direct voltage;
similar stage of construction	the stage at which the construction of a specific ship begins, and assembly has reached at least 50 tonnes or 1 % of the estimated mass of all structural material;
rated current	the maximum current with which an apparatus or component is intended to operate under normal operating conditions;
nominal voltage	voltage for which an *electrical installation* or part of an *electrical installation* is constructed;
passenger	same as in the Ship Safety Act (2003:364);
passenger ship	a ship that carries more than twelve *passengers;*
risk management	systematic work ensuring that the risks in the operations are continuously identified, analysed and eliminated or minimised;
hull length	the maximum length of the hull, including fixed fittings and durable integrated accessories;
current sensing circuit breaker	electrical couplers designed to activate uncoupling when the fault current reaches a given value;

shore-side electricity supply system	equipment and installations for *shore-side electricity supply* which are firmly mounted on the ship or accompanying the ship while travelling;
fuse[3]	apparatus containing a fuse element which melts when the current passing through it for a certain time exceeds a given value, thereby breaking the current and opening the circuit into which the apparatus is inserted;
stray current	return current or part of a return current which, during all or part of its journey, follow other paths than the metallic conductors intended for the return circuit;
overcurrent protection	*fuses* or switches affected by overcurrent.

Shore-side electricity supply systems

Safety, operation and handling

Section 6 Shore-side electricity supply systems shall be adapted to the intended use and the operating conditions to be expected. Shore-side supply shall be provided with satisfactory safety for the ship and all persons on board. Risk management shall be carried out with regard to risks that may cause explosion, fire, sparking, short circuiting, electric arc, electric shock, personal injury, material damage or downgraded operations.

> ***General advice***
> *Risk management should be carried out in accordance with accepted methods and standards. Particular account should be taken of water or ice accumulations that may cause short circuiting, loss of electrical power or downgraded operations. When connecting to land soil, particular attention should be paid to the risks of stray currents and galvanic corrosion which may damage the outer parts of the ship.*

Section 7 The shore-side electricity supply system of the vessel shall be compatible with the on-shore electrical power system. The necessary communication with the on-shore electrical power system shall be maintained with minimum risk of downgraded operations. Provisions on electromagnetic compatibility follow from the Ordinance (2016:363) on electromagnetic compatibility.

[3] The term covers the whole device with the parts contained therein.

General advice

For data interfaces and communication procedures, IEC/IEEE 80005-2:2016[4] should be applied.

Section 8 The shore-side electricity supply system of the ship shall be galvanically separated from the on-shore electrical power system, and the equipment included in the system shall have the appropriate ingress protection rating. Shore-side electricity supply systems shall be equipped with discriminative protection or an equivalent device, lightning protection equipment and automatic phase sequence switching.

General advice

Shore-side electricity supply should take place over an isolating transformer placated on board the vessel and complying with standard EN 61558-1[5] or an equivalent standard.

Section 9 Shore-side electricity supply systems shall be adapted to the ship's maximum shore-side electricity needs. Particular account shall be taken of the power demand of the ship in loading and unloading operations.

In connection with the system, there shall be visible information on the vessel's normal and maximum power demand at the quayside, nominal voltage, frequency and on procedures for secure coupling, uncoupling and emergency disconnection. For direct voltage, polarity shall also be indicated.

Section 10 Risk management shall be carried out in relation to risks that may cause a disruption of the shore-side electricity supply, and there shall be established procedures that efficiently contribute to the risk management.

General advice

In the event of an emergency stop or other interruption of the shore-side electricity supply, the ship's own power system should be automatically activated and take on the electrical load within 45 seconds. Interruptions in the shore-side electricity supply should not cause interferences to the radio communication of the electrical installation.

Section 11 In the case of shore-side electricity supply systems for tankers or other vessels with an increased risk of fire or explosion, specific risk management shall be carried out in relation to these risks. Shore-side electricity supply to such vessels shall be possible without the risk of sparking. The risk management shall be adequately documented and the documentation shall be kept available during supervision.

[4] IEC/IEEE 80005-2:2016, Utility connections in port - Part 2: High and low voltage shore connection systems - Data communication for monitoring and control.
[5] SS-EN 61558-1, Safety of transformers, reactors, power supply units and combinations thereof - Part 1: General requirements and tests.

Section 12 The operation, maintenance, trouble-shooting and control of shore-side electricity supply systems shall be carried out in an effective, efficient and secure manner, and in accordance with the manufacturer's instructions. Necessary measures shall be taken to prevent unauthorised contact with live parts of the electrical installation.

General advice

Operation and handling of shore-side electricity supply systems should be in accordance with MSC.1/Circ.1675[6]. Monitoring, locking devices and alarms should be provided in appropriate locations on board the vessel.

Connection equipment

Section 13 Vessels with shore-side electricity supply arrangements shall be equipped with a connection centre or with equivalent adequate connection equipment for the transfer of shore-side electricity to the ship.

General advice

The connection centre should be protected against water ingress under all expected operating conditions. If the connection centre is located in a special space, there should be optical indication outside the space, clearly indicating when the installation is live.

Section 14 The connection centre shall be connected to the main switchboard by a fixed cable which is sized to the connected rated current and is adequately protected if there is a risk of mechanical damage. The connection centre and the main switchboard shall bear an indication clearly indicating when the connection centre is live.

General advice

The main switchboard should indicate the voltage, phase sequence, power and frequency of the on-shore connection. The phase sequence of incoming three-phase alternating current should be verifiable.

Section 15 Connection cables and connectors shall comply with the relevant technical standards and shall be intended for marine use. Necessary measures shall be taken to prevent operation of live connectors.

General advice

Connection cables should be of flame-retardant type, oil-resistant, resistant to mechanical damage and temperature changes, as well as resistant to moisture, frost, UV radiation and salt water. The following standards may be appropriate to take into account:

[6] MSC.1/Circ.1675, Interim Guidelines on safe operation of onshore power supply (OPS) service in port for ships engaged on international voyages.

1. IEC 60092-350[7].
2. IEC 60092-360[8].
3. IEC 60092-353[9].
4. IEC 60502-2[10].

Connectors for low-voltage shore connection should meet IEC 60309-1 standard[11] or an equivalent standard.

Section 16 If multiple connection cables are used for shore-side power supply, overloading of single cables and interconnection of conducting cables shall be avoided. The protective mechanism used shall be suitable for isolation, be able to break the installed power, include all phases, protect against phase differences and alert in case of failure. The earthing wire shall not be affected by triggered overcurrent protection.

Section 17 Connection cables and connectors shall be arranged and positioned in such a way as to eliminate or minimise the risks of harmful tension and mechanical damage.

General advice
Connection cables and connectors should be designed in such a way that the movements of the vessel are absorbed and the equipment is not damaged or worn off during such movements. Connected cables should not be wrapped up.

Coupling and uncoupling

Section 18 There shall be established procedures for the manual connection and disconnection of shore-side electricity supply, effectively contributing to the elimination or minimisation of risks to the ship and to persons on board. Manual disconnection shall be possible, as far as practicable, from the ship.

General advice
There should be lifting devices, as well as a guiding device or guiderail that facilitates manual connection and disconnection and minimises the risk of damage to the crew and the equipment.

Section 19 In the case of arrangements for automatic connection and disconnection of shore-side electricity supply, a specific risk management

[7] IEC 60092-350, General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications.
[8] IEC 60092-351, Insulating materials for shipboard and offshore units, power, control, instrumentation, telecommunication and data cables.
[9] IEC 60092-353, Power cables for rated voltages 1 kV and 3 kV.
[10] IEC 60502-2, Power cables with extruded insulation and their accessories for rated voltages from 1 kV (*U*m = 1,2 kV) up to 30 kV (*U*m = 36 kV) - Part 2: Cables for rated voltages from 6 kV (*U*m = 7,2 kV) up to 30 kV (*U*m = 36 kV).
[11] IEC 60309-1, Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 1: General requirements.

shall be implemented to ensure that proper functionality can be maintained at the lowest possible risk to the ship and persons on board. The risk management shall be adequately documented and the documentation shall be kept available during supervision.

Section 20 Connection and disconnection of shore-side electricity supply with nominal current exceeding 63 A shall be possible only in a voltage-free mode.

Section 21 On-shore power supply with a nominal current exceeding 63 A shall be switched off automatically and an alert shall be provided if a connection cable to or from the on-shore electrical power system is subjected to abnormal tension.

Technical documentation

Section 22 Each electrical installation used for shore-side electricity supply shall be accompanied by comprehensive technical documentation ensuring that operation, maintenance, troubleshooting and control of the installation can be carried out in an effective, efficient and safe manner. The documentation shall be kept available during supervision.

Equivalence

Section 23 On-shore electricity supply systems may deviate from the requirements set out in Sections 6-22, provided that a technical analysis shows that an equivalent level of safety is achieved. The technical analysis shall be prepared in accordance with MSC.1/Circ.1212/Rev.1[12] and be approved by the Swedish Transport Agency.

Mutual recognition

Section 24 Goods that are lawfully marketed in another Member State of the European Union or in Turkey, or that originate from and are lawfully marketed in an EFTA State that is party to the EEA Agreement, are presumed to be in compliance with these provisions. The application of these provisions is covered by Regulation (EU) 2019/515 of the European Parliament and of the Council of 19 March 2019 on the mutual recognition of goods lawfully marketed in another Member State and repealing Regulation (EC) No 764/2008.

[12] MSC.1/Circ.1212/Rev.1, Revised Guidelines on Alternative Design and Arrangements for SOLAS Chapters II-1 and III.

Exemptions

Section 25 The Swedish Transport Agency may grant derogations from these regulations if there are special reasons.

This statute enters into force on 1 July 2024.

For the Swedish Transport Agency

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Annex

1. On ships with arrangements for connection to onshore electric power systems, there shall be a connection centre for the connection of a flexible cable from the on-shore power system.

2. The connection centre shall be connected to the main switchboard by a fixed cable which is sized to the connected rated current and adequately protected if there is a risk of mechanical damage.

3. The connection centre shall be equipped with an automatic switch or a multi-pole switch with overcurrent protection with a rated current adapted to the capacity of the fixed cable between the connection centre and the main switchboard.

4. There shall be a change-over switch with interlocking to avoid connecting live cables. The change-over switch shall be of a type that is suitable for isolation and shall be capable of breaking the installed power and of including all phases. The earthing wire must not be affected by the activation of the overcurrent protection.

5. There shall be a neutral bar for connection to suitable ground. When grounding, particular attention shall be paid to the risk of galvanic corrosion of the vessel's hull and the risk of stray currents. If separate ground connection is used, this connection shall comply with 10.

6. The main switchboard shall be equipped with an indicator indicating when the connection centre is live.

7. On the vessel, there shall be permanently installed equipment to check the phase sequence of incoming three-phase alternating current.

8. The connection centre shall contain information on the vessel's electric power system, the nominal voltage and frequency at alternating current, and how the connection is to be made. The polarity of the direct current system and the phase sequence of incoming three-phase alternating current shall be indicated.

9. In the connection centre, there shall be a contact with a built-in grounding connection that is made so that grounding takes place before the voltage-bearing conductor is connected. The connection centre shall have an appropriate ingress protection rating.

10. When connecting vessels to on-shore electrical power systems, one of the following connections shall be used:

1. Connectors complying with standard EN 60309[13] and flexible cable with an area of 2.5 mm^2 or more of the type H07RN-F, or equivalent type.

2. An equivalent cable that is permanently connected to the connection centre in accordance with 12.

11. A cable that is exposed to motion shall be protected against harmful tension. The connection cable shall be arranged and positioned in such a way that it is protected from mechanical damage. A connected cable must not be wrapped up.

12. For installations with a rated current exceeding 125 A, the connection to the vessel shall be made by a fixed connection in the connection centre. The fixed connection shall be used exclusively for this purpose. The connection centre shall be equipped with contact clamps of such size and design that satisfactory interconnections are achieved.

13. For installations with a rated current not exceeding 125 A, the connection to the vessel shall be made over a current sensing circuit breaker with a rated trigger current of no more than 30 mA or an isolating transformer.

General advice
Current circuit breakers and isolating transformers should be placed on board the vessel.

14. Isolating transformers used for on-shore connection shall be double-wound in accordance with standard EN 60742[14] or in an equivalent way.

15. For on-shore connections with a voltage not exceeding 230 V, standard IEC 60364-7-709[15] shall be applied.

[13] SS-EN 60309, Plugs, socket outlets and couplers for industrial purposes, in the version in force when the electrical installation was installed.
[14] SS-EN 60742, Isolating transformers and safety isolating transformers, in the version in force when the electrical installation was installed.
[15] IEC 60364-7-709, Electrical installations of buildings - Part 7: Requirements for special installations or locations - Section 709: Marinas and pleasure craft, Edition 1.