

ISO/IEC/IEEE 80005-1:2012-07 (E)

Utility connections in port - Part 1: High Voltage Shore Connection (HVSC) Systems - General requirements

Contents	Page
FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	10
4 General requirements.....	11
4.1 System description	11
4.2 Distribution system.....	12
4.2.1 General	12
4.2.2 Equipotential bonding.....	12
4.3 Compatibility assessment before connection	12
4.4 HVSC system design and operation	13
4.4.1 System design.....	13
4.4.2 System operation.....	13
4.5 Personnel safety	13
4.6 Design requirements	13
4.6.1 General	13
4.6.2 Protection against moisture and condensation.....	13
4.6.3 Location and construction.....	13
4.6.4 Electrical equipment in areas where flammable gas or vapour and/or combustible dust may be present.....	14
4.7 Electrical requirements.....	14
4.8 System study and calculations.....	15
4.9 Emergency shutdown including emergency stop facilities	15
5 HV shore supply system requirements.....	17
5.1 Voltages and frequencies	17
5.2 Quality of HV shore supply	18
6 Shore side installation	19
6.1 General	19
6.2 System component requirements.....	19
6.2.1 Circuit-breaker, disconnector and earthing switch.....	19
6.2.2 Transformer.....	19
6.2.3 Neutral earthing resistor	20
6.2.4 Equipment earthing conductor bonding	20
6.3 Shore to ship electrical protection system.....	20
6.4 HV interlocking.....	21
6.4.1 General	21
6.4.2 Handling of HV plug/socket-outlets	21
6.4.3 Operating of the high-voltage (HV) circuit-breakers, disconnectors and earthing switches.....	21

6.5	Shore connection convertor equipment.....	22
6.5.1	General	22
6.5.2	Degree of protection	22
6.5.3	Cooling.....	22
6.5.4	Protection.....	23
7	Ship to shore connection and interface equipment.....	23
7.1	General	23
7.2	Cable management system	23
7.2.1	General	23
7.2.2	Monitoring of cable tension.....	24
7.2.3	Monitoring of the cable length.....	24
7.2.4	Connection conductor current unbalance protection.....	24
7.2.5	Equipotential bond monitoring	25
7.2.6	Slip ring units	25
7.3	Plugs and socket-outlets	25
7.3.1	General	25
7.3.2	Pilot contacts.....	26
7.3.3	Earth contact.....	26
7.3.4	Fibre optical plug/socket.....	26
7.4	Interlocking of earthing switches	26
7.5	Ship to shore connection cable.....	27
7.6	Independent control and monitoring cable	27
7.7	Storage	27
7.8	Data communication.....	27
8	Ship requirements	28
8.1	General	28
8.2	Ship electrical distribution system protection	28
8.2.1	Short-circuit protection	28
8.2.2	Earth fault protection, monitoring and alarm	28
8.3	Shore connection switchboard.....	28
8.3.1	General	28
8.3.2	Circuit-breaker, disconnecter and earthing switch.....	29
8.3.3	Instrumentation and protection	29
8.4	On board transformer	29
8.5	On board receiving switchboard connection point.....	30
8.5.1	General	30
8.5.2	Circuit-breaker and earthing switch.....	30
8.5.3	Instrumentation.....	30
8.5.4	Protection.....	30
8.5.5	Operation of the circuit-breaker	31
8.6	Ship power restoration	32
9	HVSC system control and monitoring.....	32
9.1	General requirements.....	32
9.2	Load transfer via blackout	33
9.3	Load transfer via automatic synchronization	33
9.3.1	General	33
9.3.2	Protection requirements.....	33
10	Verification and testing.....	33
10.1	General	33

10.2	Initial tests of shore side installation	34
10.2.1	General	34
10.2.2	Tests	34
10.3	Initial tests of ship side installation	34
10.3.1	General	34
10.3.2	Tests	34
10.4	Tests at the first call at a shore supply point.....	35
10.4.1	General	35
10.4.2	Tests	35
11	Periodic tests and maintenance	35
11.1	General	35
11.2	Tests at repeated calls of a shore supply point.....	36
11.2.1	General	36
11.2.2	Verification	36
12	Documentation	36
12.1	General	36
12.2	System description	36
Annex A (informative)	Ship to shore connection cable.....	37
Annex B (normative)	Additional requirements for Roll-on Roll-off (Ro-Ro) cargo ships and Ro-Ro passenger ships	42
Annex C (normative)	Additional requirements for cruise ships.....	45
Annex D (normative)	Additional requirements of container ships	51
Annex E (normative)	Additional requirements of liquefied natural gas carriers (LNGC).....	55
Annex F (normative)	Additional requirements for tankers	60
Bibliography	63
Figure 1	– Block diagram of a typical described HVSC system arrangement	11
Figure 2	– Phase sequence rotation – Positive direction	17
Figure 3	– Balanced three-phase variables in time domain	18
Figure A.1	– Bending test arrangement.....	41
Figure B.1	– Example for general system layout	42
Figure B.2	– Example of a safety circuit	43
Figure B.3	– Power plug and socket pin assignment	44
Figure C.1	– General system layout	45
Figure C.2	– Cruise ship HVSC system single line diagram.....	46
Figure C.3	– Example of safety and control circuit	47
Figure C.4	– Shore power connector pin assignment	49
Figure C.5	– The power inlet fitted with fail-safe limit switch	50
Figure D.1	– General system layout	51
Figure D.2	– Safety circuits	53
Figure D.3	– Power plug and socket pin assignment	54
Figure E.1	– General system layout	55
Figure E.2	– Power plug and socket pin assignment	58
Figure F.1	– General system layout	60
Figure F.2	– Power plug and socket pin assignment	61
Table E.1	– LNGC 140 000 – 225 000 m ³	56
Table E.2	– LNGC > 225 000 m ³	57