

1. Course Title: High Voltage Safety Training (Operation level)

2. Scope With reference to convention Imo Model Course:

This course is designed to equip individual with skills, knowledge and attitudes required to -

- Familiarization lay out and safety features of high voltage power plant on board.
- The functional, operational and safety requirements for a marine high voltage system.
- Assignment of suitably qualified personnel to carry out maintenance and repair of high voltage switch gear of various types.
- Producing a switching strategy for isolating components of high voltage system.
- Selecting suitable apparatus for isolation and testing of high voltage apparatus.
- Carrying out a switching and isolation procedure on a marine high voltage system complete with safety documentation.
- Performing test of insulation resistance and polarization index on high voltage equipment.
- Taking remedial action necessary during faults in high voltage system.
- Risks & hazards associated with High Voltage.
- High voltage alternators safety features.
- Earthling and key interlocks for isolation of high voltage equipment
- Legislative background and Code of Safe Working Practices and PPE.
- High Voltage switch gear, SF 6, Vacuum circuit breakers and contactors, construction, operation, maintenance and tests.
- Fault levels at different locations and protection system topology. PT's, CT's and an overview of protection relays. IDMTL characteristics
- Non relay operated protection
- Generator, Motor and Transformer protection
- An introduction to High Voltage Variable Frequency Drive (PWM) and soft starters.
- 110 Volt DC for control of High Voltage Switchgear.
- Practical exercises on High Voltage Panel in disconnecting, isolating and earthing the circuit breaker and "Prove Dead" the place of work.
- Table top exercises on High Voltage Switchboard circuits. in accordance with maritime industry standards.

3. Objective:

The prime objective of the course is to impart and create awareness in seafarers responsible for the safe control and management of high voltage power systems the essential education and training in high voltage installations to meet the **Knowledge, Understanding and Proficiency** requirements set out in the specific part of the following: As high voltage applications have great use in electrical propulsion/ drive systems, it will also be taken into consideration to include electrical propulsion in the syllabus.

On completion of the course, the participants will be able to demonstrate sufficient awareness and knowledge about the following;

- Understanding the safe management of HV systems on board including the HV power distribution system and electrical propulsion systems.
- Know the switching/isolation process to make working on HV equipment safe. Usage of safety forms related with HV
- Understand the fault tracing procedures and aim at restoring the system and maintain supply. Maintenance, testing and operations of various HV systems on board.

4. Course Outline Shore base & On board Training:

Sl No	Knowledge, understanding and proficiency	Hours
1	International requisites for high voltage knowledge	1
2	Advantages of high voltage systems	1
3	Hazards	1

4	The functional operational	2
5	High voltage equipment on board	3
6	High voltage safety rules	1
7	Safe working procedures	2
8	Protective devices	2
9	Assignment of qualified personnel to carry out maintenance and repairs	2
10	High voltage electrical equipment testing methods	1
11	Performing test of insulation resistance and polarization index	1
12	High voltage equipment maintenance	1
13	Taking remedial actions necessary during faults	1
14	Carrying out a switching and isolation procedure on marine high voltage safety documentation	2
	Total	22

5. Competence Standard/Course Syllabus Checked with up-to-date STCW/IMO Model Course:

SI No.	Knowledge, understanding and proficiency
1.	International requisites for high voltage knowledge - - general concept of IMO, SOLAS, ISM, STCW -Introduction high voltage and revision of basic electricity. - Introduction to the various agencies controlling the rules and regulations for HV Ships
2.	Advantages of high voltage systems - - the necessity for high voltage industrial plant Hazards - - dangers of electricity (shock, burns, electric arc and blast)
3.	High voltage equipment on board - - generators, motors, transformers, distribution switchboards, circuit breakers, protection relays, drives - Management level and operation level control documentation and safe working procedures on HV. -Electrical propulsion systems.
4.	High voltage safety rules - - explanation of definitions used with high voltage systems Safe working procedures - - basic steps to be taken for issue of a permit to work
5.	Protective devices - - function and principle of operation - HV Power distribution, protections, instrumentation and test equipment.
6.	High voltage electrical equipment testing methods - - introduction with high voltage testing equipment (primary injection, secondary injection, conductance test, electrical pressure test, insulation - resistance test, function test)
7.	Transformer testing - - introduction with transformer testing methods (open circuit test, short circuit test)
8.	High voltage equipment maintenance - - introduction with high voltage equipment types of maintenance (fault, post fault and preventive maintenance) - assignment of qualified personnel to carry out maintenance and repairs)
9.	Taking remedial actions necessary during faults
10.	Carrying out a switching and isolation procedure on marine high voltage safety

	documentation
11.	Work on simulator - <ul style="list-style-type: none"> - reading and understanding of schematics and practical application on training center simulator (carrying out a switching and isolation procedure on marine high voltage safety documentation) - taking remedial action necessary during faults - SF6 and vacuum breakers operating principles

6. Entry Standard, Selection Criteria of Students:

Trainees or students wishing to gain entry into this course should possess the following requirements:

- **Age:** be not less than 16 years of age.
- **Education & Training:** must have valid seafaring documents.

7. Intake limitation, with specific mention Instructor-student ratio:

The number of trainees should not exceed 24 and the practical training should be undertaken in small groups of more than eight.

8. Qualification and experience of instructors:

Minimum qualification of any instructor or assessor must be Class- I Deck/Engine Officers with tanker knowledge.

9. Qualification and experience of assessors:

Minimum qualification of any instructor or assessor must be Class- I Deck/Engine Officers with tanker knowledge.

10. Details Facilities & Equipment, materials and resources available for the training; Visual aids lecture Notes, Library facilities, Rental documents, Workshops Training Equipment: Navigational, Engineering, Communication, Seamanship etc:

- a. Projectors and slides
- b. Multimedia and videos
- c. Advanced audio visual systems
- d. Tanker simulator
- e. Dummy tanker ships, tank lid, manifold
- f. Pump model Room
- g. 02 nos Generator set
- h. Synchronizing panel board
- i. Well-equipped workshop with modern machineries
- j. Engine model room

11. Conduct of Training with number of classroom lectures, practical work use of simulator, video etc:

Period → Day ↓	0900-0945	0945-1030	1030- 1115	1115- 1145	1145-1230	1230-1315	1315-1400	1400- 1500	1500-1545	1545-1630
1 st Day	International requisites for high voltage knowledge		High voltage equipment on board	Tea Break	High voltage safety rules			Launch Break	Protective devices	
2 nd Day	Advantages of high voltage systems		High voltage safety rules		High voltage electrical equipment testing methods				Transformer testing	
3 rd Day	High voltage equipment on board				Transformer testing	High voltage electrical equipment testing methods			Protective devices	
4 th Day	Taking remedial actions necessary during faults				High voltage equipment maintenance	Work on simulator			High voltage equipment maintenance	
5 th Day	Practical				Practical				Practical	
6 th Day	Work on simulator				Carrying out a switching and isolation procedure on marine high voltage safety documentation				Assessment	

12. Total duration of Training; Duration of Practical's:

Training period is of 03 days, (21 Hours)

- a. Theory - 15 Hours
- b. Practical - 06 Hours

13. Assessment procedure, whether independent of instruction or continuous performance evaluation:

Course end assessment shall be carried out to ensure adequate knowledge, understanding & competence of the candidate.

A variety of source of evidence are used which include evidence of candidate's ability, under realistic condition. Short answers, multiple choice, fill in the blanks and true/false type questions in a written test are used for assessment includes direct observation, oral questioning and role play.

14. Formats of certificate to be issued with correct reference to STCW and reference to approval and authorization by the Department of Shipping and contact point of the issuing institution for verifying authenticity:

Annex- 02

No. NMHV/		GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH নামসমূহ সরকারী সংস্থা	
		NATIONAL MARITIME INSTITUTE নেশনাল মারিটাইম ইনসিটিউট পারিস্থিতিক সম্পদ বিষয়ে ১০০% রেজিস্ট্রেশন South Halishahar, P.O. Bandar, Chittagong-4100, Bangladesh. Tel. ৮৮০-৩১-৪০৫৬৯, Fax. No. ৮৮০-৩১-৮০০৬২০, E-mail: nmict@btcl.net.bd	
এই প্রোত্তোল দ্বারা প্রদিলাতিলিলে HIGH VOLTAGE SAFETY TRAINING CERTIFICATE			
এই সর্ব ধৰ্ম ধৰ্মসমূহের মধ্যে, This is to certify that, জনক/ Mr. _____ Date & Place of Birth _____ ইস্যুর তারিখ/ স্থান/ Date & Place of Issue _____ বাসাদার অনুষ্ঠিত দ্বারা প্রদিলাত দ্বারা প্রদিলাত কর্তৃত কৃতিকৰণ কৰা হল স্বাক্ষর কৰা হল।		পিতা/ Son of Mr. _____ পদবী/ Rank _____ জি. ডি. নং/ C.D. C. No. _____ বাসাদার অনুষ্ঠিত দ্বারা প্রদিলাত দ্বারা প্রদিলাত কর্তৃত কৃতিকৰণ কৰা হল স্বাক্ষর কৰা হল।	
has successfully completed basic safety training course on HIGH VOLTAGE SAFETY TRAINING CERTIFICATE conducted at the National Maritime Institute, Chittagong, Bangladesh.			
স্থান/ from _____ এই ক্রমানুসূচিক প্রাণীজগুক-১৯৭৮ স্টেচনের ৬ দ্বারা প্রদিলাতিলিলি: V/1-1 এ প্রাণীজগুক ক্লাস দ্বারা প্রদিলাত A/III-1, A/III-2, A/III-6, & B/III-2 অনুষ্ঠিত দ্বারা এক দ্বারা প্রদিলাত কৰা হল।		পর্যায়/ to _____ The course is in conformity with International Convention on Standards of Training, Certification & Watch keeping for Seafarers, 1978 as amended, Regulation V/1-1, section A/III-1, A/III-2, A/III-6, & B/III-2 of the STCW code and has the approval of the Department of Shipping, Government of the People's Republic of Bangladesh.	
ইস্যুর তারিখ/ Date of Issue _____ সময়/ Date of Expiry _____		স্বাক্ষর কৰা হল/ Signature of the holder _____ স্বাক্ষর কৰা হল/ Principal _____	

15. Maintenance of records in Data-base for facilitation of checking including assessments:

NMI will maintain a data-base of all the students who have completed the course. The following records for each individual will be kept so as to ensure that the certificate is issued to a candidate who has met the requirements as laid down by the governing authority regarding issuance of a certificate on Bridge Resource Management.

- Application form
- Assessment papers after completion of course
- Attendance Sheet
- Attested Xerox copy of the issued certificates & licenses
- A registered data-base in hard copy and soft form

16. Internal Quality Standard System if any. Students Impressions, past results:

The institute maintains quality standard system ISO 9001:2008, Certified by DNV GL

17. Course notice served, course conducted as per course notice, progression report served:

Will be complied as per DOS Instruction.

18. Attendance of Students and Instructors:

Students and Instructor attendance sheet attached.