1. Course Title: High Voltage Safety Training (Management 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.
- Earthing 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 **K**nowledge, **U**nderstanding and **P**roficiency 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	1.5
2	Advantages of high voltage systems	1.5

3	High voltage equipment on board	3
4	High voltage safety rules	3
5	Protective devices	3
6	High voltage electrical equipment testing methods	3
7	Transformer testing	3
8	High voltage equipment maintenance	3
9	9.1 Taking remedial actions necessary during faults	2.25
10	10.1 Carrying out a switching and isolation procedure on marine high voltage safety documentation	2.25
11	Work on simulator	3
12	Practical	6
13	Assessment	1.5
	Total	36

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

Sl No.	Knowledge, understanding and proficiency	Hours
1	**International requisites for high voltage knowledge -** 1.1 general concept of IMO, SOLAS, ISM, STCW 1.2 Introduction high voltage and revision of basic electricity. 1.3 Introduction to the various agencies controlling the rules and regulations for HV Ships	**1.5**
2	**Advantages of high voltage systems -** 2.1 the necessity for high voltage industrial plant 2.2 Hazards - 2.3 dangers of electricity (shock, burns, electric arc and blast)	**1.5**
3	**High voltage equipment on board -** 3.1 generators, motors, transformers, distribution switchboards, circuit breakers, protection relays, drives 3.2 Management level and operation level control documentation and safe working procedures on HV. 3.3 Electrical propulsion systems.	**3**
4	**High voltage safety rules -** 4.1 explanation of definitions used with high voltage systems Safe working procedures - 4.2 basic steps to be taken for issue of a permit to work	**3**
5	**Protective devices -** 5.1 function and principle of operation 5.2 HV Power distribution, protections, instrumentation and test equipment.	**3**
6	**High voltage electrical equipment testing methods -** 6.1 introduction with high voltage testing equipment (primary injection, secondary injection, conductance test, electrical pressure test, insulation resistance test, function test)	**3**
7	**Transformer testing** - 7.1 introduction with transformer testing methods (open circuit test, short circuit test)	**3**
8	**High voltage equipment maintenance -** 8.1 introduction with high voltage equipment types of maintenance (fault, post fault and preventive maintenance) 8.2 assignment of qualified personnel to carry out maintenance and repairs)	**3**
9	**9.1 Taking remedial actions necessary during faults**	**2.25**
10	**10.1 Carrying out a switching and isolation procedure on marine high voltage**	**2.25**

	safety documentation	
11	**Work on simulator -** 11.1 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) 11.2 taking remedial action necessary during faults 11.3 SF6 and vacuum breakers operating principles	**3**
12	**Practical**	**6**
13	**Assessment**	**1.5**
	Total	**36**

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 18 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 not more than eight.

8. Qualification and experience of instructors:

Minimum qualification of any instructor or assessor must be Class- I Engine Officer with relevant certificate & 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:

- Projectors and slides
- Multimedia and videos
- Advanced audio visual systems
- 02 nos Generator set
- Synchronizing panel board
- Well-equipped workshop with modern machineries
- Engine model room
- Resource sharing with Bangladesh-Korea Technical Training Centre, Chittagong.

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
1st Day	International requisites for high voltage knowledge		High voltage equipment on board	Tea Break	High voltage safety rules			Launch Break	Protective devices	
2nd Day	Advantages of high voltage systems		High voltage safety rules		High voltage electrical equipment testing methods				Transformer testing	
3rd Day	High voltage equipment on board				Transformer testing		High voltage electrical equipment testing methods		Protective devices	
4th Day	Taking remedial actions necessary during faults				High voltage equipment maintenance		Work on simulator		High voltage equipment maintenance	
5th Day	Practical				Practical				Practical	
6th 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 06 days, (36 Hours)

a. Theory – 28.5 Hours
b. Practical - 06 Hours
c. Assessment- 1.5 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. NMIHV/

GOVERNMENT OF THE PEOPLE 'S REPUBLIC OF BANGLADESH

NATIONAL MARITIME INSTITUTE

South Halishahar, P.O. Bandar, Chittagong-4100, Bangladesh.
Tel. 880-31-740569, Fax. No. 880-31-800620, E-mail: nmictebd@btcl.net.bd

PHOTO

HIGH VOLTAGE SAFETY TRAINING CERTIFICATE

This is to certify that,

Mr. ..... Son of Mr. .....

Date & Place of Birth ..... Rank .....

..... Date & Place of Issue .....

has successfully completed basic safety training course on HIGH VOLTAGE SAFETY TRAINING CERTIFICATE conducted at the National Maritime Institute, Chittagong, Bangladesh.

from ..... to .....

A/III-1, A/III-2, A/III-6, & B/III-2

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 codeand has the approval of the Department of Shipping, Government of the People's Republic of Bangladesh.

Date of Issue .....

Date of Expiry .....

Signature of the holder

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.

NATIONAL MARITIME INSTITUTE

TRAINING RECORD

Instructor:

Batch No: 09

Subject: HIGH VOLTAGE SYSTEM (Management)
Course Duration: 26-12-2016 to 02-01-2017

Attendance:

Name & rank	Sign		Name & rank	Sign

Signature
Management Representative

Signature
Principal