



**HORIZON**

COURSE OVERVIEW

HIGH VOLTAGE  
POWER SYSTEMS  
OPERATION

# COURSE PURPOSE

**Anyone working on electrical systems where technical knowledge or experience is necessary to prevent Danger or Injury must have the required knowledge and/or experience or be under suitable supervision.**

**Furthermore, it is an Absolute Duty under Regulation 16 of the Electricity at Work Regulations for persons to be competent to prevent Danger and Injury.**

**In relation to High Voltage System Operation this course will provide the necessary underpinning Safety, Legal, Technical, Operational and Procedural training for persons wishing to be considered for promotion to the role of “High Voltage Authorised Person” within their employer’s organisation.**

**On successful completion of the course delegates will be awarded with a Certificate of Achievement.**

**This certificate can serve as evidence of training in the selection process for High Voltage Authorised Persons.**

**However, to become a “High Voltage Authorised Person” requires not only suitable training, which this course will provide, but also requires intimate knowledge of and operational experience on the electrical system they wish to be authorised for.**

# COURSE DELIVERY

## Introduction

This will be a modular course delivered over a 5 Day period with the final day dedicated to an exam and an assessed practical test. The content of each module will be delivered through a combination of tutor presentations interspersed with tutor guided classroom written exercises, classroom discussions, tutor questions, delegate questions, sharing of delegate experiences and where appropriate tutor guided practical exercises.

## Course Timetable

Each day the course will start at 9am and finish at 4:30pm.

The first four days of the course will be split up into four sessions.

Session 1 – 9:00am to 10:30am.

Break 10:30am to 11:00am.

Session 2 – 11:00am to 12:30 pm.

Lunch - 12:30pm to 1:15pm.

Session 3 - 1:15pm to 2:30pm.

Break - 2:30pm to 2:45pm.

Session 4 - 2:45pm to 4:30pm

## Examination

The examination will last for an hour and will comprise 40 questions based on the content of the Modules and Handouts.

## Practical Test

The Test will involve the operation of HV switchgear to achieve the safe isolation and restoration of an HV circuit including the preparation of all necessary documentation to carry out the exercise in a safe manner.

# COURSE DELIVERY

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## Facility Provision

All modules will be taught in a dedicated 1<sup>st</sup> floor training room equipped with audio visual projection facilities, whiteboards and flipcharts.

Individual seating and desks will be provided for each delegates within the Training Room.

Male and female toilets are located adjacent to the Training Room.

All practical exercises will be carried out in the ground floor simulated substation.

## Catering

A light lunch consisting of a selection of sandwiches will be provided each day. Special dietary needs can be catered for provided notice is given by email prior to the commencement of the course.

Bottled Water will be provided at each breaktime and at lunchtime.

All refreshments will be taken in the Training Room.

## Course Materials

Each delegate will be provided with the following:

- Course folder with presentation notes.
- Handouts.
- Blank notepad and pen.

The subject matter and order in which the modules will be delivered is outlined in the following Course Agenda.

# COURSE AGENDA Day 1

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- **Course Overview**
  - **Module 1- Dangers of Electricity**
    - > **Introduction.**
    - > **Electric Shock.**
    - > **Electric Burns.**
    - > **Electric Fires.**
    - > **Arcing.**
    - > **Explosion.**
  - **Module 2- Entry into Substations and Switch rooms**
    - > **Introduction.**
    - > **Pre- Entry Procedure.**
    - > **Entry Procedure.**
    - > **Dangers and Hazards.**

# COURSE AGENDA Day 1

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- **Module 3- Legislation.**
    - > **Introduction.**
    - > **Primary Legislation.**
    - > **Secondary Legislation.**
    - > **Associated Documents.**
    - > **Health and Safety at Work Act.**
    - > **Management of Health and Safety at Work Regulations.**
    - > **Electricity at Work Regulations.**
    - > **Accident Statistics and HSE Case Studies.**
  
  - **Module 4- Industrial HV Power Supply Arrangements.**
    - > **Introduction.**
    - > **Connection Agreements.**
    - > **33/11/6.6kV Intake Arrangements.**
    - > **Typical Customer HV Substation Arrangements.**

# COURSE AGENDA Day 2

- **Review of Day 1 Modules**

- **Module 5- Electrical Switchgear.**

- > **Introduction.**
- > **Capabilities of Switchgear.**
- > **Safety Interlocking.**
- > **Circuit Breaker Operating Principles.**
- > **The Electric Arc.**
- > **Types of Circuit breaker.**
- > **Circuit Breaker Isolation.**
- > **Circuit breaker Earthing.**

- **Module 6- Earthing.**

- > **Introduction.**
- > **Functions of Earthing**
- > **Equipment Earthing**
- > **Substation Earth Grid Design Requirements**
- > **Typical Substation Earth Grid**
- > **Earth Potential Rise (EPR)**
- > **Potential Gradient Across a Substation**
- > **Step, Touch, Mesh and Transferred Potentials**
- > **Hot Zones or Hot Sites.**

# COURSE AGENDA Day 2

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- **Module 7- Electrical Faults and Protection.**
    - > **Introduction.**
    - > **Fault Types.**
    - > **Open Circuit Faults.**
    - > **Short Circuit Faults.**
    - > **Protective Relays.**
    - > **Instrument Transformers.**
    - > **Current Transformers.**
    - > **Voltage Transformers.**
    - > **Fault Level.**
    - > **Protective Device Pre-Arcing Energy and Energy Let Through.**
    - > **Cable Fault Ratings.**
    - > **Protection Relay Terminologies.**
    - > **Protection Relay Schemes.**



# COURSE AGENDA Day 3

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- **Review of Day 2 Modules**

- **Module 8- Electrical Safety Rules.**

- > **Introduction.**
- > **Scope.**
- > **Roles, Responsibilities and Duties.**
- > **Typical Organisational Chart.**
- > **Safe Working Practices, Procedures and Rules.**
- > **Typical Definitions.**
- > **Documentation.**
- > **Safety Review.**
- > **Switching Programmes.**
- > **Operating Records.**
- > **Limitation of Access. (L.O.A.)**
- > **High Voltage Certificate of Isolation and Earthing.**
- > **High Voltage Permit to Work. (HVPTW)**
- > **High Voltage Sanction for Test. (SFT)**
- > **Logbook for Electrical Systems.**
- > **Servicing and Maintenance.**

# COURSE AGENDA Day 3

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- **Module 8- Electrical Safety Rules. (continued)**
    - > **Safety Locks, Safety Key Boxes, Building and Operational Locks.**
    - > **Safety/Personal Protective Equipment. (PPE)**
    - > **Test Equipment.**
    - > **Earthing Equipment.**
    - > **Fire Extinguishing Installations and Equipment.**
    - > **First Aid and Treatment of Electric Shock.**
    - > **Substation and Switch room Posters and Signs.**
    - > **Operational Restrictions.**
    - > **Audits.**

**REVISION,  
PRACTICE  
AND  
PREPARATION  
Day 4**

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**Revision and Review of Day 3 Modules**

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**Practice for Operational Test**

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**Preparation of Documentation for Practical Test**

**PRACTICAL  
TEST AND  
EXAMINATION  
Day 5**

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**Examination**

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**Practical Test**