

EX-TRAINING (SAFE ELECTRICAL TRAINING)

INSTRUCTOR PROFILE

Owen M Graham

TDD Ltd

Senior Electrical Training Consultant

Duties

Responsible for training and co-ordination of UK and overseas electrical programmes

in the following subjects: Electrical equipment in potentially hazardous areas/ HV/LV

switching/System Control & Operation /Protection Relays/ HV circuit breaker

maintenance/ Electrical Safety procedures, IEE Wiring Regulations BS 7671,

Independent assessment for Senior Authorised Electrical Persons, Ex equipment

maintenance strategy design and inspection.

Ex Project consultant for the following GASCO ASAB inspection programmes

- ASAB 0
- ASAB 1
- ASAB Lean Gas Station
- ASAB 1 Instrumentation

QUALIFICATIONS

1972	I Eng. MIIE (elec) Ordinary National Certificate Electrical Engineering
1974	Higher National Certificate Electrical Engineering
1976	Higher National Supplementary Certificates in 1. Power Systems Control 2. Analogue & Digital Electronics 3. Electrical Machines

Assessor Qualifications D32 / D33



Battery and Battery Chargers

3-Day Course

This training course and assessment program is based on the IEC 60086 Standard for Primary Batteries

Day 1

Safe Operation of Lead Acid Batteries

Safe operation of Alkaline Batteries

Relevant COSHH regulations

Basic Battery Theory

Types of Battery

Valve regulated lead acid

Vented lead acid

Nickel Cadmium (Alkaline)

Day 2

Battery installation

Safe Working Practices

Compliance with Regulation

Correct initial charging methods

Initial and float charging

Float charge voltage criticality

Day 3

Maintenance & Reports

Maintenance procedures for long life & reliability

Data interpretation

Chargers and charging regimes

Final knowledge assessment

Operation & Maintenance of C.B. & Switchgear

3-Day Course

This training course and assessment program is based on the IEC 62271 Standard for HV Switchgear, Part 100 - Alternating current circuit breakers

Day 1

Electrical Hazards: Shock/Arc Flash

First Aid Treatment for electrical injury

Fault levels in a distribution system

Switchgear types and methods of arc extinction

Use of circuit breakers, contactors, HRC fuses and isolators

Day 2

Circuit breaker ratings

Rated voltage (Ur), Rated insulation level, Rated frequency (fr), Rated normal current (In), Rated short-time withstand current (Ik), Rated peak withstand current (Ip), Rated duration of short circuit (Ssc), Rated short-circuit breaking current (Isc), Transient recovery voltage related to the rated short-circuit breaking current

Design and construction of an HV circuit breaker logic control circuit

The role of a Trip Circuit Supervision Relay

Interpretation of an HV circuit breaker schematic diagram for fault finding purposes

Day 3

Routine Testing of HV Switchgear

Dielectric test on the main circuit (oil, air, vacuum and SF6 type devices)

Tests on auxiliary and control circuits

Measurement of the resistance of the main circuit

Tightness test

Design and visual checks

Mechanical operating tests

Final Knowledge Assessment

AC Electric Motor & Drives

3-Day Course

Day 1

Three phase induction motor and associated rotating field

Reversal of rotation

Single phase induction motor and associated rotating field

Reversal of rotation

Winding configuration for three phase induction motors star and delta

Associated phase winding voltages for star and delta configuration

Day 2

Starting methods for induction motors Star/delta, slip ring methodology

Interpretation and fault finding on Start logic control systems schematic diagrams

Insulation testing and Polarization testing of induction motors

Variable speed drives and frequency converters

Day 3

Motors for use in hazardous areas Exd, Exe and Exp protection types

Elastimold connections and stress relief of HV terminations

Generation capability diagrams

Effects on system loading MVARs of starting of HV motors

Written final assessment

Safe Electrical Operations

4-Day Course

This training course and assessment program is based on Electrical Safe Operations as recommended in UK Electricity at Work Regulations Statutory Instrument SI 635 and the US NFPA-70E Standard For Electrical Safety at the Workplace

Day 1

Electrical Hazards: Shock/Arc Flash

First Aid Treatment for electrical injury

Fault levels in a distribution system

Switching programmes and safe work site preparation

Permits/electrical safety rules/electrical authorisation levels

Day 2

Practical Assessment No 1

Prepare a switching programme required to undertake IR testing on an HV/LV distribution transformer

Switchgear types and methods of arc extinction

Use of circuit breakers, contactors, HRC fuses and isolators

Synchronization and generation control

Effects of governor and excitation variation on alternator output

Parallel operation of alternators

Load sharing of MW & MVARs

Day 3

Practical Assessment No 2

Prepare a switching programme to permit safe isolation of one half of a high voltage switchboard bus bar section for torque check maintenance work. The remaining section of the switchboard is to remain live at 6.6KV

Alternator load limits & capability diagrams

Starting demands of induction motors

Load shedding

Day 4

Electrical protection schemes

Current transformers/ ratio/mag curves/ polarity checks and danger of open circuit secondary windings

IDMT over current relays

Differential protection schemes

Restricted earth fault protection schemes

Standby earth fault protection relays

Reverse power and field failure relays

Final knowledge assessment

HV/LV Switching Procedures

5-Day Course

Target Audience

Electrical Engineers, Technicians, Supervisory Staff responsible for operation and maintenance of electrical generation and distribution systems.

Day 1

Electrical Hazards

Shock/explosion/fire and burns

Calculation of fault levels

Precautions and methods of control

Permits/electrical safety rules/electrical authorisation levels

Practical Assessment EI-01

Isolate & prepare a safe work place to undertake maintenance on a 6.6KV/440V distribution transformer. Include the issue of any permits and switching programmes required

Day 2

Emergency isolations and First Aid procedures
HV/LV distribution earthing & floating systems
Use of Electrical Safety Rules for HV/ LV working Safety standards for isolation of high voltage electrical systems

Practical Assessment EI-02

Isolate & prepare a safe work place to undertake maintenance on one half of an 11KV switchboard bus bar. Include the issue of any permits/precautions and switching programmes required

Day 3

Operation of switchgear- use of contactors/isolators
Circuit breakers and HRC fuses. Integral earthing facilities and application of CME

Practical exercise on 60 MW

Distribution simulator to undertake synchronising and manual load sharing on parallel generator operation
US NFPA 70E Electrical Safety standard for arc flash protection
Calculation of Incident Energy in an arc flash & selection of appropriate flame retardant PPE

Day 4

Generator capability diagrams/ standing load and available capacity
Team Exercises to establish feasibility of requested load increase from available generation capacity and standing load conditions
Discussion exercise of chosen case studies of past HV safety incidents

Day 5

Electrical protection schemes
Current transformers/ ratio/mag curves/ polarity checks and danger of open circuit secondary windings
IDMT over current relays settings and operating parameters
Differential protection schemes
Restricted earth fault protection schemes
Standby earth fault protection relays

Final written knowledge assessment
Group final discussion on course contents.

Safe Selection, Installation and Maintenance of Electrical Equipment for use in Hazardous Locations

5-Day Course

This training course and assessment program is based on the IEX 60079 International Standard.

Target Audience

Electrical Technicians, Supervisors and Electrical Management

Day 1

General principles
Gas grouping
Upper and Lower explosive limits
Ignition temperatures and energies
T ratings
Ingress Protection
IEC
ATEX
US standards NEC 500 – 505
Hazardous areas by Zone & Division

Day 2

Certification and marking of Ex equipment
Flameproof Exd protection concepts and standards
Exd Question and Answers workshop
Demonstration of compound filled and diaphragm seal gland assembly.

Day 3

Group discussions on past explosive incidents: Brent Alpha -Cormorant Alpha -Piper Alpha - Texas City oil refinery
Increased Safety Exe protection concepts and standards
Exn protection concepts and standards
Exe/Exn Questions and Answers workshop Practical Assessments No. 1 & 2.

Day 4

Exi protection concepts and standards
Exp protection concepts and standards
Hybrid methods of protection
Inspection and maintenance standards
Construction of an Ex maintenance program Exp/Exi/Hybrid protection Question and Answers workshop Practical assessments No. 3 & 4.

Day 5

Practical assessment No 5
Knowledge assessment of candidate understanding Competence Results.