



## **Fact Sheet No.1**

### **CompEx Module Ex12 ADE**

#### **Course**

CompEx Ex12ADE: Application Design Engineers Course

#### **Location**

Exveritas Training Centre (Wrexham, UK) or Hotel Conference Suite or other similar location

At facilities other than ExVeritas Training Centre, the minimum number of candidates will be six.

#### **Title**

Explosive Atmospheres: Gas, Vapours & Combustible Dusts atmospheres.

#### **Number of persons**

Maximum of eight persons per course

#### **Duration**

5 Days

#### **Examined**

Four Multi-Choice Examinations

#### **Target Audience**

Electrical and instrumentation Designers, Engineers e.g. Maintenance Engineers, Project Engineers etc.

## Minimum Requirements

The Candidate has sufficient knowledge<sup>1</sup>, skills<sup>2</sup> and experience to undertake the training and assessments.

## Employment/Sponsorship Letter

A Company employment/sponsorship letter will also be requested in support of the candidates' technical qualifications, career history and current technical role. A template sponsorship form will be issued along with the booking forms. These letters can be downloaded from our website <http://www.exveritas.com/application-design-engineers-certification/>

## Course Overview

The course is intended to give an in-depth awareness to the candidate with regard to explosive atmospheres formed by gases, vapours, mists and some insight to combustible dusts. It covers the application design and selection of electrical equipment for use in explosive atmospheres. As the persons attending the course are Designers/Engineers or at an equivalent senior level, the course covers the basic and more in depth elements of the installation requirements from a theoretical viewpoint.

All presentation material is in Microsoft PowerPoint, whilst electronic (hard copies are available at cost) hand-outs are available in either PowerPoint (three slides per page) some of the presentations are available in word documentation format. The format of the course notes are intended that they can be used as an aide-memoir tool in the future for the candidate.

There are a number of modules available that cover topics such as:

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<sup>1</sup> A minimum of an HNC/HND or BTEC National Diploma in a relevant engineering or technology subject (or national equivalent outside the UK).

<sup>2</sup> Understanding, interpreting and applying technical content for electrical/instruments application design.

## Knowledge and Competency

Knowledge and Competency required for technical persons working in explosive atmospheres, as identified in the latest edition of IEC 60079-14.

## Explosive Atmosphere

Definition of the three groups, surface temperatures, temperature classes, density of gases and vapours, properties of dusts, flammable range and explosive range. Ambient temperatures, Minimum Ignition Energy (MIE), Maximum Experimental Safe Gaps (MESG), an overview of the latest edition of IEC 60079-20-1.

## Standards

Identifies the range of IEC (EN) standards the candidate should be aware of, how standard are formatted and how often they are amended.

## Area Classification

Understanding of the basic requirements of the latest editions of area classification for both gases and combustible dusts, i.e. IEC 60079-10-1 , gases and vapours grading sources of release i.e. continuous, primary or secondary, zone types etc.

## Protection Concepts

An overview of the concepts as applied to equipment for use in explosive atmospheres e.g.

- Electrical concepts - d, e, m, n, o, p, q, s, op, i and t;
- Principles of how the electrical concepts works;
- Intrinsic safety ;
  - 1) I.S. cable types,
  - 2) Assessment of I.S. circuits, design criteria, cable calculations;
  - 3) Preparation of Descriptive System Documentation;
  - 4) Earthing Systems e.g. High integrity earth and power earths;
- Two or more concepts on the same equipment. E.g. Ex de,

## **Ingress Protection**

Introduction and explanation of the terminology used for equipment with regard to international (ingress protection) reference to the latest edition of IEC 60529 e.g. IP54 or IP67, which is the best and why.

## **Equipment Marking/Selection**

A detailed review of equipment marking on different types of equipment.

- European marking e.g. ATEX Categories as identified in Directive 2014/34/EU.
- International Electrotechnical Commission's Equipment Protection Levels e.g. Ga, Gb, Gc and Da, Db and Dc.
- Latest edition of IEC 60079-0 referencing equipment marking.

## **Design of equipment installed in gas/vapours and combustible dust environments**

A detailed review of the requirements of latest edition of IEC 60079-14 with regard to the application design and installation practices of both electrical and intrinsically safe installations in explosive atmospheres.

## **Intrinsic Safety**

Identifying the basis of safety of I.S. The safety factors applied to I.S. systems, safety parameters of associated apparatus and field instruments, use of Curves and table from IEC 60079-11 latest version. There are calculations based on power matching and Ohm's law covered during the day.

Numerous individual exercises throughout the day plus in-depth homework.

## Cables and Glands

Theoretical aspects of cable types and cable glands types that are suitable for use in explosive atmosphere. A hand out on cable glands is available on request.

## Documentation

A review of the documentation that should be referenced when designing, installing and maintaining electrical installations for use in hazardous locations. This would include but not limited to the following:

### *IEC standards (latest editions)*

- IEC 60079-0: Explosive Atmospheres: General Requirements
- IEC 60079-10-1: Explosive Atmospheres: Area classification gas atmospheres
- IEC 60079-10-2: Explosive Atmospheres: Area classification combustible dust atmospheres
- IEC 60079-14: Explosive Atmospheres installation of electrical (also includes I.S.) systems
- IEC 60079-20-1: Explosive Atmospheres : Material characteristics for gas and vapour classification — Test methods and data

### *Certification*

- EU (was EC) type and IECEx certificates. A review of a typical EC and IECEx type document. The use and identification of the letters used on a certificate number e.g. X and U conditions. Ambient temperature range limitations especially for luminaires.
- Declaration of Conformity (DOC).

### *User instructions*

- System Descriptive Documents
- Loop Drawings
- Electrical Drawing
- General arrangement drawings( if applicable)
- Installation documentation

## Additional Information

In support of the learning program there are a number of video's that will be shown during the course. Homework's, group and individual exercises are also set during the course.

## Assessments

In total there are 7.5 hours of multi-choice written examinations to be completed;

Core paper, Marking paper, design paper and standards papers (two parts)

- 1) Core Paper Closed Book 30 questions- 45 minutes (Tuesday afternoon)
- 2) Marking Paper Closed Book 30 questions- 45 minutes (Wednesday afternoon)
- 3) Design paper Open Book 34 questions 3 hours (Friday morning)
- 4) Standards paper Open Book 80 questions 2.25hrs (Friday afternoon)

## Agenda

*The above timings are subject to change.*

### Monday

- Review of Pre-learning Material<sup>3</sup>
- Standards
- IEC 60079-14 Clause by Clause analysis (throughout the course)
- Explosive atmospheres properties
- Area Classification IEC 60079-10-1 and IEC 60079-10-2
- ATEX 2014/34/EU (94/9/EC) – Equipment and equipment marking.
- Homework

### Tuesday

- IEC 60079-14 Clause by Clause analysis (throughout the course)
- Ingress Protection IEC 60529
- Equipment Protection Levels. (IEC)
- Overview of glands and types of cables used in explosive atmospheres
- Core paper examination (closed book) Duration: 45 minutes
- Homework

### Wednesday

- IEC 60079-14 Clause by Clause analysis (throughout the course)
- Documentation reviews EC type, CoC, DoC, Datasheets, GA drawings.
- Marking Paper examination (closed book). Duration: 45 minutes
- Homework

### Thursday

- IEC 60079-14 Clause by Clause analysis (throughout the course)
- Intrinsic Safety Concept plus cable calculations.
- Production of a Descriptive System Document (DSD)
- Homework

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<sup>3</sup> Pre-learning is issued as part of the candidate pack supplied prior to the commencement of the course. It is important that candidates read the pre-learning material supplied before attending the course. In addition to this candidate should have an understanding of the structure and content of IEC 60079-14 (latest version)



## Friday- Assessments

All assessments on the Friday are open book.

- Design paper (morning session). Duration: 3 hours
- Standards paper (afternoon session) Duration: 1 x 1 hour + 1 x 1.25 hours





## **COMPEX TRAINING CENTRE**

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