THE USE OF COMPETENT PERSONS
FOR WORK IN EXPLOSIVE ATMOSPHERES

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Abstract –

Standards for hazardous locations require the use of appropriate equipment to avoid ignition of the atmosphere. If that special equipment is NOT installed correctly it may no longer provide the explosion protection integrity and therefore cause the installation to be unsafe.

The use of competent persons supports the correct use of equipment and assists in maintaining the explosion protection integrity for the life of the equipment. Competent persons are able to identify faults, which could become potential sources of ignition.

The Personnel Competencies Scheme is another element of certification to support the Equipment and Service facilities Schemes.

This IECEx Certificate of Personnel Competency (CoPC) opens the way for a global scheme to provide consistency in the assessment of competent persons. It is structured to provide separation from any training schemes and therefore gives the highest level of integrity of assessment. This Scheme recognizes that the knowledge and skills could be obtained by any means such as tertiary education, internal company training, external private training, on the job mentoring, etc.

I.   THE IECEx AND CoPC ORIGINS

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes international standards for all electrical, electronic and related technologies.

The IEC's multilateral conformity assessment systems, based on its international standards, are truly global in concept and practice, reducing trade barriers caused by different certification criteria in various countries and helping industry to open up new markets. Removing the significant delays and costs of multiple testing and approval allows industry to be faster and cheaper to market with its products.

IEC has three areas of conformity assessment and product certification systems:

IECEE System - for conformity testing and certification of electrotechnical equipment and components.

IECQ System - for the quality assessment of electronic components and associated materials and processes.

IECEx System - for certification to standards for equipment for explosive atmospheres. The IECEx operates in 4 areas:
1. Equipment Certification
2. Conformity Assessment Mark
3. Service Facility Certification
4. Certification of Persons

The original proposal to introduce certification of personal competencies was first introduced to the IECEx Management Committee at the Annual General Meeting held in Buxton on the 6th and 7th of October 2005. It was envisaged as a possible extension to the IECEx system in addition to the equipment certification scheme and the service facilities certification scheme. During the development of the Service Facilities Certification Scheme it had been identified that the competence of repair personnel was a major element on the certification of a workshop. If such a scheme for the certification of personnel competencies was introduced it would need to be both consistent and transportable.

At the Buxton meeting it was agreed that a working group would be established "To determine whether or not there is an industry need for an International verification/certification system for Competency in the Ex field. In doing so the working group may also wish to propose a possible framework/guidelines should their investigations reveal such a need."

II.   WHAT IS COMPETENCY

In determining if somebody is competent it is usual that both the level of knowledge and the acquired skills are considered. This is always assessed in light of the expectation of the duties and responsibilities that will be assigned to the individual and the application of that knowledge and skill to the standards of performance required in the workplace.

Competency includes all aspects of work performance and not only specific skills.

A.   Evidence of Competency

It is very difficult to declare somebody competent without appropriate evidence. The evidence required will include both:
1) *Qualifications (off job):* This may be a university degree, a diploma, craftsman/trade training that is generally achieved through an education system.
2) *Experience (on job):* Apprenticeships, trainee program, direct supervision or mentoring are examples of the typical experience that would be considered.
3) *Recent and relevant training (both on and off the job):* it is essential that knowledge and skills are maintained and to achieve this a competent person would be expected to attend refresher training or seminars etc.

All of these can be summarized under "Competency"

B.   Competency assessment

In order to carry out an assessment it is critical that objective evidence is obtained that is:
1) *Valid:* can be clearly shown to relate to the particular aspect that is being assessed.
2) *Direct:* is not 'referred' evidence and is original. e.g. not work done by others that has been checked.

3) *Authentic*: it must be original work carried out by the applicant.
4) *Current*: within an acceptable time frame, quite often if within a certification scheme it will be since the last assessment.
5) *Sufficient*: will need to cover all aspects being assessed and especially cover important specific aspects.

The assessment needs to also take into account four functions of competency, which are:

- Task Skills
- Task management skills
- Contingency management skills
- Job/role environmental skills

The concept of competency focuses on what is expected of an employee in the workplace rather than the learning process.

It embodies the ability to transfer and apply skills and knowledge to new situations and environments.

In summary, the IECEx CoPC Scheme provides certification that someone is competent to apply the International Standards as listed on the IECEx Certificate.

III. WHY IS COMPETENCY REQUIRED?

A. Standards references

There are several references in IEC standards that effectively require that persons that are competent carry out all work in and associated with explosive atmospheres.

In IEC 60079-14 Ed 4, Clause 4.4 "Qualifications of personnel" it states 'The design of the installation, the selection of equipment and the erection covered by this standard shall be carried out only by persons whose training has included instruction on the various types of protection and installation practices, relevant rules and regulations and on the general principles of area classification. The competency of the person shall be relevant to the type of work to be undertaken (see Annex F). Appropriate continuing education or training shall be undertaken by personnel on a regular basis.'

Also in IEC 60079-19 Ed 2 Clause 4.4 "Instructions for the repair facility" it states 'Repair facilities shall operate a Quality Management System that meets with the requirements of the ISO 9000 series of standards.

The repair facility shall appoint a person ('Responsible Person') with the required competency (see Annex B), within the management organization, to accept responsibility and authority for ensuring that the overhauled/repaired equipment complies with the certification status agreed with the user. The person so appointed shall have a working knowledge of the appropriate explosion protection standards and an understanding of this standard.

The repair facility must have adequate repair and overhaul facilities as well as the appropriate equipment necessary and trained Operatives with the required competency (see Annex B) and authority to carry out the activities, taking into account the specific type of protection.

In both these standards it is a requirement that competent persons undertake the work and it is likely in many countries that the requirements given in both these standards are embraced by regulations or legislation thus making competence mandatory.

B. Owner/Operator Responsibility

Today most countries have legislation in terms of safety and in most cases the owner or operator is responsible for the design, installation, operation and maintenance of electrical equipment in plants and their safe operation. International Standards clearly formulate the expected competency of personnel for all aspects of electrical (and soon will add the non-electrical) installations as well as for use, maintenance and adequate repair and overhaul. In case of an incident, the responsibility of the owner or the operator in charge of the plant is clearly engaged. It is in their interest to ensure that personnel involved in above work are competent, especially when using outsourced labour. The difficulty up to now has been with the ability to identify a mechanism by which they can be confident competent persons are carrying out the work. With the advent of the IECEx Certificate of Personnel Competence this will become a lot easier.

At times it is difficult to understand the actions of so called qualified persons that relate to what we would identify a complete lack of competence. The example given here is just one of many that we often look at in amazement that demonstrate not only the requirements to maintain the integrity of explosion protected equipment but also defies the basic electrical installation requirements.

The product here consists of an Ex d enclosure housing a rotary switch. The installation needs an additional contact so an extra cell is added to the switch. However it is now too long to fit into the enclosure and obviously it will mean a new enclosure should be fitted and the switch completely rewired. The solution offered by the installer is to cut a hole in the back of the enclosure to accommodate the switch and this is much simpler, quicker and cost effective but .... Apart from any issue regarding the IP rating we can be sure it has little chance of containing an internal explosion.

An Example of Lack of Competence

C. How is Competency identified?

The difficulty confronting an owner or operator is what can they accept to prove persons undertaking work in their plant are competent. They can accept the responsibility of deeming their own personnel as competent however this does not address contracted persons. The other possibility is to rely on all personnel being considered competent through a company or National scheme. This may cover most situations but

does not help if work is being done in other countries or the workers are from a different country.

In the future there will be a new path through the IECEx Certified Persons Scheme

IV. ESTABLISHING THE IECEx CERTIFICATE OF PERSONNEL COMPETENCE

To satisfy the instruction from the IECEx Management Committee Expert working group WG12 was formed and determined that there was a need to conduct some market research in order to establish of there was a need for personnel competencies and if so what are the likely areas. A questionnaire was formulated and circulated to the Member Bodies of the IECEx System seeking information as to:

- What currently exists at a National level in the way of competencies?
- Whether a need exists for an International Competency Scheme?
- Is formal training available?
- What assessment processes are in place
- Are there any regulatory obstacles to the introduction of an international certification of personnel competencies?

Questionnaire Results
National Committee responses (%)
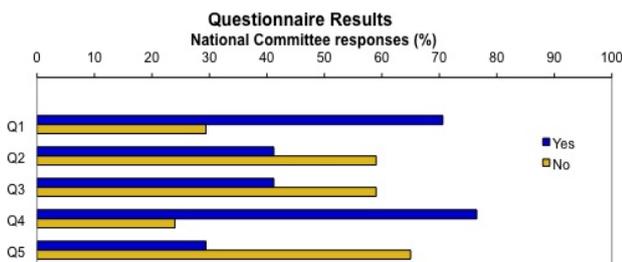
Q1 – Do Competencies exist?
Q2 – Does formal training exist?
Q3 – Is any assessment process in place?
Q4 – Is an international scheme needed?
Q5 _ Are there any regulatory obstacles?

Results:
- Some countries have documented competencies
- Few are subject to verification
- Clear support indicated for International competencies.

Where countries did have some form of competency requirements in place they were asked to identify what was in place. The results are

Competencies currently existing
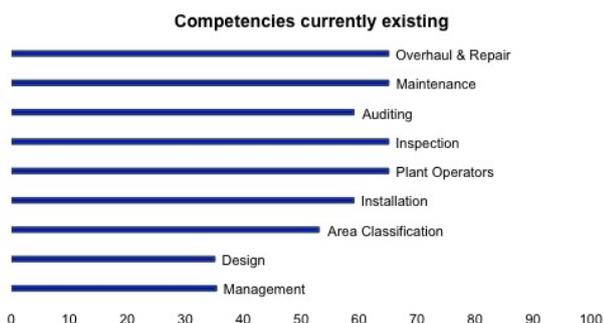
Results:
- Majority were identified in the area of the craftsman / trade work.
- Management and design are implemented the least

In order to seek guidance on the development of future competencies an indication of priorities was requested.

Competency Priorities
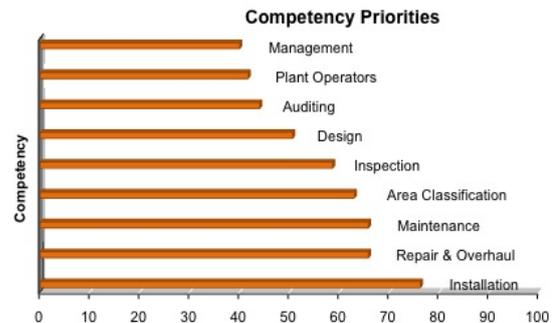
Results:
- Predictably the priorities are similar to those that already exist.
- Exceptions are classification, which came in at a higher level, and auditing and plant operation at a lower priority.

At the IECEx management Committee meeting in Shanghai on 7th & 8th September 2006, the survey results were presented by WG12 with a recommendation to proceed with the development on the basis that there was support for a personnel competency scheme to be established.

WG12 presented the completed rules and documentation covering the full requirements for a 'Certificate of Personnel Competencies" [CoPC] scheme at the Melbourne meeting of the IECEx Management Committee on 3rd & 4th September 2009. The rules and operational documents were accepted and endorsed for the CoPC to be implemented.

The documents have now been published and consist of the rules for the scheme and operational documents that cover the 1) Assessment Procedures for IECEx acceptance of Certification Bodies (ExCBs); 2) Application for Personnel Competencies, documentation and information requirements; 3) ExCB Procedures for issuing and maintaining IECEx Certificates of Personnel Competencies and 4) Specification for Units of Competency Assessment Outcomes.

The rules and procedures take into account the requirements of:

ISO/IEC 17024: 2003 Conformity Assessment – General requirements for bodies operating certification of persons

Guide 27 Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity

Guide 28 General rules for a model third-Party certification System for products

Guide 65 General requirements for bodies operating product certification systems

The key details included in the rules are:

- Governing of the IECEx System
- Principles of the IECEx CoPC Scheme
- Confidentiality
- Contents and format of Certificates and Assessment reports
- Procedures for assessment of Ex Personnel Competencies
- Surveillance and re-certification
- Suspension or withdrawal
- Compliance with rules
- Appeals
- Withdrawal
- Suspension
- Complaints
- Typical Forms for application
- Participating countries
- Certification procedure
- Acceptance of certification bodies

Work of the Expert WG12 Group still continues to assist industry and involves development of a simple language Guidance Document intended for use by any person seeking a CoPC or any organization requiring to verify they are using Competent persons plus the ongoing creation of a databank of assessment questions and tests for use by the ExCBs conducting assessment.

V. PHILOSOPHY OF THE IECEX CERTIFICATE OF PERSONNEL COMPETENCIES

The Scheme has been established in order to provide a consistent approach to the assessment of the Competence of Personnel to work in Ex areas in compliance with International Standards as listed on the certificate.

It is intended to assess the person's competency and not that of an organization. This means that it will apply directly to each individual and is not referred or conferred through a company simply because that is where the person works.

Is not concerned with how the knowledge and skills are obtained but only uses an assessment of objective evidence. This means that it is not compulsory that training is undertaken as a part of the assessment process and also helps to remove any conflict a training organization may have by removing them from the assessment.

VI. UNITS OF COMPETENCY

The different types of work are covered by "Units of Competency"

A unit of competency is the competency required for a useful work function and which resides with an individual. It must include the ability to apply both the theory and the practical skills.

This should not be confused with a job description, which may comprise a number of units of competency.

A. Units of Competency

The specification for each of the IECEx Units of Competency comprises:
1) *Scope*
2) *Pre-requisites*

3) *Elements and performance criteria*
4) *Scope Limitations*
5) *Evidence guide - Critical aspects of evidence*

There are currently ten IECEx "Units of Competency" detailed in IECEx OD 504 and are:

1. *Apply basic principles of protection in explosive atmospheres.*

This competency unit is intended for any person who will have an involvement working in or associated with explosive atmospheres including operators and management personnel. It covers the explosion-protection aspects of plant and machinery operation or maintenance. It requires the ability to visually identify any damage or deterioration of explosion-protected equipment, monitor equipment and plant in relation to changes in the explosion hazard and to follow procedures to limit the risk of an explosion

There is no minimum level of technical education applicable for this unit and is assessed in combination with, or after the gaining of, other competencies required by a given industry or enterprise for plant or machinery operation or installations, maintenance or service functions. It should be noted that this unit becomes a pre-requisite unit for most other units of competency.

2. *Perform classification of hazardous areas*

This Unit of Competency covers knowledge and skills to classify areas where explosive materials may exist. It requires the ability to gather and analyze data relative to explosion hazards, determine the extent of risk and establish and document zones. It is based on IEC 60079-10-1 and IEC 61241-10 (now IEC 60079-10-2) and any other relevant standard that apply to this Unit of Competency. This would allow the use of API RP505 & IP15.

Competency in this unit is likely to require a degree or diploma or equivalent and experience in gathering and analyzing technical data and using this data for risk assessment. Those who understand the relevance and significance of properties of flammable materials and those who are familiar with the process and the equipment along with safety, electrical, mechanical and other qualified engineering personnel should carry out the area classification.

3. *Install explosion-protected equipment and wiring systems*

This Unit of Competency covers the explosion-protection aspects for installing explosion-protected and associated equipment and wiring systems. It requires the ability to match equipment with that specified for a given location, work safely, and follow installation Standards and complete the necessary installation documentation.

This unit of competency is based on IEC 60079-14 and any other relevant standard that apply to this Unit of Competency. For installation all types of protection must be understood

The applicant shall have the level of technical education (or equivalent) attained, relevant to the application, through documents such as College Certificates and Vocational qualifications etc. together with a minimum 3

years experience in industrial electrical installation practice that is required.

Competence in this unit is assessed either concurrently with or after Unit Ex 001.

4. *Maintain equipment in explosive atmospheres*

This Competency covers the explosion-protection aspects for maintaining explosion-protected and associated equipment and wiring systems including plant maintenance schemes. It requires the ability to develop and manage maintenance programs incorporating strategies for inspections, repair/overhaul/replacement of components and recording of maintenance outcomes. This includes the ability to follow a maintenance program, work safely, carry out maintenance to Standards and manufacturer's instructions and complete the necessary maintenance documentation and is based on IEC 60079-17 and any other relevant standards that apply to this Unit of Competency.

The applicant shall have the level of technical education (or equivalent) attained, relevant to the application, through documents such as College Certificates and Trade Credentials etc. and a minimum 3 years experience in industrial maintenance practice is required.

NOTE 1 This experience can include time spent under general supervision.

Competence in this unit shall be assessed either concurrently with or after Unit Ex 001 and competencies in maintenance of general plant and equipment have been achieved.

5. *Overhaul and repair of explosion-protected equipment*

Specific for use with the Service Facilities Scheme (Repair & Overhaul) this Unit of Competency covers the explosion-protection aspects of overhauling and repairing explosion-protected equipment both at a craftsperson (operative) level and as the responsible person for verifying compliance after such overhaul and/or repair. For the operative it requires the ability to identify and select authorized components, follow repair specifications to effect the overhaul/repair of equipment and complete repair documentation. For the Responsible Person it requires the ability to establish and document the level of work required, arranging for the overhaul/repair to be carried out, verify compliance of overhauled/repaired equipment and complete the necessary documentation.

This unit of competency is based on IEC 60079-19 and any other relevant standards that may apply. The applicant will have the level of technical education (or equivalent) attained, relevant to the application, through documents such as College Certificates and Trade Credentials etc.

For an operative a minimum 3 years experience in the overhaul and repair of general electrical, electronic and/or mechanical equipment relevant to the scope of the unit of competency being applied for taking into account the scope limitations.

For a responsible person a minimum 3 years experience in the servicing of Ex electrical, electronic and/or mechanical equipment relevant to the scope of the unit of competency being applied for taking into account the scope limitations.

Competence in this unit is assessed either concurrently with or after Unit Ex 001 and competencies in the

overhaul and repair of general electrical, electronic and/or mechanical equipment have been achieved.

6. *Test electrical installations in or associated with explosive atmospheres*

This Competency covers testing electrical installations for explosive atmospheres and usually an extension to the installation or inspection competencies. It requires the ability to select, prepare and use appropriate testing devices, work safely and to Standards and to interpret and record test results and is based on IEC 60079-14 and any other relevant standards that may apply.

The applicant will have the level of technical education (or equivalent) relevant to the application, through documents such as College Certificates and Trade Credentials etc. and a minimum 3 years experience in industrial electrical installation practice is required.

Competence in this unit shall be assessed either concurrently with or after Unit Ex 001 and conducting testing of general electrical, electronic, instrumentation and/or data communication installations have been achieved. For work on wiring and equipment operating above 1000 V a.c. or 1500 V d.c. competency in high voltage switching and safe isolation should be held.

7. *Perform visual & close inspection of electrical installations in or associated with explosive atmospheres*

This Unit of Competency covers evaluating the completeness of a hazardous area verification dossier and compliance of the explosion-protected aspects of the electrical installations within the constraints of a visual inspection. It requires the ability to work safely in a hazardous area, understand verification dossier documentation, identify explosion-protected equipment with their certification and specified location, visually inspect an installation for compliance and report and act on inspection results.

This unit of competency is based on IEC 60079-14 & IEC 60079-17 and any other relevant standards that may apply. The applicant will have the level of technical education (or equivalent) relevant to the application, through documents such as College Certificates and Trade Credentials etc and a minimum 3 years experience in industrial electrical installation practice.

Competence in this unit shall be assessed either concurrently with or after units Unit Ex 003 or Unit Ex 004 have been achieved. Alternatively, competencies in general electrical inspection will satisfy the prerequisite.

8. *Perform detailed inspection of electrical installations in or associated with explosive atmospheres*

This Unit of Competency covers the explosion-protection aspects of conducting initial, periodic and sample audit inspections of explosion-protected equipment and installations. It requires the ability to audit a verification dossier, work safely in a hazardous area, inspect against Standards and report and act on inspection results. This unit of competency is based on IEC 60079-14 & IEC 60079-17 and any other relevant standards that may apply.

The applicant will have the level of technical education (or equivalent) relevant to the application, through documents such as College Certificates and Trade Credentials etc. and a minimum 3 years experience in

general electrical installation practice and a minimum of 2 years experience in Hazardous Area electrical installation practice.

Competence in this unit is assessed either concurrently with or after competencies in Unit Ex 003 or Unit Ex 004 have been achieved. Alternatively, competencies in general electrical inspection will satisfy the prerequisite.

9. *Design electrical installations in or associated with explosive atmospheres*

Intended for installation design engineers this Competency covers the explosion-protection aspects of designing electrical power, control and instrumentation systems and installations. It requires the ability to establish design briefs and to pursue economical and effective explosion-protection design solutions and is based on IEC 60079-14 and any other relevant standards that may apply.

The applicant shall have the level of technical education (or equivalent) relevant to the application, through documents such as Degree, Diploma and College Certificates etc and a minimum 3 years experience in general electrical installation design or supervised Hazardous Area installation design.

Competence in this unit shall be assessed either concurrently with or after Unit Ex 001.

10. *Perform audit inspection of electrical installations in or associated with explosive atmospheres*

This Unit of Competency covers the explosion-protection aspects of conducting an audit of an electrical installation. It requires the ability to verify whether an installation complies with the relevant hazardous area Standards for that installation and includes the verification of design and certification documentation (verification dossier), maintenance, overhaul and repair, work safety, inspection against Standards and reporting of audit results and is based on IEC 60079-14 & IEC 60079-17 and any other relevant standards that may apply.

The applicant shall have the level of technical education (or equivalent) attained, relevant to the application, through documents such as Degree, Diploma, College Certificates, Trade Credentials etc plus a minimum 3 years experience in general electrical installation or inspection practice, a minimum of 2 years experience in Hazardous Area electrical installation inspection practice.

Competence in this unit is assessed either concurrently with or after Unit Ex 001 and after competencies in engineering auditing or equivalent have been achieved.

B. *Scope limitations:*

Whilst not encouraged an applicant may choose to have a limitation placed on the scope of the competency for which they are applying and can be selected from:
1) *Type of explosion protection*
2) *Product type*
3) *Groups*
4) *Voltages*
5) *Other* – which may be related to specific National requirements

Validity

Once an assessment is satisfactorily undertaken and a certificate issued the competency is subject to surveillance and re-assessment every three years. The re-assessment includes provision of a logbook to demonstrate the competent person has been active in working in Hazardous Areas.

VII. APPLICATION FOR A CERTIFICATE OF PERSONNEL COMPETENCY.

An applicant will need to complete an application form that requires at least the following information.

A. *The scope of certification being requested.*

The unit or units of competency for which they would like to be assessed together with any limitations, selected from the list, that are to be applied.

B. *Evidence that an applicant is expected to provide:*

Evidence relating to both education and training detailing academic qualifications, education level and work experience in both non-hazardous and hazardous areas. The information must be validated and this could be through certificates, licenses or supervisors sign off.

C. *Personal details*

Personal details sufficient to uniquely identify the individual must be submitted and will include a photograph.

D. *Declaration*

A signed declaration attesting to the validity of all the information provided as well as declaring that an application has not been made to another certification body.

VIII. INSTRUMENTS OF THE CERTIFICATE OF PERSONNEL COMPETENCY SCHEME

The instruments within the scheme consist of:

A. *Application Form*

A sample application form is included in the Scheme rules but this may be customized by the participating Certification Body. It must contain as a minimum the information given on the sample form.

B. *A Certificate of Personnel Competency [CoPC]*

The actual Certificate of Personnel Competency will reside on the IECEx website in a similar way to the Certificates for both the equipment and service facility schemes. Any printed copy will be an uncontrolled copy with the status as shown on-line only being valid.

C. *A Personnel Competency Assessment Report [PCAR]*

The assessment report is the document prepared by the Certification Body to provide a report on the results of the assessment. This document, apart from the cover page, is always held as confidential.

D. An Identification Card (credit card size)

An identification card will be issued by the IECEx Secretariat (via the ExCB) containing information regarding the competent person, the competencies they have achieved and a photograph.

All details of the Certificate, ID Card and PCAR can be verified on-line at www.iecex.com

IECEx CoPC PROCESS
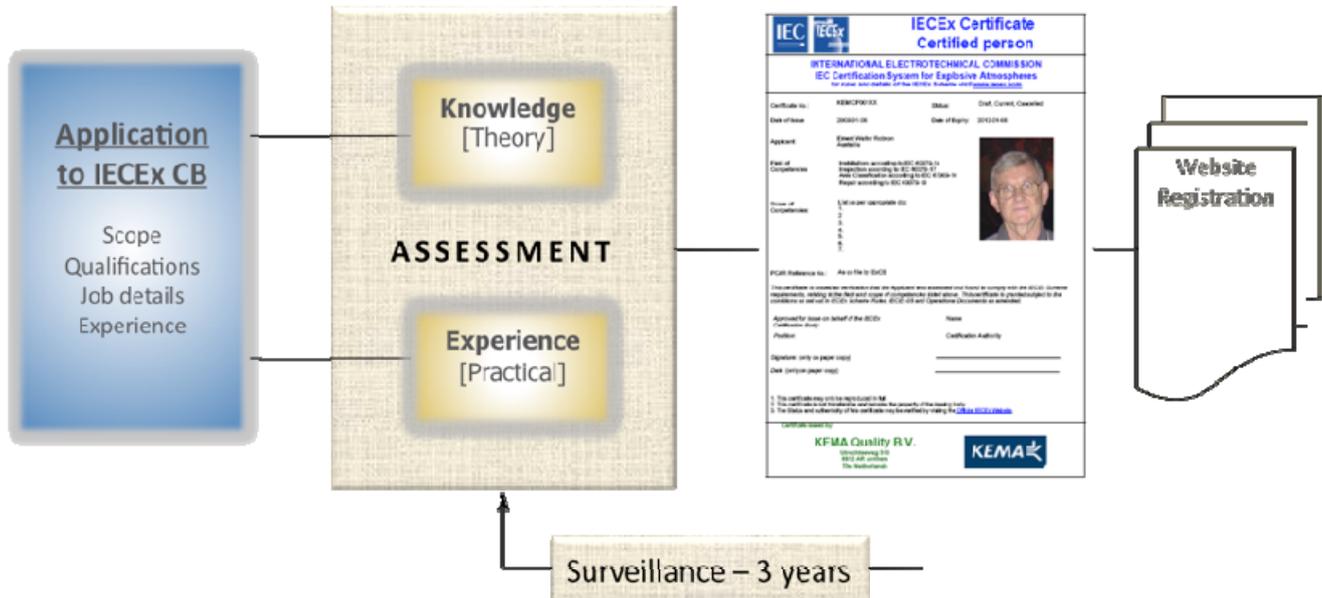
IX. SUMMARY

The CoPC Scheme recognizes the unique nature of the Hazardous Area requirements and the associated knowledge and skills for the correct application of Standards.   The areas of competency deal with all aspects including classification, design,, selection, installation, inspection, maintenance and repair and overhaul..

The use of Competent persons provides benefits with the   plant being design installed and operated correctly and the explosion protection integrity for the life of the equipment will be maintained. Competent persons are able to identify faults, which could become potential sources of ignition.

IECEx CoPC opens the way for a global scheme to provide consistency in the assessment of competent persons.   As it is divorced from any training schemes it gives the highest level of integrity of assessment.

This Scheme is not concerned with how the knowledge and skills are obtained and concentrates specifically on the abilities of the individual person.

The IECEx CoPC is the ideal Scheme to benchmark competency requirements for use within any framework providing essential support for the overall package of compliance requirements for hazardous areas.

The recent formal endorsement by the United Nations, via the UNECE (United Nations Economic Commission for Europe), of IECEx as the best practice model for verification of compliance with International Standards is testament to the respect gained by IECEx in serving the needs of both government and industry for certification in the Ex sector.

X. ACKNOWLEDGEMENTS

The IECEx Scheme is the result of much more than an individual's efforts. The IECEx work and success is the result of the many contributions from the worldwide network of Ex experts that come together to contribute to the development and operation of the System, its procedures and processes along with the companies that support the involvement of their management and staff.

All members of the Working Group 12 have contributed in the development of the IECEx CoPC Scheme, through many hours of 'heavy' discussion, and it is not appropriate to individualize.

Concerning the opportunity to present this paper and assistance with its preparation, a special note of thanks goes to:
  • IECEx Secretariat and in particular Mr. Chris Agius
  • Mr. Patrick Leroux – TOTAL

XI. REFERENCES

[1]   IEC website
[2]   IEC 60079-14 Explosive atmospheres - Part 14: Electrical installations design, selection and erection.
[3]   IEC 60079-17 Explosive atmospheres - Part 17: Electrical installations inspection and maintenance
[4]   IEC 60079-19 Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation
[5]   IEC 60079-10-1 Explosive atmospheres - Part 10.1: Classification of areas - Explosive gas atmospheres

[6] IEC 60079-10-2 (was IEC 61241-10) Explosive atmospheres - Part 10.2: Classification of areas - Explosive dust atmospheres

[7] American Petroleum Institute Recommended Practice 505, (API RP505) Recommended Practice Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2,

[8] Energy Institute (EI) IP15 Model Codes of Safe Practice - Part 15: Area classification code for installations handling flammable fluids.

[9] ISO9001 Quality Management Systems - Requirements

[10] ISO/IEC 17024: 2003 Conformity Assessment – General requirements for bodies operating certification of persons

[11] Guide 27 Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity

[12] Guide 28 General rules for a model third-Party certification System for products

[13] Guide 65 General requirements for bodies operating product certification systems

XII. VITA

Biographical details:
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Ralph Wigg operates his own company E-x Solutions International Pty Ltd providing services to the Hazardous Area Industries as a Compliance Professional.   His background is in Electrical Power Engineering having over 50 years experience with an involvement of more than 30 years in Hazardous Area equipment gives him the ability to speak with authority on this subject.

Currently chair of several Standards Australia Hazardous Areas Committees and past chair of Committee EL014 Electrical Equipment for Hazardous Areas, and of the IEC Technical Committee for Combustible Dusts, he is dedicated making standards work for the electrical industry in Australia.   The commitment to international work sees him as head Australian delegate to the TC31 Committee and a member of more than 20 Maintenance Teams & Working Groups of which he convenes four.

In addition Ralph has been active in the IECEx System from its inception and recently has convened the work of WG12 for personnel Competencies. With qualifications in both 'Workplace Training and Assessment' and Quality System auditing he is well placed to undertake this role.

Ralph was a recipient of the prestigious Standards Australia International "Standards Award" in 1997 and in 2007 had the honour of receiving the IEC "1906 award" which is given 'to those experts who have made exceptional contributions to IEC work'.