



# IECEX Scheme for Certification of Personnel Competence

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## Presentation Structure

### *IECEX Scheme for Certification of Personnel Competence*

- Process to gain IECEX CoPC Certificate (Presenter Mark Amos - Overview)
- Value in holding an IECEX CoPC Certificate (Presenter Prof XU – value to China region)



## Presentation Structure

### *IECEX Scheme for Certification of Personnel Competence*

- Process to gain IECEx CoPC Certificate (Presenter Mark Amos - Overview)

# IECEx Certification Schemes

## IECEx System

IECEx Equipment Scheme  
Certification of Ex Equipment



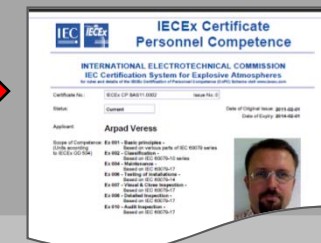
IECEx Conformity Mark License



IECEx Services Scheme  
Certification of Ex Service Providers



IECEx Personnel Competence  
Scheme





## What is “COMPETENCE” ?

- Competence = **Application** of **knowledge** and **skills** to the standards of performance required in the workplace.
- Competency includes all aspects of work performance and not just specific skills...
  - Persons must be aware of the hazards in their work area and work safely in their presence
  - Persons must know what they are doing under various scenarios
  - Equipment must be used correctly



## Elements of “COMPETENCE” ?

Competency involves **three** elements:

1. **Qualifications** (Off the Job)

2. **Experience** (On the Job)

3. **Recent and Relevant Training** (Off and On the Job)

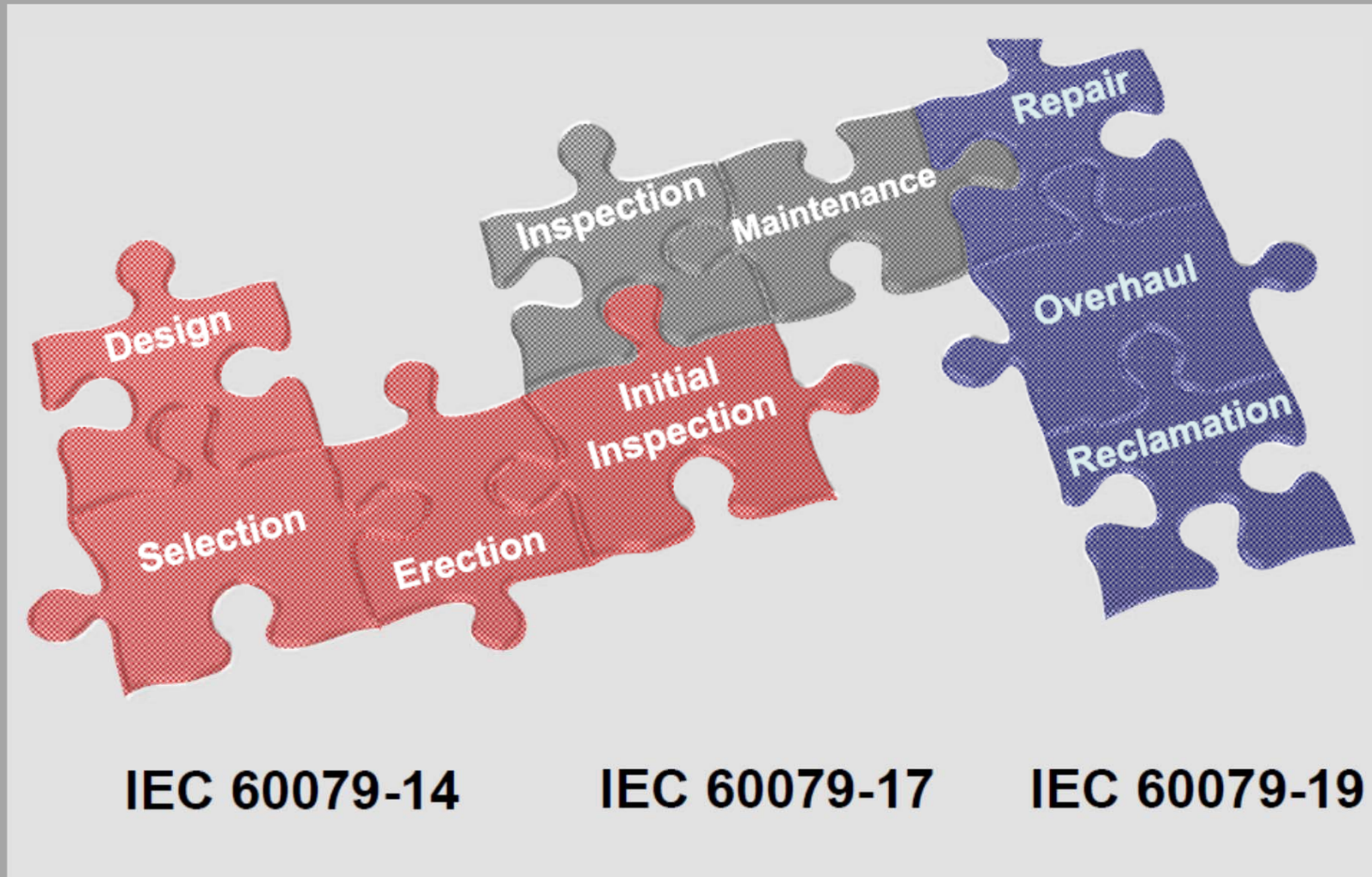
that enable safe working on or near Ex equipment



## IECEx Units of Competence

Reference	Title
Unit Ex 000	Basic knowledge & awareness to enter hazardous area site
Unit Ex 001	Apply basic principles in explosive atmospheres
Unit Ex 002	Perform classification of hazardous areas
Unit Ex 003	Install explosion protected equipment & wiring systems
Unit Ex 004	Maintain equipment in hazardous areas
Unit Ex 005	Overhaul & repair of explosion protected equipment
Unit Ex 006	Test electrical installations
Unit Ex 007	Perform visual & close inspection of electrical installations
Unit Ex 008	Perform detailed inspection of electrical installations
Unit Ex 009	Design electrical installations
Unit Ex 0010	Perform audit inspection of electrical installations

## IECEX Units based on IEC Standards





# “Fine detail” of elements of IECEx Units of Competence

## 6 Summary of essential knowledge and associated skills for each Unit of Competence

NOTE: the use of “X” in the Table below denotes applicability in full. The use of “R” in the Table below denotes reduced requirements for Ex 005 Repair Competence Unit – the applicable reduced requirements are specified as highlighted text in Clauses 5.1 to 5.19 above as relevant.

Essential knowledge and associated skills		Unit Ex 000 – Basic Knowledge and awareness to enter a site which includes a classified hazardous area	Unit Ex 001 – Apply basic principles of protection in explosive atmospheres	Unit Ex 002 – Perform classification of hazardous areas	Unit Ex 003 – Install explosion-protected equipment and wiring systems	Unit Ex 004 – Maintain equipment in explosive atmospheres	Unit Ex 005 – Overhaul and repair of explosion-protected equipment	Unit Ex 006 – Test electrical installations in or associated with explosive atmospheres	Unit Ex 007 – Perform visual and close inspection of electrical installations in or associated with explosive atmospheres	Unit Ex 008 – Perform detailed inspection of electrical installations in or associated with explosive atmospheres	Unit Ex 009 – Design electrical installations in or associated with explosive atmospheres	Unit Ex 010 – Perform audit inspection of electrical installations in or associated with explosive atmospheres
5.1	The nature of explosive hazards and hazardous areas	X					R					
5.2	Occupational health and safety responsibilities related to hazardous areas	X										
5.3	Explosive atmospheres and explosion-protection principles		X	X	X	X	R	X	X	X	X	X
5.4	Explosion-protected equipment – Ex certification schemes		X		X	X	R	X	X	X	X	X
5.5	Explosion-protected equipment – Principles		X		X	X	X	X	X	X	X	X
5.6	Explosion-protection visual checks		X		X	X		X	X	X	X	X
5.7	Explosive atmospheres classification techniques			X								X
5.8	Hazardous area classification work performance			X								X
5.9	Flameproof (Ex 'd') explosion-protection technique		X		X	X	R	X	X	X	X	X
5.10	Increased safety (Ex 'e') explosion-protection technique		X		X	X	R	X	X	X	X	X
5.11	Type of protection 'n' (Ex 'n')		X		X	X	R	X	X	X	X	X
5.12	Encapsulation (Ex 'm') explosion-protection technique		X		X	X		X	X	X	X	X
5.13	Oil immersion (Ex 'o') explosion-protection technique		X		X	X		X	X	X	X	X

## IECEX Units as “building blocks” of Competence Development

**Unit Ex 001:  
Basic Principles**

**Unit Ex 002: Zone  
Classification**

**Unit Ex 003:  
Installation**

**Unit Ex 004:  
Maintenance**

**Unit Ex 006: Test  
el. Installations**

**Unit Ex 005: Over-  
haul & Repair**

**Unit Ex 007: Visual  
& close Inspection**

**Unit Ex008:  
Detailed Insp.**

**Unit Ex 009: Design  
Electr. Installation**

**Unit Ex 010: perform  
Audit insp. of install.**



# Prerequisites for Certification to IECEx Units of Competence

**Table A.1 – Summary of prerequisite units and recommended general competence**

Unit of Competence	Specific prerequisite Unit(s)	trade or profession general competence
		Description
Unit Ex 000 – Basic knowledge and awareness to enter a site which includes a classified hazardous area	none	nil
Unit Ex 001 – Apply basic principles of protection in explosive atmospheres	none	Competence in plant or machinery operation or installations, maintenance or service functions
Unit Ex 002 – Perform classification of hazardous areas	none	Competence in gathering and analysing technical data and using this data for risk assessment
Unit Ex 003 – Install explosion-protected equipment and wiring systems	Unit Ex 001	Competence in installation of electrical, electronic, instrumentation and/or data communication equipment and wiring systems
Unit Ex 004 – Maintain equipment in explosive atmospheres	Unit Ex 001	Competence in maintenance of industrial electrical, electronic, instrumentation and/or data communication equipment and wiring systems
Unit Ex 005 – Overhaul and repair of explosion-protected equipment	none	Competence in overhaul and repair of industrial electrical/electronic equipment
Unit Ex 006 – Test electrical installations in or associated with explosive atmospheres	Unit Ex 001	Competence in conducting testing of general electrical, electronic, instrumentation and/or data communication installations
Unit Ex 007 – Perform visual and close inspection of electrical installations in or associated with explosive atmospheres	Unit Ex 001	Competence in general electrical installation inspection are an alternative to the specific units listed in Column 2
Unit Ex 008 – Perform detailed inspection of electrical installations in or associated with explosive atmospheres	Unit Ex 001	Competence in general electrical installation inspection are an alternative to the specific units listed in Column 2
Unit Ex 009 – Design electrical installations in or associated with explosive atmospheres	Unit Ex 001	Competence in designing electrical systems and installations
Unit Ex 010 – Perform audit inspection of electrical installations in or associated with explosive atmospheres	Unit Ex 002, Unit Ex 008 and Unit Ex 009	Competence in general electrical installation inspection are an alternative to the specific units listed in Column 2



# IECEx Certification Process OVERVIEW

Appropriate Mix of Competences to be certified



ExCB examines

Knowledge

Practical Skills

Experience

IECEx Certified Person



5 Year Re-assessment

IEC IECEx		IECEx Certificate Certified person	
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres for rules and details of the IECEx scheme visit <a href="http://www.iecex.com">www.iecex.com</a>			
Certificate No.	KEMA CP00100	Status	Draft, Current, Cancelled
Date of Issue	2009-01-06	Date of Expiry	2014-01-06
Applicant	Ernest Walter Robinson Australia		
Field of Competence	Installations according to IEC 60079-14 Inspection according to IEC 60079-17 Area Classification according to IEC 61240-10 Repair according to IEC 60079-19		
Scope of Competence	List as per appropriate doc. 1. 2. 3. 4. 5. 6. 7.		
FCAR Reference No.	As set by IECEx		
<small>This certificate is issued as verification that the Applicant met assessment and issued in conformity with the IECEx Scheme requirements, including the field and scope of competence stated above. This certificate is granted subject to the conditions set out in IECEx Scheme Rules, IECEx 01 and Operation Documents as referenced.</small>			
Approved for issue on behalf of the IECEx	Name		
Certification Body	Position		
Signature (only on paper copy)	Date (only on paper copy)		
<small>1. This certificate may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The rules and conditions of this certificate may be verified by visiting the <a href="http://www.iecex.com">www.iecex.com</a> website.</small>			
<small>CERTIFICATE ISSUED BY:</small> <b>KEMA Quality B.V.</b> Oostweging 370 8122 AH Arnhem The Netherlands			



## IECEX Certification Process STEPS

Applicants need to:

- ✓ Choose the required Ex Competence unit(s)
  - ✓ Select an IECEx Certification Body (ExCB)
  - ✓ Complete and submit application form to selected ExCB
- then
- ExCBs confirms acceptance of application
  - ✓ Applicant successfully complete the **KNOWLEDGE** assessment of each requested Ex Competence units
  - ✓ Applicant successfully complete the **PRACTICAL SKILLS** assessment (if required for the Ex units requested in application)
  - ExCB issues IECEx Certificate and the IECEx ID Card

# Selecting an ExCB

**INTERNATIONAL ELECTROTECHNICAL COMMISSION SYSTEM  
FOR CERTIFICATION TO STANDARDS RELATING TO EQUIPMENT  
FOR USE IN EXPLOSIVE ATMOSPHERES (IECEX SYSTEM)**

Information ▾
Publications ▾
Members' Area ▾
Certificates & Licenses ▾
Meetings & Events ▾
Contact
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**Information**

- About the IECEX
- New Releases
- PCIC Europe Papers
- UNECE
- Countries
- Executive
- ExCBs:
  - ▶ Equipment
  - ▶ Service Facilities
  - ▶ Certified Persons
  - ▶ Conformity Mark
- Meeting Schedule
- Links:
  - ▶ IEC
  - ▶ IECQ
  - ▶ IECEE-CB

### IECEX Scheme for Certification of Personnel Competencies (CoPC)

The following organisations have successfully completed the IECEX assessment process. These organisations are now approved to operate within the IECEX Scheme for Certification of Personnel Competencies (CoPC) and can therefore issue IECEX Certificates of Personnel Competencies. Please check this website for regular updates as other bodies are in the process of being approved to operate within this scheme.

Notes:

- for IECEX bodies approved to operate under the IECEX Certified Equipment Scheme [click here](#)
- for IECEX bodies approved to operate under the IECEX Certified Facility Scheme (Ex Repair) [click here](#).
- for IECEX bodies approved to operate under the IECEX Conformity Mark licensing System [click here](#)

Country	Acronym
Canada	QPS
France	INERIS
France	LCIE
Germany	TUV Rheinland
Malaysia	SIRIM
Netherlands	DEKRA KEMA
United Kingdom	SGS BASEEFA
United Kingdom	SIRA

Country: Canada  
Name: QPS Evaluation Services Inc.  
Acronym: QPS

Logo:

Contact: Mr Nick Maalouf  
Vice President  
QA & External Affairs  
81 Kelfield St  
Unit 8  
Toronto, Ontario M9W 5A3

Tel: 416-241-8857, ext 422  
Fax: 416-241-0682  
E-mail: [nmaalouf@qps.ca](mailto:nmaalouf@qps.ca)

Scope: Unit Ex 001 – Apply basic principles of protection in explosive atmospheres  
Unit Ex 002 – Perform classification of hazardous areas

Scope is according to IECEX Operational Document OD 504

## KNOWLEDGE Assessment

The knowledge assessment exam consists of multiple choice questions and constructed questions

Table 3 – Minimum number and type of items

OD 504 Clause/ "Module"	Description	Selected Response	Constructed Response	Total Number of Items	Practical assessment
5.1	The nature of explosive hazards and hazardous areas	6		6	
5.2	Occupational health and safety responsibilities related to hazardous areas	6		6	
5.3	Explosive atmospheres and explosion-protection principles	6		6	
5.4	Explosion-protected equipment – Ex certification schemes	6	2	8	
5.5	Explosion-protected equipment – Principles	4	1	5	
5.6	Explosion-protection visual checks	8	2	10	



## PRACTICAL SKILLS Assessment

Some Units need to assess practical skills prior to certification – for example, in ..... your ability to ... will be assessed:

- Unit Ex 002: do a zone classification in Gas and in Dust area.
- Unit Ex 003: do installation of several equipment as ‘d’ enclosure, ‘e’ terminal box and intrinsic safety barriers and sensors by following a wiring diagram
- Unit Ex 004: do maintenance of installation by doing the preparation, the check and the report
- Unit Ex 005: do the repair of a motor
- Unit Ex 006: do installation testing by doing the preparation, conducting testing and writing the report





## Overall Assessment for Certification

In accordance with the IECEx OD 503, the following is applied:

**KNOWLEDGE** assessment:

At least 80% of all items in a knowledge test shall be answered correctly.

**PRACTICAL SKILLS** assessment:

All items shall be correctly demonstrated.



## Content of IECEX 'CoPC' Certificate

	<h3>IECEX Certificate Personnel Competence</h3>	
<b>INTERNATIONAL ELECTROTECHNICAL COMMISSION</b> <b>IEC Certification System for Explosive Atmospheres</b> <small>for rules and details of the IECEX Certification of Personnel Competence (CoPC) Scheme visit <a href="http://www.iecex.com">www.iecex.com</a></small>		
Certificate No.:	IECEX CP BAS11.0015	issue No.:2
Status:	Current	Date of Original Issue: 2011-11-22 Date of Expiry: 2015-12-17
Applicant:	<b>Manggau Galawing</b>	
Scope of Competence: (Units according to IECEX OD 504)	<ul style="list-style-type: none"><li><b>Ex 001 - Basic principles -</b> Based on various parts of IEC 60079 series</li><li><b>Ex 002 - Classification -</b> Based on IEC 60079-10 series</li><li><b>Ex 003 - Installation -</b> Based on IEC 60079-14</li><li><b>Ex 004 - Maintenance -</b> Based on IEC 60079-17</li><li><b>Ex 005 - Overhaul and repair -</b> Based on IEC 60079-19</li><li><b>Ex 006 - Testing of installations -</b> Based on IEC 60079-14</li><li><b>Ex 007 - Visual &amp; Close Inspection -</b> Based on IEC 60079-17</li><li><b>Ex 008 - Detailed Inspection -</b> Based on IEC 60079-17</li></ul>	

ALL IECEX CoPCs publicly searchable and visible @ [http://iecex.iec.ch/iecex/exs.nsf/ex\\_pe.xsp?v=p](http://iecex.iec.ch/iecex/exs.nsf/ex_pe.xsp?v=p)

# Content of an IECEx 'CoPC' Certificate

Unique Certificate #

Certified Person's Name

Certificate Scope

**IECEX Certificate**  
**Personnel Competence**

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**  
**IEC Certification System for Explosive Atmospheres**  
for rules and details of the IECEx Certification of Personnel Competence (CoPC) Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.: **IECEX CP BAS11.0015** issue No.:2

Status: **Current**

Applicant: **Manggau Galawing**

Scope of Competence (Units according to IECEx OD 504)

- Ex 001 - Basic principles** - Based on various parts of IEC 60079 series
- Ex 002 - Classification** - Based on IEC 60079-10 series
- Ex 003 - Installation** - Based on IEC 60079-14
- Ex 004 - Maintenance** - Based on IEC 60079-17
- Ex 005 - Overhaul and repair** - Based on IEC 60079-19
- Ex 006 - Testing of installations** - Based on IEC 60079-14
- Ex 007 - Visual & Close Inspection** - Based on IEC 60079-17
- Ex 008 - Detailed Inspection** - Based on IEC 60079-17

Date of Original Issue: **2011-11-22**  
Date of Expiry: **2015-12-17**

Certificate Issue Date and Validity

Certified Person's Photograph



## Content of portable IECEx 'CoPC' ID Card





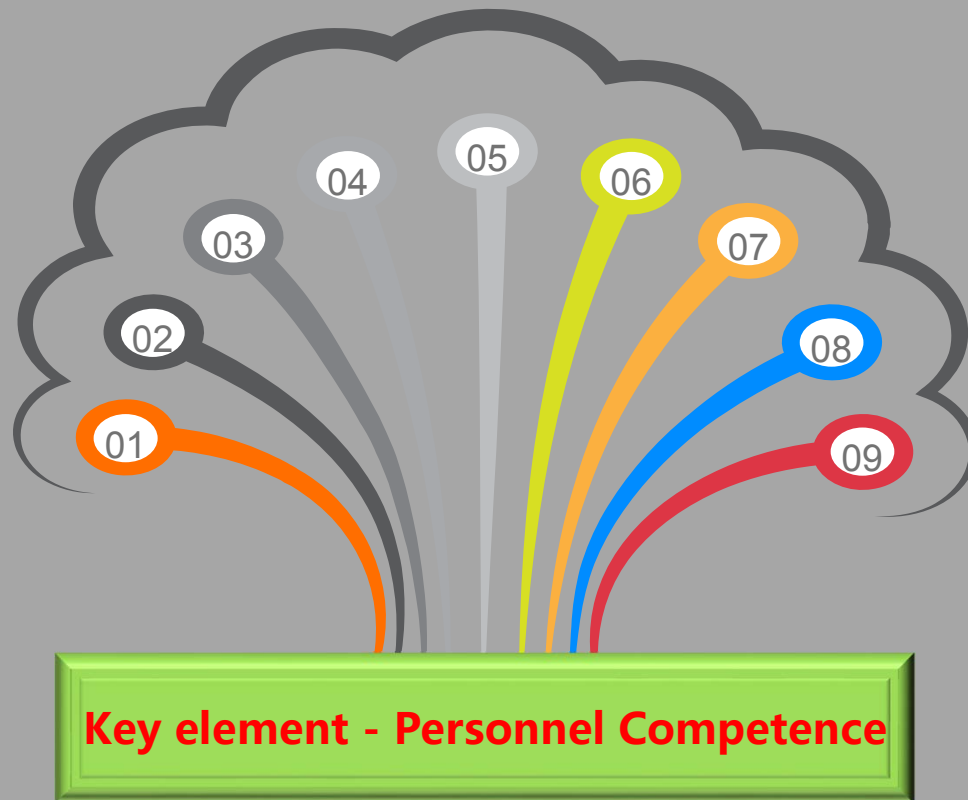
## Presentation Structure

### *IECEX Scheme for Certification of Personnel Competence*

- Value in holding an IECEx CoPC Certificate (Presenter Prof XU – value to China region)

# Roles of Personnel Competence for Ex industry

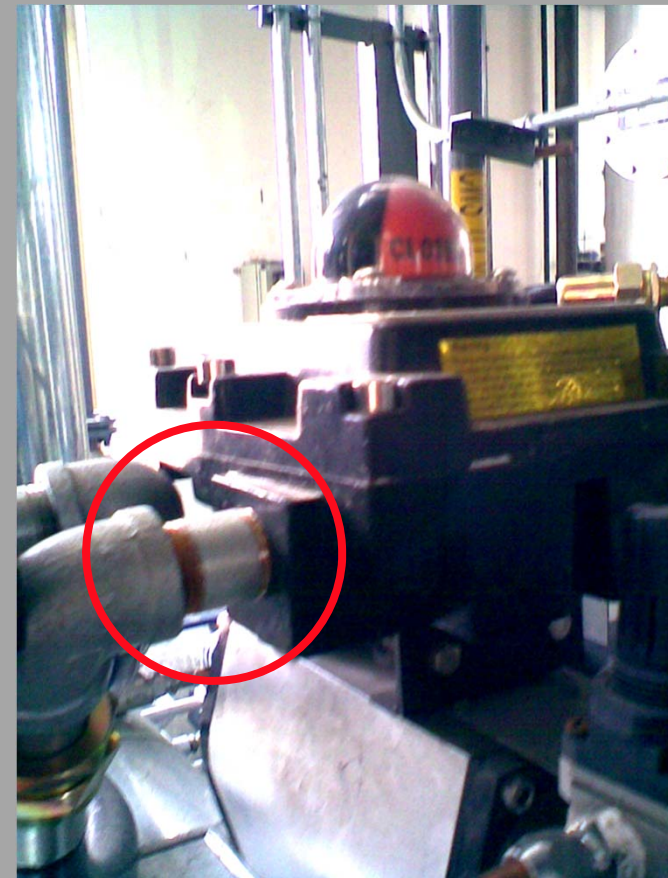
Qualified (equipment + services + **persons**) = **Entity Explosion Protection**



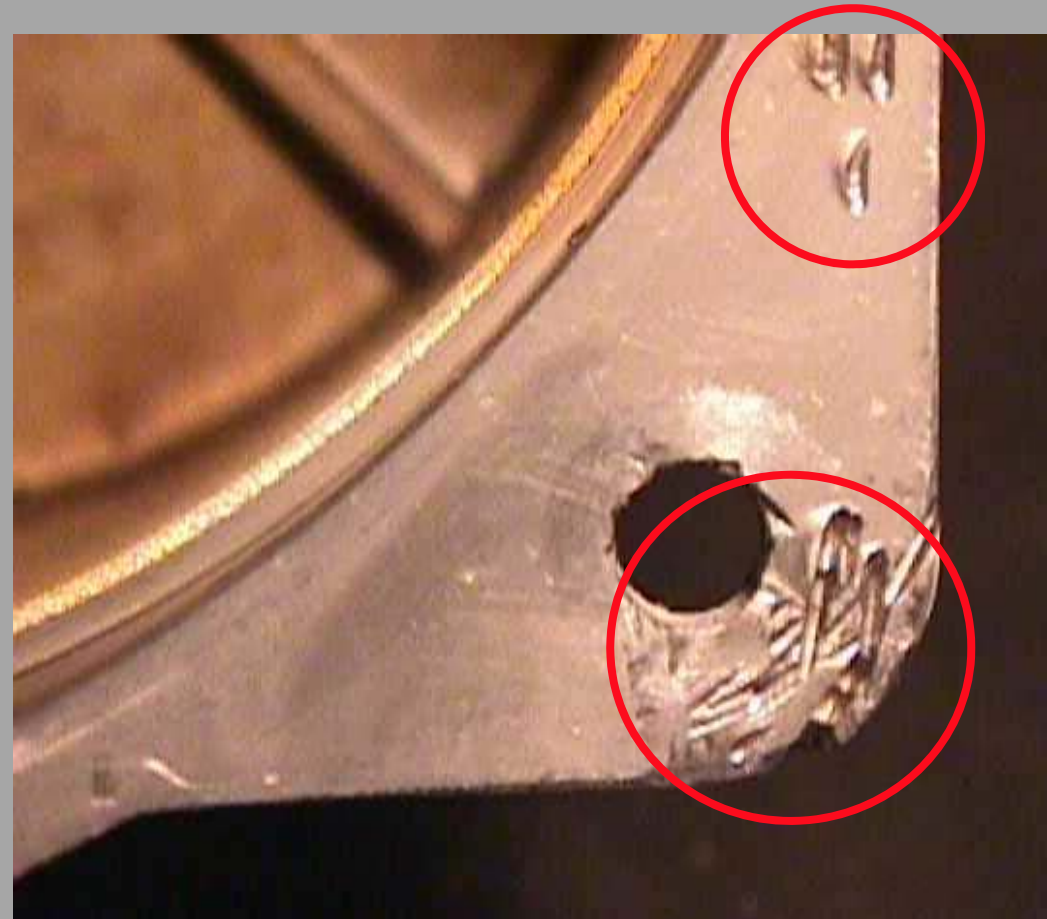
## ■ Ex services:

- 01 Design
- 02 Area classification
- 03 Selection
- 04 Installation
- 05 Inspection
- 06 Maintenance
- 07 Repair
- 08 Overhaul
- 09 Reclamation

# Examples of errors due to lack of competence



## Examples of errors due to lack of competence





## Requirements in Chinese mandatory standards

- Standards
  - GB 3836.14 idt IEC 60079-10
  - GB 3836.15 mod IEC 60079-14
  - GB 3836.16 idt IEC 60079-17
  - GB 3836.13 mod IEC 60079-19
- Requirements on personnel competence



### 4.4.1.3 资质

直接参与设备修理和/或检修的人员应为有资质的人员或在有资质人员的监督下的人员。资质可对不同的具体工种。

培训和资质评定在附录 B 中规定。

应定期进行适当的培训和评定,相隔的时间取决于工艺方法或技能使用的频次以及标准或规程的变更,时间间隔通常不宜超过 3 年。

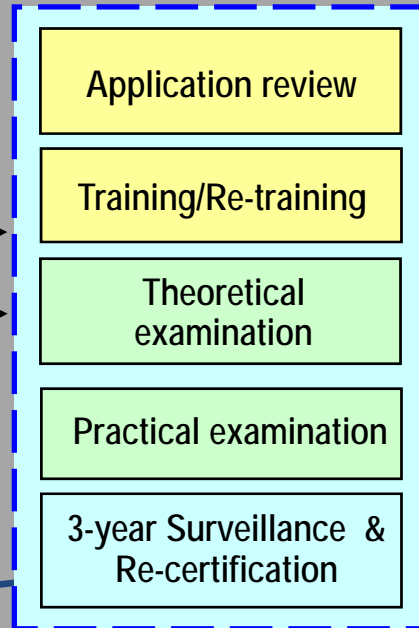
- How to fulfill the personnel qualification?

# Qualification system mandated by Law in China

Application by Candidates

Authorized training and examination centers

Note: Separately operated btw Training and exam



Certified Persons

## Mandated by:

- Production safety law of PRC
- Provisions on the administration of training and assessment of special operations personnel safety technology (Ex services are defined as **special operation**)



## Current status of Chinese ExCoPC

- Mandated, but JUST includes the activities:
  - Installation, maintenance and repair , **NOT** including all the Ex services for equipment lifecycle
- Training and examination operated independently
- Training and examination centers nominated based on assessment and nomination, e.g., SIPAI
- Certification process, similar as IECEx CoPC:
  - Examination, including theoretical and practical exams, **BUT**
  - Training is mandated
  - Holding electrician operation certificate is a prerequisite for candidates
- Since 2014, more than 300 Ex CoPC certificates issued for the persons from 10 provinces in China



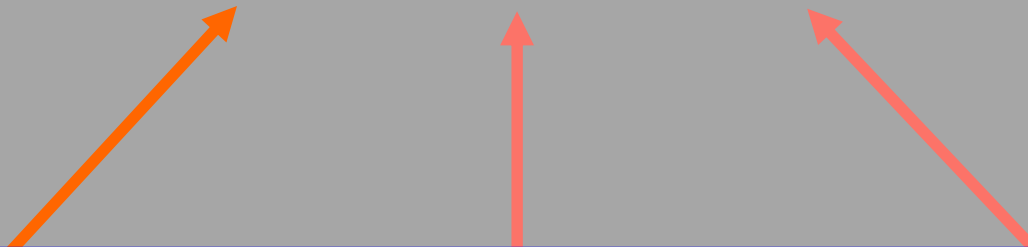
## Comparison with IECEx CoPC – a total solution

- Development of IECEx Rule of Procedure (IECEX 05)
- Classification of competence units (unit 000-010)
  - Covering all the service activities on Ex facilities (whole lifecycle)!
- Definition of unit specifications (IECEX OD 504)
- Assessment process of ExCB (IECEX OD 501/505)
  - All ExCBs undergo the single process (based on Peer Assessment)
- Application instruction for candidates (IECEX OD 502)
- Unit based certification process (IECEX OD 503)
  - Question bank (knowledge assessment) (IECEX OD 506)
  - Exam facilities (practical assessment)
- Online certification system (IECEX OD 011-5)

**All the ODs for IECEx CoPC available at IECEx Website!**



## IECEX CoPC Foundation



Equity

Transparency

Confidence

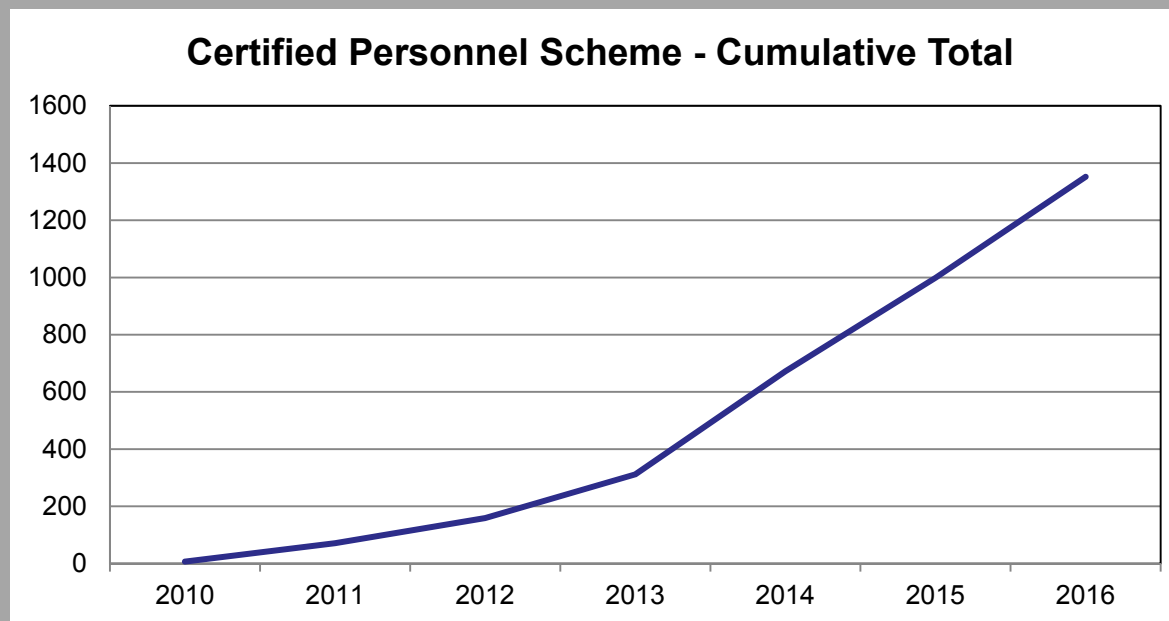
**FOUNDATION**

Int'l evidence that meets Int'l standards, endorsed by UNECE!



## IECEX CoPC is available at market place

- IECEX Certified Personnel Scheme
  - 10 accepted ExCBs, plus 4 applicants
  - 1352 Ex CoPC issued (as of 31 December 2016)



- Also available in China (in which **30 Ex CoPC holders from China**)



## Value to China in holding IECEx CoPC

- For Enterprises, e.g. chemical plants:
  - Support whole lifecycle activities on Ex facilities
  - Meet with int'l practice and standards, avoiding legal responsibility
  - Cost saving by reduction of risks and accidents
  - Safer production and operation by priority recruitment
  - Appreciation in asset value
  - Global operation
- For Employees:
  - Demonstration of ability to national and int'l standards
  - Stronger competitiveness
  - Wider career prospects
  - Safer operation for himself
  - Add value to employer



## Value to China in holding IECEx CoPC

- For Manufacturers and Service Facilities :
  - More professional on equipment and services
  - Development of more extensive services
  - Easier to be qualified for specific service extension
  - To win higher confidence/reputation
  - Stronger competitiveness
  - To facilitate int'l trade in equipment and services





## Chinese organization in action

- Actively involved in IECEx CoPC scheme, e.g. NEPSI
  - Member of relevant WGs, e.g. ExPCC WG4
  - Participation in ExPCC meetings
  - Accepted as an IECEx RTP Provider (SIPAI training center)
  - Active promotion of IECEx CoPC, and provide IECEx CoPC-based training
- Further actions:
  - Continuous promotion of IECEx CoPC
  - Close cooperation with existing foreign ExCB
  - Continuously provide training based on IECEx units of competence
  - Assist candidates to apply for IECEx CoPC certificate via partner
  - Local interview and examination in Chinese



## Suggestions for regulators in China

- IECEx CoPC meets demands by industry, government and regulators, towards safe development:
  - Improvement of national regulatory system for lifecycle coverage
  - Participation in IECEx CoPC scheme
  - Research the acceptance of IECEx CoPC for installation, maintenance and repair
  - Encourage national organizations to be as ExCB of IECEx CoPC, to provide local certification service for benefits to candidates and industry
  - Encourage industry to accept IECEx CoPC certificates in the vacant fields in national certification system of personnel competence



# Thank you

Mark Amos  
Business Manager  
IECEX Secretariat

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ExTAG Chairman  
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