IECEx Scheme for Certification of Personnel Competence

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IECEx Secretariat

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ExTAG Chairman
NEPSI
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)
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
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
<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Ex 000</td>
<td>Basic knowledge &amp; awareness to enter hazardous area site</td>
</tr>
<tr>
<td>Unit Ex 001</td>
<td>Apply basic principles in explosive atmospheres</td>
</tr>
<tr>
<td>Unit Ex 002</td>
<td>Perform classification of hazardous areas</td>
</tr>
<tr>
<td>Unit Ex 003</td>
<td>Install explosion protected equipment &amp; wiring systems</td>
</tr>
<tr>
<td>Unit Ex 004</td>
<td>Maintain equipment in hazardous areas</td>
</tr>
<tr>
<td>Unit Ex 005</td>
<td>Overhaul &amp; repair of explosion protected equipment</td>
</tr>
<tr>
<td>Unit Ex 006</td>
<td>Test electrical installations</td>
</tr>
<tr>
<td>Unit Ex 007</td>
<td>Perform visual &amp; close inspection of electrical installations</td>
</tr>
<tr>
<td>Unit Ex 008</td>
<td>Perform detailed inspection of electrical installations</td>
</tr>
<tr>
<td>Unit Ex 009</td>
<td>Design electrical installations</td>
</tr>
<tr>
<td>Unit Ex 0010</td>
<td>Perform audit inspection of electrical installations</td>
</tr>
</tbody>
</table>
IECEEx Units based on IEC Standards

IEC 60079-14  IEC 60079-17  IEC 60079-19

## “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.

<table>
<thead>
<tr>
<th>Essential knowledge and associated skills</th>
<th>Unit Ex 002 - Basic knowledge and awareness to enter a blasthole in hazardous areas</th>
<th>Unit Ex 003 - Apply basic principles of protection in explosive atmospheres</th>
<th>Unit Ex 004 - Perform classification of hazardous areas</th>
<th>Unit Ex 005 - Install explosion-protected equipment and wiring systems</th>
<th>Unit Ex 006 - Maintain equipment in explosive atmospheres</th>
<th>Unit Ex 007 - Overhaul and repair of explosion-protected equipment</th>
<th>Unit Ex 008 - Test electrical installations in associated atmospheres</th>
<th>Unit Ex 009 - Perform detailed inspection of electrical installations in associated atmospheres</th>
<th>Unit Ex 010 - Perform and it design, installation, testing, and ongoing inspection of electrical installations in associated atmospheres</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 The nature of explosive hazards and hazardous areas</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2 Occupational health and safety responsibilities related to hazardous areas</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3 Explosive atmospheres and explosion-protection principles</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.4 Explosion-protected equipment - Ex certification schemes</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.5 Explosion-protected equipment - Principles</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.6 Explosion-protection visual checks</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.7 Explosive atmospheres classification techniques</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.8 Hazardous area classification work performance</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.9 Flameproof (Ex 'd') explosion-protection technique</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.10 Increased safety (Ex 'e') explosion-protection technique</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.11 Type of protection 'n' (Ex 'n')</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.12 Encapsulation (Ex 'm') explosion-protection technique</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.13 Oil immersion (Ex 'o') explosion-protection technique</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Extracted from IECEx OD 504
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 005: Overhaul & Repair
- Unit Ex 006: Test el. Installations
- Unit Ex 007: Visual & close Inspection
- Unit Ex 008: 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

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

Extracted from IECEx OD 504
IECEEx Certification Process OVERVIEW

Appropriate Mix of Competences to be certified

ExCB examines

IECEEx Certified Person

Knowledge

Practical Skills

Experience

Unit Ex 001

Unit Ex 005 "d" "e"

5 Year Re-assessment

IECEEx Certificate

Certified person
IECEEx Certification Process STEPS

Applicants need to:

✔ Choose the required Ex Competence unit(s)
✔ Select an IECEEx 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 IECEEx Certificate and the IECEEx ID Card
Selecting an ExCB

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: Canada
Acronym: GPS

Contact: Nick Mailouf
Vice President
CA & External Affairs
01 Keftield St
Unit B
Toronto, Ontario M9W 5A3

Tel: 416-241-8857, ext 422
Fax: 416-241-0632
E-mail: nmailouf@gps.ca

Scope: Unit Ex 001 – Apply basic principles of protection in explosive atmospheres
Unit Ex 062 – 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

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

Extracted from IECEx OD 503
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**

**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

<table>
<thead>
<tr>
<th>Certificate No.</th>
<th>IECEx CP BAS11.0015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Current</td>
</tr>
<tr>
<td>Date of Original Issue</td>
<td>2011-11-22</td>
</tr>
<tr>
<td>Date of Expiry</td>
<td>2015-12-17</td>
</tr>
</tbody>
</table>

**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

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

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

Certificate No.: IECEx CP BAS11.0015
Issue No.: 12

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

Applicant: Manggau Galawing

Scope of Competence (Units according to IECEx OD 604)
- 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
Content of portable IECEx ‘CoPC” ID Card

IECEx Certified Person
IECEx CP BAS11 0015

Manggau Galawing
Units of competence
(As per OD 504)
Ex 001 Ex 002 Ex 003 Ex 004 Ex 005 Ex 006
Ex 007 Ex 008 Ex 009 Ex 010

Issuing ExCB

Baseefa

Expiry Dec-2015
Original Issue: Nov-2011
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:
  - Design
  - Area classification
  - Selection
  - Installation
  - Inspection
  - Maintenance
  - Repair
  - Overhaul
  - Reclamation

Key element - Personnel Competence
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

- How to fulfill the personnel qualification?
Qualification system mandated by Law in China

Application by Candidates

Authorized training and examination centers

Application review

Training/Re-training

Theoretical examination

Practical examination

3-year Surveillance & Re-certification

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!
IECEEx 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