IECEx: Conformity Assessment Solution for the Ex field

12 October 2014
Who is the IEC?

- International Electrotechnical Commission
- Founded in 1906 - Promote international co-operation on all questions of standardization and related matters in the fields of electrotechnology, including Conformity Assessment.

According to the IEC Masterplan:

**Standardisation**

**Conformity Assessment**

The 2 Pillars of IEC
IEC Family: 166 countries – Global Reach

83 Members 83 Affiliates
(Offices in 5 Countries)

IEC Central Office – Geneva
Regional Offices in Brazil, Singapore, Nth America and Australia
Some recent developments at IEC

Standards Work - New Technical committees:

- TC 114 “Marine Energy – Wave/Tidal/water current converters”
- TC 115 “High Voltage Direct Current Transmission - >100KV”
- TC 116 “Safety of motor operated electric tools”
- TC 117 “Solar Thermal electric plants”
- TC 118 “Smart grid user interface”
- TC 119 “Printed Electronics”
- TC 120 “Electrical Energy Storage”
- SC 31M “Non-Electrical Committee for Ex”

Conformity Assessment – New/Emerging Activities:

- IECEx Personnel Certification Scheme
- IECEE Energy Efficiency Scheme
- New IECQ Programme for “Counterfeit Avoidance - Electronic Components and Assemblies”
- Development of an IEC Scheme for Marine Energy Converters and Installations
- CA activity for Renewable Energies
Key Demand Drivers for IEC CA (eg IECEx)

- Removal of costly duplication of testing/Cert at local level + delays to accessing markets
- **Confidence** among Industry, Regulators + Stakeholders – equipment + Systems, high capital cost
- **Confidence** among Bodies (Labs + Certifiers), level playing field for CBs and TLs to compete
- Portability of assessment results + certs
- Ex Services + Personnel Cert not covered elsewhere
- Instant access to information, including “On-Line” Certificates – instant checking.
Terminology/meaning can be Confusing ??

"CONFORMITY ASSESSMENT"

INTERNATIONAL STANDARD  ISO/IEC 17000

NORME INTERNATIONALE

МЕЖДУНАРОДНЫЙ СТАНДАРТ

Conformity assessment — Vocabulary and general principles

Évaluation de la conformité — Vocabulaire et principes généraux

Оценка соответствия. Словарь и общие принципы
Certificate of Conformity versus Test Report

Test Report:-
- What Information is being conveyed by a Test Report?
- Who is the legal owner of the Test Report?
- Should an End User have free access to a Test Report, how?
- How long is a test report Valid, after its issue?

Certificate of Conformity (third Party according to ISO/IEC Guide 67)
- What Information is being conveyed by a Certificate?
- Who is the legal owner of the Certificate?
- Should an End User have free access to a Certificate, how?
- How long is a Certificate Valid, after its issue?
28.2 Certificate
The manufacturer shall prepare, or have prepared, a certificate confirming that the equipment is in conformity with the requirements of this standard along with its other applicable parts and additional standards mentioned in Clause 1. The certificate can relate to Ex equipment or an Ex Component.

An Ex Component certificate (Identified by the symbol “U” suffix to the certificate number) is prepared for parts of equipment that are incomplete and require further evaluation prior to incorporation in Ex equipment. The Ex Component certificate may include a Schedule of Limitations detailing specific additional evaluation required as part of incorporation into Ex equipment. An Ex Component certificate shall clarify that it is not an Ex equipment certificate.

29.3 Marking – General Item d)
d) the name or mark of the certificate issuer and the certificate reference in the following form: the last two figures of the year of the certificate followed by a “.” followed by a unique four character reference for the certificate in that year;
Definitions

ISO/IEC 17000 Definitions

5.2 attestation
issue of a statement, based on a decision following review (5.1), that fulfilment of specified requirements (3.1) has been demonstrated

4.2 testing
determination of one or more characteristics of an object of conformity assessment, according to a procedure (3.2)

IEC 60079-0 Definitions

2.4 third-party conformity assessment activity
conformity assessment activity that is performed by a person or body that is independent of the person or organization that provides the object, and of user interests in that object

NOTE 1 Criteria for the independence of conformity assessment bodies and accreditation bodies are provided in the International Standards and Guides applicable to their activities (see Bibliography).

IEC 60079-0 Definitions

3.8 certificate
document that assures the conformity of a product, process, system, person, or organization with specified requirements

NOTE The certificate may be either the supplier’s declaration of conformity or the purchaser’s recognition of conformity or certification (as a result of action by a third party) as defined in ISO/IEC 17000
Long Standing Testing / Assessment
Requirements for Ex Equipment
Assessment and Tests for Ex Equipment – IEC 79-0 1983

- Verification of documents
- Compliance of Prototype with documents
- Marking Requirements
- Type Tests – include:
  - Mechanical Tests
  - Resistance to Impact
  - Thermal Tests
  - Insulation Resistance of plastic parts
  - Test in explosive mixtures
  - Test of clamping of cables
Under the IECEx Certified Equipment Scheme, the IECEx Certificate number displayed on the product matches the Master version on the website – provides instant verification of claims of IECEx Certification.
What is IECEx?

"IECEx is the International Standard way of doing Ex Certification"

The IEC’s System with Schemes covering Certification to Standards that relate to Equipment, Services and Persons in areas relating to Explosive Atmospheres, to provide an Internationally accepted means of demonstrating claimed compliance with International Standards

IECEx is a “Conformity Assessment Tool” providing confidence that Products, Services and Personnel covered by an IECEx Certificate meet specified requirements, (International Standards)
“Ex” is not an Industry of its own!

Ex is part of almost every Industry known to Man, Examples:

- Automotive refuelling stations or petrol stations
- Oil + gas extraction
- Oil refineries, rigs and processing plants
- Gas pipelines and distribution centres
- Chemical processing plants
- Printing industries, paper and textiles
- Hospital eg operating theatres
- Aircraft refuelling and hangars
- Surface coating industries
- Coal mining
- Sewerage treatment plants
- Grain handling and storage
- Woodworking areas
- Sugar refineries, storage, packaging + distribution
- Metal surface grinding, eg aluminium dusts and particles.
- Transportation
- Pharmaceuticals
- Food processing
- Furniture manufacturer
- Textiles - + Many others
Ex Equipment and Installation’s are complex.

The Ex industry requires verification of compliance in every aspect from:
- Installation Design
- Equipment and Systems
- Inspection
- Maintenance
- Repair
- Personnel

FACT 2 – Ex Equipment and Installations are Complex.
Buncefield, UK

- Sunday 11th Dec 2005
- Over 40 people injured
- Burned for several days, destroying most of the site.
- Countless Millions (£) lost in damages, legal fees, loss of infrastructure, and loss of production.

FACT 3 - The goal of Standards and Conformity Assessment is to prevent this.
Schemes within the IECEx System

IECEx System
www.iecex.com

IECEx Equipment Scheme
Certification of Ex Equipment + Systems

IECEx Conformity Mark License Scheme

IECEx Services Scheme
Certification of Ex Service Providers, eg Repair and overhaul workshops

IECEx Certified Persons Scheme (CoPC)
Competency to work in Ex field (New)

Choice between:
- IECEx “Certificate of Conformity”
- IECEx “Component Certificate”
- IECEx “Unit Verification” Cert.
Choice between:

- IECEx “Certificate of Conformity”
- IECEx “Component Certificate”
- IECEx “Unit Verification” Cert.
Examples of Equipment + Systems Covered by IECEx

- Transducers, Sensors etc
- Switchgear
- Control Stations
- Motors
- Luminaries and Lighting
- Underground vehicles
- Radios + Communication
- Junction boxes
- Control Modules
- Control Systems
- Instrumentation
- Analyser houses
- Ventilation Rooms
- Components
  - Terminals
  - Adaptors / Reducers
  - Cable terminations
  - Glands
- Many others
Flowserve Ex System

Optional Accessories include:
- IECEx Certified Junction Box
- IECEx Certified Limit Switches
- IECEx Certified Solenoids
IECEx Overview

Standard Procedures + Rules

Standard Reporting formats

Logo + Mark

All IECEx Certificates available “On-Line” – Full Transparency
IECEx Structure

IEC CONFORMITY ASSESSMENT BOARD, CAB
Oversees IEC Conformity Assessment policy and Systems, eg IECEx

IECEx Management Committee, ExMC
National Members (Countries)
Overall management of the IECEx System
- Officers + Executive, TC 31 Chair, IEC Gen. Sec
- ExMC Expert Working Groups (WGs)
- IECEx Expert Assessors

IECEx Secretariat
- Technical Support
- Administration

Ex Officio Members
- IEC General Secretary
- IEC TC 31 Chairman

IECEx Technical Assessment Group
Members: ExCBs + ExTLs
- ExTAG Expert WGs
- TC 31 + SC Liaison

IECEx Marks Committee
Operation of IECEx Mark
- Appointed Members
- IECEx Executive

IECEx CoPC Committee
Operation of Personnel Cert
- Appointed Members
- IECEx Executive
IECEx Approved CBs + TLs

- **IECEx 02 Equipment Scheme:**
  - ExCBs 48
  - ExTL = 56

- **IECEx 03 Service Facility Scheme (ExCBs 13)**

- **IECEx 04 Mark License System (ExCBs 14)**

- **IECEx 05 Personal Competence (ExCBs 8)**
IECEx On-Line CoC System key Features

- Web site version is the MASTER
- Certificates issued by ALL ExCBs in the one place – *if not on IECEx website – then not issued!*
- Data Backed up by IEC Central Office, Geneva
- Certificate / Report Number automatically generated by system, *all Cert. Nos begin with “IECEx….”*
- Certificates + reports deleted *only* by Secretariat
- Editing only allowed during first 14 days after issue of the Certificate
- ExCBs only issue CoCs within their scope
- Supported by technical Secretariat.
1. Select “Certificate & Licenses”

2. Select Type of IECEx Scheme: Certified Equipment, or Certified Service Provider, or Conformity Mark License, or Certified Persons

3. Refer to IECEx OD 011 Part 1 for search and display options

4. Master Controlled Version of Certificate now displayed
IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
For rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx ITS 07.0008X Issue No.: 2
Status: Current
Date of Issue: 2011-12-21
Page 1 of 5

Applicant: Joy Mining Machinery
Thorn Hill Industrial Park
177 Thorn Hill Road
Warrendale
PA 15086
United States of America

Electrical Apparatus: Controller Enclosure 7L51A / Type 500043161

Optional accessory:
### IECEx Certified Ex Equipment

**IEC System for Certification to Standards relating to Equipment for use in Explosive Atmospheres (IECEx System)**

[IECEx CoC Home > Certified Equipment Scheme > Listing](#)

<table>
<thead>
<tr>
<th>Certificate No</th>
<th>Status</th>
<th>Manufacturer country / location</th>
<th>Manufacturer name</th>
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IECEx UL 13.0049

- IECEx Certification
- Certificate Issuing Body: IECEx
- Year of Issue: 2013
- Certificate Issued in that year: IECEx UL 13.0049

IECEx UL 13.0049
- Normal Certificate Number

IECEx UL 13.0049X
- Conditions of Product Use
- Apply

IECEx UL 13.0049U
- Component Certificate

Certificate Number appears on Product Marking
IECEx On-Line Certificate System

Also Provides for adding an Attachment / Annex to the online certificate for Additional Product Information
IECEx Certification – Unit Verification

Each Unit must be tested/assessed by the IECEx Body and identified on the Certificate, by serial No.

**Product Test/Asses.**
- IECEx Assessment and Test Report
- ExTR
- Testing of Samples (Type Testing)
- IEC/TC 31 International Standards

**Factory Audit + Ongoing surveillance**
- IECEx Quality Assessment Report
- QAR
- Assessment of Manufacturers Quality System
- ISO/IEC 80079-34 In line with EN 13980 and Based on ISO 9001

Live “On-Line” System
- In-built controls
- Consistent format
- Search capabilities
- Covers only Units identified
IECEx Unit Verification Certificate - Option

- Issued on the basis of Satisfactory ExTR
- Only covers items actually assessed/tested
- Not require Factory inspection nor ongoing surveillance
- Items traceable on certificate via serial numbers/etc
- Can cover more than 1 item but all serial Nos appear.
IECEx Services Scheme
Certification of Ex Service Providers, eg Repair and overhaul workshops
IECEx Services Scheme – Repair Workshops

Ex Equipment High Capital cost

Ex Equipment usually Cheaper to Repair than Replace!

Incorrect Repairs can compromise inherent Ex protection

IECEx Certifies Workshops to IEC 60079-19

IECEx 03A Guide to Applicant Workshops [www.iecex.com]
IECEx CoC
Certified Service Facility

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx BAS S0013
Issue No.: 1

Status: Current
Date of issue: 2012-06-13

Applicant: ABB Pte Ltd
2 Tuas Lane
638611
Singapore

Type of Service: Repair and Overhaul according to IEC 60079-19

Type of Protection:
- Flameproof Enclosure "d"
- Increased Safety "e" Type of Protection "n"

Scope of Service: On site Repair and Overhaul of Exd, Exe, Exde, Exn Rotating Machine and enclosures.
Off site work limited to replacement of machine bearings.

Locations covered by this Certificate: as above
IECEx Certified Persons Scheme (CoPC)
Competency to work in Ex field (New)
IECEx Certified Persons Scheme -

- Same IEC TC 31 Standards already used by IECEx apply, 60079-10, -19, -14, -17
- Certifies a Person’s Competence to be able to apply the Standards
- Manufacturers now interested

**Scheme Rules**

**Operational Documents**

| Unit Ex 001 | 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 |
| Unit Ex 007 | Perform visual & close inspection |
| Unit Ex 008 | Perform detailed inspection |
| Unit Ex 009 | Design electrical installations |
| Unit Ex 010 | Perform audit inspection of installations |
IECEx Cert Persons Scheme

According to ISO/IEC 17024 + IECEx Rules + Operational Docs

Person prepares application

IECEx Certification Body (ExCB)

Testing of knowledge

Assessment of experience

Surveillance

Re-assessment

By ExCB

New Scheme for Personnel

IECEx 05

Certified Person
Examples of errors due to lack of competence
Sustained Growth and demand continues towards end 2014

- Increased inquiries received by Secretariat from industry
- Total Certificates + Reports issued across ALL IECEx Schemes at end Dec 2013 = 35768 [>42,000 at Oct 2014]
- Financially Stable: Gen. Reserves CHF 1’151’475
IECEx Foundation – it’s DNA

- Being part of IEC: Statutes + Rules
- Industry Based Management Committee
- One single set of Rules and Operational Procedures for TLs + CBs
- ALL TLs and CBs undergo the same qualification process to join, use of peer assessment.
- Common Test Report and Certificate Format used by ALL TLs and CBs but always maintaining CB Brand
- Use of Internet “On-Line” Systems for Certificates. Equipment, Services, Personnel
- Technical Secretariat - Day to Day Management
IECEx Promotional Activities:
IECEx 2012 Dubai Conference

2 Day Conference Hosted jointly by

PRESENTERS:
• Hiromichi Fujisawa IEC V/P
• Kerry McManama
• Jim Munro
• Lorenza Jachia
• Chris Agius
• Patrick Leroux
• Peter Thurnherr
• John Allen
• Ralph Wigg
• Gerold Klotz-Engmann
• Ron Sinclair
• UAE Governmental
• Others
IECEx 2014 Conference
19 + 20 February 2014 Kuala Lumpur

http://www.iecex.com/malaysia/

• Information on
  • Standards
  • Conformity Assessment

• Information on Regulations

• Practical Presentations / tuition
  • Area Classification
  • Installation requirements
  • Inspection
  • Maintenance
  • Repair
IECEx ACTIVITIES: Continued

- IECEx/UNECE Paper at PCIC Europe Conference Prague, June 2012

- Joint IECEx/UN Technical Paper Presented at 1st PCIC Middle East Conference Abu Dhabi November 2012, by Head of UNECE Regulatory Unit

- Joint Paper to PCIC Nth America 2012 “Personal Competence in IECEx” by Marty Cole + Kerry McManama

- IECEx Vice Chairman, Dr Zalogin presentation EU-Russia Industrialists' Roundtable meeting in Kazan, RU, Oct. 2012

- 2 Day IECEx African Training Workshop + Capacity Building by Thierry Houiex + Peter Thurnherr, 2012 – Very Successful

- HazardxEx Presentations + regular articles Ron Sinclair, Jim Munro
IECEx Planned Activities:

- **22+23 April 2015**: 2 Day International Conference to be held in Poland

- **During 2014**: Upgrading of the iPhone/Android App

- **During 2014**: Enhanced Search features for the IECEx On-Line Certificate System.

- **18-22 May 2015**: IECEx series of Operational meetings in Toronto Canada

- **14-18 Sep 2015**: IECEx annual Meetings, NZ
IECEx Meetings 2014:

- **Sept. 2014:** IECEx Annual Meetings, NL Hosts.
  - IEC V/President (Dr Fujisawa) along with IEC General Secretary (Mr Vreeswijk) attended

- **May/June 2014:** 7 Days of IECEx Operational Meetings hosted by ESMA in United Arab Emirates
  - WG1/WG5 – IECEx 02 Rules and Factory Auditing
  - WG 13 – IECEx Business Development
  - ExPCC/WG 4 – Training Body Certification
  - WG 15 – Non Electrical Standards
  - ExPCC – IECEx CoPC Committee
  - ExMarkCo – IECEx Mark Overseeing Committee
  - IECEx Executive – Oversight of the IECEx System
Future Annual IECEx Meetings Planned

- 2015: Australia/New Zealand
- 2016: South Africa
- 2017: USA
- 2018: France
- 2019: UAE
- 2020: Canada
- 2021: Japan
United Nations, via its UNECE Endorses IECEx
REGULATORY DIALOGUE AT THE UNITED NATIONS

To promote trade as a means of development

To protect the safety of workers and consumers & preserve the natural environment

To foster the international transfer of knowledge & technology
United Nations Endorsement of IECEx

New United Nations Publication, March 2011 endorsing IEC TC 31 Standards + IECEx as “world’s best practice”.

Full Text
http://www.unece.org/press/pr2011/11trade_p03e.htm
10. The CROs are drawn up with reference to international standards and conformity assessment procedures developed by IEC and ISO and to best practice in the assessment of conformity to such standards, within the IECEx.

11. The CROs address the requirements both for electrical and mechanical equipment being placed on the market (part one of the present document) and for the safe installation and use of the equipment in the workplace (part two of the present document).

12. Explosion protection in industry can be assured through a variety of legitimate means. The present document is based on one of them, namely, the “IEC Zone Concept, in accordance with IEC 60079-10 Parts 1 + 2”. This concept classifies hazardous locations as high, medium and low risk zones based on a standard risk-assessment methodology.

B. Definition of applicable conformity assessment procedures

22. Compliance with this CROs shall be by use of an international certification scheme such as the IECEx for direct market acceptance of products carrying IECEx Certification. Alternatively, where national legislation does not allow for use of IECEx Certificates, national certification of compliance should be based on IECEx testing and assessments.
Manufacturers trade Globally

Re-testing/ Re-certification
- Adds undue costs
- Results in delays to access markets
- Denies smaller countries access to new products/technology

IECEx Provides a Single Global Process :

a) Issuing of Test/Audit Reports and International Certificates that can either:
   - Be exchanged among participating Certifiers (ExCBs)
   - Be used both on a voluntary (purchasing requirements) or Regulatory basis.

b) Qualifying and Monitoring the operation of credible Certifiers + Labs
Demand for Oil and Gas (excluding biofuels) continues to grow steadily expected to reach 99 million barrels per day by 2035 – 15 mb/d up on 2009. *(IEA Report 2011)*

Despite the concerns of the late 1970s/80s Fossil Fuel is in super abundant supply

Developing economies are expected to account for largest growth in energy demand hence demand for Ex Equipment, Services and Competent Persons continue to grow

Demand for CA Services covered by IECEx will continue.
Oil and Gas will continue to meet 60% of the world’s energy needs thru to 2040 due to a growing population.

There is enough Gas resources to meet the current demand and consumption for more than 200 years.

It is estimated that by 2030 the demand of Oil and Gas will rise by 50%.
In 2012 84,141,209 cars and commercial vehicles were produced globally.

In 2010 Over 1 billion cars were on the road. Every Petrol Station is an Ex Installation.

It is projected that by 2014 there will be 3.3 Billion airline passengers annual worldwide. (IATA) – Every airport in the world is an Ex installation.
In 2011 the global production of Sugarcane was 1,794 Million Tonne.

In 2011 704,080,283 tonnes of Wheat was produced Globally.

In 2010 the world consumed around 1,726 Million tonne of Grains worth $352 Billion.
Coal - the facts

- Coal is mined commercially from over 50 countries worldwide with the 2011 top 5 producers:
  - China = 3,471 Million tonnes
  - USA = 1,004 Million tonnes
  - India = 585 Million tonnes
  - Australia = 414 Million tonnes
  - Indonesia = 376 Million tonnes

- ‘In 2011 coal’s share in global primary energy consumption increased to 30.3% - the highest since 1969.’ (IEA)

- Coal provides 30.3% of global primary energy needs and generates 42% of the world's electricity

- ‘Total world coal production reached a record level of 7,678Mt in 2011, increasing by 6.6% over 2010. The average annual growth rate of coal since 1999 was 4.4%.’ (IEA and BP)

- There are 1004 billion tones of coal reserves left, equivalent to 130 years of global coal output in 2011. (German Federal Institute for Geosciences and Natural Resources (BGR))
Oil and Gas Reserves

- 1,652.6 Thousand Million Barrels of oil as proven Oil reserves (end 2011)
- Natural Gas Reserves grew to 208.4 Trillion cubic meters in 2011
- In addition to Oil and Natural gas is the relatively new fossil fuel industry of “Shale Gas” which only commenced large scale production as late as the 1990s
- With Coal considered twice as bad for CO₂, Gas is becoming the preferred fuel for power stations
Thank You