Session 6 – IEC EX Scheme and adoption of it by the USCG
The IECEx Scheme facilitates the international exchange and acceptance of product-safety test results among participating laboratories for national approval or certification in one or more countries, normally without the need for additional testing. This is a universal goal among suppliers, consumers, and interested parties stated as “one standard, one test, accepted everywhere.” The objective of the IECEx Scheme is to facilitate international trade in electrical equipment intended for use in explosive atmospheres (referred to as Ex equipment).

The Ex scheme applies to manufacturers of:

- Electrical apparatus for explosive gas atmospheres
- Electrical apparatus for the detection and measurement of flammable gases
- Electrical products such as switches, outlets and outlet boxes, circuit breakers, electric motors, and lighting used in hazardous environments

According to the IEC, these manufacturers can expect:

- Reduced testing and certification costs
- Reduced time to market
- International confidence in the product assessment process
- One international database listing

There are currently 17 Accepted Certification Bodies (ACBs) in 22 countries participating in the IECEx Scheme.
The IECEx Scheme

Background

Historically, obtaining all of the necessary national safety certifications for electrical products used in explosive atmospheres has been a difficult, time-consuming and expensive proposition. To facilitate the entry of U.S. manufacturers into the international market, the United States applied to join the IECEx Scheme on February 9, 2001 and was accepted in April of 2001.

In the Ex Scheme, the IECEx accredits Accepted Certification Bodies (ACBs) to test and certify conformity of electrical equipment used in explosive atmospheres with internationally harmonized product safety standards and issue “Ex” test certificates and test reports. By significantly reducing duplicate testing, the Ex scheme provides substantial advantages over the previously available methods of obtaining multiple international certifications.

Operating Concepts

The IECEx Scheme is a multilateral agreement among participating countries and certification organizations based on the use of international (IEC) Standards. If a member’s national standards are not yet completely harmonized with the IEC standards, a transitional period is allowed. The transitional period can vary for different standards and is intended to allow time for harmonization between the IEC standards and the country’s national standards and to obtain national acceptance of IECEx Certificates of Conformity and the IECEx Mark of Conformity.

The IECEx Scheme utilizes Ex test certificates to attest that product samples have successfully complied with the appropriate tests and are in compliance with the requirements of the relevant IEC Standard.
The IEC Ex Scheme

The IEC Ex Scheme is a recent movement started by the IEC in 1991 to facilitate international trade by eliminating the need for duplication of testing and certifications. Presently, for a manufacturer to gain approval of equipment in various countries, the alternative to submitting equipment to each country’s test laboratory is to apply to one laboratory. These labs have agreements with many others around the world resulting in a spider web arrangement. Each agreement requires periodic review of each other’s capabilities which is expensive and time consuming. Each country has specific conflicts with universal standards and markings that are known as national differences. Examples of these differences are the flame-retardant tests or shock tests required by local fire codes in the U.S.. The U.S. has joined the IEC Ex scheme but allows for a 15-year adoption period while differences are resolved among the multitude of differences in local requirements.

The ultimate goal of the IEC EX Scheme is to remove any trade barriers between countries and have a single unified stamp, single test procedure and reciprocal agreements among countries and test labs for implementation....
What are the differences from a certificate standpoint?
IEC Draft as voted upon with members of Cenelec

ATTENTION

IEC – CENELEC PARALLEL VOTING

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this final draft international Standard (DIS) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.

ATTENTION

IEC – CENELEC PARALLEL VOTING

L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de norme internationale est soumis au vote parallèle. Les membres du CENELEC sont invités à voter par le système de vote en ligne du CENELEC.

31/999/FDIS

FINAL DRAFT INTERNATIONAL STANDARD
PROJET FINAL DE NOUVEAU INTERNATIONAL

Project number
Nombre du projet
IEC 60079-1:Ed7

TC 31

Submitted for parallel voting (CENELEC)
Soumis au vote parallèle (CENELEC)

UK

Secretariat (Secretariats)

Superseded document

Supplanté par la norme

IEC 60079-1:2012

31/999/CV

31/999/RVC

Performances expected

Performances attendues

Horizontal standard

Norme horizontale

Other TSCs are requested to indicate their interest, if any, in the FDIS to the TC31 secretary
Les autres TSC sont invités à indiquer leur intérêt, s'il existe, pour le FDIS auprès du secrétaire du TC31.
EN standard as adopted from the original IEC standard

UK National Standard (BS)

EN 60079-14

...so from a performance standpoint, the EN standard is almost identical to the IEC standard with European deviations listed in the Annex

Explosive atmospheres - Part 14: Electrical installations design, selection and erection (IEC 60079-14:2007)

Based upon IEC 60079-14 Standard with no deviations
Example of Dual Marked IECEx/ATEX Label

**ELECTRICAL PRODUCT**

- **II 2 GD**
- **Ex d IIC T4 Gb**
- **Ex t IIC T125°C Db IP66**
- **LCIE 11 ATEX 3000**
- **-30°C ≤ Ta ≤ +55°C**
- **IECEx LCI 11.0099**

**Manufacturer name and Address**
92260 Fontenay aux Roses - FRANCE

**Type**
AB12X

**Serial N°**
12345_2011

**Product type**
Manufacturing serial number and year of manufacturing

**Ambient temperature range**
-30°C ≤ Ta ≤ +55°C

**Degrees of protection provided by enclosure**
Ex d IIC T4 Gb
Ex t IIC T125°C Db IP66
LCIE 11 ATEX 3000

**IECEx certificate number**
IECEx LCI 11.0099

**Conformity to all the relevant European directives**

**Notified body number in charge of the quality surveillance**

**Distinctive mark for product in the scope of ATEX directive [94/9/EC]**

**Safety warning**
AVERTISSEMENT : NE PAS OUVrir SOUS TENSION
WARNING : DO NOT OPEN WHEN ENERGIZED

**Voluntary IECEx conformity mark license number**

**SOURCE IEx**
IECEx vs. ATEX Directive

The standards that have been set forth between CENELEC (who is responsible for EN hazardous location standards in Europe) and the IEC with regards to IEC standards for hazardous locations are now identical. Countries such as the UK, Italy, Germany, etc. adopt the EN standards and by law, are to follow these as country specific standards. From a manufacturing standpoint, this makes life much easier as the products to comply with EN & IEC standards are now the same....
ISO and IEC are committed to creating market-driven International Standards, based on objective information and knowledge on which there is global consensus, and not on subjective judgments, in order to provide credible technical tools that can support the implementation of regulation and public policy initiatives.

ISO and IEC are committed to developing International Standards that are market relevant, meeting the needs and concerns of all relevant stakeholders including public authorities where appropriate, without seeking to establish, drive or motivate public policy, regulations, or social and political agendas.
Experience with the IECEx system for one manufacturer re: IEC Ex Test Reports...

- US/Canada: ExTR accepted for Zone System, ExTR may be accepted for division concept (e.g. Intrinsic Safety)
- Russia, Ukraine, Belarus: ExTR accepted
- China: ExTR accepted
- South Korea: ExTR accepted
- Hongkong, Taiwan, Vietnam, Indonesia (not IEC Ex members) ExTR not accepted but ATEX Test report accepted
- Japan: ExTR not generally accepted, many tests required
- India: ExTR accepted
- Brazil, Argentina, Chile: ExTR accepted
- South Africa: ExTR accepted

So to conclude here, even though many countries do not yet accept IECEx Certification as written, they will accept the IECEx Ex Test Report issued by one of the Ex Test Labs as a basis for approval for issuing an Ex certificate for that particular country, since most of these country standards are based upon the original IEC 60079 set of standards
Factors leading towards IECEx as the defacto ‘World Standard’

• Since most countries adopt ‘IEC’ in some form or fashion, it has the widest following.
• Many of the developed countries are members of the IEC
• EN Standards and IEC Standard are in many cases the same
• Makes it simpler for a manufacturer to build and certify a product
• Makes it simpler for a customer to use ‘best practices’ on a world wide basis
• Since it is International and not Country/Region Specific, less likely to be influenced by specific country political conflicts
• Many users would like to harmonize to streamline production and drive efficiency into the production system
• More competition from more sources around the world from both test labs and manufacturers

• Key point: India and China are both making it clear that they would prefer IECEx over alternative Ex testing/standards systems
• Key Markets such as Australia already accept IECEx certification with other countries such as Brazil (Inmetro/Cepel) and Russia (GOST-R) potentially accepting IECEx.
• How about the US? How are we leaning?
EX Equipment in the US

Onshore: NEC 500 & 505

- Division Concept/Zone Concept both acceptable
- Approval – By recognized NRTL (OSHA) which includes UL, FM, Intertek (ETL), CSA to ANSI/NEMA/UL standards including UL60079 series of standards
- Zone Concept in US – Must be tested and certified to “AEx” which does not recognize true IEC standards and approvals. ATEX & IECEx not accepted in the NEC.

- Offshore: BSEE has authority over fixed platforms while the USCG has authority over floaters

- Recognizes both US/Division/Zone concepts and recognizes IEC standards (IEC 60079 series) per 46CFR-111 and protection concepts such as flameproof (Ex d), Increased Safety (Ex e) and others.
- Must be tested and certified by a recognized USCG test lab which include the ones above as well as some other test labs as listed on the next slide.
Some of the USCG Approved Test Labs

All of these labs are able to offer some sort of approval to IEC 60079 set of standards and many of these labs are also ATEX Notified Bodies as well.

What about using a non-USCG IECEx TL for the GOM?
The Coast Guard is providing guidance regarding electrical equipment installed in hazardous areas on foreign-flagged Mobile Offshore Drilling Units (MODUs) that have never operated, but intend to operate, on the U.S. Outer Continental Shelf (OCS). Chapter 6 of the 2009 version of the IMO Code for the Construction and Equipment of Mobile Offshore Drilling Units (2009 IMO MODU Code) sets forth standards for testing and certifying electrical equipment installations.

The Coast Guard is considering issuing a rule that will implement Chapter 6 of the 2009 IMO MODU Code and that will be applicable to foreign-flagged MODUs that have never operated, but intend to operate, on the U.S. OCS. In the interim, the Coast Guard recommends that owners and operators of foreign-flagged MODUs that have never operated, but intend to operate on the U.S. OCS, voluntarily comply with Chapter 6 of the 2009 IMO MODU Code.
The 2009 IMO MODU Code recommends that electrical installations in hazardous areas be tested and certified in accordance with the IEC 60079 series of standard(s). The IEC offers an international certification system called the "Certification to Standards Relating to Equipment for use in Explosive Atmospheres" (IECEx). The IECEx system requires full compliance with the applicable IEC 60079 series of standard(s), including the testing of equipment by an Independent Test Lab.

The ATEX Directive is intended to ensure the certification of electrical equipment to the Essential Health and Safety Requirements given in the Directive or appropriate IEC harmonized standards, but it does not specifically require testing and certification by an independent third party lab.

To summarize, the USCG prefers IECEx equipment tested by one of the USCG test labs vs. ATEX approved equipment for foreign flagged vessels operating in the GOM.

Note: The ‘self-certifying issue with ATEX as well as the quality of the Notified Bodies by Europa is driving organizations concerned about safety away from ATEX and towards IECEx.
EX Equipment in the GOM

Latest Ruling by the USCG, March 2015....

Key Points

- All rigs currently in the GOM are grandfathered as well as rigs currently in construction
- Any rig that wishes to operate in the GOM effective April 1st 2018 must be either North American Division/Zone or IECEx per a USCG approved test lab....
- ATEX only equipment not allowed....
To summarize:

- If a company wishes to sell products into the offshore market in the US, you can follow IECEx, AEx (NEC505) or Class Division (NEC 500).
- If a company wishes to sell products for the offshore European market, you are limited to following the ATEX Directive.
- If a company wishes to sell to other offshore markets, generally speaking IECEx is acceptable but you may have to get additional certification/markings such as TR CU (Russia), Inmetro (Brazil), etc. These country specific standards are based around the IEC 60079 sets of standards.
# IECEx vs. ATEX Directive

<table>
<thead>
<tr>
<th>ITEM</th>
<th>IECEx</th>
<th>ATEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation / Management</td>
<td>Industry Representatives (Manufacturers, Certification Bodies, Ex Equipment End Users, Regulators, Community interests)</td>
<td>E. U. Commission (Government Regulatory)</td>
</tr>
<tr>
<td>Aim</td>
<td>One Single Certificate, for any hazardous area product and services recognized and accepted worldwide (Market Acceptance)</td>
<td>Covers equipment &amp; remove barriers to trade and improve safety for equipment and workers</td>
</tr>
<tr>
<td>Validity / Legal</td>
<td>Today: Products with IECEx Certificate accepted in several countries. Alternatively a single test report (ExTR) can be sent to any IECEx Certifier to issue locally accepted certification.</td>
<td>ATEX Directive is Law in all the E. U. Countries (Mandatory application). Limited in scope to Europe.</td>
</tr>
<tr>
<td>Field of Application</td>
<td>Current: Electrical and Non electrical products and systems. Gas/Dust Industries. Now Covering SERVICE INDUSTRIES, e.g. Repair and Overhaul.</td>
<td>Electrical and non electrical products and systems. Gas/Dust Industries. Equipment ONLY.</td>
</tr>
<tr>
<td>Standards Used</td>
<td>International Standards only, e.g. IEC Compliance to Standards is mandatory.</td>
<td>Any recognized standard may be applied provided it meets the Essential Health and Safety Requirements of the Directive. However, the E.U. Commission approves list of Harmonized Standards. Allows for Interpretation Compliance to Standards not mandatory but is generally used to assess products.</td>
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## IECEx vs. ATEX Directive

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<tr>
<td>Certification Procedure</td>
<td>ExCBs issue [for Certified Equipment Program]: ExTR (Product Type), Ex QAR (production facility quality audit), IECEx CoC (Certificate of Conformity), ExCBs issue [for Certified Service Facilities Program], CAR (IEC 60079-19 Compliance Report Form), FAR (Facilities Audit Report Form), IECEx CoC (Certificate of Conformity) On-Line Certificate of Conformity System - Reports are officially registered on IECEx website. Electronic On-Line CoC available for full public view, acts as master controlled version. Common Rules applicable to all applications. Rules of Procedure for each Program (IECEx 02, IECEx 03, IECEx 04), Operational Document ODs provide Standard operating procedures to be followed by all ExCBs, Technical Decision Sheets, Accessible full listing along with all Scheme documents maintained and available via single IECEx website location, Single appeals body available, Decisions of the Management Committee are binding on all ExCBs, Certificate Holders etc.</td>
<td>ExNBs issue-EC Type examination certificate. Ex QAN (Quality Assessment notification for production facility).</td>
</tr>
<tr>
<td>Conformity Assessment</td>
<td>For IECEx Certified Equipment Program: ExTR + QAR = IECEx Certificate of Conformity (CoC) ExTR = IECEx Test Report QAR = IECEx Quality Assessment Report Applicable to ALL products, no difference between Zones or products CoC issued via Secure IEC Website ensures FULL Public access to issued Certificates Self Certification not permitted For IECEx Certified Services: FAR + Assessment of Competencies = IECEx Certificate FAR = Facilities Audit Report Applicable to ALL Services CoC issued via Secure IEC Website ensures FULL Public access to issued Certificates. Self Certification not permitted.</td>
<td>Declaration of Conformity by Manufacturer to declare that he is in possession of necessary documents and reports. -Certificate issued by ExNB only for category 1 / 2 and M 1 / 2 electrical equipment-Self certification allowed for Category 3 and Category 2 Mechanical. Does not cover service facilities.</td>
</tr>
</tbody>
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<td>Organisms for Certification</td>
<td>All ExCBs and ExTLs are subject to the following assessment: Initial Peer Assessment by a 3 member IECEx Assessment Team, prior to entry to IECEx - Annual Surveillance of ExCBs and ExTLs - 5 Year re-assessment for all ExCBs and ExTLs Dedicated IECEx Technical Secretariat to manage day to day operations of the IECEx Scheme IECEx Management Committee (ExMC) IECEx Technical Assessment Group (ExTAG) IECEx Conformity Mark Committee (ExMarkCo).</td>
<td>ATEX Notified Bodies (ExNBs) appointed by individual nomination of the governments of their countries. A common assessment system does not exist. Surveillance of ExNBs dependant upon national governments.</td>
</tr>
<tr>
<td>Manufacturer Surveillance</td>
<td>ExCB maintains the Status of the IECEx Certificate of Conformity based on the outcome of follow up Quality Audits, QARs.</td>
<td>ExNBs conduct regular audits of manufacturers.</td>
</tr>
<tr>
<td>Work place Requirements</td>
<td>Nothing – Refers to National regulations.</td>
<td>ATEX Directive 137 contains special requirements for workers and management.</td>
</tr>
</tbody>
</table>
IECEx Marking: EPL

EPL =

- Explosion
- Protection
- Level

- This is the IECEx equivalent to the ATEX Catagories
- Now current for newly-certified equipment, even ATEX

<table>
<thead>
<tr>
<th>Zone</th>
<th>ATEX Cat.</th>
<th>IECEx EPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1G</td>
<td>Ga</td>
</tr>
<tr>
<td>1</td>
<td>2G</td>
<td>Gb</td>
</tr>
<tr>
<td>2</td>
<td>3G</td>
<td>Gc</td>
</tr>
<tr>
<td>20</td>
<td>1D</td>
<td>Da</td>
</tr>
<tr>
<td>21</td>
<td>2D</td>
<td>Db</td>
</tr>
<tr>
<td>22</td>
<td>3D</td>
<td>Dc</td>
</tr>
</tbody>
</table>

(Ga) (Da) [Ex ia] IIC

Brackets () indicate that the device is to located in the ‘safe area’
But can supply zones 0 (Ga) and 20 (Da)
IECEx Equipment Marking

New marking including EPLs

Similar marking is also being implemented on mechanical equipment
IECEx Marking Requirements compared to ATEX...

ABTECH
HUMBLE, TEXAS, 77338 USA

TYPE SX_________64_________________
RATING______ 10________________WATTS
SERIAL No.______ 43433_________ 2002

II 2 GD – IP66 – T6 55°C
Gb Ex e II T6 T amb__55__
IECEx SIRA 07.0123X
WARNING!!!

LIVE TERMINALS ISOLATE ELSEWHERE BEFORE OPENING ENCLOSURE
The IECEx QAR is a requirement under the IECEx scheme to ensure the manufacturer has a quality system in place to produce the hazardous equipment. The manufacturer is audited by the certification body every 12 to 28 months to ensure this quality is being maintained.
IECEx Certified Repair Facility Program

The IECEx Certified Service Facility Program is the latest International Certification system dedicated to the highly specialized 'Ex' industries – where potentially explosive environments require more stringent equipment standards. These include the oil and gas, coal mining, and grain and dust industries. Within the European Community, a suitable repair facility that did work on EX equipment could be done by any number of firms, at various levels of competency, the IECEx certified service program allows firms that are in this field to obtain accreditation for services on EX equipment and also allows products that may not be put back into service otherwise...