European Sealing Association e.V.

IECEx Explosion Protection Procedures and a Summary Comparison with ATEX 2014/34/EU for Mechanical Seal Manufacturers

Introduction

Plant owners and Engineering contractors are faced with the complex task of planning, designing and maintaining a plant which will operate effectively, efficiently and safely.
Design philosophy is under the control of the plant owner and engineering contractor. In the case of safety, they must comply with the national legal framework of the country where the plant is located.
Plants processing or using flammable gas, vapours or combustible dusts contain hazardous areas where explosive atmospheres may be present. This means higher risks to personnel, plant and surrounding areas. These hazardous areas are identified and classified by the plant operator or contractor. Equipment utilised in hazardous areas has to be designed and approved to cover applicable safety requirements, this is the responsibility of the relevant equipment manufacturers.

There are currently three philosophies for equipment intended for use in Hazardous Areas (Locations).

- The North American one based on Classes and Divisions as defined in Article 500 of the National Electrical Code (NEC)
- The European one which is governed by ATEX Directives 99/92/EC and 2014/34/EU and is based on Zones and Equipment categories.
- IECEx that is based on Equipment Groups and EPLs as defined in IEC standards

The aforementioned certification schemes are not interchangeable, and their application depends on the geographical location of the plant and the local safety regulations. IECEx offers, on the basis of existing IEC standards, an assessment of the conformity and the certification of electrical equipment for use in explosive atmospheres. With the completion of the ISO 80079 standards, this certification is now also available for non-electrical products.
The IECEx conformity assessment methodology for non-electrical equipment follows the same principles and procedures used in ATEX. However, the scheme only allows third party assessment by an IECEx approved Testing Laboratory and Certification Body combining all aspects of design evaluation, verification and production control; all assessments and verifications are conducted against IEC standards. The assessment and test reports issued by accredited IECEx Testing Laboratories are accepted by national certification bodies in countries participating under the scheme, and as such, they can facilitate regional or national certification without the need for additional testing

The purpose of this document is to provide guidance on the IECEx and ATEX systems in relation to the conformity assessment procedure, harmonized standards and the course of the respective certification procedure.

The information contained in this document is intended to provide a general overview. The official documents relating to the rules and standards of the IECEx and the ATEX systems take precedence at all times.

Scope

The IECEx System provides means for assessment and certification of multiple aspects related to hazardous areas but it is not a mandatory system such as the EC Directives in Europe.
The IECEx System publishes original certificates and licenses on its web site providing a convenient means to check the validity of the certificates and licenses.

Many nations participate in the IECEx System, either as a full member or applicant member.

The IECEx system comprises four schemes:
1. The IECEx 02 Certified Equipment Scheme.
2. The IECEx 03 Certified Service Facilities Scheme.
3. The IECEx 04 Conformity Mark Licensing System.
4. The IECEx 05 Certified Persons Scheme.

The IECEx 02 Certified Equipment Scheme may be best compared to the ATEX Directive. The scheme is well accepted internationally due to the fact that it only allows third party assessment by IECEx approved Testing Laboratories and third party certification by IECEx approved Certification Bodies. IECEx accepts the participation of Ex Certification Bodies and Ex Test Laboratories only after successful completion of the IECEx assessment process, which also includes on-going surveillance.
Approval is achieved by peer review audits of not only the facilities but also the test reports and certificates. Certificates of Conformity can only be issued once confirmed that the manufacturers Quality Assurance System complies with the requirements of the IECEx Certified Equipment Scheme.

IEC Certification (including Quality)
ATEX and IECEx both require quality assurance systems to be in place but the quality assurance requirements of Directive 2014/34/EU for non-electrical equipment do not always necessitate manufacturers to obtain EU Type Certification and QAN from an EU Notified Body. ATEX permits non-electrical equipment manufacturers to conduct self-assessments and self-certify products for products classed as Cat 2 and 3; for these products, the quality assurance requirements are listed in the conformity assessment procedures of the Directive and they generally form an integral part of the QMS of the manufacturers. IECEx requires a QAR for all Ex certified products.
Besides the product certification, in both cases a quality system must be set up by the manufacturer and will periodically be checked by a Notified Body. For both ATEX and IECEx, the quality system is mainly based on ISO 9001 with additional requirements for the design, manufacture and testing of explosion proof products.
IECEx Test Reports (ExTR) are a consistent information medium. All IECEx accredited Notified Bodies must accept each other's IECEx test reports. So when evaluations and tests are carried out by Notified Body 'X', these should in principle be accepted by Notified Body 'Y' (if both are accredited for IECEx 02). Information can easily be exchanged between different Notified Bodies. ExTRs are formally accepted without the need for extensive additional technical evaluations and testing for the certification of equipment to other regional or local cert schemes.

Compliance

- ATEX 95 is legally required for all electrical and non-electrical equipment in hazardous environments.
- ATEX 95 is law-driven, compliance with standards is not mandatory
- For ATEX, the manufacturer is fully responsible for collection of the modules for examination and production control.
- IECEx 02 was, originally, only intended for electrical equipment in hazardous environments. Since 2016, the same requirements apply for Non-Electrical equipment.
- IECEx 02 is standard-driven, compliance is mandatory
- Ex CBs / ExTLs as well as ExNBs verify compliance of products to the requirements of the scheme; in all cases, it is assumed that a product has been designed to the requirements of the applicable certification.

In practice the technical requirements between ATEX & IECEx are identical. The quality assurance requirements for a QMS system are identical – the method / route of demonstrating compliance is the only difference.
ATEX and IECEx both use the same standards (eg EN-IEC 60079-0), so in terms of technical content, there is basically no difference. Only visible difference in many cases is the marking on the device.

The leading directive in the EU is ATEX, as it contains general requirements for products in the EU. To meet these requirements the underlying standards (eg EN-IEC 60079-0) can be used. ATEX certification is attained upon successful completion of an assessment against the EHSRs of Directive 2014/34/EU, not a standard or standards; any recognised technical standard (national, EN, or international) can be used to support a technical assessment. As the EHSRs of the Directive do not include specific tech requirements as a standard practice EN Harmonised standards are used; using EN Harmonised standards offers a presumption of conformity to most of the EHSRs of the Directive. Deviation from the requirements of the standards is possible
For IECEx the standards are leading, which means that products must meet the relevant requirements in the standards. Within both IECEx 02 and ATEX there is little room for interpretation and deviation from the standards are almost impossible.

Status
Conformity assessment procedure according to 2014/34 / EU (ATEX) requires examination by a "Notified Body" only for Category 1 (Zone 0) equipment. By contrast IECEx places the same requirements across all levels. This may result in a disproportionate increase in the cost of certifying non-electrical products for use in potentially explosive atmospheres. E.g. for opeartors in the chemical industry the proportion of devices with EPL a is usually no more than approx. 1% of the installed devices. The cost of certification of all devices thus represents a disproportionately high financial cost for manufacturers, which is passed on to the users.
Both for ATEX and IECEx; as part of the technical review, a verification test, e.g. resistance to impact, is identified as applicable. An applicable test can be waived (not conducted), if there is sufficient technical information to support that the explosion safety aspects of the equipment will not be compromised.

In principle, the goal of a uniform international certification of non-electrical equipment for use in explosive atmospheres is welcomed. However, application of the ATEX Directive is legally binding across the EU, as such IECEx certification cannot be applied as a replacement for these known and recognized conformity assessment procedures. IECEx remains a voluntary system.

Given the current legal status associated with the two standards, and the low ignition potential of mechanical devices compared to electric motors, the ESA proposes members recommend maintenance of ATEX (EU-Directive 2014/34 / EU) as appropriate for EPL Gb and Gc (device category 2 & 3).
The ESA would welcome moves by the IECEx organization to harmonize its certification with the legally prescribed practice according to EU Directive 2014/34 / EU (ATEX).

Review
One objective of the IECEx Scheme is to make certification more cost-effective and timely for manufacturers. In principle, the goal of a uniform international certification of non-electrical equipment for use in explosive atmospheres is a logical progression for industry.
However, the scheme at the current time does not offer a cost-effective solution, even in International markets, to justify the time and cost of certifications for many manufacturers and for numerous types of products.
The mandatory requirement of a test, ignition source analysis and QA assessment for all device categories represents a significant deviation from the legally required practice in the EU (ATEX), which has been tried and tested for many years. For manufacturers and users, the effort is disproportionate since there are no compelling safety reasons for this, currently areas involving the greatest safety risk are covered by ATEX Category 1 requirements. .
Typically the chemical industry, has operated with around 1% of equipment requiring Category 1 ATEX compliance. The cost of certification of all devices represents a considerable expense to the manufacturer which would be passed on to the users and ultimately their customers.
Some discussion has suggested that implementing the same certification procedures across all equipment may potentially increase the risk that device categories/ equipment protection level will be diluted in practice as differences will be less recognisable.
While the IECEx certification system is consistent with the postulated goal of a globally uniform regulation, there are currently no requirements for non-electrical explosion protection outside the EU. Currently, for most countries

without regulations for explosion-proof equipment for non-electrical equipment, ATEX certification is generally accepted.
The recommendation of the European Sealing Association is therefore that the default means of certifying hazardous equipment remains the ATEX system and individual companies discuss this with plant operators when compliance with IECEx is requested.

Guide comparing various elements of both IECEx and ATEX

ITEM	IECEx	ATEX
Organisation / Management	Industry Representatives (Manufacturers, Certification Bodies, Ex Equipment End Users, Regulators, Community interests)	E. U. Commission (Government Regulatory)
Aim	One Single Certificate, for any hazardous area product and Services recognised and accepted worldwide (Market Acceptance)	Covers Equipment, Remove barriers to trade and improve safety for equipment and workers
Validity / Legal	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	ATEX Directive is Law in all the E. U. Countries (Mandatory application) Limited to Europe
Field of Application	Current: - Electrical and Non electrical products and systems - Gas / Dust Industries - Now Covering SERVICE INDUSTRIES, e.g. Repair and Overhaul	- Electrical and non-electrical products and systems - Gas / Dust Industries - Equipment ONLY
Standards Used	International Standards only , e.g. IEC Compliance to Standards is mandatory	Any recognised Standard may be applied provided it meets the Essential Health and Safety Requirements of the Directive. However, the E.U. Commission approves list of Harmonised Standards. Allows for Interpretation Compliance to Standards not mandatory but is generally used to assess products
Certification Procedure	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	ExNBs issue - EC Type examination certificate - Ex QAN (Quality Assessment notification for production facility)

	- Decisions of the Management Committee are binding on all ExCBs, Certificate Holders etc.	
Conformity Assessment	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	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.
	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	Does not cover service facilities.
Certification	All ExCBs and ExTLs are subject to the following assessment: - Initial Peer Assessment by a 3 member IECEx Assessment Team - 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)	ATEX Notified Bodies (ExNBs) appointed by individual nomination of the governments of their countries. A common assessment system does not exist. Surveillance of ExNBs dependent upon national governments
Manufacturer Surveillance	ExCB maintains the Status of the IECEx Certificate of Conformity based on the outcome of follow up Quality Audits, QARs	ExNBs conduct regular audits of manufacturers
Work place Requirements	Nothing – Refers to National regulations	ATEX Directive 137 contains special requirements for workers and management.

Putting IECEx and ATEX Together
The Key Elements: - Technically Identical Standards for Electrical Equipment since 2005 (very few exceptions) - When using IEC Standards a single set of Tests and assessments can be used for both IECEx and ATEX, in accordance with the respective rules - An ATEX EC Type Examination can be based on an IECEx ExTR BUT ATEX documentation alone is not sufficient for IECEx - QA audits are the same for both IECEx and ATEX.