



General Panorama of the “Ex” Regulatory Experience in Brazil

A necessary whole life-cycle user’s point of view
beyond the certification of “Ex” equipment

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Brazil has a National Regulation on “Ex” equipment since 1991



- First Regulation issued by Inmetro (the Brazilian Accreditation Body and Regulator) in 1991, after explosions occurred in offshore platforms
- “Ex” Regulation has been periodically updated since 1991 up to now, improving certification requirements for Ex electrical equipment as well updating reference Standards
- Since the end of the 70’s the Brazilian “Ex” Standards are based on the IEC Standards and since 2006 they are issued **fully harmonized** with IEC TC 31



General Panorama of the “Ex” Regulatory experience in Brazil



- ▶ Current Directive No. 179 was issued by Inmetro in 2010, covering Ex electrical equipment for gas and dust explosive atmospheres
- ▶ Inmetro issues Ex Regulation with support of the Brazilian society represented by:
 - ▶ Manufacturer Associations
 - ▶ Certification Bodies and Testing Laboratories
 - ▶ End Users Associations and major user, such as Petrobras
 - ▶ Neutral Organizations, such as Cobei

Main changes in Directive Inmetro 179/2010 (*Improvements*):

- ▶ Dust Atmospheres product certification become mandatory
- ▶ CBs are authorized to analyze and accept the **IECEX Test Reports (ExTR)** on their discretion
- ▶ Test Results performed by Testing Laboratory accredited by an **ILAC** (International Laboratory Accreditation Cooperation) Full Member, on their discretion, may also be accepted by Brazilian CBs



Current Brazilian Regulation on “Ex” equipment issued in 2010



- ▶ Use of the newest applicable IEC 60079 standards, already translated to Portuguese as ABNT NBR IEC 60079
- ▶ For those (exceptional) cases where a Brazilian ABNT NBR IEC 60079 standard is not yet available, the **respective international IEC 60079 or ISO/IEC 80079** standard shall be considered for the certification process
- ▶ Other standards or directives from other specific **countries** (e.g. NEC, NEMA, ISA, DIN etc.) or **regional** standards or directives (e.g. ATEX) cannot be directly used, **unless harmonized with IEC 60079 Series**
- ▶ Adoption of quality evaluation for Manufacturer Quality System audits based on CDV stage (available in 2010) of **ISO/IEC 80079-34**
- ▶ Any other activities performed by a certification body in another country, such as inspections, are allowed only if there is a **MOU** (Memorandum of Understanding) between the BR Certification Body accredited by Inmetro and the Certification Body abroad



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ASSOCIAÇÃO
BRASILEIRA
DE NORMAS
TÉCNICAS


Who sets the “Ex” Standards in Brazil

- ▶ **ABNT** - Associação Brasileira para Normas Técnicas
Brazilian Association for Technical Standards (1940)
- ▶ **COBEI** - Comitê Brasileiro de Eletricidade, Eletrônica,
Iluminação e Telecomunicações
*Brazilian Committee of Electricity, Electronics, Lighting
and Telecommunications (1908)*
 - ▶ Explosive atmospheres Standards:
Subcommittee **SC-31** – Atmosferas explosivas
(Brazil TC-31 **Mirror** Technical Committee)

Who sets the “Ex” Standards in Brazil


- ▶ ABNT has as general policy issuing Brazilian standards that are **harmonized** (same technical content and format) with the relevant international standards of IEC or ISO, **without any national deviation**
- ▶ Brazil is a “P” (Participant) member of several IEC Technical Committees, such as **TC-2, TC-18, and TC-31**
- ▶ In these Technical Committees Brazil offers comments and suggestions for the improvement of the relevant international IEC standards based on **best practices, lessons learned and the experiences** of Brazilian manufacturers, CBs, TLs and users
- ▶ After publication of the IEC 60079 Standard, ABNT issues corresponding NBR IEC 60079 Standard in **Portuguese**

The weakest “Ex” link: Risk of explosions



The overall safety of a facility and the people engaged in electrical and mechanical installations in explosive atmospheres can be compared with a **chain**, which contains “**Ex**” links, such as: **Area classification, installation design, “Ex” equipment selection, erection, inspection, maintenance and repair, over the whole life-cycle.**

The maximum strength of an “Ex” installation is determined by its **weakest “Ex” link.**





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Regulations covering the whole life cycle of plants containing hazardous areas

- ▶ To date, there are no BR regulations about certification of non-electrical “Ex” equipment, or Service Facilities providing services in hazardous locations or Personnel Competencies in explosive atmospheres, yet
- ▶ However, Inmetro is currently drafting new Directives on the certification of **Workshops for Repair & Overhaul** of “Ex” equipment, based on the requirements given in **ABNT NBR IEC 60079-19**. This new regulation is planned to be issued by Inmetro in **2013/2014**
- ▶ Moreover, Inmetro also plans to issue, in **2014**, a new Directive on the Certification of **Personnel Competencies in explosive atmospheres**, based on the requirements set forth in ABNT NBR IEC 60079 – **Parts 10-1, 10-2, 14, 17 and 19**
- ▶ It is also foreseen by Inmetro to start working, in a near future, on certification of other types of “Ex” Services Facilities engaged in **Area classification, Design, Installation, Inspection and Maintenance**



“Ex” Timeline in Brazil: Major events



- 1958:** University of Sao Paulo IEE - Test Laboratory starts performing tests for Explosion Proof Enclosures (supported by Petrobras)
- 1980s:** Issuing of several ABNT NBR “Ex” Standards (based on, but not fully IEC TC 31 harmonized, with National differences)
- 1987:** **Cepel Labex** Test Lab accredited by Inmetro (in cooperation with PTB and supported by Petrobras)
- 1991:** **First** Inmetro Regulation for certification of Ex electrical Equipment
- 2000:** Updating of Inmetro Regulation for certification of Ex electrical equipment
- 2004:** BR Ministry of Labour updates BR Directive on Electrical Safety of Electrical installations, including periodic inspections, inclusive in hazardous location
- 2006:** **First** ABNT NBR IEC 60079 Standard issued, fully harmonized with respective IEC TC 31 Standard (NBR IEC 60079-17)
- 2006:** Updating of Inmetro Regulation for certification of Ex electrical equipment
- 2006:** TC 31 Meeting in **Rio de Janeiro** (First TC 31 Meeting in Latin America since 1948)
- 2008:** Foundation of Brazilian Subcommittee SC IECEX BR in Cobei
- 2008:** TC 31 Meeting in **Sao Paulo (along with IEC General Meeting)**
- 2008:** BR NC for IEC (Cobei) **application for a membership** to IECEX System

“Ex” Timeline in Brazil: Major events (cont.)

2009: Brazil becomes an IECEx Member

2009: First “Ex” Repair Workshop Facility Certificate issued by an “Ex” BR CB, according to the requirements set forth in **ABNT NBR IEC 60079-19** (first issue in 2008)

2010: Updating of Inmetro Regulation for certification of Ex equipment (Current Directive No. 179)

2011: First Brazilian ExCB accredited by IECEx to operate in Ex Equipment Scheme (NCC Certification)

2013: More than 50 ABNT NBR IEC 60079 Standards issued and/or updated since 2006, with no National Differences to current Edition Standards issued by IEC TC-31

2013: 38 “Ex” Repair Services Facilities Certified in Brazil since 2009, against requirement set forth in ABNT NBR IEC 60079-19

2013: IECEx Meeting in Fortaleza / Brazil hosted by Cobei

The “Ex” chain is only as strong as its weakest “Ex” link



All “Ex” equipment shown have been duly third-part certified by an accredited Certification Body.

Certification of “Ex” equipment is not sufficient to assure safety in hazardous areas. There is an urgent need of a **wider approach**:

Certification encompassing the **whole life-cycle** operation of an “Ex” plant.



General Panorama of the “Ex” Regulatory experience in Brazil



Whole Life-Cycle in Explosive Atmospheres steps: From design to routine inspections, maintenance and overhauls



Process risk assessment

Using requirements of **area classification** for flammable gases and combustible dust (Industrial Codes and Standards **ABNT NBR IEC 60079** - Parts 10-1 or 10-2)



Ongoing management of risks and of changes

Using requirements of **design, installation and commissioning**, including initial detailed inspection (Standard **NBR IEC 60079-14**)

Using ongoing requirements of continuous routine **inspection** (sampling or visual) and **maintenance** (Standard **NBR IEC 60079-17**)



Safe “Ex” Plant

Using ongoing requirements of **repair or overhaul** of “Ex” equipment (Standard **NBR IEC 60079-19**)

An user's point of view on safety of an "Ex" plant



A proper area classification

A proper Ex design

A proper Ex equipment (electrical/mechanical) selection

A proper Ex equipment (electrical/mechanical)

(CBs, TLs and Manufacturers are engaged in this link)

A proper installation of Ex equipment

A proper Ex initial inspection

A proper Ex commissioning

A proper Ex start-up

A proper Ex operation

A proper Ex periodic inspection

A proper Ex repair service

A proper Ex change management policy



And then we could hope to rely on a safe plant, in the case of a leakage occurs and a cloud of explosive atmosphere involves an "Ex" electrical or mechanical equipment



General Panorama of the “Ex” Regulatory experience in Brazil: **Conclusions**



1. In Brazil, all National “Ex” Standards are fully aligned with international IEC 60079 Series , without any National differences.
2. In Brazil, Inmetro is working on the issuing of **two new National Directives** on “Ex” Repair Service Facilities and “Ex” Personnel Competencies based on requirements indicated in the applicable ABNT NBR IEC 60079 Standards.
3. Many countries around the world adopt “Ex” Regulation only for certification of “Ex” **equipment**. A new **life-cycle** approach is needed for safer Ex installations
4. Buying an “Ex” certified equipment is not sufficient to assure safety for people and installations engaged in hazardous locations



5. **The whole life-cycle “Ex” safety approach** is required: Area classification, design, installation, inspection, maintenance, repair, and competent persons
6. The main objective of **End Users, Manufacturers, IECEx, IEC TC 31, UN/UNECE, Regulators and CBs** must be to increase safety level, during the **whole life-cycle** operation of onshore/offshore plants
7. Third-part certification of **Service Facilities and Personnel Competencies** is required. A Common Regulatory Framework issued by UN/UNECE is now available in **different languages**
8. We urgently need a stronger “Ex” chain. Strengthening the **weak “Ex” links** makes the entire process stronger. **And safer.**



General Panorama of the “Ex” Regulatory experience in Brazil



A necessary whole life-cycle user's point of view
beyond the “Ex” equipment certification

Thank you for your attention

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CAUTION
Risk of presence
of explosive
atmosphere