Control of Ignition Sources in the Oil & Gas Industry

FORUM of Sharing Best HSE and Process Safety Practices at ADNOC

Ind-Ex Middle East LLC
26-27 May 2016 in Abu Dhabi UAE
Árpád Veress

Professional
- 20 yrs experience in HA projects
- ATEX and IECEx auditor
- Certified acc to ATEX and IECEx
- IECEx CP BAS11.0002 issue2 (9 units)
- International references
- Rep of TC31
- Lecturer at various international Technical Universities

Personal
- Married
- Father of 2+1
Control of Ignition Sources...

...means:

All aspects of industrial explosion protection are considered!

As general rule we do have the 3 Ex principles:

- No Ex Atmosphere There is a HA
- No Ignition Sources Ex installations
- Safety distances
Ex Installation...

... means:

- Total lifetime on site is considered
- Specification, design, installation, commissioning, start up, operation, maintenance, cleaning, repair, modification, relocation, shutdown

All in Ex way

Done by Ex competent colleagues, team
- Kick off meeting to clarify Ex Compliance study objectives, identify study focus areas and determine execution methodology
- Submission of initial report highlighting management plan, control procedure & area classification philosophy/design basis for COMPANY review & approval.
- Preparation of overall IECEx certification management plan, control procedures, execution strategies from concept to commissioning, evidence file
- Data collection from site (HAC layouts, equipment lists, products certificates, maintenance records)
- Report including preparation of design basis for area classification studies and identify list of deliverables.
- Ensure operability, quality and effective cost to the COMPANY satisfaction and completion of Ex Compliance objectives within agreed project execution schedules
- Ensure that COMPANY HSE Policy objectives are adhered
- Recommendations as required as per scope of work for increased plant safety
- Ensure that all Vendor supplied equipment and packages are fully compliant with Ex compliance requirements
- Gap analysis and risk analysis and mitigation
- 30% engineering design review
- Training to project personnel for installation and commissioning with regard to IEC Ex compliance.
- HAZOP workshop
- EHAZOP workshop
- HAZID workshop
- Design Basis, Specification and Data Sheets are to be issued for design after COMPANY approval
- Procurement documentation to be reviewed prior to order of equipment.
- 60% engineering design review
- EHAZOP workshop
- HAZID workshop
- 90% engineering design review
- EHAZOP workshop
- Optional: FAT (factory acceptance test)
- Review and inspect the installation (Pre-Commissioning & Commissioning)
- Site Ex Policy for handling, installation, verification and inspections of hazardous area located electrical and non-electrical equipment
- Verification Dossier (software based: EPDS)
- Site based training to operational personal (including hands on practical)
- Site Survey / As – built documentation
All in Ex way...

... means:

- **Requirements/Amendments**
  - Competent Plant Owner Team
  - Optional: Awareness & Ex Professional Training
  - Goal: Common Understanding of Ex Engineering
  - End Result: Ex Compliant Plant/Project, Increased Plant Safety, Audit Friendly HAC site

This we shall fulfill!
Done by Ex competent colleagues, team...

... means:

- Ex competency is achieved
- Deep understanding of industrial explosion protection
  - Electrical
  - Non electrical
3 SCOPE OF WORK

All work undertaken during this work scope is to comply with the relevant part(s) of the IEC standard 60079 for Management, Inspection, Maintenance and Repair of Explosion protected equipment.

1. To undertake inspection of all ASAB explosion protected equipment and thereby populate an accurate inventory of existing Ex enclosures for inclusion in a submitted Hazardous Area Equipment Register (HAER) to GASCO.
2. To verify and allocate Ex certification number to each Ex enclosure listed in the Register.
3. To undertake the Ex enclosures inspection at a visual grade as Per IEC-60079 recommendation.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Protection type</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Voltage motors</td>
<td>Exde, Exn, and Exp</td>
</tr>
<tr>
<td>Low Voltage motors</td>
<td>Exde, Exn</td>
</tr>
<tr>
<td>Junction boxes</td>
<td>Exd, Exp, Exn, Exe</td>
</tr>
<tr>
<td>Light &amp; emergency lights fittings</td>
<td>Exed, Exd, Exe, Exn</td>
</tr>
<tr>
<td>LCS (Start, Stop &amp; Emergency push bottoms)....ETC</td>
<td>Exd, Exp, Exn, Exe</td>
</tr>
</tbody>
</table>
Ex Compliance training comes as follow:

**Plant owner team:**
- assessment of existing Ex Compliance knowledge
- based on result we recommend
  - awareness
  - Ex professional
- including:
  - electrical
  - non-electrical explosion protection
- theoretical
- practical / hands on
- certificate will be issued by international certification body

**EPCM, External Site workforce, Contractors:**
- assessment of existing Ex Compliance knowledge
- based on result we recommend
  - awareness
  - IECEX CoPC training (or ATEX)
- including:
  - electrical
  - non-electrical explosion protection
- theoretical
- practical / hands on
- certificate will be issued by Independent IECEX Certification Body
All Ex Compliance training certificates...

... shall be renewed within 3 years as part of refreshment training.

- Competent Plant Owner Team
- Optional: Awareness & Ex Professional Training
- Goal: Common Understanding of Ex Engineering
- End Result: Ex Compliant Plant/Project, Increased Plant Safety, Audit Friendly HAC site
IECEx vs ATEX

ATEX is for Europe

IECEx covers the world
Road Map

To Assure the Safe use of Ex or Hazloc equipment in UAE

- **Benchmark & Awareness**
  - Q1-2012

- **Stakeholders meetings**
  - Q3-2012

- **Forming National Committee**
  - Q1-2013

- **Draft & Issue Regulation**
  - 2014

- **Enforcement**
Oil and Gas...

- ... is a Hazardous area
- ... must have(s):
  - Hazardous area classification
  - Ex proof electrical and non electrical installations
  - Ex proof installation
  - Ex proof operation
  - Ex proof maintenance
  - Ex documentation
  - Hazardous area register
  - Verification Dossier
Minimum requirements:

- To do hazardous area classification
- Ex certified installations
  - To specify
  - To design
  - To install
  - To operate
  - To maintain
  - To do inspection, audit
    - Acc to the manufacturer’s original specifications

All in Ex way
No damages
No damages
No damages
No damages on Ex housings
No damages on IP protection
Not any non-Ex parts
EOL
Plant Owner/Employer

- **Identify** the areas where Explosive Atmospheres might occur
- **Classify** the affected areas according to the risk
- **Risk Assessment** – Assess the Risk of an explosion in each area
- **Implement** technical and organisational measures to eliminate the risk from explosive atmospheres. Where this is not possible take measures to control the risk and to minimise the harmful effects of any fire or explosion
- **Document** the protective measures to be taken in the Explosion Protection Document
Plant Owner/Employer

- **Verification** – Before a hazardous area is brought into use for the first time, employ a *competent person* to verify the explosion safety of the area.

- **Maintenance** – Ensure the equipment and installations are maintained in accordance with the manufacturers instructions and IEC 60079-17.

- **Periodic Inspections** – Employ a competent person to ensure that periodic inspections of the installations are carried out in accordance with IEC 60079-17.
Design Engineer

- Applicable also to Electrical Contractors who carry out the design function
- Select mechanical and Electrical equipment certified for use in the area
- Implement any pertinent Special Conditions of Use mentioned on the equipment certificates
- Design the electrical installation in compliance and IEC 60079 part 14
- Prepare a Descriptive System Document for all intrinsically Safe Circuits.
Electrical Contractor

- Employ only suitably Trained and Competent persons to carry out the installation.

- Implement any pertinent Special Conditions of Use mentioned on the equipment certificates or other manufacturers instructions.

- Install the electrical installation in compliance with IEC 60079-14.

- Inspect and Test the installation in accordance with IEC 60079-14, in particular Annex C – Initial Inspections (See Note).

- Certify – Issue a valid completion certificate including test and inspection records for the installation.
Mechanical Contractor / Supplier

- **Supply** only suitably *Certified* Mechanical equipment
- **Advise** the Electrical Contractor or Designer of any *Special Conditions of Use* for the supplied equipment
- **Provide** copies of all equipment certificates
Proper Explosion Protection on site means...

- ... there is:

- Control of Ignition Sources

- and it is operated, maintained on Ex way for the total lifetime of the site

Full Hazardous Area Compliance
VALUE ADDED HAZARDOUS AREA ENGINEERING

Ind-Ex initiatives for value added hazardous area engineering briefly summarised as follows:

- **At New O&G Projects and Plants**
  - Free or initial advisory services at project start up to establish an economically robust and proven ignition control schemes for the process and plant operation
  - Incorporate value added hazardous area engineering building blocks into the HSSE policies and plant maintenance protocol to ensure increased plant safety and seamless operating licence approval
Ind-Ex initiatives for value added hazardous area engineering briefly summarised as follows:

- **Existing Petrochemical Plants and Facilities**
  - Free or initial advisory services for plant Owners and Operators to establish the effectiveness of existing hazardous area engineering practices
  - Implement opportunities arising plant inspections and audits such as remedial actions to fix minor non-compliances hence keep costs under control
  - Introduce and re-engineer if necessary existing plant hazardous area engineering documents, certificates for hassle free plant licence renewals
• Through an **Exclusive** partnership with International Oil & Gas Field Services Company, Index can perform all disciplines of Ex – Protection in the **UAE (countrywide)**.

• Those services include but not limited to:
  
  • Ex – compliance - Inspections
  • Training - Ex Installation
  • Ex Maintenance - Documentation
  • Ex Design - Additional services

• International Oil & Gas Field Services Co. is an Emirati entity that is based in Abu Dhabi and managed by (HH) Sheikh Ahmed Al Nahyan.
Method statement
Engineering: www.ind-ex.ae
Training: www.ind-ex.ae