RBI of Ex electrical equipment installed within hazardous areas

Risk based ex-inspection strategies using statistical sampling methodology provide a cost effective means of measuring the integrity of Ex equipment to As Low As Reasonably Possible (ALARP) requirements.

The close and detailed inspection of 100% of the electrical equipment installed within the zoned areas is an Ex inspection strategy, which provides a high level of confidence that the Ex integrity of the installed equipment is being maintained. This is, however, the highest cost strategy, not only in terms of the direct cost of inspection, but also in terms of the potential lost production, stemming from a need to undertake all of the inspections. For offshore installations the Ex inspection team take up a lot of bed space that could otherwise be used more productively.

An alternative and more cost effective ex-inspection strategy outlined in IEC 60079-17 can now be implemented. Where the duty holder has an established and robust Ex inspection strategy together with well documented inspection history and fault records a risk based sampling strategy can be applied to Ex equipment inspection.

Benefits
The risk based statistically valid sampling strategy for close and detailed inspections, when coupled with an appropriate regime of visual inspections, delivers the following benefits.

- The sampling strategy allows the duty holder to have sufficient confidence in the Ex integrity of the installed equipment while inspecting only a proportion of the equipment
- Can significantly reduce the number of inspections that need to be undertaken whilst continuing to satisfy ALARP requirements
- Strikes a balance between the cost of ex-inspection, ignition source risk and the maintenance of Ex integrity
- Enables the backlog of inspections to be kept under control

Progressive sampling strategies are not capable of providing a valid basis for satisfying ALARP.
Results of Inspection for Equipment in a Zone 2 Hazardous Area

<table>
<thead>
<tr>
<th>Hazardous Area</th>
<th>Equipment</th>
<th>Faults</th>
<th>FA Code Priority</th>
<th>Probability of Ignition</th>
<th>Ignition Risk</th>
<th>Equipment Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 2 (Daresbury Park)</td>
<td>Junction Box</td>
<td>Corrosion on support structure</td>
<td>9</td>
<td>Low</td>
<td>Low</td>
<td>3</td>
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<tr>
<td></td>
<td></td>
<td>Corrosion on support structure</td>
<td>9</td>
<td>Low</td>
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<td>3</td>
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<td></td>
<td></td>
<td>Corrosion on support structure</td>
<td>9</td>
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</tbody>
</table>

What we offer

Methodology

Led by one of ABB’s experienced EC&I consultants the methodology encompasses the following stages.

- An audit to establish the status of the Ex equipment management regime and the Ex inspection records
- The creation of the Risk Based Inspection (RBI) strategy for the Ex electrical equipment population
- The allocation of the Ex equipment into lots according to the type of equipment, age, location and relative risk of ignition
- Establish the sample size, inspection frequency and rejection criteria for each lot in line with ALARP principles and rigorous statistical sampling criteria
- Incorporate the results of previous Ex inspections (number of faulty equipment and types of faults) to adjust the inspection criteria for subsequent cycles of inspections
- This is repeated for each cycle of Ex inspections for each lot with adjustments to the strategy being based upon the current condition of the equipment and the risk of ignition
- Periodic review of the Ex inspection strategy and reporting

The resulting Ex inspection strategy remains live, dynamic and cost effective.

Why ABB?

By extending its established RBI tools and techniques ABB has developed a prIME Ex software tool to support the delivery of the sampling methodology. The methodology follows the principles described in the Energy Institute guidelines for managing inspection of Ex electrical equipment ignition risk in support of IEC 60079-17.

To be valid the creation and management of the Ex electrical equipment inspection strategy needs to be completely independent from the inspection organisation.

ABB’s safety and integrity management consultants provide consulting services to process industry companies in relation to compliance with ATEX, DSEAR and PFEER.

The services provided range from Hazardous Area Classification (HAC) and the selection of compliant equipment for installation in the zoned areas to hazardous area management and regulatory compliance auditing.