



Managing Ex Asset Integrity

White Paper

Electrical Considerations for Hazardous Areas

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Electrical Considerations for Hazardous Area ATEX Inspections

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1.0 Hazardous Area ATEX Inspections: Industry Oversight

Many companies do not give adequate consideration to the condition of their electrical installations in relation to potentially explosive atmospheres, especially within older plants. Whilst most are concerned with ensuring completion of their hazardous area ATEX inspections and demonstrating compliance with the DSEAR regulations, ATEX 137 directive and BS EN 60079-17 standard, they tend to ignore or forget electrical testing which should be equally considered to the ATEX inspections (BS 7671-part 6 in conjunction with BS EN 60079-14 section 4.1 General Requirements, HSE 2002, HSE: ATEX and explosive atmospheres).

There are a number of reasons why companies focus upon ATEX inspections rather than having a dual focus on both electrical and ATEX inspections. These may include local, regional or national safety authority drive on achieving ATEX compliance; insurance requirements; organisational policy and safety processes, all of which may prioritise the requirement of ATEX inspections over electrical inspections. In fact, it is apparent within some industries and, particularly, within smaller companies that do not possess the resources to maintain awareness of legislative compliance requirements, that there is a clear lack of industrial awareness in order to demonstrate and achieve compliance for electrical and hazardous area ATEX inspections.

Organisations may conduct a hazardous area inspection and gain a satisfactory result as required by the BS EN 60079-17 standard even though the installation remains non-compliant with the required electrical inspection and verification standard BS 7671 due to outdated certification and condition reports. Moreover, in some situations the installation and verification of electrical systems and overall safety considerations are carried out in-house by the maintenance workforce. The problem may arise that although the workforce is highly skilled and has knowledge of ATEX hazardous area requirements, it may not have complete clarity of the most recent UK amendments to the BS 7671 wiring standard – *a valuable tool which is an essential consideration of the electrical risks to new installations, plant maintenance, modifications and for the employees or contractors who install or maintain electrical equipment*. The standard provides guidance towards a compliant and a safe electrical installation in line with The Health and Safety at Work Act 1974 and Electricity at Work Regulations 1998.

Furthermore, the capability of the inspectors completing the assessment should also be audited by a competent duty holder or third party organisation proficient in both hazardous areas and electrical inspection. Certified training, experience and tacit industrial knowledge of electrical and hazardous area inspection should all be included in the competency assessment (BS EN 60079-14: 2014, Annex A & IET Guidance Note 3 – 1.2) e.g. possessing a CompEx certificate will demonstrate the operative has received formal training in the basic principles of ATEX electrical installation but this does not necessarily guarantee competency for inspection activities.

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2.0 Examples of Possible Unsatisfactory Scenarios

Without taking adequate consideration of the risks for the electrical supplies, possible unsatisfactory scenarios could develop resulting in an overall unsatisfactory outcome.

- Lack of up to date electrical installation certificate or electrical condition report.
- Undersized live conductors and voltage drop considerations - cable size and length, additional electrical equipment added to the local circuits, or additional protection by RCDs.
- Main supplying control gear and distribution equipment suitable for any increased load and the condition of control gear supplying the hazardous areas - un-serviced lighting, motors , unmaintained motor overload, spent fuses replaced by ill-fitting and un-monitored ones - overloaded switchgear and distribution equipment.
- Poor type and condition of earthing arrangement.
- Undersized main protective bonding conductors on infrastructure, structural steelwork, fabricated steelwork, process pipe-work, storage and process tanks.
- Secondary supplies - undersized UPS systems and insufficient back-up generators.
- Insufficient use of SWA (steel wire armouring) cable or braid used as a circuit protective conductor.
- Incorrect application of calculations and equations when using the appropriate technical guidance to determine conductor size.
- Lack of considerations with electrical designs when alterations are made after the initial installation - VSDs (Variable Speed Drives) paired incorrectly with specific motors.
- Lack of consideration for insufficient electrical isolation for maintenance purposes in a hazardous area - poor isolation of live conductors entering the hazardous area.
- Suitability of containment systems -.use of limited materials and appropriate-containment systems in certain classified hazardous area zones.

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3.0 Electrical and Hazardous Area ATEX Inspections

The list of unsatisfactory electrical considerations is non-exhaustive and experience can dictate that every installation creates a different challenge.

With reference to *BS 7671-part 6 in conjunction with BS EN 60079-14 section 4.1 General Requirements*, the electrical installations in a hazardous area should also comply with the appropriate requirements for electrical installations in a non hazardous area. However the requirements for non hazardous areas are insufficient for installations in a hazardous area.

In fact, it could be argued that electrical and hazardous ATEX inspections are best suited when completed simultaneously, as it demonstrates that the risks have been considered for both the electrical installation and the electrical equipment within the potentially explosive atmosphere (*BS 7671-part 6 & BS EN 60079-14*). For the electrical installation, an inspection should be carried out followed by an electrical installation condition report (EICR), as required by BS 7671-part 6. The results of the electrical report are pertinent to the inspections required in BS 60079-17, tables 1-3.

Both the hazardous area and electrical condition reports should be utilised to ensure that the installations are maintained to a satisfactory condition for continual use and for the identification of a pass, fail or non applicable limitation (*noting that too many limitations will devalue the credibility and integrity of the information within the report*) (60079-17: 2014-4.3, NICEIC EICR Report: 2013, amendment 2).

Furthermore, issues with electrical installations outside hazardous areas can have a direct effect on systems within the hazardous areas which, in turn, could result in a catastrophic occurrence.

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4.0 Conclusion

Taking into account the requirements within *BS 7671-part 6 in conjunction with BS EN 60079-14 section 4.1, General Requirements*, it could be argued within some organizations there is a general lack of awareness of compliance to both electrical and ATEX hazardous area inspections..

There are a number of reasons which have created this industry trajectory and although organizations may have completed their ATEX inspections accurately, the installations may still be non-compliant to the required electrical inspection and verification standard BS 7671.

Organisations may conduct a hazardous area inspection and gain a satisfactory result as to the inspections required in the BS EN 60079-17, although the installation may still be non-compliant. The proficiency of the inspectors conducting the inspections should also be assessed and audited accurately by a competent duty holder or third party. Certified training, experience and tacit industrial knowledge should all be included within such competency assessment.

BS7671 is the UK electrical installation industry standard and is a most valuable tool for the consideration of the electrical risks for new installations, plant maintenance, modifications and for the employees or contractors who install or maintain electrical equipment - *the primary reason for ensuring that an electrical inspection is conducted is to ensure that the supplies into the hazardous ATEX area are adequate and safe for the application*. Unsatisfactory electrical installation scenarios vary greatly as previously described where the list is non-exhaustive and experience dictates that every installation will pose a different challenge. Condition reports must be utilised to ensure electrical systems are installed and maintained to a satisfactory condition.

Ultimately, *whilst electrical installations in a hazardous area must comply with the appropriate standards for a non-hazardous area, the requirements for non-hazardous areas are technically insufficient for installations where potentially explosive atmospheres have been classified*. Electrical and hazardous areas ATEX Inspections should be completed simultaneously in order to demonstrate that the risks have been suitably assessed and provide, as far as reasonably practicable, a safe installation. Conducting electrical and hazardous area ATEX inspections as part of any maintenance strategy will minimise the risk of a catastrophic occurrence.

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5.0 References

1. BSI. (2008). BS 7671:+A3 2015 Requirements for Electrical Installations. IET.
2. BSI. (2014). BS EN 60079-14: 2014 Explosive Atmospheres: Electrical installations design, selection and erection. BSI.
3. BSI. (2014). BS EN 60079-17: 2014 Explosive atmospheres. Electrical installations inspection and maintenance. BSI.
4. Copyright, C. (1998). The Electricity at Work Regulations, 1998. Retrieved February 20, 2015, from [legislation.gov.uk](http://www.legislation.gov.uk):
<http://www.legislation.gov.uk/ukxi/1989/635/contents/made>
5. HSE. (n.d.). ATEX 137: ATEX and explosive atmospheres. Retrieved February 20, 2015, from HSE: <http://www.hse.gov.uk/fireandexplosion/atex.htm>
6. HSE. (2002). Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance. HSE (Health and Safety Executive).
7. HSE. (1974). Health and Safety at Work etc Act 1974. Retrieved February 20, 2015, from HSE: <http://www.hse.gov.uk/legislation/hswa.htm>
8. NICEIC. (2013). Amendment 2: The Electrical Installation Condition Report (EICR). NICEIC.