

## 12 ELECTRICAL, CONTROL & INSTRUMENTATION ASPECTS OF SAFETY REPORT ASSESSMENT

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### 1. INTRODUCTION

- 1.1** This guidance is for assessors completing the electrical, control and instrumentation (EC&I) assessment and is relevant to all types of safety report.
- 1.2** All EC&I assessment must use the criteria and guidance set out in Appendix: 12B '*Electrical, Control & Instrumentation Assessment Criteria and Guidance*'.
- 1.3** EC&I assessment must be recorded on the form SRAM 21 '*Electrical, Control & Instrumentation Assessment Record*'
- 1.4** The criteria are designed to follow in sequence the specific requirements set down in Schedule 3 of the 2015 COMAH regulations and to reflect relevant purposes set out in Regulation 8 of the same regulations. These are minimum legal requirements and are clear and enforceable (Regulation 9).
- 1.5** Demonstrations should be proportionate to the hazard and risks of identified major accident hazards. This aspect can only be decided by an operator when all the elements of Schedule 3 have been determined. The determination of proportionality is an iterative process both for an operator and an assessor.
- 1.6 Use of assessment criteria**

The criteria will be applied by a competent assessor against the stated benchmarks. In this context, a competent assessor will have a good understanding of the safety report assessment process, its place within the CEMHD Regulatory framework and of the stated benchmarks.

- a. Criteria will be **"met"** when all relevant items are included in descriptions and the necessary supporting information has been provided;
- b. Criteria will be **"not met"** when all relevant items are not included in descriptions or the necessary supporting information has not been provided;
- c. Criteria will be **"not relevant"** when they are not relevant to the establishment (e.g. functional safety criteria are unlikely to be relevant to a warehouse);

- d. Criteria will be “**previously met**” when the previous assessor recorded the criterion as “met”.

## **2. THE GENERAL APPROACH TO EC&I ASSESSMENT**

### **2.1** The EC&I assessor is looking for:

- a. demonstration that adequate safety and reliability have been taken into account in the design, construction, operation and maintenance of any installation, storage facility, equipment and infrastructure connected with the establishment’s operation which are linked to major accident hazards inside the establishment;
- b. an adequate description of the following aspects of the Safety Management System, so far as they apply to the EC&I discipline:
  - (i) organisation and personnel;
  - (ii) operational control;
  - (iii) management of change;
  - (iv) monitoring performance.

### **2.2 Use of Examples in the Safety Report**

Where relevant, site records should be used as examples to validate descriptions or where demonstration is required by Regulation 8, primarily relating to design, construction, operation and maintenance.

The assessment criteria guidance lists a number of supporting records which should be provided by the Operator where it is relevant to do so. The examples given have been drawn from established benchmarks to remove subjectivity and to ensure that the examples are restricted to site records.

## **3. BENCHMARKS**

- 3.1** EC&I Engineering is subject to established international, European, national and industry sector standards. They will be used, where relevant, by the EC&I assessor to establish whether assessment criteria have been met. The use of established standards ensures consistency between different assessors.

## **4. PROPORTIONALITY**

- 4.1** Unless the establishment carries out a particularly novel or high risk activity, only Site records that are produced as a result of applying established EC&I benchmark standards, or equivalent, can be requested.
- 4.2** The established EC&I benchmark standards are universal, however they are only applied to establishments that have relevant installations. For example, standards on Functional Safety would be unlikely to apply to a flammable storage warehouse due to the absence of chemical processing, however, standards on explosion protected (Ex) equipment and lightning protection would apply to a flammable storage warehouse just as they would to a refinery. Proportionality is therefore related to the time and effort involved in applying

relevant good practice to the establishment rather than to the time and effort involved in demonstrating that relevant good practice has been applied.

## **5. PRE-CONSTRUCTION AND PRE-OPERATION SAFETY REPORTS**

**5.1** All engineering projects follow a common process of design, construction, commissioning and operation. These activities comprise sub-tasks and are spread over a schedule that can be subject to significant change, therefore the contents of pre-construction and pre-operation safety reports develop over time. It is, therefore difficult to select a defined point in time when a pre-construction or pre-operation safety report can be issued. It is also impractical to halt a project just prior to construction or operation so that a safety report can be produced and assessed.

**5.2** For the purposes of EC&I assessment, a rolling submission is more practical than complete submissions, however, either option is acceptable.

**5.3** Pre-Construction safety reports

Assessment will be based on the assessment criteria relating to activities up to and including design.

**5.4** Pre-Operation safety reports

Assessment will be based on the assessment criteria relating to activities up to and including construction.

Pre-Operation safety reports should include details of significant changes to the previously specified design and relevant additional information resulting from the detailed engineering phase.

**5.5** For large projects (involving external design / construction contractors) the operator's arrangements for managing outstanding issues / actions ('snag items') identified during 'pre-handover' inspection should be described.

## **6. POTENTIAL SERIOUS DEFICIENCY AND SIGNIFICANT OMISSION**

**6.1** Examples of potential serious deficiencies in the on-site measures (as described in the safety report) include but are not limited to:

- (i)** Demonstration that risk was unacceptable, for example by submission of a seriously flawed SIL determination record that showed that protective layers thought to reduce risk from an unacceptable level were invalid;
- (ii)** Demonstration of the likely presence of electrical ignition sources in an area where an explosive atmosphere is likely or very likely to be present
- (iii)** Demonstration that high power electrical equipment adjacent to major hazard plant was of inadequate strength and capability

**6.2** Significant omissions in the content of the safety report may include:

- (i)** Insufficient information to support the necessary demonstrations, for example, the absence of design, construction (where relevant) and maintenance records. A logical reason for the absence of documentation generated by the application of relevant good practice would be failure to apply relevant good practice;

- (ii)** Failure to address a topic that is likely to be relevant, for example, failure to address Functional Safety at a chemicals processing establishment, failure to address lightning protection at a flammable storage warehouse or failure to address electrical power systems at a large establishment;
- (iii)** Failure to describe how the safety management system addresses engineering issues such as Functional Safety management, management of explosion protected (Ex) equipment and technical competence of Engineers, technicians and managers.

TECHNICAL CRITERION	GUIDANCE
<b>Link with predictive criteria</b>	
<p><b>12.1</b> The safety report should show a clear link between the measures taken and the major accident hazards described.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• links between EC&amp;I measures taken and the major accident hazards described, for example by using records of process risk assessments, bowtie diagrams, link tables etc.</li> </ul>
	<p><b>Benchmarks</b></p>
	<p>EC&amp;I Operational Delivery Guide: <a href="http://www.hse.gov.uk/eci/eci-delivery-guide.pdf">http://www.hse.gov.uk/eci/eci-delivery-guide.pdf</a></p>
	<p><b>Proportionality</b> The description need only address measures that are implemented to manage major accident scenarios.</p>
<b>Design</b>	
<p><b>12.2.1.1</b> The safety report should describe how the establishment and installations have been designed to an appropriate standard.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• the general approach to the application of EC&amp;I design standards, such as those benchmark standards listed within this appendix, including how the following types of standards are applied where applicable: <ul style="list-style-type: none"> <li>○ British, European and international standards; <ul style="list-style-type: none"> <li>▪ how the latest British, European, international or other relevant standards are applied to EC&amp;I measures</li> </ul> </li> <li>○ Company standards <ul style="list-style-type: none"> <li>• how it has been established that company standards continue to be aligned with relevant good practice;</li> </ul> </li> <li>○ Industry standards.</li> </ul> </li> </ul>

TECHNICAL CRITERION	GUIDANCE			
	<p><b>Proportionality</b>                      This criterion is equally relevant to all establishments.                      The description can be a brief overview of the approach to the application of design standards.</p>			
<p><b>12.2.1.4</b> Utilities that are needed to implement any measure defined in the safety report should have suitable reliability, availability and survivability.</p>	<p><b>To meet this criterion the Safety Report should describe, where applicable:</b></p> <ul style="list-style-type: none"> <li>• how electrical distribution is managed at all relevant voltages including roles and responsibilities;</li> <li>• how instrument air supplies (and any other fluid used to provide motive force to instrumentation, e.g. nitrogen) are managed including roles and responsibilities;</li> <li>• how electrical and instrument air supplies (and any other fluid used to provide motive force to instrumentation, e.g. nitrogen) have been designed to have suitable reliability, availability and survivability.</li> </ul> <p><b>Where applicable, the Safety Report should contain the following records, or equivalent:</b></p> <ul style="list-style-type: none"> <li>• sample of a current electrical single line diagram demonstrating diversity and/or redundancy of electrical supply where relevant;</li> <li>• sample protection study showing that equipment is of adequate strength and capability and that adequate discrimination has been achieved.</li> </ul>			
<b>Benchmarks:</b>				
<p>electricity general:</p> <ul style="list-style-type: none"> <li>○ BS7671</li> <li>○ BS EN 61936-1</li> <li>○ <a href="#">HSG 230</a></li> <li>○ <a href="#">HSR 25</a></li> <li>○ <a href="#">HSG 85</a></li> </ul>	<p>electrical power system earthing:</p> <ul style="list-style-type: none"> <li>○ BS EN 50522</li> <li>○ BS 7430</li> <li>○ BS 7671</li> <li>○ <a href="#">HSR 25</a></li> </ul>	<p>fault energy level calculation</p> <ul style="list-style-type: none"> <li>○ <a href="#">HSG 230</a></li> <li>○ BS EN 61936-1</li> <li>○ BS EN 60909</li> </ul> <p>selectivity and protection</p> <ul style="list-style-type: none"> <li>○ BS EN 61936-1</li> <li>○ <a href="#">HSR 25</a></li> </ul>	<p>instrument air:</p> <ul style="list-style-type: none"> <li>○ BS 6739</li> </ul> <p>impact of utility failure on process safety systems:</p> <ul style="list-style-type: none"> <li>○ BS EN 61511</li> </ul>	

TECHNICAL CRITERION	GUIDANCE		
	<p><b>Proportionality</b>                      This criterion is generally more relevant to establishments that operate large or complex utility networks or rely on specific utilities to manage major accident scenarios.</p> <p>Electrical aspects of the criterion are generally more relevant to establishments that manage high voltage equipment (including through third parties) or large distribution networks. For example, protection studies would not be required for a warehouse with a simple distribution network that complied with BS7671, the IET wiring regulations.</p>		
<p><b>12.2.1.10</b> The safety report should describe how adequate safeguards have been provided to protect the plant against excursions beyond design conditions.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• the overall process control and safety strategy;</li> <li>• the types of installed control and safety systems;</li> <li>• in general terms, and without providing sensitive information, the cyber security management system, including roles and responsibilities, applied to Industrial Automation and Control Systems (IACS).</li> </ul> <p><b>Benchmarks</b></p> <table border="1" data-bbox="546 778 2125 1002"> <tr> <td data-bbox="546 778 1339 1002"> <p>Functional safety</p> <ul style="list-style-type: none"> <li>• BS EN 61511</li> </ul> <p>Alarm management</p> <ul style="list-style-type: none"> <li>• BS EN 62682</li> <li>• EEMUA publication no. 191</li> </ul> </td> <td data-bbox="1339 778 2125 1002"> <p>Cyber security</p> <ul style="list-style-type: none"> <li>• <a href="#">HSE Operational Guidance 86</a></li> </ul> </td> </tr> </table> <p><b>Proportionality</b>                      This criterion is generally more relevant to chemical processing establishments.</p> <p>For example, the description for a warehouse might be limited to environmental monitoring whereas the description for a chemicals processing site would provide an overview of the process control and safety strategy and the key process control and safety systems.</p>	<p>Functional safety</p> <ul style="list-style-type: none"> <li>• BS EN 61511</li> </ul> <p>Alarm management</p> <ul style="list-style-type: none"> <li>• BS EN 62682</li> <li>• EEMUA publication no. 191</li> </ul>	<p>Cyber security</p> <ul style="list-style-type: none"> <li>• <a href="#">HSE Operational Guidance 86</a></li> </ul>
<p>Functional safety</p> <ul style="list-style-type: none"> <li>• BS EN 61511</li> </ul> <p>Alarm management</p> <ul style="list-style-type: none"> <li>• BS EN 62682</li> <li>• EEMUA publication no. 191</li> </ul>	<p>Cyber security</p> <ul style="list-style-type: none"> <li>• <a href="#">HSE Operational Guidance 86</a></li> </ul>		
<p><b>12.2.1.11</b> The safety report should show how safety-related control systems have been designed to ensure safety and</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• the Functional Safety Management System including roles and responsibilities;</li> <li>• how current relevant good practice, e.g. BS EN 61511 has been applied as far as reasonably practicable to systems designed before its publication;</li> </ul>		

TECHNICAL CRITERION	GUIDANCE		
reliability.	<ul style="list-style-type: none"> <li>• how instrumented safety systems with a required integrity of less than SIL 1 are managed.</li> </ul> <p><b>Where applicable, the Safety Report should contain the following records, or equivalent:</b></p> <ul style="list-style-type: none"> <li>• sample SIL determination record for each method used - e.g. LOPA / Risk Graph output / QRA;</li> <li>• sample Safety Requirements Specification;</li> <li>• sample SIL verification record - e.g. PFD calculation &amp; fault tolerance assessment;</li> <li>• sample record of competence for an individual involved in the design of safety instrumented systems or in the review of safety instrumented systems against relevant good practice.</li> </ul> <p><b>Benchmarks:</b></p> <table border="1" data-bbox="555 587 2125 759"> <tr> <td data-bbox="555 587 1339 759">                     Functional safety:                     <ul style="list-style-type: none"> <li>• BS EN 61511 (process safety)</li> <li>• BS EN 62061 (machinery safety)</li> <li>• <a href="#">HSE Operational Guidance 46</a></li> </ul> </td> <td data-bbox="1339 587 2125 759">                     Alarm systems:                     <ul style="list-style-type: none"> <li>• BS EN 62682</li> <li>• EEMUA publication no. 191</li> </ul> </td> </tr> </table> <p><b>Proportionality</b>                      This criterion is only relevant to establishments that manage functional safety.                      For example, it would not be relevant to warehousing unless environmental control measures such as temperature or humidity alarms are relevant to major accident scenarios.</p>	Functional safety: <ul style="list-style-type: none"> <li>• BS EN 61511 (process safety)</li> <li>• BS EN 62061 (machinery safety)</li> <li>• <a href="#">HSE Operational Guidance 46</a></li> </ul>	Alarm systems: <ul style="list-style-type: none"> <li>• BS EN 62682</li> <li>• EEMUA publication no. 191</li> </ul>
Functional safety: <ul style="list-style-type: none"> <li>• BS EN 61511 (process safety)</li> <li>• BS EN 62061 (machinery safety)</li> <li>• <a href="#">HSE Operational Guidance 46</a></li> </ul>	Alarm systems: <ul style="list-style-type: none"> <li>• BS EN 62682</li> <li>• EEMUA publication no. 191</li> </ul>		
<p><b>12.2.1.13</b> The safety report should show that there are systems for identifying locations where flammable substances could be present and how the equipment has been designed to take account of the risk.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• how the following ignition sources are managed:                             <ul style="list-style-type: none"> <li>○ fixed and movable electrical installations in explosive atmospheres;</li> <li>○ lift trucks in potentially flammable atmospheres;</li> <li>○ lightning in relation to structures with a risk of explosion;</li> <li>○ electrostatic hazards;</li> <li>○ radio frequency radiation;</li> <li>○ isolating joints, for example in cathodic protection systems;</li> </ul> </li> <li>• how fire and gas detection technology has been selected;</li> <li>• how toxic gas detection technology has been selected.</li> </ul>		

TECHNICAL CRITERION	GUIDANCE		
	<b>Where applicable, the Safety Report should contain the following records, or equivalent:</b>		
	<ul style="list-style-type: none"> <li>• sample initial radio frequency assessment</li> </ul>		
	<b>Benchmarks:</b>		
	Electrical installations design, selection and erection: <ul style="list-style-type: none"> <li>• BS EN 60079-14</li> </ul> Lightning protection: <ul style="list-style-type: none"> <li>• BS 6651 (withdrawn)</li> <li>• BS EN 62305</li> <li>• <a href="#">HSE Operational Guidance 44</a></li> </ul>	Hazards due to static electricity: <ul style="list-style-type: none"> <li>• PD IEC/TS 60079-32-1</li> </ul> Ignition of flammable atmospheres by radio-frequency radiation: <ul style="list-style-type: none"> <li>• PD CLC/TR 50427</li> <li>• ISGOTT</li> <li>• <a href="#">HSE Operational Guidance 45</a></li> </ul>	Isolating joints: <ul style="list-style-type: none"> <li>• BS EN 13636</li> <li>• ISGOTT</li> </ul>
<b>Proportionality</b> This criterion is equally relevant to all establishments where potentially explosive atmospheres might exist.			
<b>Construction</b>			
<b>12.2.2.2</b> The safety report should show how the construction of all plant and systems is assessed, and verified against the appropriate standards to ensure adequate safety.	<b>To meet this criterion the Safety Report should describe, where applicable:</b> <ul style="list-style-type: none"> <li>• the process for ensuring that the EC&amp;I equipment and systems are verified against the appropriate standards to ensure adequate safety prior to the major accident hazards being present.</li> </ul> <b>Where applicable, the Safety Report should contain the following records, or equivalent, for new installations since the previous Safety Report submission:</b> <ul style="list-style-type: none"> <li>• sample Stage 3 Functional Safety Assessment (i.e. the Functional Safety Assessment that covers all life cycle phases up to and including validation);</li> <li>• sample initial Ex inspection record;</li> <li>• record of competence, e.g. CompEx / IECEx certificate(s), of the persons who carried out the initial Ex inspections;</li> <li>• sample HV and LV fixed installation inspection &amp; test (initial verification) records.</li> </ul>		
<b>Benchmarks</b>			

TECHNICAL CRITERION	GUIDANCE	
	Functional safety assessment: <ul style="list-style-type: none"> <li>• BS EN 61511</li> </ul> Electrical installations inspection and maintenance: <ul style="list-style-type: none"> <li>• BS EN 60079-14</li> </ul>	Requirements for electrical installations: <ul style="list-style-type: none"> <li>• BS EN 61936-1</li> <li>• BS 7671</li> </ul>
	<p><b>Proportionality</b></p> <p>This criterion is generally relevant to the construction of all establishments, however, functional safety assessment will only be relevant to chemicals processing establishments where functional safety is a consideration.</p> <p>Where functional safety is relevant, there is an expectation that records of Stage 3 Functional Safety Assessment will exist for installations that were brought into service since the publication of BS EN 61511.</p>	
<b>Operation</b>		
<p><b>12.2.3.1</b> The safety report should show that safe operating procedures have been established and are documented for all reasonably foreseeable conditions.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• the control of operation of electrical switchgear, including the control of switching by subcontractors and distribution network operators.</li> </ul> <p><b>Where applicable, the Safety Report should contain the following records, or equivalent:</b></p> <ul style="list-style-type: none"> <li>• sample record of authorisation for person(s) authorised to operate electrical LV, HV and generation systems.</li> </ul>	
	<p><b>Benchmarks</b></p> <p>Safe Operation</p> <ul style="list-style-type: none"> <li>• BS 6867</li> <li>• BS 6626</li> <li>• BS 6423</li> <li>• <a href="#">HSG 230</a></li> <li>• <a href="#">HSG 85</a></li> <li>• <a href="#">HSR 25</a></li> </ul>	
	<p><b>Proportionality</b></p> <p>In the context of the control of major accident hazards, the safe operation of electrical switchgear and the authorisation of</p>	

TECHNICAL CRITERION	GUIDANCE
	<p>personnel to operate electrical LV, HV and generation systems are only relevant to establishments that manage such equipment or systems. For example, they would not be relevant to a safety report for a warehouse with a simple distribution network that complied with BS7671, the IET wiring regulations.</p>
<p><b>Maintenance</b></p> <p><b>12.2.4.1</b> The safety report should show that an appropriate maintenance scheme is established for plant and systems to prevent major accidents or reduce the loss of containment in the event of such accidents.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>● the establishment’s Maintenance Management Systems, including roles and responsibilities, applied to: <ul style="list-style-type: none"> <li>○ Functional Safety;</li> <li>○ cyber security;</li> <li>○ explosive atmospheres, including fire and gas detection systems;</li> <li>○ electrical power systems;</li> </ul> </li> <li>● the location and structure of the establishment’s EC&amp;I safety critical elements inventories (e.g. Ex equipment, SIS, electrical supplies);</li> <li>● the strategy for managing obsolescent EC&amp;I equipment.</li> </ul> <p><b><u>Where applicable, the Safety Report should contain the following records, or equivalent:</u></b></p> <ul style="list-style-type: none"> <li>● functional safety: <ul style="list-style-type: none"> <li>○ sample SIS proof test procedure;</li> <li>○ sample record of completed SIS proof test;</li> <li>○ sample record of competence for an individual involved in the maintenance of safety instrumented systems.</li> </ul> </li> <li>● equipment in explosive atmospheres: <ul style="list-style-type: none"> <li>○ representative sample of periodic Ex inspection records (or records of continuous supervision), including protection concepts d, e, n, i, p and t where they exist on site;</li> <li>○ record of competence, e.g. CompEx / IECEx certificate(s), of the persons who carried out the periodic Ex inspections (or continuous supervision);</li> <li>○ sample lightning protection system periodic test &amp; inspection record in relation to a structure with a risk of explosion;</li> <li>○ sample static earthing system periodic test &amp; inspection record for an installation in an explosive atmosphere;</li> <li>○ sample flammable gas detector periodic test &amp; inspection record relating to a major accident mitigation measure;</li> <li>○ sample fire detector periodic test &amp; inspection record relating to a major accident mitigation measure;</li> </ul> </li> </ul>

TECHNICAL CRITERION	GUIDANCE		
	<ul style="list-style-type: none"> <li>○ sample toxic gas detector periodic test &amp; inspection record relating to a major accident mitigation measure;</li> <li>● electrical power systems:                             <ul style="list-style-type: none"> <li>○ sample HV / LV transformer periodic inspection &amp; test record;</li> <li>○ sample HV &amp; LV switchgear periodic inspection &amp; test records;</li> <li>○ sample electrical power system earthing periodic inspection and test record;</li> <li>○ sample emergency generator periodic inspection, maintenance and test (no load and/or load) record;</li> <li>○ sample UPS and associated battery periodic inspection, maintenance and test record.</li> </ul> </li> </ul>		
	<b>Benchmarks</b>		
	<p>Functional safety:</p> <ul style="list-style-type: none"> <li>● BS EN 61511</li> <li>● <a href="#">HSE OG 46</a></li> </ul> <p>Electrical installations inspection and maintenance:</p> <ul style="list-style-type: none"> <li>● BS EN 60079-17</li> </ul> <p>Lightning protection:</p> <ul style="list-style-type: none"> <li>● BS EN 62305</li> <li>● <a href="#">HSE OG 44</a></li> </ul>	<p>Static earthing:</p> <ul style="list-style-type: none"> <li>● PD IEC/TS 60079-32-1</li> </ul> <p>Detectors for Flammable gases and oxygen:</p> <ul style="list-style-type: none"> <li>● BS EN 60079-29-2</li> </ul> <p>Fire detection and fire alarm systems:</p> <ul style="list-style-type: none"> <li>● BS 5839-1</li> </ul> <p>Detectors for toxic gases and vapours:</p> <ul style="list-style-type: none"> <li>● BS EN 45544-4</li> </ul>	<p>Electrical power systems:</p> <ul style="list-style-type: none"> <li>● BS EN 61936 (HV &amp; LV switchgear &amp; power system earthing)</li> <li>● BS 7671 (LV systems)</li> <li>● BS EN 60422 (HV / LV transformers)</li> <li>● BS EN 50522 (power system earthing)</li> <li>● BS 7430 (power system earthing)</li> <li>● BS 6867 (HV switchgear and control gear)</li> <li>● BS 6626 (HV switchgear and control gear)</li> <li>● BS 6423 (LV switchgear and control gear)</li> <li>● BS 7698-12 (emergency generators)</li> <li>● BS EN 50272-2 (UPS batteries)</li> <li>● <a href="#">HSR 25</a></li> </ul>
<p><b>Proportionality</b></p> <p>This criterion applies equally to all establishments.</p> <p>The established EC&amp;I benchmark standards that apply to the maintenance of major accident establishments are universal, however they are only applied to establishments that have relevant installations. For example, maintenance standards on Functional Safety would be unlikely to apply to a flammable storage warehouse due to the absence of chemical processing, however, standards on explosion protected (Ex) equipment and lightning protection would apply to a flammable storage warehouse just as they would to a refinery.</p>			

TECHNICAL CRITERION	GUIDANCE			
<p><b>12.2.4.2</b> The safety report should describe the procedures for maintenance that take account of any hazardous conditions within the working environment.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• how safe systems of work are applied to EC&amp;I maintenance activities (for example, electrical isolation, transport and use of electrical equipment in explosive atmospheres, process isolation of instrumentation, hot work etc.);</li> <li>• how electrical safety rules are applied to maintenance activities.</li> </ul>			
	<p><b>Benchmarks</b></p> <p>Electricity at work, Safe working practices</p> <ul style="list-style-type: none"> <li>• <a href="#">HSG 85</a></li> <li>• <a href="#">HSR 25</a></li> <li>• BS 6867</li> <li>• BS 6627</li> <li>• BS 6423</li> </ul>			
	<p><b>Proportionality</b></p> <p>This criterion applies equally to all establishments, however, it need only describe safe systems of work that are specific to EC&amp;I maintenance activities and are not covered by safe systems of work defined by the site safety management system.</p>			
<p><b>12.2.4.4</b> The safety report should describe the system in place to ensure the continued safety of the installations based on the results of examinations and maintenance.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• the use of performance monitoring of EC&amp;I systems and equipment, including the use of safety performance indicators such as faults and failures found during operation, inspection and testing;</li> <li>• the procedure for identifying, reporting and investigating the failure of EC&amp;I protective measures against major accidents.</li> </ul> <p><b>Where applicable, the Safety Report should contain the following records, or equivalent:</b></p> <ul style="list-style-type: none"> <li>• functional safety:                             <ul style="list-style-type: none"> <li>○ sample Stage 4 Functional Safety Assessment.</li> </ul> </li> </ul>			
	<p><b>Benchmarks</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">                     Developing process safety indicators:                     <ul style="list-style-type: none"> <li>• <a href="#">HSG 254</a></li> </ul>                     Functional safety:                     <ul style="list-style-type: none"> <li>• BS EN 61511</li> </ul> </td> <td style="width: 50%; padding: 5px;">                     Electrical installations inspection and maintenance:                     <ul style="list-style-type: none"> <li>• BS EN 60079-17</li> </ul> </td> </tr> </table>		Developing process safety indicators: <ul style="list-style-type: none"> <li>• <a href="#">HSG 254</a></li> </ul> Functional safety: <ul style="list-style-type: none"> <li>• BS EN 61511</li> </ul>	Electrical installations inspection and maintenance: <ul style="list-style-type: none"> <li>• BS EN 60079-17</li> </ul>
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TECHNICAL CRITERION	GUIDANCE
	<p><b>Proportionality</b></p> <p>This criterion applies equally to all establishments but only in relation to the extent of the installed EC&amp;I systems. For example, performance monitoring of safety instrumented systems would be unlikely to apply to a flammable storage warehouse due to the absence of chemical processing, however performance monitoring of Ex equipment would be likely to apply due to the presence of potentially explosive atmospheres.</p> <p>Where functional safety is relevant, there is an expectation that records of Stage 4 Functional Safety Assessment will exist for installations that have been operational since the previous revision of the safety report.</p>
<b>Modifications</b>	
<p><b>12.2.5.1</b> The safety report should show that there is a system in place for ensuring modifications are adequately conceived, designed, installed and tested.</p>	<p><b><u>To meet this criterion the Safety Report should describe, where applicable:</u></b></p> <ul style="list-style-type: none"> <li>• how the impact on Electrical, Control and Instrumentation systems, equipment, operation and maintenance is addressed when carrying out plant and process modifications;</li> </ul> <p><b>Where applicable, the Safety Report should contain the following records, or equivalent:</b></p> <ul style="list-style-type: none"> <li>• functional safety: <ul style="list-style-type: none"> <li>○ sample Stage 5 Functional Safety Assessment.</li> </ul> </li> </ul> <p><b>Benchmarks</b></p> <p>Functional safety:</p> <ul style="list-style-type: none"> <li>• BS EN 61511</li> <li>• <a href="#">HSE Operational Guidance 46</a></li> </ul> <p><b>Proportionality</b></p> <p>This criterion applies equally to all establishments, however, it need only describe change management systems that are specific to EC&amp;I measures and are not covered by change management systems defined by the site safety management system.</p> <p>Where functional safety is relevant, there is an expectation that records of Stage 5 Functional Safety Assessment will exist for modifications to Safety Instrumented Systems made since the publication of BS EN 61511:2017..</p>