



## Electrical Change Control Procedure (ECCP)

### **Why ECCP?**

In industries, additions & modifications in electrical installations happen almost every day. Popularly known as CAPEX (Capital Expense) or those electrical changes that require purchase will get approval from the plant head or electrical head depending on their financial powers. Normally technical aspects / specifications are not reviewed through any defined control processes, unlike process modifications.

### **ECCP:**

Additions and modifications carried out in electrical installations without a controlled systematic procedure could lead to accidents such as accidents, injuries to personnel, and breakdowns. ECCP is similar to Management of Change (MoC) that is effectively practiced in chemical process industries.

The examples described in the following table explain the concept of ECCP:

<b>Electrical Modifications</b>	<b>Potential Consequences (Without ECCP)</b>	<b>ECCP Control Point/s</b>
Utilization of a spare feeder to connect a new equipment	-Overloading -Equipment / cable failure -Loss of production	-Review of cable & feeder sizing, based on equipment rating -Updating of schematic diagram
Installation of a pump motor push button station in an area where flammable chemicals are handled	- Installation of ordinary push button station - Fire / explosion	-Review of Hazardous Area Classification (HAC) & selection of appropriate electrical equipment - Updating of HAC drawing
Installation of EPBAX / telecom / CNC / Gas Chromatograph / DCS / SCADA equipment	-No surge protection -Equipment damage due to lightning surges	-Selection & installation of appropriate Surge Protection Devices (SPD)
Installation of MCCB / ACB for a new load	- No / improper protection against overload or short circuit for the equipment	-Setting of overload & short circuit protection in breakers
Addition of new transformer / generator / HT equipment	- Inadequate protection against serious faults - Tripping of wrong breakers, leading to loss of production	-Protection system co-ordination Study considering the changed fault levels - Review / change of time & current settings for protection relays /breakers
Procurement / Installation of an outdoor motor	-Ordinary motor located in outdoor location -Equipment damage due to water ingress	- Use of Ingress Protected (IP) motor with appropriate IP nomenclature

Routing of down conductor for a new / modified building as part of lightning protection	-Side flashes between down conductors (DC) and near by metal objects in the DC route -Side Flash Damage (SFD) to metal objects (such as telecommunication antennae)	- Review of SFD possibilities, while routing DC
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As can be seen from the above table, there are various ways of causing equipment damage / personal injury due to oversight / negligence while taking decisions with respect to electrical installations. ECCP could be a comprehensive, macro-control document, which should ideally be linked to various details / guidelines /standards, to be looked up for details. Example could be the selection of SPDs. ECCP will remind the engineer that SPD aspect needs consideration and if required, the relevant guideline /standard (BS 6651 / IEEE 1100/AS 1768 /UL 1449) can be referred. In order to effectively use ECCP, it is essential for the electrical engineer to review the ECCP format to ensure that all relevant control points are included. Any experienced electrical engineer (familiar with the plant operations) who can identify potential causes for electrical accidents /injuries/ equipment failures (a 'what-if' approach would help).

In other words, ECCP can be effectively used to have effective control over electrical changes and also can reduce accidents /breakdowns /injuries.

### **ECCP- Customization:**

ECCP format (**Attachment 1**) suggested should be customized to make it appropriate for your operations. For example, the industry has to define when ECCP requires to be initiated. May be any of the following criteria could be the deciding factor:

- ✓ Load additions of more than 5 KW
- ✓ Equipment modification / addition in hazardous areas
- ✓ Installation of expensive electrical / electronic equipment
- ✓ Any equipment that can affect the continuity of business operations / could lead to a hazardous situation (loss of cooling leading to run away reaction)

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**Attachment 1**

<b>Electrical Change Control Procedure (ECCP)</b>		
<b>Logo</b>	<b>Name of the organization</b>	<b>Format Reference No.:</b>  <b>Revision Number:</b>
<b>Brief Detail of Electrical Change:</b>		
<b>Reference Drawing /s:</b>		<b>As-Built Drawing Updating details:</b> <b>Revision Number:</b>
<b>Period of installation:</b>  <input type="checkbox"/> <i>Temporary</i> <input type="checkbox"/> <i>Permanent</i>		
<b>Location of equipment (new / existing):</b>		<b>Statutory approvals:</b>
<input type="checkbox"/> <i>Outdoor</i> <input type="checkbox"/> <i>Indoor</i> <input type="checkbox"/> <i>Flammable area</i> <input type="checkbox"/> <i>Dust prone</i> <input type="checkbox"/> <i>Corrosive Area</i>		
<b>Ventilation / Heat Dissipation</b> <i>(for battery rooms, enclosed sub stations, MCC rooms):</i> <i>Reference:</i>		
<input type="checkbox"/> <i>Air exchange rates</i> <input type="checkbox"/> <i>Operation of exhaust fans</i> <input type="checkbox"/> <i>Panel louvers / sizing</i>		
<b>Illumination Level:</b> <i>Reference:</i>		
<b>Access:</b>		
<b>Electrical Clearance:</b> <i>Reference: Indian Electricity Rule 51, 1956</i>		

<b>Review of Hazardous Area Classification:</b> <i>Reference: IS 5572, IS 5572, NFPA 550</i>	
<b>Existing Classification:</b>  <input type="checkbox"/> <i>Zone 0</i> <input type="checkbox"/> <i>Zone 1</i> <input type="checkbox"/> <i>Zone 2</i>	<b>Proposed Classification:</b>  <input type="checkbox"/> <i>Zone 0 to Zone 0 / 1 / 2</i> <input type="checkbox"/> <i>Zone 1 to Zone 0 / 1 / 2</i> <input type="checkbox"/> <i>Zone 2 to Zone 0 / 1 / 2</i>
<b>Electrical Protection / System Review:</b>	

<b>Reference: various applicable standards</b>		
<ul style="list-style-type: none"> <li><input type="checkbox"/> Review of equipment Feeder capacity</li> <li><input type="checkbox"/> Setting of overload relay</li> <li><input type="checkbox"/> Fuse / MCB rating</li> <li><input type="checkbox"/> Review of cable size</li> <li><input type="checkbox"/> Protection co-ordination study</li> <li><input type="checkbox"/> Earth leakage protection</li> <li><input type="checkbox"/> Arc Fault Protection (circuits &amp; switchgear)</li> </ul>		
<b>Lightning Protection:</b>		
<b>Reference: IS 2309 / NFPA 780 / API RP 2003/BS 6651</b>		
<ul style="list-style-type: none"> <li><input type="checkbox"/> Lightning Protection Risk Assessment</li> <li><input type="checkbox"/> Air termination</li> <li><input type="checkbox"/> Down conductor</li> <li><input type="checkbox"/> Earthing system</li> <li><input type="checkbox"/> Side flashes</li> </ul>		
<b>Surge Protection:</b>		
<b>Reference: BS 6651</b>		
<ul style="list-style-type: none"> <li><input type="checkbox"/> Risk Assessment</li> <li><input type="checkbox"/> Selection of SPDs (Surge Protection Devices)</li> </ul>		
<b>Static Electricity Hazards:</b>		
<b>Reference: IS /API RP 2003/NFPA 77</b>		
<b>Earthing System:</b>		
<i>Reference: IS 3043</i>		
<ul style="list-style-type: none"> <li><input type="checkbox"/> Voltage of changed / added equipment</li> <li><input type="checkbox"/> Earth Resistance Measurement</li> </ul>		
<b>Personal Safety:</b>		
<i>Reference: IS5206/NFPA 70 E</i>		
<b>Fire Safety:</b>		
<i>IS</i>		
<b>Cable Installation:</b>		
<b>Reference: IS 1255 /IS 694</b>		
<b>ECCP prepared by:</b>	<b>Date:</b>	<b>Remarks:</b>
<b>ECCP reviewed &amp; approved by:</b>	<b>Date:</b>	<b>Remarks:</b>

