

Checklist	Remarks	Action (X)
<p style="text-align: center;">Project System Audit Electrical Group</p> <p>Note: Not all items of the checklist shall be checked. It depends on the status of the work and whether it is the first, second or third audit. ⊗ = EH&S related question</p> <p>1. Project Definition</p> <p>1.1 Is the Project Procedure and Execution Manual (PPEM) available? What is the status, issue and date?</p> <p>1.2 Does the PPEM properly describe the scope of work and services expected from your discipline and does it describe how to execute the work?</p> <p>1.3 Are the applicable governmental, local authorities design codes/norms/ rules/ standards design guides listed in the PPEM? Are they available in the discipline group?</p> <p>1.4 Are Company/client, standards/norms/guides/ practices/procedures/forms and specifications, applicable and to be used by your discipline being listed in the PPEM? Are they available in your group?</p> <p>1.5 Are specific project (account) specifications and/or amendments applicable and to be used? Are these certified, including client's comments incorporated?</p> <ul style="list-style-type: none"> • Design Specification Electrical • Electrical Design Standards <p>Are they listed in the PPEM?</p> <p>1.6 Does the PPEM contain an instruction how to handle project variations of the original scope of work (including project development changes), regarding administration, approvals and distribution prior to be implemented?</p>		
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<p>1.7 Is the spare part philosophy listed in the PPEM for the various equipment and bulk components regarding your discipline.?</p>		
<p>1.8 Is a preferred, or approved supplier's list included in the PPEM for the electrical items?</p>		
<p>2. Engineering Technical</p>		
<p>2.1 How is it ensured that electrical specifications and studies are supported by (preliminary) calculation results to prove the quality in accordance with the applicable design codes and governmental and/or local statutory requirements</p>		
<p>2.2 How is it ensured that:</p> <ul style="list-style-type: none"> • final calculations/documents prepared by the suppliers are provided for comments and/or approval? • supplier documents are approved by the discipline engineer assigned on the project? 		
<p>2.3 How has the discipline project file been organized?</p>		
<p>2.4 Are checkprints and masterprints of documents available?</p>		
<p>2.5 Are previous issues of documents kept with the discipline?</p>		
<p>2.6 ⊗ Has the electrical area classification been developed and updated in cooperation with the process L.E.?</p> <ul style="list-style-type: none"> • state issue, date and status. 		
<p>2.7 Computer Calculations</p> <p>Are clients software programs to be used?</p> <p>If so, are they listed in the PPEM with issue number, date and status?</p> <p>If not, have our programs been certified by the discipline manager?</p> <p>Have they been approved by the client?</p> <p>If a design code is involved how is it verified that the latest design code issue has been</p>		
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<p>implemented in the program?</p> <p>2.8 Is it expected that our standard computer programs need to be updated to comply with the requirements of this project?</p> <p>2.9 Is it anticipated that non-routine calculations are required?</p> <p>2.10 ☒ Is a basis for noise calculations defined and agreed by the noise engineer for each electrical noise generating drive?</p> <p>2.11 Have job related internal instructions been developed?</p> <p>Are all group members provided with copies?</p> <p>2.12 Have trench layouts been properly coordinated with U/G piping, control systems and civil department?</p> <ul style="list-style-type: none"> • state issue, date and status of plotplans used? <p>2.13 Have substation layouts and transformer foundation information for conduits and holes been transmitted to civil department?</p> <p>2.14 Have civil/structural design information for conduits and holes been received?</p> <p>2.15 ☒ Has the electrical (hazardous) area classification been agreed upon with the process L.E. and properly been communicated to control systems?</p> <ul style="list-style-type: none"> • state document no. of agreement with process L.E. and document transmittal to control system L.E. <p>2.16 Has the split of work electrical/control systems been properly defined and deviations from standard procedures been recorded?</p> <ul style="list-style-type: none"> • state document no. indicating split of work responsibilities. <p>(Ref. BN-EP-304)</p> <p>2.17 Are piping studies available for electrical design?</p> <p>Which status is being used for design purposes?</p>		

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<p>2.18 Are structural drawings/information available for lighting design?</p> <ul style="list-style-type: none"> state document status. 		
<p>2.19 Is the key one-line diagram available?</p> <ul style="list-style-type: none"> state issue, date and status. 		
<p>2.20 ☒ Are safeguarding memoranda, safeguarding narratives and safeguarding flow schemes available within the group regarding electrically controlled equipment? i.e.: shut-off of airfins, blowers, remotely controlled MOV's etc.</p>		
<p>2.21 ☒ Has the electrical group been involved in any formal reviews of the safeguarding documents?</p> <p>Have results been properly documented?</p>		
<p>2.22 Has the information received regarding the power requirements for:</p> <ul style="list-style-type: none"> electrical drivers? auxiliary equipment? possible electrical (process) heating? electrical tracing? instrument power(emergency power)? sockets? package units? MOV's? fans? 		
<p>2.23 Have the authority requirements been established?</p> <p>list documents to be submitted</p> <p>Is sufficient time allowed for presentation and approval time?</p>		
<p>2.24 Are there any indications that either in the group or within Company/client/manufacturers etc. there are unfavorable conditions which could make Company liable and add cost to the project?</p>		

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<p>2.25 Has the questionnaire for the electrical design specification been completed?</p> <ul style="list-style-type: none"> state % complete. 		
<p>2.26 Have load studies been completed?</p> <ul style="list-style-type: none"> state % complete. 		
<p>2.27 ☒ Have restart requirements been discussed with the process L.E., properly recorded and issued to parties involved?</p>		
<p>2.28 Are process data sheets available for electrically driven equipment and electrical users, incl. induction heating and electrical tracing?</p>		
<p>2.29 How is ensured that technical input is provided for the electrical field erection/installation subcontract?</p>		
<p>3. Engineering General</p>		
<p>3.1 In case client's standards/details/procedures/forms etc., must be used are they:</p> <ul style="list-style-type: none"> listed in the PPEM? available in the group and/or other Company disciplines, where required? technically acceptable for the type of project under consideration? 		
<p>3.2 ☒ Has the control philosophy been agreed between process, electrical and control systems?</p>		
<p>3.3 Have the overall and unit plotplans been certified?</p>		
<p>3.4 ☒ Has the equipment list electrical loads incl. emergency power been certified?</p> <p>If not, assess percentage certified.</p>		
<p>3.5 ☒ Have the electrical tracing requirements been defined?</p> <ul style="list-style-type: none"> state status. 		

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3.6	⊗ Has the cathodic protection been defined?	
3.7	<p>Has the electrical equipment list been reviewed versus one line(s), cable list and equipment list and is status satisfactory?</p> <ul style="list-style-type: none"> what is the status of the official project equipment list? 	
3.8	Has the cable list been reviewed versus cable requisitions and basic electrical design documents and is status satisfactory?	
3.9	<p>Has electrical input been given for "G" package units?</p> <ul style="list-style-type: none"> state status. 	
3.10	<p>Are requisitions of Company specified equipment and bulk materials available?</p> <p>Are they consistent with the latest issued equipment list?</p> <p>Are these released for purchase or for bids?</p>	
3.11	Is a planning list available of all requisitions to be prepared by the electrical group?	
Engineering Flow Diagrams		
3.12	<p>Are supplier EFD's for e.g. package units available?</p> <p><i>Note: only applicable if they contain electrical equipment and/or components.</i></p>	
3.13	<p>Are the project master copies of supplier EFD's for package units kept up-to-date with process, instrumentation and piping changes on a continuous basis or with frequent intervals?</p> <p>How is this achieved?</p> <p><i>Note: applicable if the PU's do contain electrical equipment and/or components.</i></p>	
3.14	How is the status of checks of supplier drawings against Company engineering documents and their (re) issues documented?	
3.15	Are copies of all EFD's provided to the electrical group for information and/or action	

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<p>regarding electrical design changes ,if any?</p>		
<p>3.16 How is the electrical group informed about changes to be implemented on EFD's after "approved for design"?</p>		
<p>3.17 Are later issues properly highlighting these changes?</p>		
<p>3.18 What is the frequency of EFD re-issues? When was the last (re)issue?</p>		
<p>Linetables</p>		
<p>3.19 Are the insulation and electrical tracing requirements available?</p>		
<p>3.20 Have electrical tracing requirements for equipment and lines been submitted and approved by the lead process engineer?</p>		
<p>3.21 In case of electrical process heating, have the requirements and approval also been handled by the lead process engineer?</p>		
<p>Equipment Lists</p>		
<p>3.22 Is the information incorporated in the equipment list consistent with the issued process data sheets, received from process?</p>		
<p>3.23 What is the frequency of receipt of new issues of the equipment list? When was the last issue received? State issue no., date and status</p>		
<p>3.24 Are package units properly identified with cross reference i.e. does the package unit entry contain a listing of the (numbered) components and does each component refer to the package unit number?</p>		
<p>3.25 What actions have been taken to ensure the equipment lists provide a complete and accurate picture of electrical requirements?</p>		
<p>Design Drawings/Standards etc.</p>		
<p>3.26 <input checked="" type="checkbox"/> Has the installation philosophy been agreed with the client? Is this philosophy covered in the documents?</p>		

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<p>3.27 ☒ Are instrument electric power requirements summarized and coordinated with Control Systems?</p> <p>Are uninterrupted power (ups) requirements well established and agreed?</p>		
<p>3.28 ☒ Is the accessibility for the electrical installation coordinated?</p>		
<p>3.29 ☒ Are main electrical substation equipment lay-outs established?</p> <p>Is HVAC requirement defined/coordinated?</p> <p>Are cable entry requirements coordinated with Civil Group?</p>		
<p>3.30 Are typical lay-outs and installation details prepared?</p> <p>Are electric power requirements for sample pumps coordinated with Control Systems?</p>		
<p>3.31 Is it expected that we need the services of consultants for special items?</p>		
<p>3.32 Are miscellaneous materials for heat tracing/ installation/mounting etc. defined and are supply sources established?</p>		
<p>4. Job Control</p>		
<p>4.1 Has the budget for the electrical been defined?</p>		
<p>4.2 Was the electrical group involved in preparing the estimate, planning and manpower curve in executing the scope of work and services required for the project?</p>		
<p>4.3 Has the Project Execution Control System (PEC) been prepared for the scope of work and services required and is it used for progress measurement?</p>		
<p>4.4 How much is the progress measured against the PEC summary for the electrical group? State date.</p>		
<p>4.5 What efficiency is being reported?</p>		

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4.6	Are the PEC and scheduled manhours being adjusted based on the approved project variations?	
4.7	How does the final expected manhours requirement relate to the assigned manhour budget?	
4.8	Are changes in the scope of work being processed in time?	
4.9	Have electrical data sheets (for motors, MOV's etc.) been prepared? State % complete.	
4.10	Have electrical requirements for package units been defined? State status.	
4.11	Were any manpower problems experienced in: <ul style="list-style-type: none"> • filling requirements? • assigning people? • performance of people? • attrition? 	
4.12	Does the lead electrical group engineer receive a copy of the weekly LDS print-out?	
4.13	Is there a regular coordination meeting with the project/engineering management and other lead engineers, including planning and cost control?	
4.14	Is there evidence of good communication with other disciplines/departments?	
4.15	To what extent and by whom are the planning, cost and engineering managers informed when changes and/or slippage are encountered?	
4.16	Is the specification/requisition tracking report regularly updated?	
4.17	Are planned milestones met in time?	
4.18	On the planning list how do the actual dates "for bids" or "for purchase" relate to the	

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<p>original schedule date?</p> <p>4.19 Is the electrical group lead engineer involved in capital expenditures review?</p> <p>4.20 What is currently the percentage of agency personnel on the job within the electrical group?</p> <p>4.21 How is the quality and safety design controlled and maintained in the electrical group?</p> <p>4.22 How is it ensured that a smooth flow of information and close work relation is maintained between the electrical group and other disciplines concerned regarding the entire electrical design?</p> <p>5. Additional Questions</p>		
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Product Audit Checklist

Note:

Any major deviation from requirements shall be tagged in the 'No' column and be elaborated on in the main report under Product Audit Findings.

Documents reviewed:

Questions	YES	NO	NA
1. Are input data available?			
2. Have they been formally issued?			
3. Have the data been qualified? (what is/is not included)			
4. Have they been screened for completeness?			
5. Have calculations been performed?			
6. Have these calculations been checked?			
7. Has the product been formally checked?			
8. Is checking evidence available?			
9. Do the issued documents contain sufficient information?			
10. Have multi-discipline input/comments been obtained?			
11. Are the issued documents checked for compliance with client, licensor and authority specifications?			
12. Have all deviations from client, licensor and authority specifications been discussed and formally agreed upon with the relevant party?			
13. Are supplier data included in the document?			
14. Have supplier data been qualified?			
15. Have all requirements of the document been covered?			
16. Have the document requirements been discussed with the internal client?			
17. Have the document requirements been discussed with the external client?			
18. Have any comments been received on earlier issues of the document?			
19. Have all comments been incorporated in later issues?			
20. If not, has agreement been reached about the implementation of comments?			
21. Have changes been clearly indicated?			
22. Has the PM or EM been involved in this discussion in case of comments from the client?			
23. Has the document been reviewed by the discipline manager or his delegate, if required?			
24. Has the document been formally approved at the proper authorization level?			