

**Project System Audit
Control Systems Group**

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

1. Project Definition

1.1 Is the Project Procedure and Execution Manual (PPEM) available?

What is the status, issue and date?

1.2 Does the PPEM properly describe the scope of work and services expected from your discipline to execute the work?

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?

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?

1.5 Are specific project (account) specifications and/or amendments applicable and to be used?

Are these certified, including client's comments incorporated?

K-1 Engineering/Design Spec. Instrumentation

K-2 Accessibility

K-3 Control valve noise limitations

K-7 Packages

Are they listed in the PPEM?

1.6 Does the PPEM contain an instruction how to handle project variations of the original scope of work regarding administration, approvals and distribution prior to be implemented?

Checklist	Remarks	Action (X)
<p>1.7 Is the spare part philosophy being spelled-out in the PPEM for the various components regarding your discipline?</p> <p>Are items to be purchased?</p>		
<p>1.8 Is a preferred, or approved supplier's list included in the PPEM for the Instrument items to be purchased?</p>		
<p>1.9 Are licensor packages included?</p> <p>If so, are the control system requirements compatible with this project?</p> <p>Are instrument process data requirements adequately covered?</p> <p>Is the split in scope defined?</p>		
<p>2. Engineering Technical</p>		
<p>2.1 Is it ensured, by means of planning schedule, that instrument specifications and calculations are prepared in sequence of criticality as far as delivery and consistency check with the process discipline is concerned?</p>		
<p>2.2 Is it ensured that final calculations/documents prepared by the selected suppliers are provided in time for comments and/or approval?</p>		
<p>2.3 How is the discipline project file 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>What marking is used to distinguish them from active documents?</p>		
<p>2.6 What reference is being used to check supplier prints?</p>		
<p>2.7 <input checked="" type="checkbox"/> Is an electrical area classification received and up-to-date (covering all areas where instrumentation is installed)?</p>		
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	Checklist	Remarks	Action (X)
2.8	<p>Computer calculations:</p> <ul style="list-style-type: none"> • are clients software programs to be used? • if so, are they listed in the PPEM with issue number, date and status? • If not, have our programs been certified by the discipline manager? • have they been approved by the client? • if a design code is involved how is it verified that the latest design code issue has been implemented in the program? • is supplier or third party software being used? 		
2.9	<p>Is it expected that our standard computer programs need to be updated to comply with the requirements of this project?</p>		
2.10	<p>Is it anticipated that non-routine calculations are required (e.g. thermowells, I.S. calc's.)?</p>		
2.11	<p>⊗ Is a basis for C.V. noise calculations defined?</p> <p>Has a maximum noise level per source been agreed with the noise engineer?</p>		
2.12	<p>Are calculated back-pressures for S.R. valves discharging into closed flare system available and corrections applied for sizing?</p> <p>Are rupture discs applied?</p> <p>If so, has it been checked that:</p> <ul style="list-style-type: none"> • correct temperature correction is used • process fluid conditions allow proper operation • capacity correction for combination of R.D. plus S.R. valve is accounted for 		
2.13	<p>Are analyzer fastloop systems calculations based on Company approved methods utilizing approved formulae, reference documents etc.?</p>		
2.14	<p>Are low level D.C. circuits calculated, in respect to voltage drop constraints?</p>		

Checklist	Remarks	Action (X)
2.15	⊗ Are intrinsically safe installation practices in respect to capacity/inductance constraints calculated and acceptable?	
2.16	Are velocity constraints for thermowells considered/calculated?	
2.17	How is it ensured that control system requisitions for e.g. analyzers, control valves and relief valves are reviewed and approved by the lead process engineer, prior to be issued for bids/purchase?	
2.18	How is defined what process data have to be provided to Control Systems to complete the instrument index?	
2.19	How is process data transferred to the control systems group? How is the quality of the data ensured? Ref. CM-PE-404.	
2.20	Which disciplines are involved in checking/ approval of instrument data sheets? e.g. piping engineering and process.	
2.21	If process is responsible for preparation of start-up procedures and/or operating manuals, is it ensured that logics are prepared following exactly the same philosophy laid down in safeguarding narratives?	
2.22	How were P&ID/EFD reviews organized, multi-discipline meetings or discipline by discipline? At which milestones? Is the control systems group involved in such reviews?	
2.23	⊗ Are safeguarding memoranda, safeguarding narratives and safeguarding flow schemes prepared as per the project schedule? Are logic diagrams defined?	
2.24	To what extent has control systems been involved in the development of these documents?	

Checklist	Remarks	Action (X)
<p>2.25 ⊗ Has control systems been involved in any formal reviews of the safeguarding documents?</p>		
<p>2.26 Have the authority requirements been established, i.e. which authorities are involved, which documents have to be submitted for approval and by whom, is sufficient time allowed for presentation and approval time?</p> <p>Is the authority engineer a leading party in this?</p>		
<p>2.27 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>		
<p>2.28 ⊗ Has a proper safety review or HAZOP been conducted?</p>		
<p>2.29 To what extent was control systems involved?</p>		
<p>2.30 Have all findings been minuted?</p>		
<p>2.31 ⊗ How has been assured that all findings have been properly implemented?</p>		
<p>2.32 To what extent have Painting and Insulation quantification sheets been explained to selected suppliers during bid explanation / pre-award meetings?</p>		
<p>2.33 Are supplier completed quantification sheets checked prior to transmittal to the P/I group?</p>		
<p>3. Engineering General</p>		
<p>3.1 Are job related internal instructions used to execute the scope of work and services?</p> <p>Have all group members and other possible disciplines been provided with a copy?</p>		
<p>3.2 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? 		

Checklist	Remarks	Action (X)
<ul style="list-style-type: none"> • technically acceptable for the type of project under consideration? 		
<p>3.3 Is the standard split of responsibility/work between electrical and control systems applicable and agreed?</p> <p>(Ref. BN-EP-304)</p>		
<p>3.4 ☒ Have the accessibility requirements been agreed with client?</p>		
<p>3.5 Has the control system engineer been involved in basic process design?</p> <p><u>Engineering Flow Diagrams etc.</u></p>		
<p>3.6 What is the status of the process flow diagrams?</p>		
<p>3.7 Are process data sheets for instruments available and what is the status?</p>		
<p>3.8 ☒ Are the start-up and shut-down requirements available? In what form?</p>		
<p>3.9 ☒ Are level gauges etc. hooked up to a closed drain system?</p>		
<p>3.10 ☒ Is a pressure/temperature profile available with relief valve requirements and design pressures/temperatures?</p>		
<p>3.11 Are equipment data sheets of Company designed equipment available (towers, vessels and shell and tube heat exchangers)?</p>		
<p>3.12 Is a planning list available for all requisitions to be prepared by the control systems group?</p>		
<p>3.13 Are (supplier) EFD's for e.g. package units available?</p>		
<p>3.14 Are supplier EFD's set up in accordance with Company job standards?</p>		
<p>3.15 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>		

Checklist	Remarks	Action (X)
<p>3.16</p>	<p>How is the status of checks of supplier drawings against Company engineering documents and their (re) issues documented?</p>	
<p>3.17</p>	<p>Are copies of all EFD's provided to the control systems group for information and/or action?</p>	
<p>3.18</p>	<p>Which checklist or procedure is used to ensure completeness of the EFD's?</p>	
<p>3.19</p>	<p>How is the group informed about EFD changes after the "approved for design" issue?</p> <p>Are changes on later issues properly highlighted?</p>	
<p>3.20</p>	<p>What is the frequency of EFD issues?</p> <p>When was the last (re)issue?</p>	
<p>3.21</p>	<p>Are the C1 and C2 specifications available?</p>	
<p>3.22</p>	<p>⊗ Are the insulation and tracing requirements available?</p>	
<p><u>Design Drawings</u></p>		
<p>3.23</p>	<p>Is the installation philosophy agreed with the client?</p> <p>Is this philosophy covered in the documents?</p>	
<p>3.24</p>	<p>Are the vessel nozzle location and sizes coordinated?</p> <p>Is this documented on vessel sketches?</p> <p>Are the standpipes on vessels coordinated with piping?</p>	
<p>3.25</p>	<p>⊗ Are instrument electric power requirements summarized and coordinated with electrical department?</p> <p>Are uninterrupted power (ups) requirements well established and agreed?</p>	
<p>3.26</p>	<p>⊗ Is the accessibility for instrument installation coordinated with client/piping design?</p>	
<p>3.27</p>	<p>⊗ Are control room lay-outs established and do they comply with customer's wishes?</p> <p>Is HVAC requirement defined/coordinated?</p>	

Checklist	Remarks	Action (X)
<p>3.28 Are cable entries and troughs coordinated with civil group?</p> <p>Are analyzer building lay-outs prepared?</p> <p>Are electric power requirements for sample pumps coordinated with electrical department?</p> <p>Will hook-up details be prepared by supplier(s)?</p>		
<p>3.29 Are electronic/electric loop wiring details established, issued?</p> <p>Has an independent check been made prior to release for issue?</p>		
<p>3.30 Are miscellaneous materials for heat tracing/installation/mounting etc. defined and are supply sources assigned?</p> <p>Are details prepared by piping/electrical department?</p>		
<p>4. Job Control</p>		
<p>4.1 Where has the budget for the control system group been defined?</p>		
<p>4.2 Was the control system 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 control system group?</p> <p>State date.</p>		
<p>4.5 What efficiency is being reported?</p>		
<p>4.6 Are the PEC and scheduled manhours being adjusted based on the approved project variations?</p>		
<p>4.7 How does the final expected manhours requirement relate to the assigned manhour budget to date?</p>		

Checklist	Remarks	Action (X)
4.8	Do instrument data sheets reflect the status of current EFD's?	
4.9	Have instrument requirements for package units been defined and agreed?	
4.10	Have CV, flow, RV and TW calculations been completed?	
4.11	Are in-line instruments plus orifice flanges for bids?	
4.12	Are control/safeguarding rack(s) layouts issued for approval?	
4.13	Is it expected that we need the services of consultants for special items?	
4.14	<p>Were any manpower problems experienced in:</p> <ul style="list-style-type: none"> • filling requirements? • assigning people? • performance of people? 	
4.15	Are changes in the scope of work frequently being processed in time?	
4.16	Does the lead control system engineer receive a copy of the weekly LDS print-out?	
4.17	Is there a regular coordination meeting with the project/engineering management and other lead engineers, including planning and cost control	
4.18	Is there evidence of good/poor communication with other disciplines/departments?	
4.19	To what extent and by whom are the planning, cost and engineering managers informed when changes and/or slippage are encountered?	
4.20	Is the specification/requisition tracking report regularly updated?	
4.21	On the planning list how do the actual dates "for bids" or "for purchase" relate to the original schedule date?	
4.22	Are planned milestones met in time?	

Checklist	Remarks	Action (X)
<p>4.23 Is the control system group lead engineer involved in capital expenditures review?</p>		
<p>4.24 What is currently the percentage of agency personnel on the job within the control system group?</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?			