

Checklist	Remarks	Action (X)						
<p style="text-align: center;">Project System Audit Process Engineering</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.</p> <p>⊗ = question is HE&S related.</p> <p>1. Project Definition</p> <p>1.1 What documentation served as a basis for preparation of the design basis? What is the current status?</p> <p>1.2 Has the design basis been updated on a regular basis?</p> <p>1.3 Which other documents have been prepared to serve as a common basis for design calculation (GII)?</p> <p>1.4 Are there any outstanding data affecting design progress?</p> <p>1.5 How are additions/changes to the design basis administered and distributed prior to incorporation into the revised design basis?</p> <p>1.6 Was design basis approved by client/licensor?</p> <p>1.7 Which Company's previous job experience and know-how was considered in establishing the design basis?</p> <p>1.8 Client issued design standards, requirements and forms?</p> <ul style="list-style-type: none"> • Client documents issued to the process design team. • Technically acceptability to the process department (exceptions as noted). • Client document/standards referenced in the design basis. <p>1.9 How and where is the format for flow diagrams and type of information to be included on them, specified?</p>								
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1.10 To what extent have the physical properties data selection been reviewed and verified?					
1.11 What is the basis for selecting vapor liquid equilibrium correlations and enthalpy data? Are they generally or uniquely applied?					
1.12 How and where is the equipment sparing philosophy defined?					
1.13 ☒ How is the basis for establishing design pressures/temperatures specified?					
1.14 Where are the battery limit conditions for process units defined?					
1.15 Where has the utility conditions summary been specified?					
1.16 ☒ Special safety standard to be used?					
1.17 Specific regulatory authority requirements to be met: <ul style="list-style-type: none"> • document availability to the process department? 					
2. Engineering Technical					
2.1 Are heat and material balances checked for: <ul style="list-style-type: none"> • consistency with design basis? • technical quality? 					
2.2 Are equipment calculations checked for: <ul style="list-style-type: none"> • consistency with design basis? • reference to basic data source? • qualification of calculation results, e.g. preliminary, pending verification of assumptions, etc? 					
2.3 What communication took place to satisfy internal clients?					
2.4 What filing system has been implemented?					
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<p>2.5 Are other computer calculations checked for:</p> <ul style="list-style-type: none"> • consistency with design basis? • conclusions from runs? <p>2.6 Are all computer programs certified for use on the project?</p> <p>2.7 ☒ Are computer programs referring to codes and norms based on the latest codes and norms?</p> <p>2.8 Have changes in the design basis by client been incorporated and has the project manager agreed to these changes (project deviation report)?</p> <p>2.9 Were any process initiated changes incorporated and what kind?</p> <p>2.10 Did lead process engineer review and sign engineering documents e.g.:</p> <ul style="list-style-type: none"> • PFD and material balances? • process specifications? • instrument data sheets? • analyzer specifications? • logic diagrams? • P&ID's/EFD's? • UFD's? • line tables? • critical requisitions and supplier documents/drawings? <p>2.11 ☒ How were instrument process data (IPD) transferred to control systems group?</p> <p>2.12 ☒ Were IPD, used by control systems group, back-checked by process?</p> <p>2.13 Were start-up procedures (operating manual) developed?</p>					
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<p>2.14 ⊗ Were P&ID's/EFD's and equipment design reviewed from a start-up point of view? Need for recirculation lines, additional valves, etc.</p>					
<p>2.15 How were P&ID/EFD reviews organized, multi-discipline meetings or discipline by discipline?</p>					
<p>2.16 Have the performance guarantees and contractual obligations been reviewed in relation to the process and utility design?</p>					
<p>2.17 ⊗ Was a metallurgical pressure/ temperature profile (MPTP) prepared and issued?</p>					
<p>2.18 Who outside process reviewed the MPTP prior to being issued?</p>					
<p>2.19 ⊗ Was a safeguarding flow scheme prepared and issued?</p>					
<p>2.20 ⊗ Was a safeguarding memorandum prepared and issued?</p>					
<p>2.21 ⊗ Was a safeguarding narrative prepared and issued?</p>					
<p>2.22 ⊗ Were memorandum and narrative reviewed/ checked by control systems group?</p>					
<p>2.23 Did process control review the design?</p>					
<p>2.24 Is a process critical equipment list available?</p>					
<p>3. Engineering General</p>					
<p>3.1 What kind of critical items were identified for process review?</p>					
<p>3.2 ⊗ Have control valve capacities calculated by control systems been checked for possible governing relief loads?</p>					
<p>3.3 ⊗ Have calculated standard relief valve sizes been used to size the flare (header) system?</p>					
<p>3.4 ⊗ Have low temperatures resulting from depressurization been calculated for material selection?</p>					
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<p>3.5 Has the piping layout of critical process lines been checked on the basis of sketches following piping studies?</p> <p>3.6 Have hydraulic reviews of critical lines been performed such as:</p> <ul style="list-style-type: none"> • two phase flow lines? • pump suction? • gravity lines? • relief valve in and outlets: • compressor circuits? <p>3.7 Have control valves in flashing service been properly calculated and located?</p> <p>3.8 ☒ To what extent was process involved in the 30 and 60 per cent design model review and subsequent check to insure incorporation of comments?</p> <p>3.9 Does the process team have the latest issues of the P&ID's/EFD's and UFD's, line table and critical equipment requisitions?</p> <p>3.10 Were utility/catalyst/chemical summaries prepared and updated?</p> <p>3.11 Has the process team been involved in supplier / requisitions and bid evaluations for process critical equipment items?</p> <p>Give examples.</p> <p>3.12 ☒ Has the process team been advised of changes in engineering affecting the process design (such as relocation of equipment, control valves etc.)?</p> <p>3.13 How was this information transferred to process?</p> <p>3.14 ☒ Has HAZOP review been performed?</p> <p>3.15 Have other departments been made aware of critical process items?</p> <p>3.16 Is the heat exchangers rating specialist aware of the process and typical heat exchange aspects of the job?</p>					
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3.17 ⊗ Has the process team been involved in the plot plan reviews?		
3.18 How were plot plan reviews organized? Multi-discipline meetings or discipline by discipline?		
3.19 What actions have been taken to minimize/avoid 2-phase flow problems in flare systems?		
3.20 If existing equipment is re-used, what verification has been implemented to guarantee satisfactory performance?		
3.21 In case of major changes in process conditions, what verification took place to guarantee satisfactorily equipment performance?		
3.22 ⊗ What measurements / tests have been performed to establish current equipment design conditions?		
4. Job Control		
4.1 Is a PPEM available within the group?		
4.2 How was process involved in forming the manhour estimate and schedule? Was process management involved in the review?		
4.3 Is there a means of progress measurement for process engineering activities? What system is being used?		
4.4 What percentage of physical completion has been achieved? State date.		
4.5 What percentage of efficiency is reported?		
4.6 Have budgeted manhours been adjusted as a result of scope changes?		
4.7 How does the final expected manhour requirement relate to the assigned manhour budget?		
4.8 Is the weekly LDS print-out distributed to the		
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<p>lead process engineer?</p> <p>4.9 Is there regular contact with the project manager and project control manager to ensure that process job control is according to project and contract requirements?</p> <p>4.10 Is there evidence of good communications with other departments?</p> <p>4.11 How is the relationship between issue status of documents versus the planning list?</p> <p>4.12 Has a level IV planning schedule been prepared for process activities and/or deliverables?</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?			
1. Have they been formally issued?			
1. Have the data been qualified? (what is/is not included)			
1. Have they been screened for completeness?			
1. Have calculations been performed?			
1. Have these calculations been checked?			
1. Has the product been formally checked?			
1. Is checking evidence available?			
1. Do the issued documents contain sufficient information?			
1. Have multi-discipline input/comments been obtained?			
1. Are the issued documents checked for compliance with client, licensor and authority specifications?			
1. Have all deviations from client, licensor and authority specifications been discussed and formally agreed upon with the relevant party?			
1. Are supplier data included in the document?			
1. Have supplier data been qualified?			
1. Have all requirements of the document been covered?			
1. Have the document requirements been discussed with the internal client?			
1. Have the document requirements been discussed with the external client?			
1. Have any comments been received on earlier issues of the document?			
1. Have all comments been incorporated in later issues?			
1. If not, has agreement been reached about the implementation of comments?			
1. Have changes been clearly indicated?			
1. Has the PM or EM been involved in this discussion in case of comments from the client?			
1. Has the document been reviewed by the discipline manager or his delegate, if required?			
1. Has the document been formally approved at the proper authorization level?			

