# Project System Audit
# Piping Engineering 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.

## 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 and 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 and available in your group?

**1.5** Which specific project (account) specifications and/or amendments are applicable and to be used?:

C1 General piping design

C2 Frame work piping materials

C3 Pipe fabrication

C4 Pipe supports

C5 Pressure testing

C6 Steam/electric tracing plus insulation

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

**1.7** Is the spare part philosophy being spelled-out in the PPEM for the various account codes - components regarding your discipline items to be purchased?

| | Checklist | Remarks | Action (X) |
|---|---|---|---|
| **1.8** | Has a preferred, or approved supplier's list been included in the PPEM for the in-line items and components to be purchased, including those applicable for package units? | | |
| **2.** | **Engineering Technical** | | |
| **2.1** | How is it ensured, that in-line items and components, specifications and calculations are:<br>• coordinated with other disciplines concerned, where required.<br>• supported by (preliminary) calculation results to prove the quality in accordance with the applicable design codes and governmental and/or local statutory requirements. | | |
| **2.2** | How is it ensured that:<br>• data sheets from other disciplines (with a potential impact on piping engineering work) are obtained.<br>• supplier documents for piping engineering items are approved by the discipline engineer assigned on the project and any other relevant discipline engineer.<br>• final calculation documents, prepared by the selected suppliers are provided for comments and/or approval. | | |
| **2.3** | How has the discipline project file been organized? | | |
| **2.4** | Computer calculations:<br>• have our programs been certified by the discipline manager?<br>• if a design code is involved how is it verified, that the latest design code issue has been implemented in the program? | | |
| **2.5** | Has the process discipline approved the materials specified in the C2 piping spec? | | |

| | Checklist | Remarks | Action (X) |
|---|---|---|---|
| **2.6** | Were there piping material specification revisions after the purchase of the first piping material bulk quantities?<br><br>If so, has Piping engineering been advised to change the relevant PO's? | | |
| **2.7** | What system has been implemented to make sure process lead engineers, approve all major in-line/ components requisitions and supplier documents which are normally reviewed by the piping group lead engineer and contain internals and/or nozzles? | | |
| **2.8** | In case a licensor is involved, how is it ensured that also the licensor approves the in-line equipment and/or components involved? | | |
| **2.9** | What system is in place, to allow the lead process engineer to review and comment on the piping completed supplier data sheet, i.e. pulsation lines etc? | | |
| **2.10** | How is ensured that e.g. analog studies for compressors are reviewed by the piping engineering group? | | |
| **2.11** | Relative to piping engineering, do risks exist which could ultimately make Company liable and add costs (Dfl), to the project. | | |
| **2.12** | Is it anticipated that non-routine calculation methods are to be applied?<br><br>Are these calculations performed inhouse or by third parties? | | |
| **2.13** | Does the piping engineer attend pre-award/bid clarification meetings? | | |
| **2.14** | How is ensured that an inspection representative is present at these pre-award / bid clarification meetings? | | |
| **3.** | **Engineering General** | | |
| **3.1** | Are job related internal instructions used to execute the scope of work and services?<br><br>Have all group members and other possible disciplines been provided with a copy? | | |

| | Checklist | Remarks | Action (X) |
|---|---|---|---|
| | **Engineering Flow Diagrams etc.** | | |
| **3.2** | Is a pressure/temperature profile available? | | |
| **3.3** | Have the pressure/temperature profile data and insulation/priming data been incorporated in the line designation table? | | |
| **3.4** | Is a planning list available of all Company piping requisitions including special manufactured pipe supports, i.e. spring BTM supports and/or hangers? | | |
| **3.5** | Are tie-in points to supplier packages approved by piping engineering? | | |
| **3.6** | How is the status of checks of supplier drawings for piping engineering items, against Company documents and their (re-issues) documented? | | |
| **3.7** | Are copies of all EFD's provided to the Piping Engineering Group? | | |
| **3.8** | Has the Piping Engineering Group been involved in EFD review meetings? | | |
| **3.9** | Which checklist or procedure is used to ensure completeness of the EFD's, concerning piping engineering items/components such as nozzle sizes, ratings, internals etc? | | |
| **3.10** | How is the group informed about planned EFD changes after the RFD issue? | | |
| **3.11** | Are these changes properly highlighted on the next issue? | | |
| | **Linetables** | | |
| **3.12** | Are the C1 and C2 Specifications available in the Piping Engineering Group? Indicate issue number, date and status. | | |
| **3.13** | Are the insulation and painting requirements for piping in-line equipment and components available? | | |
| **3.14** | Have tracing requirements been indicated by process? | | |
| | **Equipment Lists** | | |
| **3.15** | What is the frequency of receipt of new issues | | |

of the equipment list?

# 4. Job Control

**4.1** Where has the budget for the piping engineering group been defined?

**4.2** Was the piping engineering group involved in preparing the estimate, planning and manpower curve in executing the scope of work and services required for the project?

**4.3** Has the Project Execution Control System (PEC) been prepared for the scope of work and services required and is it used for proper progress measurement?

**4.4** How much is the progress measured against the PEC summary for the piping engineering group? State date.

**4.5** What efficiency is reported?

**4.6** Are the PEC and scheduled manhours being adjusted based on the approved project variations?

**4.7** How does the final expected manhour requirement relate to the assigned manhour budget?

**4.8** Are planned milestones met in time?

**4.9** Are changes in the scope of work being processed in time?

**4.10** Does the lead piping engineer receive a copy of the weekly LDS print-out?

**4.11** Is there a regular coordination meeting with the project/ engineering management and other lead engineers, including planning and cost control?

**4.12** Is there evidence of good communication with other disciplines/departments?

**4.13** To what extent and by whom, are the planning, cost and engineering managers informed, when changes and/or slippages are encountered?

**4.14** Is the specification/requisition tracking report regularly updated?

**4.15** On the planning list, how do the actual dates "for bids" and "for purchase" relate to the original schedule date?

**4.16** Is the Piping Engineering Group, lead engineer involved in capital expenditures review?

**4.17** What is currently the percentage of agency personnel on the job within the piping engineering group?

## 5. Additional Questions

## 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? | | | |