Pipe Stress Analysis Project Specification Audit Sheet:

Rev: 01

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Department: Piping

Project Ref:

Proposal Ref:

Note: Not for Client Submission and Only for Internal Audits.

Check

	O	C	TP	REF
Calculation number stated				
Plot of system included				
All input files included				

Design Report

	O	C	TP	REF
Scope of work stated				
Conclusion and recommendations stated				

Design Basis and Input

	O	C	TP	REF
Are assumptions reasonable				
Are assumptions trackable/traceable				
Fluid type stated				
All operating scenario's stated				
Pipe Specification stated				
Allowances stated				

Design Pressure stated				
Design Temperature stated				

Calculations

	O	C	TP	REF
Pressure Containment calculation				
Wind Loading calculation				
Seismic Loading calculation				
Reinforcement thickness calculation				
Other calculations (Provide details)				

Stress Analysis file check

	O	C	TP	REF
Correct Piping Code used				
Correct Ambient temperature used				
Correct Thermal cases selected				
Correct Material of pipe selected				
Correct Pipe diameter used				
Anchor/Nozzle displacement entered				
Correct Nozzle flexibility used				
Correct tee type selected				
Correct bend type selected				
Correct valve type & weight selected				
Correct flange type & weight selected				
Friction considered				
Modelling matches drawing layout				
Spring selected				
Stresses in all load cases are within allowable				
Nozzle loads are within allowable				

Pipe Displacements acceptable				
Support loads are within design limits				
Anchor loads are within design limits				

Extended Checklist, Ref: to Project Spec andf Input Echo

1. Whether the input for pipe material, pipe diameter, pipe wall thickness, pipe temperatures (operating, design and upset), pressures (design and hydrotest), insulation thickness, corrosion allowance, fluid density, insulation density is correct?
2. Whether the input for above design parameters for equipment and nozzles are correct?
3. Whether SIF's for Tee, bend/elbow, cross and trunnions are taken correctly?
4. Whether flanged elbow is considered where required?
5. Whether actual weight of control valves/nonstandard rigid items/valve actuators are considered appropriate?
6. Whether equipment has been modelled with correct dimensions from general arrangement drawing?
7. Whether trunnion modelling is done following inhouse work instructions?
8. Whether settlements/displacements have been considered where required? Normally settlement is used for storage tanks and thermal displacements are used for compressors, turbines and packaged items?
9. Whether proper parameters have been used for seismic and wind analysis?
10. Whether friction has been included when significant?
11. Whether the expansion stress range has been checked in between maximum and minimum temperatures for which the piping system will be subjected?
12. Whether the effect of friction on sliding support loads been considered?
13. Whether the use of low friction pads been properly marked if used?

14. Whether the analysis is performed for the system with and without friction to check the effect of friction (to determine the worst case) as friction is not something that can be relied on? The harmful effects of friction need to be considered but not the benefits.
15. Whether the Caesar plot and isometric plot are matching with 3D plot?
16. Whether the loads on connected equipment are within allowable limit?
17. Whether the thermal effects of pipe support, equipment supports been considered?
18. Whether the flange weight include weight of bolting? In large size piping bolt weights become significant? -
19. Whether all possible load cases (start up, shutdown, regeneration, any special process consideration) are considered in analysis? –
20. Whether proper ambient temperature is used for the location?
21. Whether spring are modelled properly and selected considering all operating temperature cases?
22. Whether adequate documentation in case of gapped restraints (or any special consideration) are mentioned in isometric clearly to assure that supports will be installed in that manner in construction site?
23. Whether there is a possibility of elastic follow up or strain concentration condition?
24. Whether radial thermal expansion has been considered for line sizes greater than 24-inch NB?-
25. Whether hot sustained check has been performed?
26. Whether pressure thrust has been considered while using expansion joints?
27. Whether flanged elbows has been considered?
28. Whether sustained deflection and thermal displacements are within limit specified by project document? -
29. Whether the SIF limitation been considered for large D/t piping? -

30. Whether pressure stiffening of bends has been considered in analysis?
31. Whether flange leakage has been performed as per specification?
32. Whether change in pipe length due to internal pressure has been considered? –
33. Whether all stresses are are within code limits?
34. Whether variability of springs are within 10% near rotary/critical equipments and 25% for others?
35. Whether thermal displacements more than 50 mm are marked on isometric?
36. Whether support loads are checked and discussed with layout/design?
37. Whether feasibility of all supports has been checked?
38. Whether routing change and special support requirements has been clearly marked in stress isometric and informed to layout/design group?
39. Whether spiders are modelled properly at appropriate intervals for jacketed pipes?
40. Whether weight of hot tapping machine and related equipments are considered in specific situations?
41. Whether alignment checking (WNC file) has been performed for all rotary equipments as per API RP 686?
42. Whether PSV forces are considered for open discharge PSV systems?
43. Whether Hot-Cold and Operating-Standby philosophy has been used when required?

Project Lead /Project Manager

Delivery Head