KLM Technology Group
#03-12 Block Aronia,
Jalan Sri Perkasa 2
Taman Tampoi Utama
81200 Johor Bahru
Malaysia

OFF SHORE SKID PACKAGE PIPING DESIGN CRITERIA

(PROJECT STANDARDS AND SPECIFICATIONS)

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SCOPE

This Project Standard and Specification outlines to the minimum and mandatory requirements of designs activities for piping, piping components, piping specialties including piping within battery limits of various skids/ package/ modules etc.

All piping assemblies, specialties & materials supplied or installed under these specifications shall be in accordance with sound engineering principles. Any omission from this specification shall not relieve the contractor from his responsibility of furnishing equipment or materials to meet the specific process parameters, environmental parameters, safety parameters and any other applicable statutory laws or relevant codes & standards.

REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

1. ASME B1.20.1 Pipe threads
2. ASME B16.5 Pipe flanges and flanged fittings
3. ASME B16.9 Factory made wrought steel butt-welding fittings
4. ASME B16.10 Face-to-face & end-to-end dimensions of valves
5. ASME B16.11 Forged fittings (socket welding and threaded)
6. ASME B16.20 Metallic Gaskets for pipe flanges: Ring joint spiral wound and jacketed.
7. ASME B16.21 Non-metallic flat gaskets for pipe flanges
8. ASME B16.25 Butt welding ends
9. ASME B16.34 Valves- flanged, threaded & welding ends
10. ASME B31.3 Process piping
11. ASME B31.4 Pipe line transportation systems for liquid hydro carbons and other liquids.
12. ASME B31.8 Gas transmission and distribution piping system
13. ASME B36.10 M Welded and seamless wrought steel pipe
14. ASME B36.19 M Stainless steel pipe

15. ASME SEC.VIII	Pressure vessel code
16. ASME SEC.IX	Welding and brazing qualifications
17. ASTM A105	Specification for forgings. Carbon steel, for piping components
18. ASTM A106	Specification for seamless carbon steel pipe for high temperature service
19. ASTM A 153	Zinc coating (hot dip) on iron & steel hardware
20. ASTM A 182	Specification for forged or rolled alloy steel pipe flanges, forged fittings & valves and parts for high temperature service.
21. ASTM A193	Specification for alloy steel & stainless steel bolting materials for high temperature service.
22. ASTM A 194	Specification for carbon & alloy steel nuts for bolts for high pressure & high temperature service
23. ASTM A216	Specification for carbon steel casting suitable for fusion welding for high temperature service.
24. ASTM A234	Specification for piping fittings of wrought carbon steel & alloy steel for moderate & elevated temperature
25. ASTM A262	Recommended practice for detecting susceptibility to inter granular corrosion attack in stainless steels
26. ASTM A 312	Specification for seamless & welded austenitic stainless steel pipe
27. ASTM A370	Test methods and definitions for mechanical testing of steel products
28. ASTM A403	Specification for wrought, austenitic stainless steel, piping fittings
29. ASTM A453	Specification for bolting materials high temperature 50 to 120 ksi with expansion coefficient comparable to austenitic steels
30. ASTM A578	Straight beam ultrasonic examination of plain & clad steel for special applications.
31. ASTM A 694	Std specs. For forgings, carbon and alloy steel for pipe flanges, fittings, valves & parts for high-pressure transmission service
32. ASTM A 790	Seamless and welded ferritic/austenitic stainless steel pipe
33. ASTM A 799	Std. practice for steel castings, stainless instrument calibration for estimating ferrite content.

34. ASTM B42	Std. spec. For seamless copper pipe
35. ASTM B 124	Std. spec. For copper and copper alloy forging rod, bar and shapes.
36. ASTM B 165	Std. spec. For nickel copper alloy (UNS4400) seamless pipe and tube
37. ASTM B 337	Std. spec. For seamless and welded titanium and titanium alloy pipe
38. ASTM B 363	Std. spec. for unalloyed titanium and titanium alloy welding fittings
39. ASTM B 366	Std. spec. for factory made wrought nickel and nickel alloy welding fittings.
40. ASTM B 423	Std. specs. for nickel-iron-chromiummolybdenum copper alloy (UNS no.8825&8221) seamless pipe and tube
41. ASTM B 425	Std. spec. for NI-FE-CR-MO- CU alloy (UNS no. 8825 & 8221) rod & bar.
42. ASTM B466	Std spec. for seamless copper nickel pipe and tube
43. ASTM D 1785	Spec. for poly vinyl chloride (PVC) plastic pipe
44. ASTM D 2665	Spec. for poly vinyl chloride (PVC) plastic drain, waste and vent pipe fittings
45. ASTM E18	Rockwell hardness testing of metallic materials
46. ASTM E 45	Determining inclusion content of steel
47. ASTM E 92	Vickers hardness of metallic materials
48. ASTM B 142	Controlling quality of radiographic testing
49. ASTM E 165	Liquid penetrant inspection method
50. ASTM E 709	Recommended practice for magnetic particle examination.
51. API 5 L	Line pipe Specification
52. API 6A	Wellhead and Chrismas tree Equipment
53. API 6D / ISO 14313	Petroleum and natural gas industries-Pipeline Transportation system –Pipeline valves
54. API 6FA	Fire test for valves
55. API RP 14C	Analysis, design, installation testing for basic surface safety system
56. API RP 14E	Design and installation of offshore production platform piping system

57. API RP 14G	Fire prevention and control on open type offshore production platform.
58. API 598	Valve inspection and testing
59. API 600 / ISO 10434	Steel gate valves, flanged and butt-welded ends (nps 1 through nps 24)
60. API 607	Fire test for soft-seated Quarter turned valves
61. BS 1868	Spec. for steel check valves (flanged &butt welding ends) for the petroleum petrochemical & allied industries
62. BS 1873	Spec. for steel globe and globe stop and check valves (flanged & butt welding ends) for the petroleum, petrochemical & allied industries.
63. BS EN 1092-3	Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated Copper Alloy Flanges.
64. BS EN ISO 17292	Metal Ball Valve For The Petroleum, Petrochemical And Allied Industries
65. BS EN ISO 5761	Steel Gate, Globe & Check valves For DN 100 and Smaller, For Petroleum and Natural Gas Industries
66. BS 5353	Specification For Steel Plug Valve
67. BS 6755-2	Testing Of Valves. Specification for Fire Type-Testing requirements.
68. MSS SP 44	MSS Steel Pipe Line Flanges
69. MSS SP 75	Spec. For High Test Wrought Butt Welding Fittings
70. NACE MR 01-75/ ISO 15156-1/2/3	Material for use in H2S containing environments in Oil and Gad Production. Part-1: General principles for Selection of Cracking resistant Materials. Part-2: Cracking resistant Carbon and Low Carbon Steels, and the use of Cast irons. Part-3: Cracking resistant CRAs (Corrosion Resistant alloys) and other alloys.
71. NACE TM-01-77	Laboratory-Testing Of Metals For Resistance To Sulfide Stress Cracking and stress corrosion cracking in H_2S Environments

72.	NACE-TM-02-84	Evaluation Of Pipeline and pressure vessel steels for Resistance To Hydrogen induced Cracking
73.	NFPA-Volume-6	National Fire Code For Sprinklers, Fire Pumps And Water Tanks
74.	NFPA Volume 8	National Fire Code For Portable And Manual Fire Control Equipment.
75.	NFPA 15	Standard for Water spray fixed systems for fire protection.
76.	ASTM D 2996	Specifications For Filament Wound Reinforced Thermosetting Pipes & Fittings.
77.	ASTM D 2992	Method For Obtaining Hydrostatic Design Basis For Reinforced Thermosetting Resin Pipes & Fittings.
78.	ASTM A 815	Specification for wrought ferritic, ferritic/austenitic and martensitic stainless steel piping fittings.
79.	ASTM G 36	Performing stress corrosion-cracking tests in a boiler magnesium chloride
80.	ASTM G 48A/B	Standard Test Method For Pitting & Crevice Corrosion Resistance of Stainless Steel & Related Alloy By Use Of Ferritic Chloride Solution
81.	ASME B16.24	Cast Copper Alloy Pipe Flanges and flanged fittings – Classes 150, 300, 400, 600, 900, 1500 and 2500.
82.	ASME B 16.18	Cast Copper Alloy Solder Joint Pressure Fittings
83.	MSS-SP-80	Bronze Gate, Globe, Angle and Check Valve
84.	MSS-SP-97	Integrally reinforced forged branch outlet Fittings-Socket Welding, Threaded and Butt Welding Ends

ENVIRONMENTAL DESIGN CRITERIA AND UTILITIES

Seismic and Transportation Loads

All equipment supports and braces, pipe supports and other support steel work, including temporary braces, shall be designed to withstand seismic loads applicable to the present location. Refer to the Structural Basis of Design for seismic design considerations.

All equipment supports and braces, pipe supports and other support steel work, including temporary braces, shall be designed to withstand the operating, lifting, transport (by road and by sea) and hydro-test loads specified in Project Standard and Specification.

Design Life

The process facilities design life requirement is 25 years.

Dimensions

SI units shall be used. Dimensions shall be in mm and be related to the Platform datum's or reference lines.

DESIGN REQUIREMENTS

All materials shall conform to Project Standard and Specification and the identified API, ASME, ASTM, BS and NACE codes and Standards.

Design and fabrication shall conform to this Specification and ASME B31.3, API RP14E. In case, any other applicable codes are proposed/ referred the same shall be complied with sufficient information/justification after approval by company.

From piping of pig-barrel of Launcher/Receiver up to piping-pipeline interface shall be designed as a minimum to ASME B 31.4 and ASME B 31.8.

For smooth pigging operation, attempts shall be made to keep the ID of the piping from reducer of pig-Barrel to pipeline–piping interface as close as possible to the ID of the riser in splash zone.

In case, ID of the topside is more than the the ID of the riser, thickness of the topside piping shall be increased to match the ID's.

If the ID of the topside piping is less than that of riser in splash zone, thickness of the topside piping may be adjusted to match the ID's by:

- Considering the actual design conditions of the line in place of class conditions for pipe wall thickness calculations.
- Reducing the corrosion allowance for topside piping but not less than the internal corrosion allowance in corresponding pipeline.

In case, the difference in ID's still exists, ID of the topside piping shall be checked for the passage of gauge plate with out interference. The gauge plate Diameter shall be calculated by the formula given in the 'specification of submarine pipelines'.

All cupro-nickel piping shall be supplied in 14-bar system.

Velocity in Cu-Ni piping shall not exceed 1.6 m/sec for 2" NB and below and 3.3 m/sec. for 3" NB and above.

Fluid velocities in copper piping shall not exceed 1.5 m/sec.