

Recommended Practice for Subsea Structures and Manifolds

API RECOMMENDED PRACTICE 17P
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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

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Introduction

The first edition of API 17P was published on January 30, 2013. The first edition of API RP 17P was a U.S. National Adoption of ISO 13628-15. The first edition of ISO 13628-15 was published in the third quarter of 2011 and was created by a joint API/ISO task group. This second edition of API 17P has been completely rewritten as recommended practice (RP). While the scope is similar to the first edition of API RP 17P, the material section has been rewritten and Sections 8 through 12 have been added.

The intent of this RP is to provide guidance for the specification, design, construction, transportation, installation, maintenance, and operation of subsea structures and manifolds.

This standard is under the jurisdiction of API Subcommittee 17 on Subsea Production Systems. Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

This is the Second Edition.

API Subcommittee 17 documents consist of the following:

- Recommended Practice 17A, *Design and Operation of Subsea Production Systems—General Requirements and Recommendations*
- Recommended Practice 17B, *Recommended Practice for Flexible Pipe*
- Specification 17D, *Design and Operation of Subsea Production Systems—Subsea Wellhead and Tree Equipment*
- Specification 17E, *Specification for Subsea Umbilicals*
- Standard 17F, *Standard for Subsea Production Control Systems*
- Recommended Practice 17G, *Recommended Practice for Completion/Workover Risers*
- Recommended Practice 17H, *Recommended Practice for Remotely Operated Vehicle (ROV) Interfaces on Subsea Production Systems*
- Specification 17J, *Specification for Unbonded Flexible Pipe*
- Specification 17K, *Specification for Bonded Flexible Pipe*
- Specification 17L1, *Specification for Flexible Pipe Ancillary Equipment*
- Recommended Practice 17L2, *Recommended Practice for Flexible Pipe Ancillary Equipment*
- Recommended Practice 17N, *Recommended Practice on Subsea Production System Reliability, Technical Risk, and Integrity Management*
- Standard 17O, *Standard for Subsea High Integrity Pressure Protection Systems (HIPPS)*
- Recommended Practice 17P, *Design and Operation of Subsea Production Systems—Subsea Structures and Manifolds*

- Recommended Practice 17Q, *Recommended Practice on Subsea Equipment Qualification*
- Recommended Practice 17R, *Recommended Practice for Flowline Connectors and Jumpers*
- Recommended Practice 17S, *Recommended Practice for the Design, Testing, and Operation of Subsea Multiphase Flow Meters*
- Recommended Practice 17U, *Recommended Practice for Wet and Dry Thermal Insulation of Subsea Flowlines and Equipment*
- Recommended Practice 17V, *Recommended Practice for Analysis, Design, Installation, and Testing of Safety Systems for Subsea Applications*
- Recommended Practice 17W, *Recommended Practice for Subsea Capping Stacks*
- Technical Report 17TR1, *Evaluation Standard for Internal Pressure Sheath Polymers for High Temperature Flexible Pipes*
- Technical Report 17TR2, *The Ageing of PA-11 in Flexible Pipes*
- Technical Report 17TR3, *An Evaluation of the Risks and Benefits of Penetrations in Subsea Wellheads Below the BOP Stack*
- Technical Report 17TR4, *Subsea Equipment Pressure Ratings*
- Technical Report 17TR5, *Avoidance of Blockages in Subsea Production Control and Chemical Injection Systems*
- Technical Report 17TR6, *Attributes of Production Chemicals in Subsea Production Systems*
- Technical Report 17TR7, *Verification and Validation of Subsea Connectors*
- Technical Report 17TR8, *High-pressure High-temperature Design Guidelines*
- Technical Report 17TR9, *Umbilical Termination Assembly (UTA) Selection and Sizing Recommendations*
- Technical Report 17TR10, *Subsea Umbilical Termination (SUT) Design Recommendations*
- Technical Report 17TR11, *Pressure Effects on Subsea Hardware During Flowline Pressure Testing in Deep Water*
- Technical Report 17TR12, *Consideration of External Pressure in the Design and Pressure Rating of Subsea Equipment*
- Technical Report 17TR13, *General Overview of Subsea Production Systems*
- Technical Report 17TR15, *API 17H Hydraulic Interfaces for Hot Stabs*

It is important that users of this part of API 17 be aware that further or differing requirements can be needed for individual applications. This part of API 17 is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment engineering solutions for the individual application. This can be particularly applicable if there is innovative or developing technology. If an alternative is offered, it is the responsibility of the vendor to identify any variations from this part of API 17 and provide details.

Recommended Practice for Subsea Structures and Manifolds

1 Scope

This document addresses recommendations for subsea structures and manifolds, within the frameworks set forth by recognized and accepted industry specifications and standards.

Equipment within the scope of this document is listed below (see Figure 1):

a) the following structural components and piping systems of subsea production systems:

- production and injection manifolds,
- modular and integrated single satellite and multi-well templates,
- subsea processing and subsea boosting stations,
- flow control modules,
- flowline riser bases and export riser bases,
- pipeline end manifolds (PLEM),
- pipeline end terminations (PLET),
- T- and Y-connections,
- subsea isolation valves (SSIV);

b) the following structural components of subsea production system:

- subsea controls and distribution structures,
- other subsea structures;

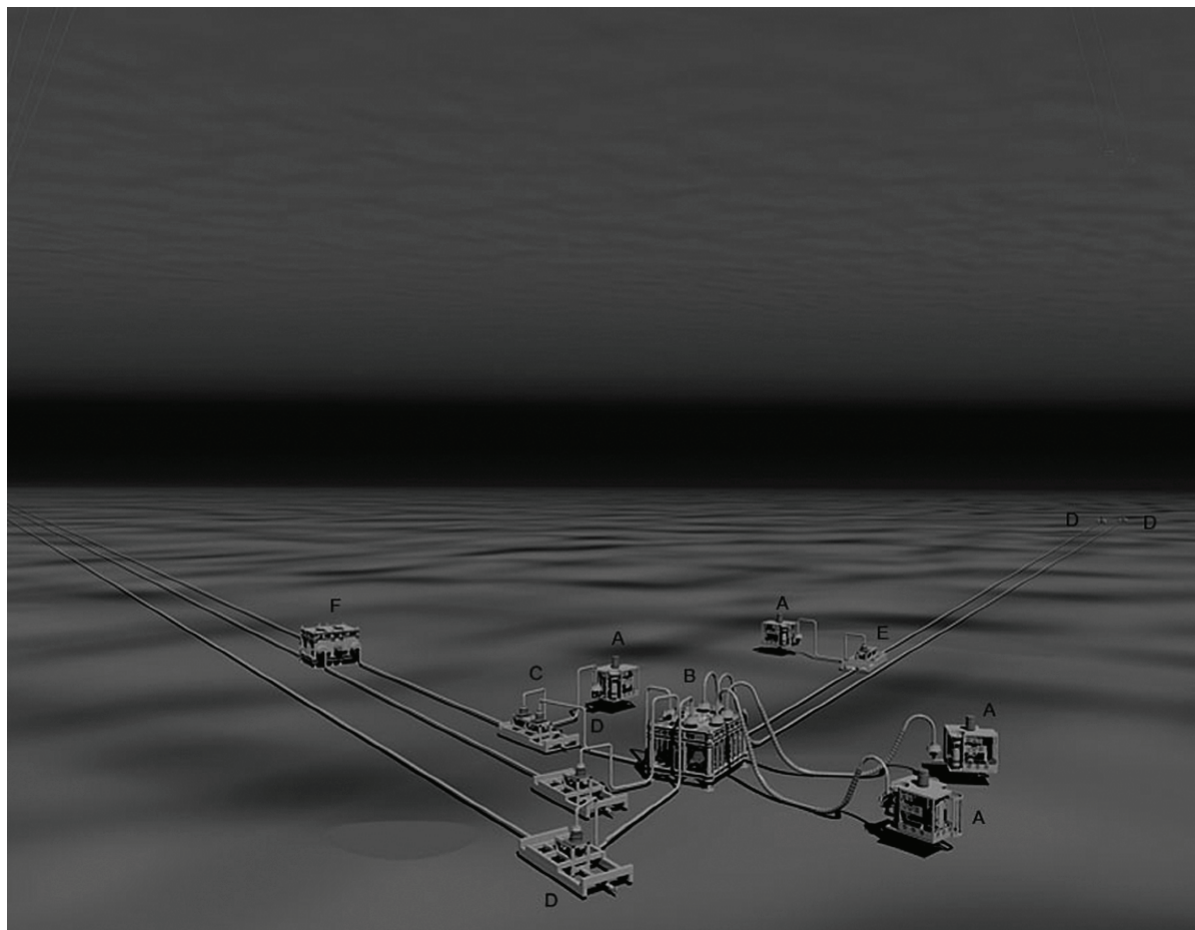
c) protection structures associated with the above components;

d) foundations and mounting bases to support above structures;

The following components and their applications are outside the scope of this document:

- pipeline and manifold valves;
- flowline and tie-in connectors;
- choke valves;
- flow control valves;
- multi-phase flow meters;
- pressure vessels;
- production control systems.

NOTE General information regarding these topics can be found in additional publications, such as API 17A, API 17E, and API 2C.



Key

A	tree (API 17D)	D	PLET/FLET
B	cluster manifold	E	inline tee
C	PLEM	F	multi-phase pump skid/HIPPS

Figure 1—Example of Some Typical Subsea Structures

2 Normative References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to or revisions of any of these publications do not apply. For undated references, the latest edition of the normative document applies.

API 2A-WSD, *Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms—Working Stress Design*

API 6A, *Specification for Wellhead and Christmas Tree Equipment*

API 17A, *Design and Operation of Subsea Production Systems—General Requirements and Recommendations*

API 17D, *Design and Operation of Subsea Production Systems—Subsea Wellhead and Tree Equipment*

API 17H, *Recommended Practice for Remotely Operated Vehicle (ROV) Interfaces on Subsea Production Systems*

API 20E, *Alloy and Carbon Steel Bolting for Use in the Petroleum and Natural Gas Industries*

API 20F, *Corrosion Resistant Bolting for Use in the Petroleum and Natural Gas Industries*

ASME VIII, Boiler and Pressure Vessel Code (BPVC), Section VIII, *Rules for Construction of Pressure Vessels*, Div. 1

ASNT SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*

ASTM A36, *Standard Specification for Carbon Structural Steel*

ASTM A193, *Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications*

ASTM A320, *Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service*

ASTM A388, *Standard Practice for Ultrasonic Examination of Steel Forgings*

ASTM E562, *Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count*

ASTM G48, *Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution*

ISO 3834-2, *Quality requirements for fusion welding of metallic materials—Part 2: Comprehensive quality requirements*

ISO 9606 (all parts), *Qualification test of welders—Fusion welding*

ISO 9712, *Non-destructive testing—Qualification and certification of NDT personnel—General principles*

ISO 10474, *Steel and steel product—Inspection documents*

ISO 14731:2006, *Welding coordination—Tasks and responsibilities*

ISO 14732:2013, *Welding personnel—Qualification testing of welding operators*

ISO 15156 (all parts), *Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production*

ISO 15590-1, *Petroleum and natural gas industries—Induction bends, fittings and flanges for pipeline transportation systems—Part 1: Induction bends*

ISO 15609 (all parts), *Specification and qualification of welding procedures for metallic materials—Welding procedure specification*

ISO 15614 (all parts), *Specification and qualification of welding procedures for metallic materials—Welding procedure test*

ISO 19902:2007, *Petroleum and natural gas industries—Fixed steel offshore structures*

EN 1418, *Welding personnel—Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

EN 10228-3, *Non-destructive testing of steel forgings—Part 3: Ultrasonic testing of ferritic or martensitic steel forgings*

NS 477, *Welding—Rules for qualification of welding inspectors*

3 Abbreviations and Definitions

3.1 Definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

barrier

element forming part of a pressure-containing envelope that is designed to prevent unintentional flow of produced/injected fluids, particularly to the external environment.

3.1.2

carbon steel

full range of carbon, carbon-manganese, and low-alloy steels used in the construction of conventional oilfield equipment.

3.1.3

cluster manifold

independent structure used to comingle produced fluids or distribute injection fluids to or from one or more wells.

NOTE There are no wells positioned on a cluster manifold.

3.1.4

corrosion-resistant alloy

CRA

alloy that is intended to be resistant to general and localized corrosion in oilfield environments that are corrosive to carbon steels.

NOTE This definition is in accordance with ISO 15156 (all parts) and is intended to include materials such as stainless steels and nickel base alloys. Other ISO documents can have other definitions.

3.1.5

drilling template

multi-well template used as a drilling guide to predrill wells prior to installing a surface facility.

NOTE The wells are typically tied back to the surface facility during completion. The wells can also be completed subsea, with individual risers back to the surface.

3.1.6

driven pile

jettied pile

typically, a tall steel cylindrical structure, with or without internal stiffener system, used to support subsea structures.

NOTE Driven piles are usually driven into the sea-floor with impact hammers, while jettied piles rely on jetting the soil at the lower end of the pile.

3.1.7

end user

operating facility or operating license for which the system is being purchased.

NOTE Due to differing ownership solutions, the end user may not be the same entity as the purchasing party.

3.1.8**engineered lift plan**

a lifting plan that ensures controls and safe guards are in place such that no components experience conditions above code requirements.

3.1.9**inline tee**

system of piping and valves used to make a subsea connection at the middle of a pipeline, and generally integral to the pipeline.

NOTE The pipeline may be used to transport produced fluids or to distribute injected fluids.

3.1.10**low-alloy steel**

steel containing less than 5 % mass fraction total alloying elements, or steels with less than 11 % mass fraction chromium, but more than that specified for carbon steel.

3.1.11**manifold**

system of headers, branched piping and valves used to gather produced fluids or to distribute injected fluids in subsea oil and gas production systems.

NOTE A manifold system can also provide for well testing and well servicing. The associated equipment can include valves, pumps, compressors, connectors for pipeline and tree interfaces, chokes for flow control, and through-flow loop (TFL) diverters. The manifold system can include control system equipment, such as a distribution system for hydraulic and electrical functions, as well as providing interface connections to control modules. All or part of the manifold can be integral with the template or can be installed separately at a later date if desired. Manifold headers can include lines for water or chemical injection, gas lift, and well control.

3.1.12**modular template**

template installed as one unit or as modules assembled around a base structure (often the first well).

NOTE If installed as one unit, the template is of a cantilevered design. If installed as modules, these modules can be of cantilevered design.

3.1.13**mudmat**

typically a shallow structure used to support a subsea structure by distributing the load to the seabed via a structural plate and/or shallow skirt.

3.1.14**pipeline end manifold****PLEM**

system of headers, piping, and valves at the end of a pipeline used to gather produced fluids or to distribute injected fluids in subsea production systems, generally integral to the pipeline and having more than one subsea connection.

3.1.15**pipeline end termination****PLET**

system of piping and valves, generally integral to the pipeline, used to make a subsea connection at the end of a pipeline.

NOTE 1 Typically, a PLET has only one subsea connection.

NOTE 2 The pipeline can be used to transport produced fluids or to distribute injected fluids.

3.1.16**pitting resistance equivalent number****PREN**

index that exists in several variations and usually based on observed resistance to pitting of corrosion-resistant alloys in the presence of chlorides and oxygen, e.g. as found in seawater.

3.1.17**protection structure**

independent or integral structure that protects subsea equipment against damage from dropped objects, fishing gear and other relevant accidental loads.

3.1.18**riser base**

structure that supports a marine production riser or loading terminal, and that serves as a structure through which to react to loads on the riser throughout its service life.

NOTE A riser base can also include a pipeline connection capability.

3.1.19**sealine**

subsea flowline.

3.1.20**sour service**

service in H₂S-containing fluids.

NOTE "Sour service" refers to conditions where the H₂S content is such that restrictions as specified in ISO 15156 (all parts) or NACE MR 0175 apply.

3.1.21**suction pile**

typically a tall steel cylindrical structure, open at the bottom and normally closed at the top and used as a foundation for subsea structures.

NOTE 1 The structure can be designed with or without an internal stiffener system and usually has a suction interface.

3.1.22**sweet service**

service in H₂S-free fluids.

3.1.23**template**

seabed structure that provides guidance and support for drilling and includes production/injection piping.

NOTE 1 A template typically comprises a structure that provides a guide for drilling and/or support for other equipment, and provisions for establishing a foundation (piled or gravity-based). It is typically used to group several subsea wells (modular manifold) at a single seabed location.

NOTE 2 Production from the templates can flow to floating production systems, platforms, shore, or other remote facilities.

NOTE 3 Templates can be of a unitized or modular design.

3.1.24**type 316**

austenitic stainless steel alloy.

EXAMPLE UNS S31600/S31603.

3.1.25**type 6Mo**

austenitic stainless steel alloy having $PREN \geq 40$ mass fraction and Mo alloying ≥ 6.0 % mass fraction; also refers to nickel alloy having a Mo content in the range 6 % mass fraction to 8 % mass fraction.

3.1.26**type 22Cr duplex**

ferritic/austenitic stainless steel alloy with $30 < PREN \leq 40$ and Mo > 1.5 % mass fraction.

EXAMPLE UNS S31803 and S32205 steels.

3.1.27**type 25Cr duplex**

ferritic/austenitic stainless steel alloys with $40 < PREN \leq 45$.

EXAMPLE S32750 and UNS S32760 steels.

3.1.28**validation**

confirmation that the operational requirements for a specific use or application have been fulfilled through the provision of objective evidence.

NOTE Typically validation is achieved by qualification testing and/or system integration testing.

3.1.29**verification**

confirmation that specified design requirements have been fulfilled through the provision of objective evidence.

NOTE Typically verification is achieved by calculations, design reviews, and hydrostatic testing.

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

ACCP	ASNT Central Certification Program
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ASNT	American Society of Nondestructive Testing
AWS	American Welding Society
BOP	blowout preventer
BPVC	Boiler and Pressure Vessel Code
CRA	corrosion-resistant alloy
CVN	Charpy V-notch
DAC	distance amplitude curve
DC	design class
DNV	Det Norske Veritas
EWf	European Federation for Welding, Joining and Cutting
EN	European Norm
FIV	flow-induced vibration

GMAW	gas metal arc welding
GTAW	gas tungsten arc welding
HAZ	heat-affected zone
HAZOP	hazard and operability analysis
HD	diffusible hydrogen, expressed as ml/100 g deposited metal
HIP	hot isostatic pressed
ID	inner diameter
IIW	International Institute of Welding
IWE	International Welding Engineer
ISO	International Organization for Standardization
LP	liquid penetrant
MC	material class
MDT	minimum design temperature
MPFM	multi-phase flow meter
MPS	Manufacturing Procedure Specification
NDT	nondestructive testing
NORSOK	Norsk Søkkel
P&ID	process and instrumentation diagram
PLEM	pipeline end manifold
PLET	pipeline end termination
PQR	procedure qualification record
PREN	pitting resistance equivalent number
PSL	product specification level
PWHT	post-weld heat treatment
ROT	remotely operated tool
ROV	remotely operated vehicle
SAFOP	safety and operability analysis
SCM	subsea control module
SMYS	specified minimum yield strength
SSIV	subsea isolation valve
TFL	through-flow loop
UNS	Unified Numbering System
UT	ultrasonic testing
VIV	vortex-induced vibration
WM	weld metal
WPS	welding procedure specification
WPQR	weld procedure qualification record
WROV	work-class remotely operated vehicle
XT	christmas tree

4 System Design

4.1 General

4.1.1 Material Selection

Material selection for individual components, including all seal materials, should meet the requirements of API 17A concerning:

- production, injection fluids, and completion fluids for wetted areas;
- exposure to chemical injection and service fluids;
- environmental conditions.

4.1.2 Design Recommendations

Subsea modules can be used to provide flexibility to meet various production scenarios, for example “retrofit” installation of pumps, separators, and other modules. Any requirements for future expansion should be addressed during the design phase. Future expansion functionality should be documented along with any requirements for implementation.

The following functionality related to structures and modules should be addressed during the design phase:

- transportation, lifting, installation (inclusive of potential levelling), abandonment;
- flowline pull-in, connection and seal testing;
- well drilling, completion, workover and XT installation;
- precommissioning and commissioning;
- production/injection start-up and production/injection;
- injection of chemicals, such as emulsion, scale, wax and corrosion inhibitors;
- methanol or monoethylene glycol (MEG) injection for hydrate control;
- thermal performance;
- annulus bleed operations;
- well testing;
- barrier testing;
- planned and emergency shutdowns of wells and manifolds;
- pressurization and depressurization of piping system;
- slugging and flow-induced vibrations;
- vibration due to rotating equipment

- pigging of flowlines, such as for gauge and cleaning operations;
- subsea inspections and interventions, inclusive of module replacement;
- diver or vehicle intervention access;
- sand/pig detection facilities inspection;
- well interventions;
- potential hook-up of retrofit-installed modules and components;
- seawater ingress during tie-in operations;
- corrosion protection;
- erosion protection;
- wall thickness measurement;
- fluid flow rate;
- pressure drop through piping system;
- fluid composition;
- configuration to minimize hydrate formation potential;
- fluid flow regimes (slugging).

4.1.3 Fluid Characteristics

Design of manifolds and piping systems should take into account the fluid characteristics. These fluids include produced hydrocarbons (liquids and gases), formation water, completion fluids, injected water and gases, barrier fluids, and injected chemicals.

The general design characteristics for produced fluids are typically supplied by the end user, and include:

- pour point;
- pressure;
- temperature;
- chemical composition;
- viscosity;
- gas/oil/water ratio (including any changes during the life of the field);
- sand/paraffin/hydrates;
- corrosivity.

4.1.4 Interfaces

The system interfaces should maintain integrity and functionality in the service conditions and take into account the following:

- internal and external pressure;
- expansion and contraction forces acting on the structure;
- zero external leakage;
- seawater ingress;
- tolerance loops for interface make-up;
- internal and external temperature variations;
- structure for protection against dropped objects and snag loading;
- impact from dropped objects
- short- and long-term structure settlement;
- marine growth;
- corrosion and erosion;
- scaling on subsea mateable surfaces;
- potential blockage of piping system (e.g. hydrates);
- installation/retrieval loads;
- pull-in and connection loads;
- serviceability;
- protection from subsea vehicle impact loads;
- environmental loads (currents, waves, seismic);
- subsea controls connection systems;
- chemical injection requirements/locations.

Interface data sheets and outlined installation procedures for critical external interface areas should be provided. The data sheets, when implemented, should clearly describe design limitations, weights, and dimensions, as applicable. Areas that, as a minimum, should be covered are:

- interfaces towards the well system, including maximum conductor angle, hang-off weights, lengths of conductor, BOP envelopes, sequential requirements (sequence and number of wells that can be drilled before design load capacity is achieved), limitation on mud pressure/flow during drilling out the conductor, cement/grouting strength, well growth, wellhead design, etc.;

- interfaces towards marine contractor (equipment mass and size, lifting height, deck space, load capacity of tie-in points and structures, installation limitations, sea states, etc.);
- interfaces towards flowline jumpers, well jumpers, controls flying leads;
- interfaces with installation/retrieval systems and tooling.

4.1.5 Manifold Functionality

Manifold system design typically fulfills the following functions:

- commingles production fluids from production wells;
- distributes water/gas from/to multiple production, water, or gas injection wells;
- directs flow of fluids through manifold headers;
- contains one or more headers either using remotely or manually actuated valves;
- allows isolation of individual well slots from header;
- incorporates flowline connections between manifolds and appropriate flowlines and/or test lines;
- allows continuity for circulation of fluid and/or pigging of the flowline system;
- provides capability for future expansion;
- provides support to control system including control pods, sensors, flow meters, etc.

4.1.6 Manifold Performance and Configuration

The end user should define or approve the following performance and configuration requirements, including:

- maximum dimensions and target weight;
- pressure and temperature ratings (see 5.3.2);
- flow rates;
- equipment interfaces;
- process and instrumentation diagrams (P&IDs);
- materials requirements, including erosion and corrosion performance requirements;
- water depth;
- design life;
- geotechnical and geophysical data;
- metocean data;
- dropped-objects protection requirements;

- modes of operations (subsea hydrostatic testing, operation, bull heading, acid stimulation, etc.);
- subsea vehicle impact requirements;
- snag load for the geographic region;
- availability and reliability requirements;
- levels of redundancy of equipment within the manifold;
- overtrawling or fishing friendly requirements.

All equipment should:

- conform to the latest revision of the end user's product requirements;
- be designed to the pressure and temperature ratings (see Appendix A for datasheet);
- be compatible (dimensions and mass) with construction site limitations as well as transportation vessels;
- be compatible (dimensions and mass) with the handling and installation capabilities of the installation vessel;
- be compatible with potential extreme conditions (hot or cold) during transportation, storage, and the installation site. Note: The transportation/storage/installation site may experience subzero weather, which could be more extreme than normal operating conditions.
- be functional and meet the requirements for the specified operating environment.

4.2 Standalone Structures

4.2.1 General

Standalone structures such as cluster manifolds, subsea distribution units, and electrical distribution units typically consist of a framework that supports other equipment, such as piping, pipeline pull-in and connection equipment, and protective framing. Standalone structures typically provide a foundation to sufficiently transfer all design loads into the seabed.

Examples of standalone structures are:

- production and injection cluster manifolds;
- subsea processing skids;
- subsea boosting stations;
- subsea controls and distribution structures.

Subsea structures may include the following components;

- subsea control module;
- subsea distribution unit;
- electrical distribution unit.

4.2.2 Structure Orientation

Standalone structures should provide an alignment capability to ensure proper orientation to physical interfaces, such as flying leads, connectors and foundations.

4.2.3 Subsea Guidance

Standalone structures should provide for a guidance system to support operations through the life of the installation. If guidelines are used, the standalone should provide proper spacing and installation/ maintenance capability for the guide posts. If guidelineless methods are used, the standalone should provide sufficient space and passive guidance capability to successfully install key equipment items.

4.3 Pipeline Structures

Pipeline structures such as PLEM, PLETS, riser bases, in-line tees, and subsea isolation valve structures typically consist of a framework that supports other equipment, such as piping, pipeline pull-in and connection equipment, and protective framing, as well as installation equipment such as yokes and stab and hinge-over arrangements. The pipeline structures typically provide an end termination for a pipeline segment. The pipeline structures provide a foundation to sufficiently transfer design loads into the seabed.

Examples of pipeline structures are:

- PLEM;
- PLET;
- riser base;
- in-line tees;
- subsea isolation valve structures;
- towheads.

4.4 Template Systems

4.4.1 General

The framework of a template supports equipment such as manifolds, risers, drilling and completion equipment, pipeline pull-in and connection equipment, and protective framing. The template should provide a foundation to sufficiently transfer design loads into the seabed (see Figure 2).

The template design may be based on an integrated or modular system layout, as follows:

- integrated template, which concept may include bottom structure, manifold, and protection structure in one unit.
- modular template, which concept may consist of separately installable/replaceable modules and structures. If applicable, an additional requirement for moonpool installable size may be applied.

The following parameters will influence the selection of the template concept:

- field development strategy, including future expansion;