Templates & Manifolds

This module will cover:

- Applicable Codes and Standards
- Templates
  - Purpose of a template
  - Designs
  - Protection structures
  - Foundations
- Manifolds
  - Purpose of a manifold
  - Functions
Goal

- Be familiar with the purpose and design requirements for templates and manifolds

Codes and standards

The following standards are a selection normally used for template/manifold design. The code requirements will vary with customer preference and local legislation

- ISO 13628-15 Subsea structures and manifolds (2011)
- ISO 13628-1 General requirements and recommendations
- Steel structure: Eurocode 3
- NORSOK U-001 (Dropped objects)
- ASME B 31.3 (Process piping)
- ASME B 31.8 (Gas transmission piping)
- DNV-OS-F101 (Submarine pipeline systems)
- BS8010 Part 3
- DNV standards for planning and Execution of Marine Operation
Templates

- Guide, hang off and support to drilling and to the wellhead conductor
- Base for the subsea trees and the manifold

Template Design

The design of the template will vary with:

- Location
  - Local legislation
- Installation methods
  - Moonpool, drillpipe, crane vessel, modular, barge or wet tow
- Pipeline methods
  - Horizontal or vertical flowline connection, pipeline forces,
- Protection requirements
  - Fishing gear protection, dropped objects
- Drilling methods
  - Suction of drill cuttings, cement suction, drill cutting injection
Template Foundations

- Based on seabed condition, the template be designed with:
  - Mudmats as foundation and provide bearing capacity to avoid settlements
  - Washout sleeves to avoid shortfall and fracture in seabed during 36" drilling
  - Skirts to penetrate seafloor for resist lateral forces and to provide friction against heave during installation
  - Mini suction piles or a large single suction pile to support vertical and horizontal loads on the manifold
Mini Suction Piles

Template foundations with skirts or mini-suction piles:
- Installed before main manifold so reduced weight
- Allow drilling taking place (normally one season prior to manifold installation)
- Each mini pile can be sucked down individually to adjust elevation
- Supports weight of manifold or template and anchors it in place on the seabed

Single Suction Piles

Key features:
- Supports vertical and horizontal loads on the template
- Also used as anchor foundations for FPSO or Semi-submersible moorings
- Installed partially by self weight and then by ROV deployed pump
- Can be recovered by reverse pumping
- May be designed so that orientation is not critical during installation
Fixed Template – Production Guidebase

Hinged Manifold / Template
Manifolds

A manifold is a system of headers, branched piping and valves used to gather produced fluids or to distribute injected fluids. The manifold should provide sufficient piping, valves and flow controls to safely gather produced fluids or distribute injected fluids such as gas, water or chemicals. (ISO 13628-1)

- The Manifold Module provides the interface between the production pipeline, flowline and well.
- Pipelines or flexibles normally interconnect the manifold.
- Collecting produced fluids from individual subsea wells.
- Distributing production fluids, inject gas, inject chemicals and control fluids.
- Distribute the electrical and hydraulic system.
- Several XT can be connected to the manifold.
- Satellite modules (if required) will be connected to the manifold via a flow line.

Templates and Manifolds

- In Norwegian terms the manifold is often referred to as the “Template/Manifold”, since the manifold is an integral part of the template.
**Manifold headers**

Flowlines / piping are connected to one or two headers in the manifold. Two production headers have the advantage of:

- Increased flexibility in export options
- Increased flexibility for future tie-ins
- Increased production availability
- Possibility for installing a pigging loop
- Possibility for hydrate plug removal from two sides

...at the cost of increased complexity and weight

---

**Manifold Piping**

![Manifold Piping Diagram]

- 6” Branch Line To/From Well
- 5 1/8” Branch Valves
- 2” CI Valves
- Remote Actuated Valves
- 10” Main Header
- Pigging Loop Isolation Valve
- ROV Panel
Manifold
Manifold Piping

Snafvit Subsea Concept

Notes
1. Annulus lines can be routed directly from the 8711 to the manifold.
2. Knob inhibition in multiphase lines should be considered as per the 8711 design guide.
3. AEC = Annulus Expansion Compartment
   API = API Interface
   CC = Control Center
   MEC = Multiphase Separator
   PCP = Production Control Panel
   PCV = Production Control Valve
   SCV = Safety Control Valve

Production choke module

Manifold Deployment

DNV GL © 2013 September 2014
Gemini

Gemini System Integration Test (SIT)
Manifold System Integration Testing (SIT)

Manifold and distribution System

Manifold centers w/o template function
Cluster Manifold

GE Oil & GAS: KIZOMBA manifold & foundation

Template Manifold

GE Oil & GAS: SKARV manifold & foundation
Template Manifold

GE Oil & GAS: Snøhvit manifold & foundation

Videos

- Installation of sub sea template Animation
- Super Pipeline construction of Ormen Lange marine natural gas pipeline
- Constructing Totals Dalia Field Part 9 - Installation of Manifold