Offshore Valves
Agenda

- Offshore Project Description
- Subsea and Trunk line Equipment
- Floating Platform Unit
Offshore Project Description
Facts about the field

- Located 610 km from Murmansk
- Water depth 340 m, reservoir 2 000 m below mud line
- Reserves estimated at 3 700 GSm³
- Covers an area of 1 400 km²
- Production of 70 million Sm³/day
Offshore installations

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Field layout

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Subsea and Trunkline Equipment
Template manifolds
72 x 8” (hydraulic actuated)
12 x 16” (ROV-operated)
Infield Riser bases
6 x 16” valves (hydraulic actuated)
2500# pressure class
TRB with XOV
Trunkline riser base
4 x 16” valves (hydraulic actuated)
6 x 16” valves (ROV)
2500# pressure class
Export system

Figure 2-1 PLEM Overall General Arrangement Isometric

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PLEM valve modules
4 x 36” (ROV) - 1500# pressure class
8 x 16” (ROV) - 2500# pressure class
Trunkline onshore termination
8 to 10 x 36” - 1500# pressure class
Technical information for 36” valves

<table>
<thead>
<tr>
<th>Item</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Ball valve</td>
</tr>
<tr>
<td>Location</td>
<td>Subsea / Trunk line / Plem / Onshore</td>
</tr>
<tr>
<td>Water deth</td>
<td>Up to 340 m</td>
</tr>
<tr>
<td>Design life</td>
<td>50 years</td>
</tr>
<tr>
<td>Nominal diameter / Bore</td>
<td>36”/34”</td>
</tr>
<tr>
<td>Service</td>
<td>Isolation</td>
</tr>
<tr>
<td>Design pressure</td>
<td>189.5 Barg</td>
</tr>
<tr>
<td>Design temperature Flow</td>
<td>-20 to + 75 °C</td>
</tr>
<tr>
<td>Design temperature environment</td>
<td>Subsea: -1.8 to + 1 °C / Onshore: -40 to + 25 °C</td>
</tr>
<tr>
<td>Design standard</td>
<td>ISO 14313 / ISO B16.34</td>
</tr>
<tr>
<td>Maximum differential pressure</td>
<td>189.5 Barg</td>
</tr>
<tr>
<td>Design</td>
<td>Full bore throughout piggable</td>
</tr>
<tr>
<td>Corrosion allowance</td>
<td>3 mm</td>
</tr>
</tbody>
</table>
Supply of valves

- All Subsea valves to be supplied by EPC Contractor (*).
- Selection of valves suppliers under responsibility of EPC Contractor.
- SDAG approval for main suppliers required.

(*) Except for 4 x 36” subsea valves for trunkline directly supplied by SDAG.
Some pictures

- Valve with interface for High pressure cap, actuator and torque tool.
- Actuator
- Valve actuator assembly
Ball valve with subsea interface
Subsea actuators

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Valve and actuator assembly

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Floating Platform Unit (FPU)
FPU

- Ice resistant & disconnectable floater
- Design capacity: 70 MSm³/d
- 3 separation & dehydration trains in parallel
- Compression: 85 MW compression duty – 160 bar discharge pressure
- Utilities (LQ, power generation, etc.)
- Winterization
FPU

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Shtokman Topsides Overview

HP PHASE

Inlet separator
-12/19°C
74.3 barg
20°C

MP Compressor
74 barg
108°C

MP Separator
24.3 bara
40 °C

Condensate Stripping Column
2.4 bara
40 °C

Fresh Water
0.1% vol

Electrostatic Separator
33 bara
60 °C

Gas Metering
153 – 163 bara

Condensate Metering
160 bara
55 °C

Condensate Metering

MEG Reclamation & Regeneration

Fuel Gas system

150-160 bara
60 °C

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FPU registration

- All equipment including valves to be approved by Russian Maritime Register of Shipping

- Class notation as follows
  - I ✗ HULL ✗ MACH
  - Offshore Service Barge
  - Production
  - Unrestricted navigation - Shtokman Field
  - AUTO ✗ POSA ✗ IG ✗ VeriSTAR-HULL HEL
  - ARC ✗ DYNAPOS ✗ ALM LSA COLD STI COMF

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Specifications

- All equipment including valves to be defined according to applicable Russian Standards
- All equipment including valves to be defined according to SDAG General Specifications
- All equipment designed for 50 years services
Main type of valves used

- Ball valves – around 1 200
- Gate valves – around 60
- Globe valves - around 10
- Check valves – around 200
- Butterfly valves – around 80
- Control valves – around 1 100
- Diameter : 2” – 30”
Main type of materials used

- Carbon steel
- Austenitic stainless steel
- Ductile cast iron
- Copper alloy
Other characteristics

- Large spread of dimensions
- Manual valves
- Actuated valves
- Remote controlled valves
## Service classes for valves

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</thead>
<tbody>
<tr>
<td><strong>Services</strong></td>
<td>Utility or water injection</td>
<td>General process</td>
<td>General process (Cryogenic)</td>
<td>General process</td>
<td>“Critical”</td>
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<tr>
<td><strong>Temp.</strong></td>
<td>$T \leq 17 , ^\circ C$</td>
<td>$T \leq 200 , ^\circ C$</td>
<td>$T &lt; 46 , ^\circ C$</td>
<td>$T &gt; 200 , ^\circ C$</td>
<td>$T \leq 200 , ^\circ C$</td>
</tr>
<tr>
<td></td>
<td>$T \geq \text{Ambient}$</td>
<td>$T \geq -46 , ^\circ C$</td>
<td></td>
<td></td>
<td>$T \geq -46 , ^\circ C$</td>
</tr>
</tbody>
</table>
Supply of valves

- All FPU valves to be supplied by EPCC Contractor
- Selection of valves suppliers under responsibility of EPCC Contractor
- SDAG approval for main suppliers required