Unconventional Applications of Isolation Plugs Throughout the Pipeline Life Cycle

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Agenda

Conventional Applications of Pipeline Isolation Plugs

Overview of Double Block Isolation Plugs – Piggable and Non-Piggable

Case Studies: Unconventional Applications of Isolation Plugs Through the Pipeline’s Life-Cycle
  • Subsea Pipeline Construction – Flood Mitigation
  • Repair and Maintenance – Pipeline Sectional Replacement
  • Repair and Maintenance – Dead Leg Removal
  • Decommissioning and Abandonment

*Above cases include short descriptive animations*

Questions and Answers
Conventional Applications of Pipeline Isolation Plugs

Remote controlled, Tethered and Hot tap installed Isolation plugs are routinely used to provide fully proved Double Block and Bleed / Monitor isolations to enable safe breaking containment operations on pressurised pipelines - for repair or modification.

Typical Applications: Valve Repair, Replacement or Pipeline Tie-In Modifications
Conventional Applications of Pipeline Isolation Plugs

Isolation plugs are routinely used to enable safe breaking containment operations on pressurised pipelines - for repair or modification

Typical Applications: Retrofitting Pigging Facilities
Double Block Isolation Plugs (Type Approved)

Piggable Isolation Tools

- Remote controlled Tecno Plug: Through-wall communication
- Isolation Category: Proved Double Block and Monitor (DBM)
  > With a managed bleed capability

If full bore access such as pig launchers or blinded flanges exists then a piggable isolation tool can be used

Tethered Tecno Plug: Controlled via hydraulic umbilical
Isolation Category: Proved Double Block and Bleed (DBB)
Tecno Plug - Remote Controlled Isolation Plug
Double Block Isolation Plugs (Type Approved)

Hot Tap Fitting, Branch Installed – Isolation Tools

If full bore access is not available then an isolation tool can be installed into the pipeline via a hot tap intervention.

Some line stop isolation tools such as the BISEP provide an isolation that complies with isolation category: Proved Double Block and Bleed (DBB)
BISEP - Branch Installed Isolation Plug
Unconventional Applications of Isolation Plugs – Through Pipeline’s Life-Cycle

Construction - Wet Buckle Contingency

Operational Phase – Sectional Replacement

Decommissioning - Abandonment
Pipeline Construction – Wet Buckle

Wet Buckle
- Undesired loss of integrity in a pipeline
- Raw seawater and seabed floods into air-filled pipeline

Wet Buckle Location
- Usually where pipeline is most stressed, near the sag bend, before touch down point
- Occasionally at the overbend on the installation vessel

Emergency Abandonment
- If a wet buckle occurs - especially during deep water large diameter pipeline installation
- Increased weight of the flooded pipeline will overload the pipeline handing system
- Pipeline released to the seabed

Dewater and Recover
- Following wet buckle and emergency abandonment of the pipeline - usually need to
- Dewater the pipeline
- Connect A&R line to recover back onto pipe lay vessel
Wet buckle contingency is a method of mitigating against the effects of a wet buckle:

- Remediates the situation
- Allows pipeline recovery for installation to continue, so the pipeline can be completed
- Sometimes a project insurance requirement
Wet Buckle Contingency - Scenarios

Example Wet Buckle Contingency System for two Scenarios

Shallow Water / Above Water Tie-Ins - Wet Buckle Flood Prevention

Deep Water 2200m, ~900 Km Pipelines

Deep Water Section - Wet Buckle Recovery
Deep Water – Wet Buckle Recovery

Following deep water wet buckle

• Abandoned pipeline end prepared by cutting upstream of wet buckle and removing damaged section
• Debris removal, raw seawater displacement 3-pig train pigged through the pipeline with treated seawater - pigs pre-installed in subsea initiation head
• First two pigs ejected from pipe end
• Final pig remains in line - preventing raw seawater contaminating treated seawater
• A Tecno plug installed onto the cut end of the pipeline subsea - using diverless flangeless subsea launcher or PRT with cassette
• Dewater catenary section (5km) with Tecno Plug - pigged back at 220 bar air via coiled tubing
• Plug set to hold back treated seawater
Shallow Water - Wet Buckle Flood Prevention

Strategic use of isolation plugs prevents seawater flooding into deep water section of pipeline, if wet buckle occurs while doing above water tie-ins

Preinstalled plugs pigged out of Initiation and Laydown heads and set in the pipeline – before pipeline is lifted up to do above water tie-ins

Preventing deep water section of pipeline flooding if wet buckle occurs
Wet Buckle - Flood Mitigation
Repair - Sectional Replacement

Counter Opposed Pigging
Repair - Sectional Replacement
Repair - Sectional Replacement

Pressure Equalisation for Testing and Unsetting
Repair - Sectional Replacement
Repair – Dead Leg Removal

Tethered Tecno Plug – Stem Bar Deployed around a Bend

Pipeline Configuration Before

Dead Leg Threat Removed at 14 locations – Without Interrupting Production

Pipeline Configuration After
Repair – Dead Leg Removal

Tethered Tecno Plug – Stem Bar Deployed around a Bend

Tethered Tecno Plug Deployment
Isolation Location
Flange Welded Behind Tecno Plug
Repair – Dead Leg Removal
Decommissioning / Abandonment / Dead Leg Removal

Permanently plugging a 42” subsea dead leg connected to 96” pump header

Tethered Tecno Plug deployed subsea
- 38m into dead leg
- Up 5 degree incline - with rams
- Plug mechanically locked-in

Loss of Containment Threat Removed
Thank You For Your Attention
Questions?

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