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2008 SURVEY OF OFFSHORE NON-CHEMICAL FLOW ASSURANCE SOLUTIONS

Products & Systems Methodologies

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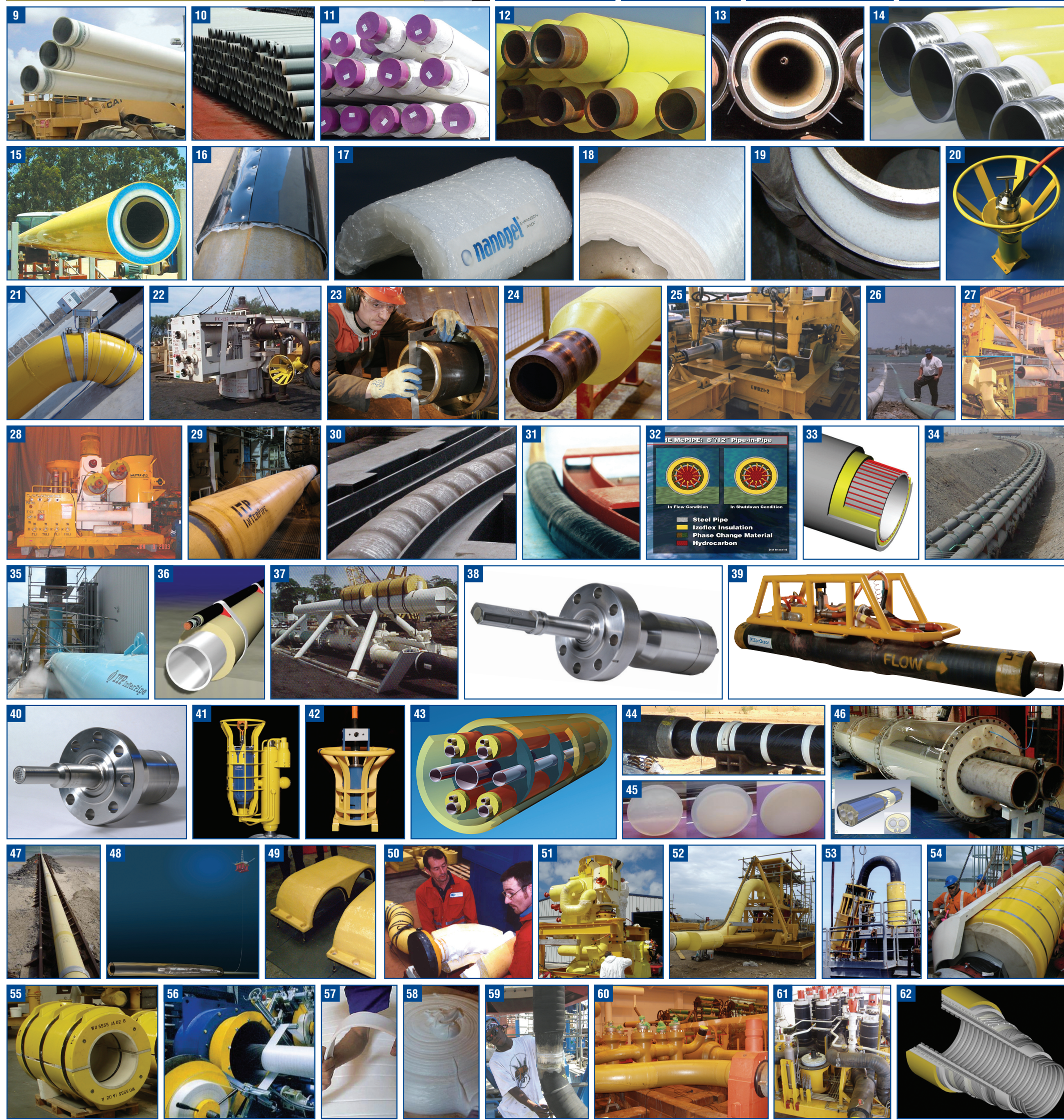
ABBREVIATIONS: F: Flowline, R: Riser, W: Well, T: Tree, JPR: Jumper, JT: Joint, M: Manifold, HTM: High Pressure / High Temperature, DP: Deepwater, PIP: Pipeline, CAPEX: Capital Expenditure, OPEX: Operating Expenditure, INTSTX: Installation Expenditure, PENDING: Pending Use in Field, PROTOTYPE: Prototyped, CONCEPTUAL: Design Only, U-VALUE: Overall Heat Transfer Coefficient

CONVERSION FACTORS: Length: 1 ft. = 0.3048 m, 1 m. = 3.2808 ft, 1 mile = 1.609 km, Thermal Conductivity: 1 Btu/(hr·ft²) = 1.73 W/(m²·K), U-Value: 1 Btu/(hr·ft²) = 0.176 W/(m²·K)

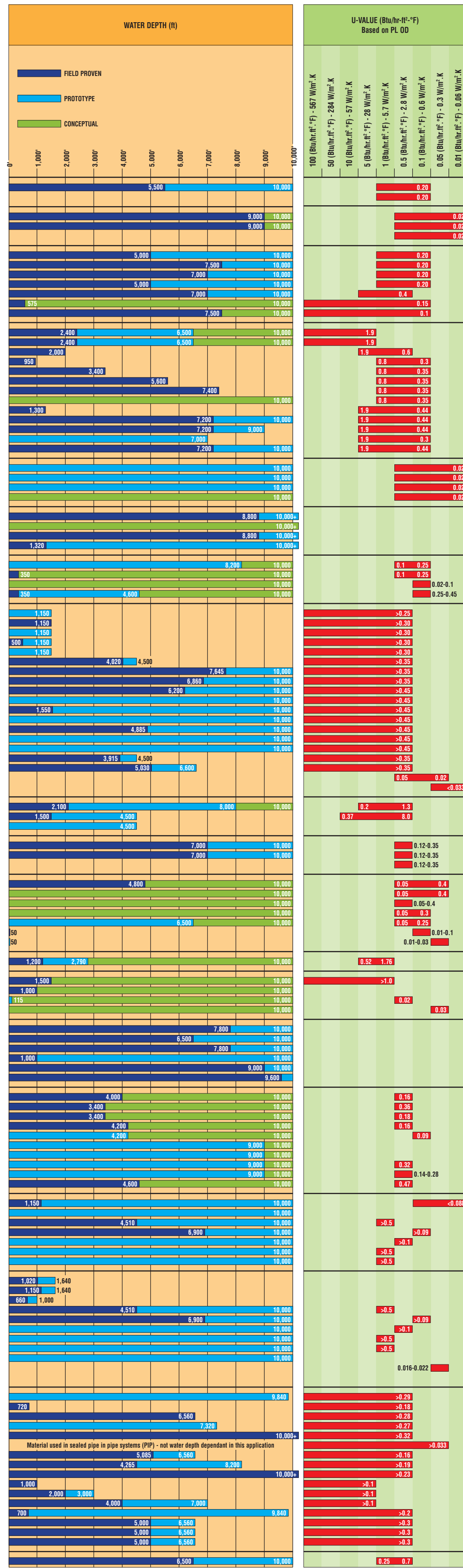
NOTES: A: Specific heat and density of materials are provided. These characteristics have a strong influence on cool down time. B: Although extremely important to flow assurance, pigging issues have not been included in these calculations.



Disclaimer: Every effort has been made to locate all companies, their products and services, which provide non-chemical flow assurance solutions. The company was not intended to be an endorsement or recommendation of any company, as well as products, by being listed in this magazine. The information is provided for informational purposes only. The publisher and authors assume no responsibility for any errors or omissions. The publisher and authors assume no responsibility for any damage or loss of any kind, including consequential damages, arising from the use of the information provided in this magazine.



PAPER NUMBER	VENDOR	ISSUES	ACTIVE SYSTEMS		PASSIVE SYSTEMS		OTHER INNOVATIVE METHODS		DETECTION SYSTEMS	CONNECTION METHOD	EXPERIENCE	APPLICATION	
			TYPE	CHARACTERISTICS	TYPE	CHARACTERISTICS	TYPE	ADVANTAGES					
1	ALLEY MATERIALS	1. ContraTherm JF120 Subsea Insulation System 2. ContraTherm JF120 Passive Fire Proof Protection and Insulation	•	•	•	•	•	•	•	•	•	F, R, JPR, JT, M, T	
2	ASPER AEROGELS, INC.	1. Specialist Aerogel Pipe-in-Pipe (PIP) Insulation 2. Pyrogel Aerogel High Temperature Insulation 3. ContraTherm JF120 Subsea Insulation	•	•	•	•	•	•	•	•	•	F, R, JT	
3	BAYOU FLOW TECHNOLOGIES (BFT)	1. C-THERM S Synthetic Foam Insulation for Flow Lines and Risers 2. C-THERM F Synthetic Foam for Jumpers, Trees, Manifolds, etc. 3. C-THERM R Synthetic Foam Sleeves for Field Joints, Jumpers, etc. 4. C-THERM H Synthetic Foam Hybrid Riser Buoyancy & Insulation 5. Auto-Therm Glass Synthetic Polyurethane 6. XTREME-THRM Mid to High Density Wet Insulation PU with PE Jacket 7. XTREME-THRM Pipe-in-Pipe (PIP) with PE Jacket	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
4	BREXIDON	1. 3 Layer Polyethylene 2. 3 Layer Polypropylene 3. ThermoFoam - L1400 4. ThermoFoam - D2000 5. ThermoFoam - D2800 6. ThermoFoam - D3000 7. ThermoFoam - D3200 8. ThermoFoam - D3400 9. ThermoFoam - D3600 10. ThermoFoam - D3800 11. ThermoFoam - D4000 12. ThermoFoam - D4200 13. ThermoFoam - D4400 14. ThermoFoam - D4600 15. ThermoFoam - D4800 16. ThermoFoam - D5000 17. ThermoFoam - D5200 18. ThermoFoam - D5400 19. ThermoFoam - D5600 20. ThermoFoam - D5800 21. ThermoFoam - D6000 22. ThermoFoam - D6200 23. ThermoFoam - D6400 24. ThermoFoam - D6600 25. ThermoFoam - D6800 26. ThermoFoam - D7000 27. ThermoFoam - D7200 28. ThermoFoam - D7400 29. ThermoFoam - D7600 30. ThermoFoam - D7800 31. ThermoFoam - D8000 32. ThermoFoam - D8200 33. ThermoFoam - D8400 34. ThermoFoam - D8600 35. ThermoFoam - D8800 36. ThermoFoam - D9000 37. ThermoFoam - D9200 38. ThermoFoam - D9400 39. ThermoFoam - D9600 40. ThermoFoam - D9800 41. ThermoFoam - D10000	•	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T
5	CLAMPON, INC.	1. Particle Monitor (Sand) 2. DSP Corrosion-Erosion Monitoring 3. DSP Pig Detector 4. DSP Leak Detector	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
6	CONTO TECH	1. Pipe-in-Pipe (PIP) - Lightweight Structural System 2. Pipe-in-Pipe (PIP) - Injected Polyurethane Foam 3. Pipe-in-Pipe (PIP) - Nanogel® Polyurethane Foam Hybrid Hydrogel™	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
7	DOW HYDROTECT	1. Hyplast Synthetic™ L1512E 2. Hyplast Synthetic™ S11E 3. Hyplast Synthetic™ S12E 4. Hyplast Synthetic™ H12E 5. Hyplast Synthetic™ DW-S12150 6. Hyplast Synthetic™ DW-S12200 7. Hyplast Synthetic™ DW-S12300E 8. Hyplast F230 9. Hyplast F202 10. Hyplast F215 11. Hyplast F260 12. Hyplast F283 13. Hyplast F388 14. Hyplast F435E 15. Hyplast Synthetic™ DW-S12100E 16. Hyplast Synthetic™ DW-S12200E 17. Hyplast F Pig PU Foam for Field Joint 18. Hyplast F Pig PU Foam for Pipeline Insulation	•	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T
8	EVAM MATERIALS CORPORATION	1. Aqua Thermo Submersible Insulation - (solid, very cost effective) 2. Nysalite Submersible Insulation (400 degree operating temperature) 3. Proprietary electric foaming heating (return cable optional)	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
9	HECHTEL	1. Novotherm™ 2. Novotherm-JT™ 3. Heat Tracing for Subsea Hardware	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
10	HYDRATECH	1. Highly Insulated Double Wall Pipe 2. Light Weight Double Wall Pipe 3. Ultimate Pipe 4. MOPex (180 Days Cool-down) Developed w/ J. Ray McDermott, Inc. 5. Heat Traced Pipe 6. LPG Refrigerated Pipe 7. LNG Cryogenic Pipe 8. 3E DEH	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
11	INSULATION	1. Single Insulated Pipeline and Riser 2. Pipe-in-Pipe Pipeline and Riser 3. LNG Cryogenic Pipeline 4. LNG Cryogenic Pipeline	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
12	INSULATION	1. Sand and Erosion Monitoring System 2. SMTM Corrosion / Erosion Monitoring System 3. Pressure / Temperature Monitoring 4. Flow Force 5. Riser Subsea MFM 6. Riser Subsea Sand monitor / Pig detector	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
13	INSULATION	1. Bundle Hybrid Outer Riser (BHR) - Riser Tower 2. Pipe in Pipe Single Insulated Riser (PIP-SIR) 3. PU foam Insulated Pipe in Pipe (PIP-PIP) 4. Aerogel Insulated Pipe in Pipe 5. Gel Insulating material 6. Gel ILS - Phase change insulating material 7. Gel ILS production flowline 8. Gel production bundle 9. Single Pipe Flowline & Riser	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
14	INSULATION	1. Bundled Pipe 2. Gel® - Flowline Blockage Remediation (via SureStream alliance) 3. Single Pipe Flowline & Riser 4. Pipe-in-Pipe Flowline & Riser 5. Electrically Heated Pipe-in-Pipe Flowline & Riser 6. Plastically Lined Pipeline for Water Injection Service 7. Plastically Lined Pipeline for Hydrocarbon Transport	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
15	INSULATION	1. Multi-Phase Plug-in / Back-Fill Plug 2. Riser Trencher 3. TMB Trencher 4. Single Pipe Flowline & Riser 5. Pipe-in-Pipe Flowline & Riser 6. Electrically Heated Pipe-in-Pipe Flowline & Riser 7. Plastically Lined Pipeline for Water Injection Service 8. Plastically Lined Pipeline for Hydrocarbon Transport 9. Integrated Production Bundle 10. LNG Cryogenic Pipeline 11. LNG Cryogenic Pipeline	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T	
16	INSULATION	1. ARDENT™ (High Temperature Phenolic Synthetic) 2. URATHERM™-5200 (Synthetic Polyethylene) 3. URATHERM™-23000 (Synthetic Polyethylene) 4. URATHERM™-23000T (Synthetic Polyethylene) 5. URATHERM™-P7000 (Polyurethane) 6. URATHERM™-PIP (Preformed Polyurethane for Pipe in Pipe systems) 7. ULTRATHERM™-1500 (Synthetic Foam) 8. ULTRATHERM™-2000 (Synthetic Foam) 9. ECOETHERM™ P1 1000 10. ECOETHERM™ P1 3000 11. ECOETHERM™ P1 7000C Blue 12. THEMODIS™-3000 13. WIKOTHERM™-HSC protection 14. WIKOTHERM™-High temp resistant 15. WIKOTHERM™-Standard 16. WEIstream International, Ltd. 17. WEIstream Flexible Pipe	•	•	•	•	•	•	•	•	•	•	F, R, JT, JPR, M, T





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