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2010 DEEPWATER PRODUCTION RISER SYSTEMS & COMPONENTS

STATUS OF THE TECHNOLOGY FROM SEABED TO SURFACE

NOVEMBER 2010

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TABLE 2 - INDUSTRY ACRONYMS & ABBREVIATIONS

ABS: American Bureau of Shipping	CEB: Gas Liquid Ratio	GOR: Gas Oil Ratio	OPR: Operational Performance	SPR: Steel Catenary Riser	T: Tension Leg Platform
API: American Petroleum Institute	GOR: Gas Oil Ratio	GOR: Gas Oil Ratio	OPR: Operational Performance	SPR: Steel Catenary Riser	T: Tension Leg Platform
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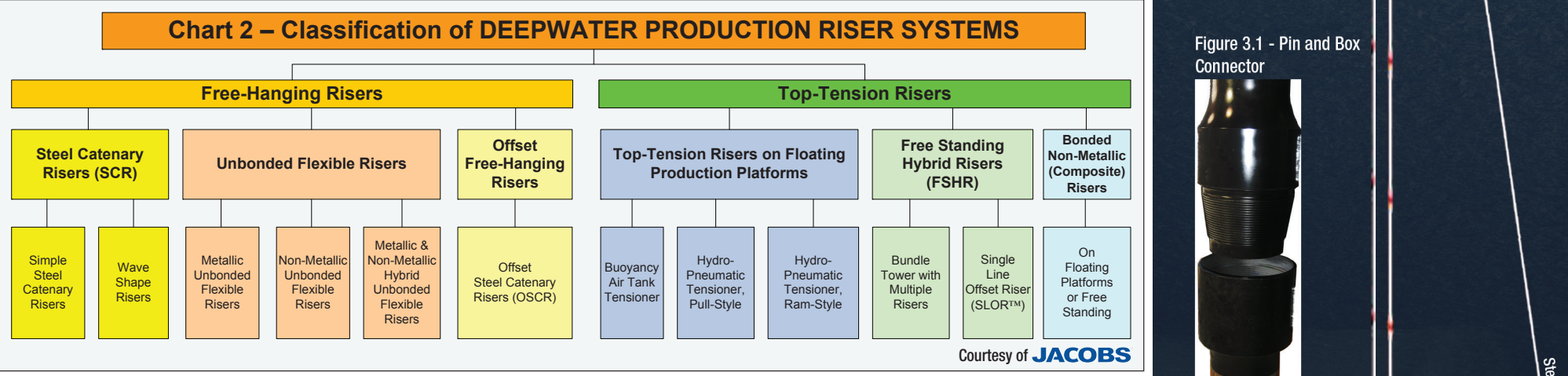
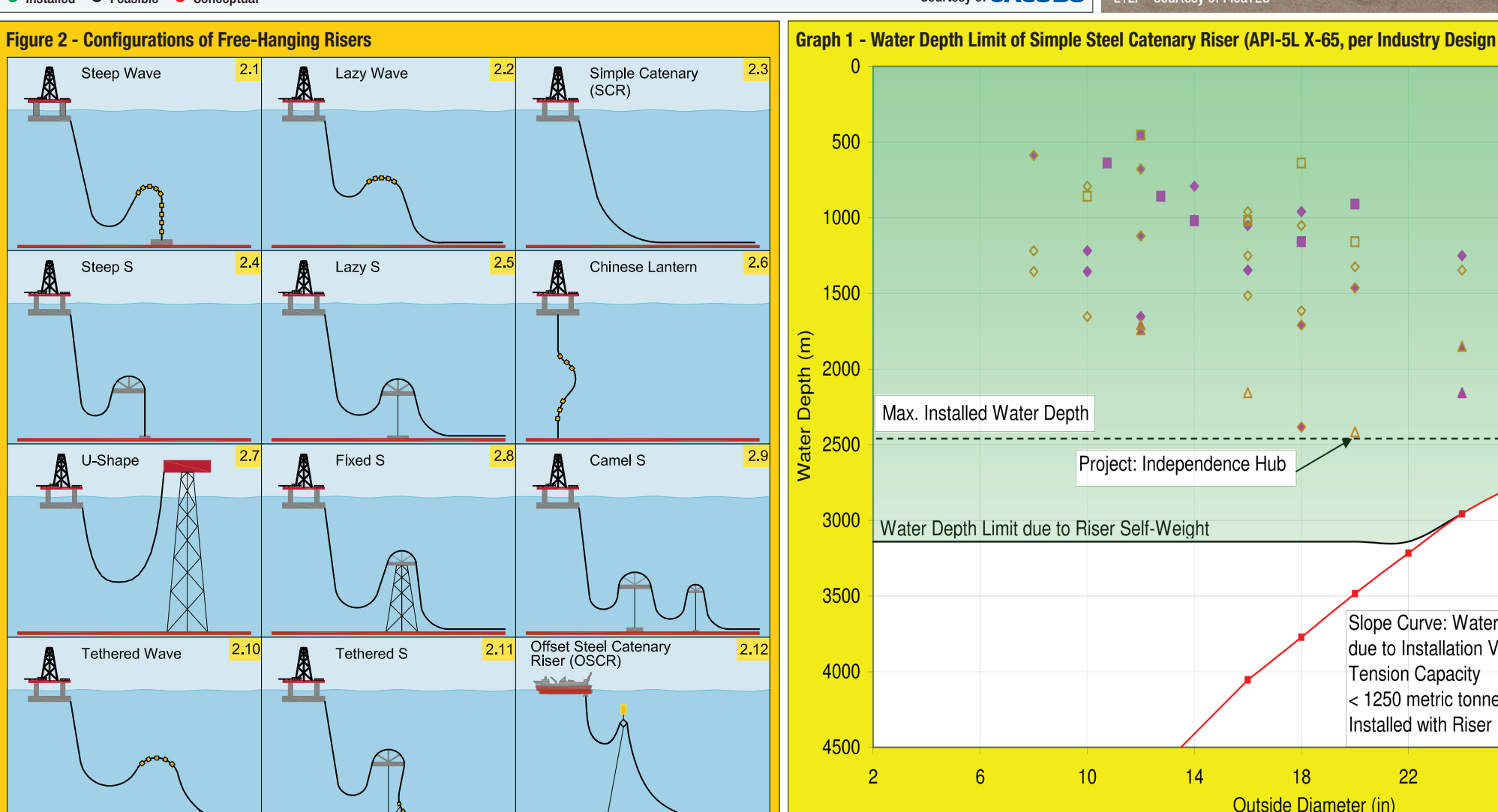


Table 3 - Riser System Options with Floating Production Platforms

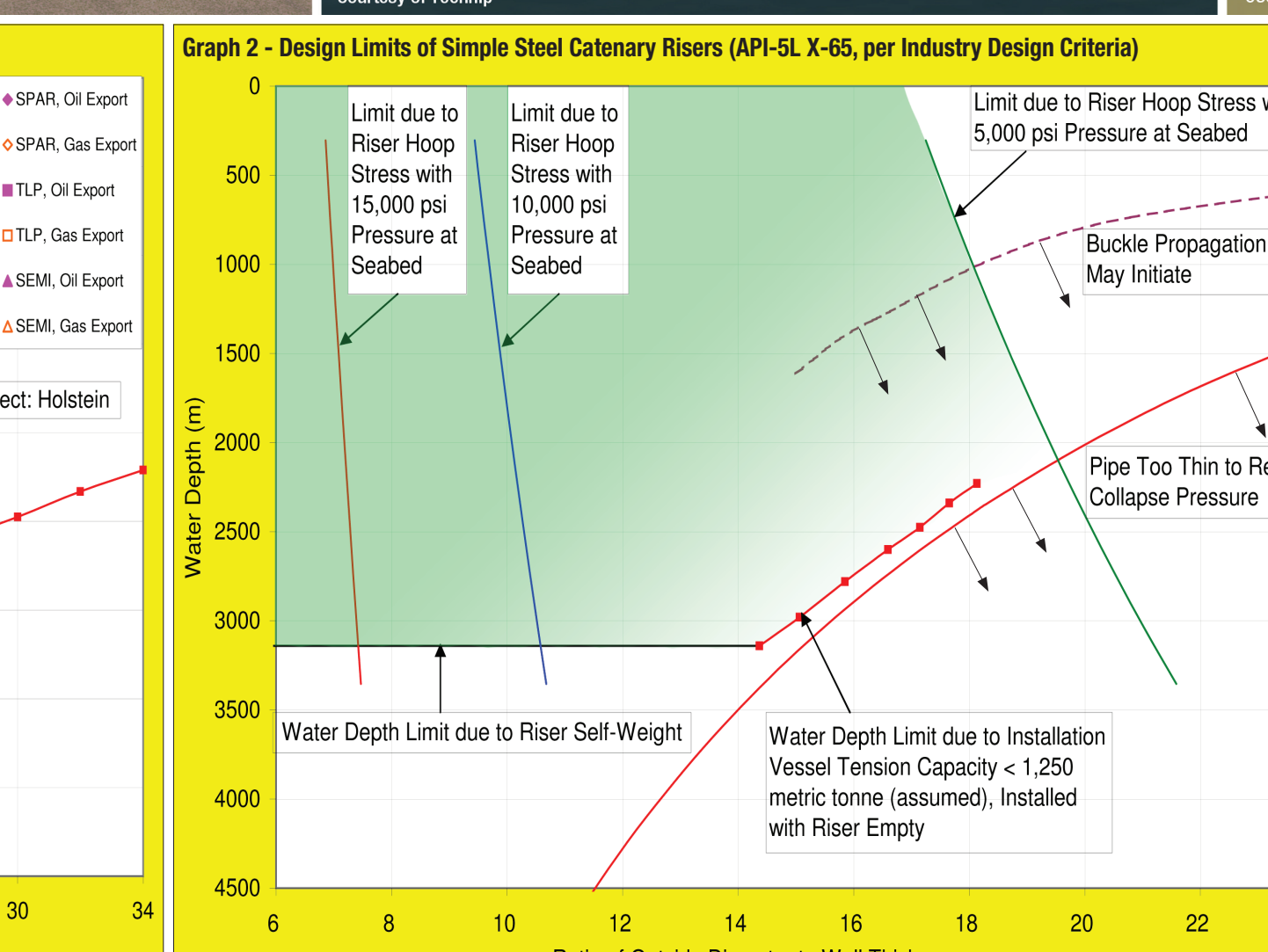
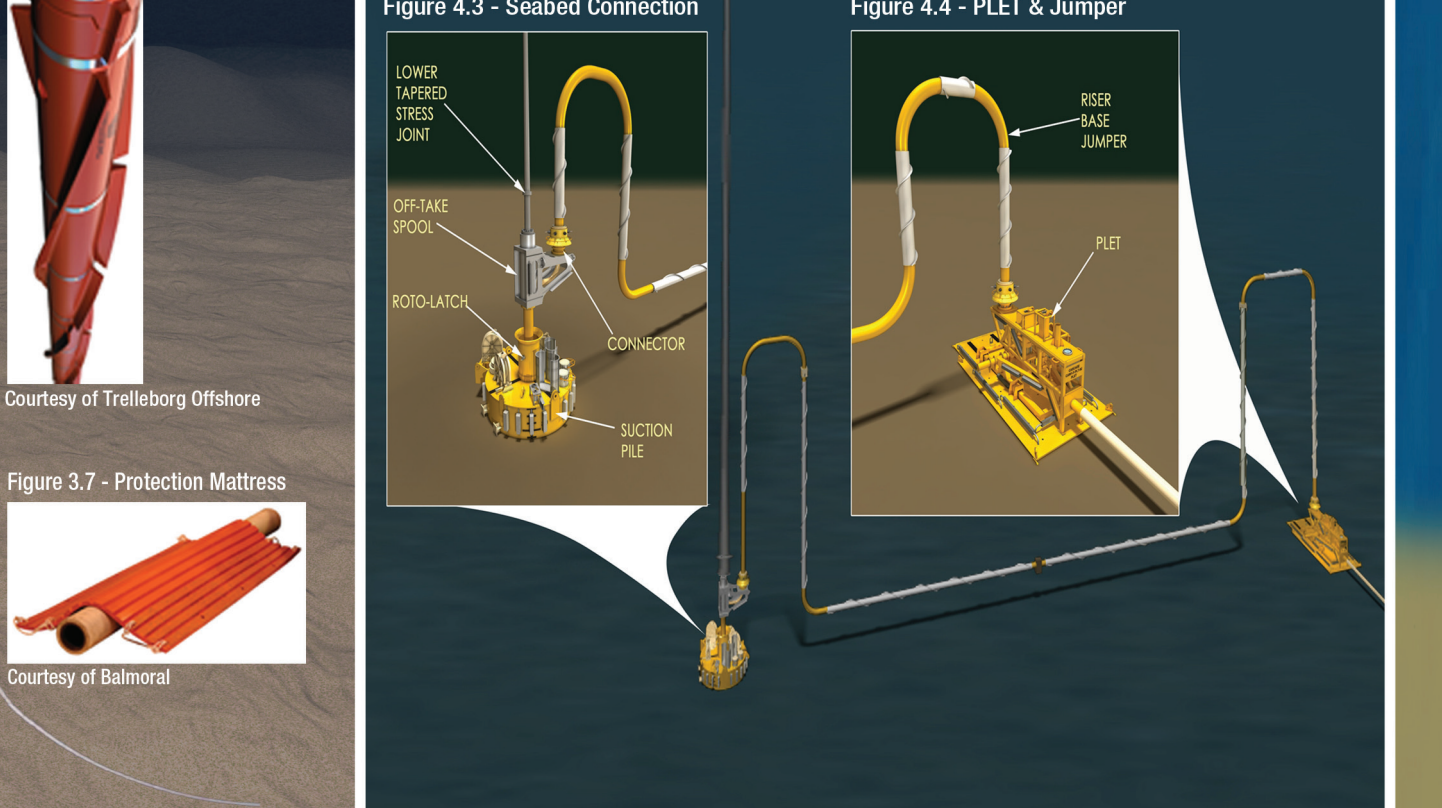
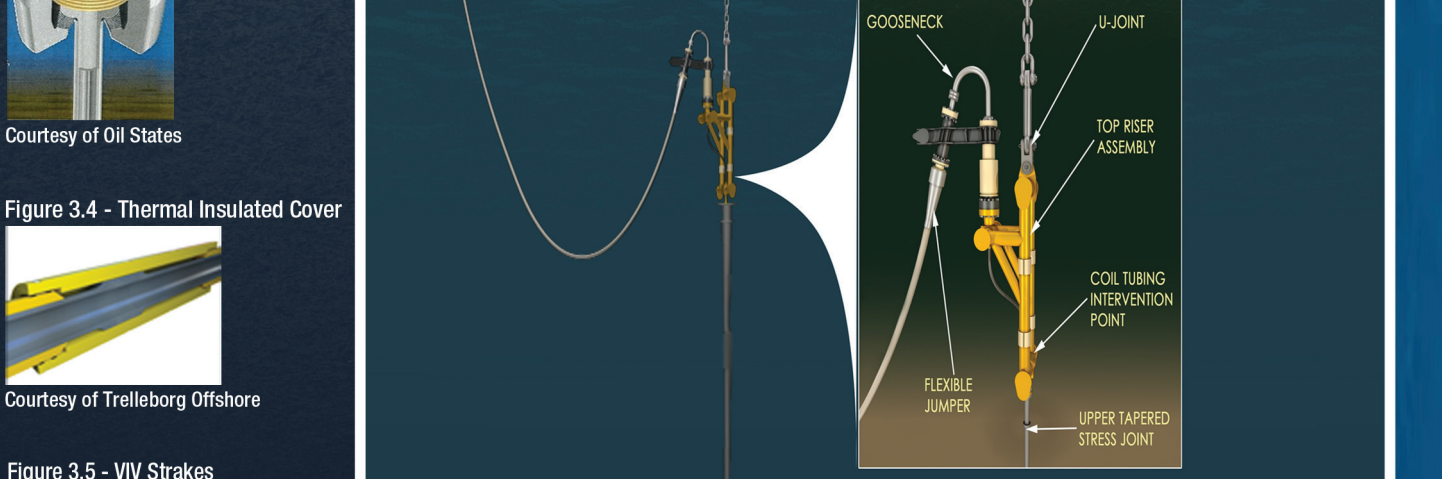
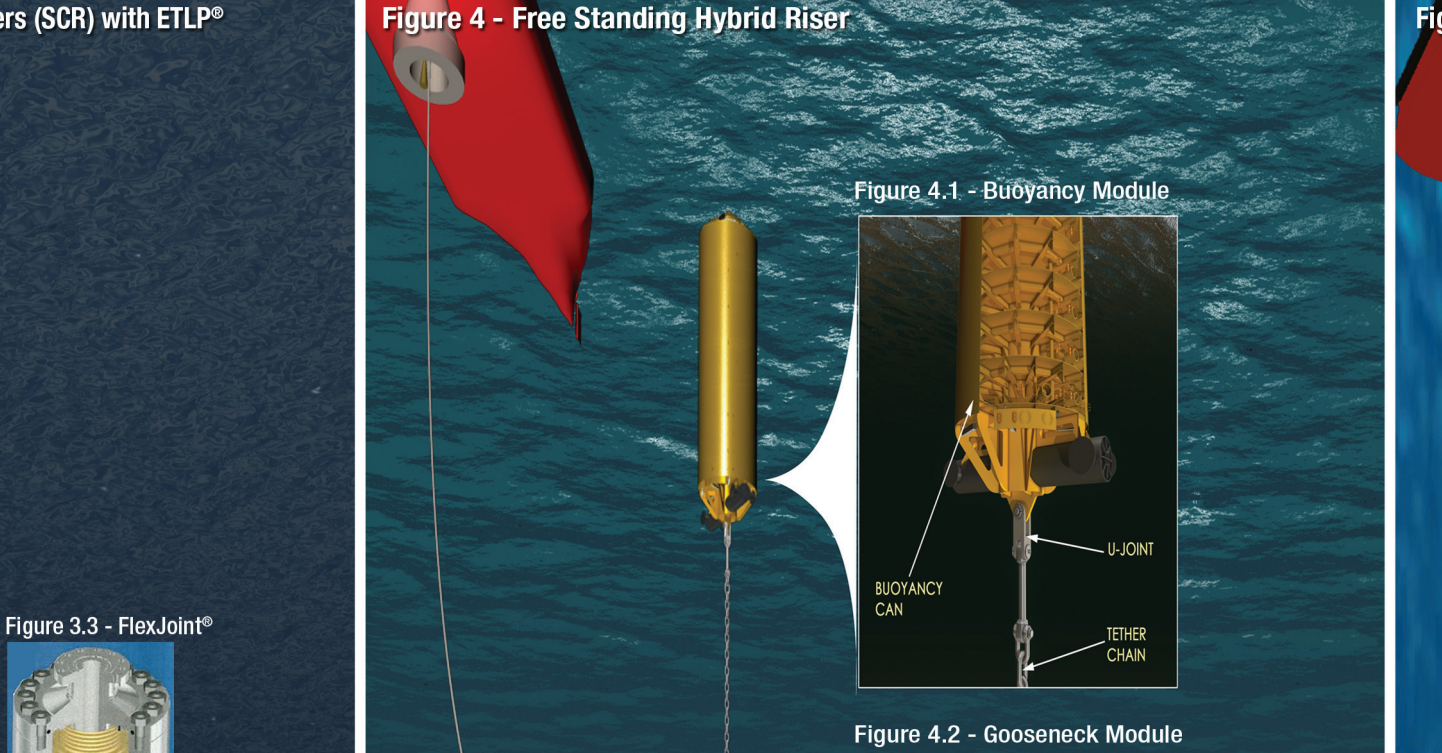
Riser Types	Compliant tower	TLP	SPAR	SEM	FPD	Mini-TLP	Min-DC
1.0 Free-Hanging Risers							
1.1 Steel Catenary Risers							
1.2 Unbonded Flexible Risers							
1.3 Offshore Free-Hanging Risers							
2.0 Top-Tension Risers							
2.1 Top-Tension Risers on Floating Production Platforms							
2.2 Free Standing Hybrid Risers (FSHR)							
2.3 Bundled Non-Mosaic Composite Risers							



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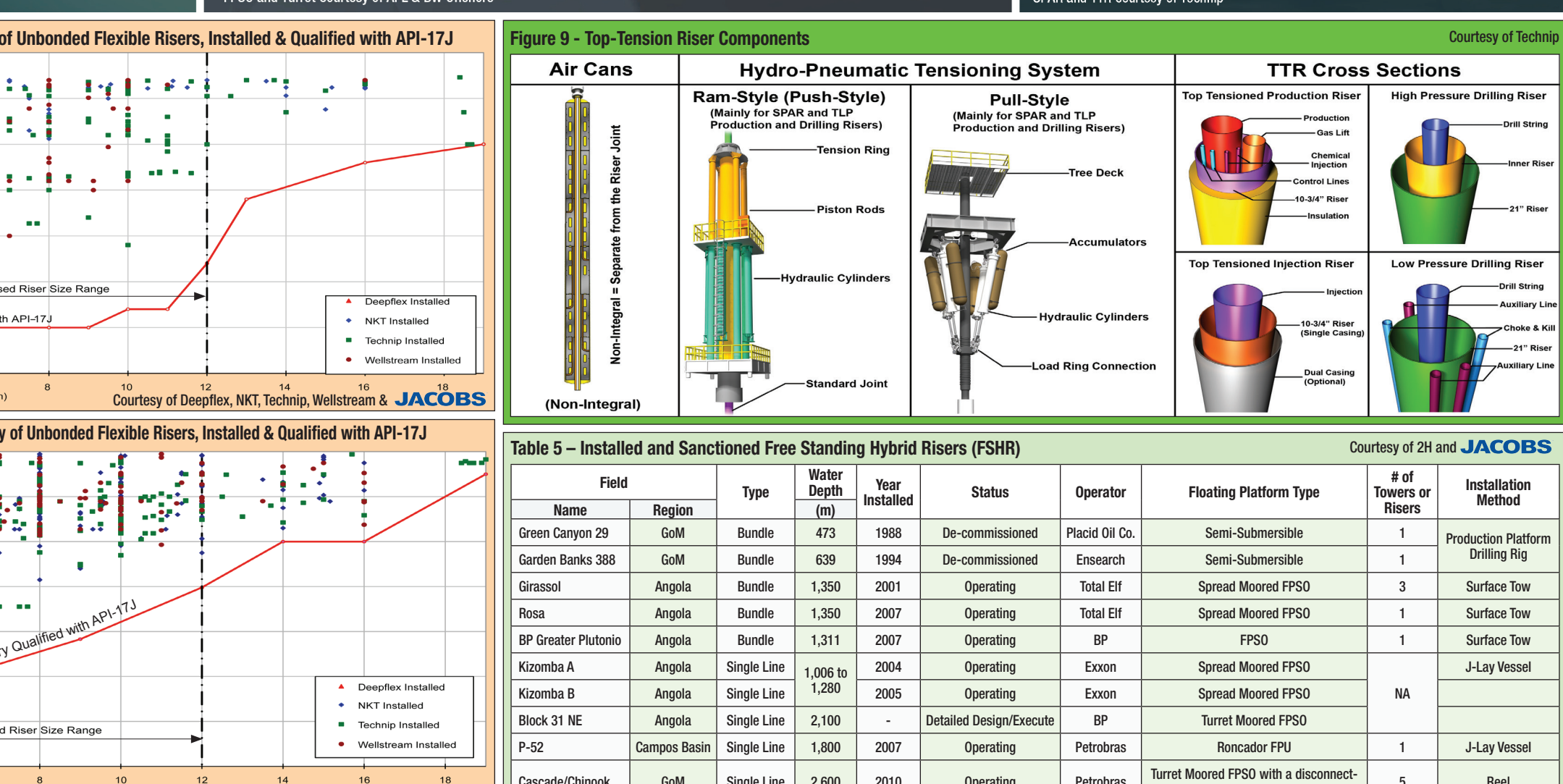
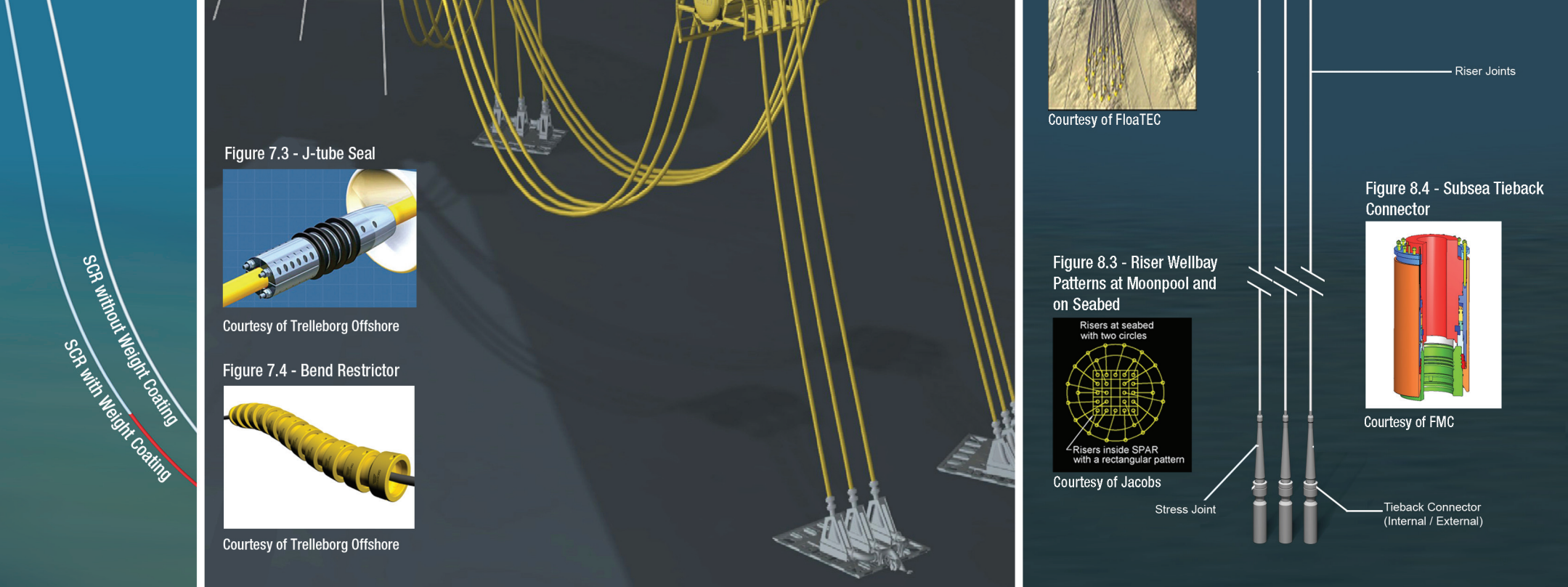
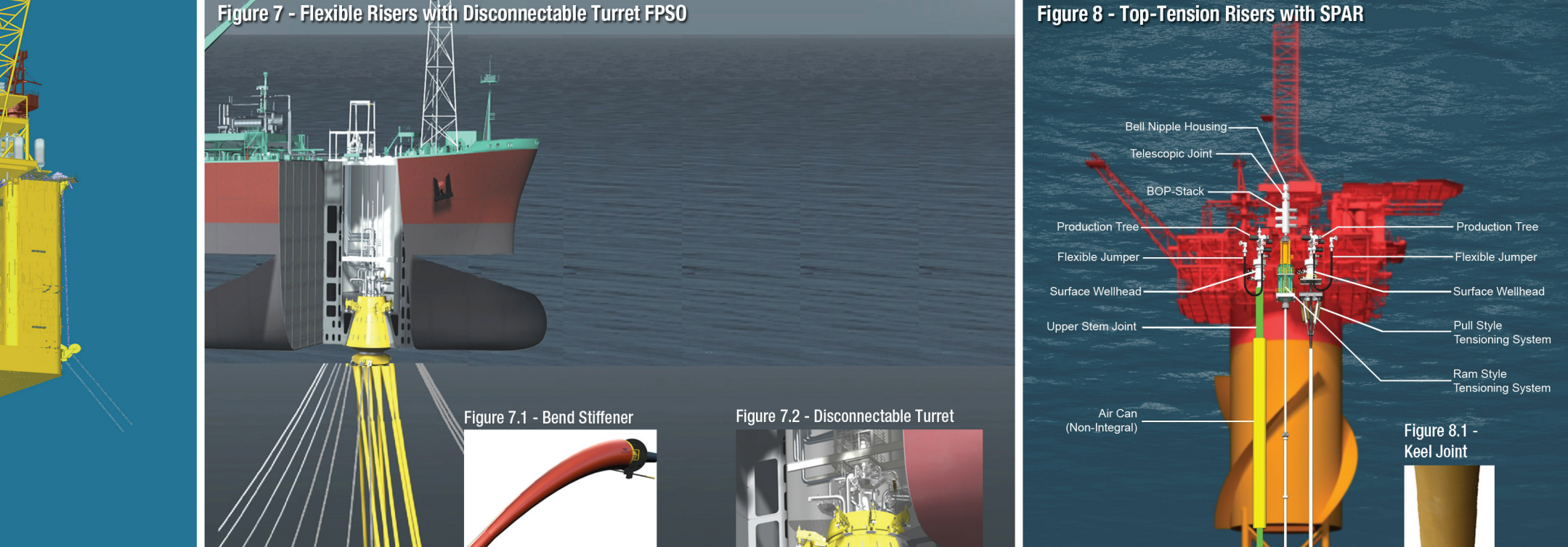
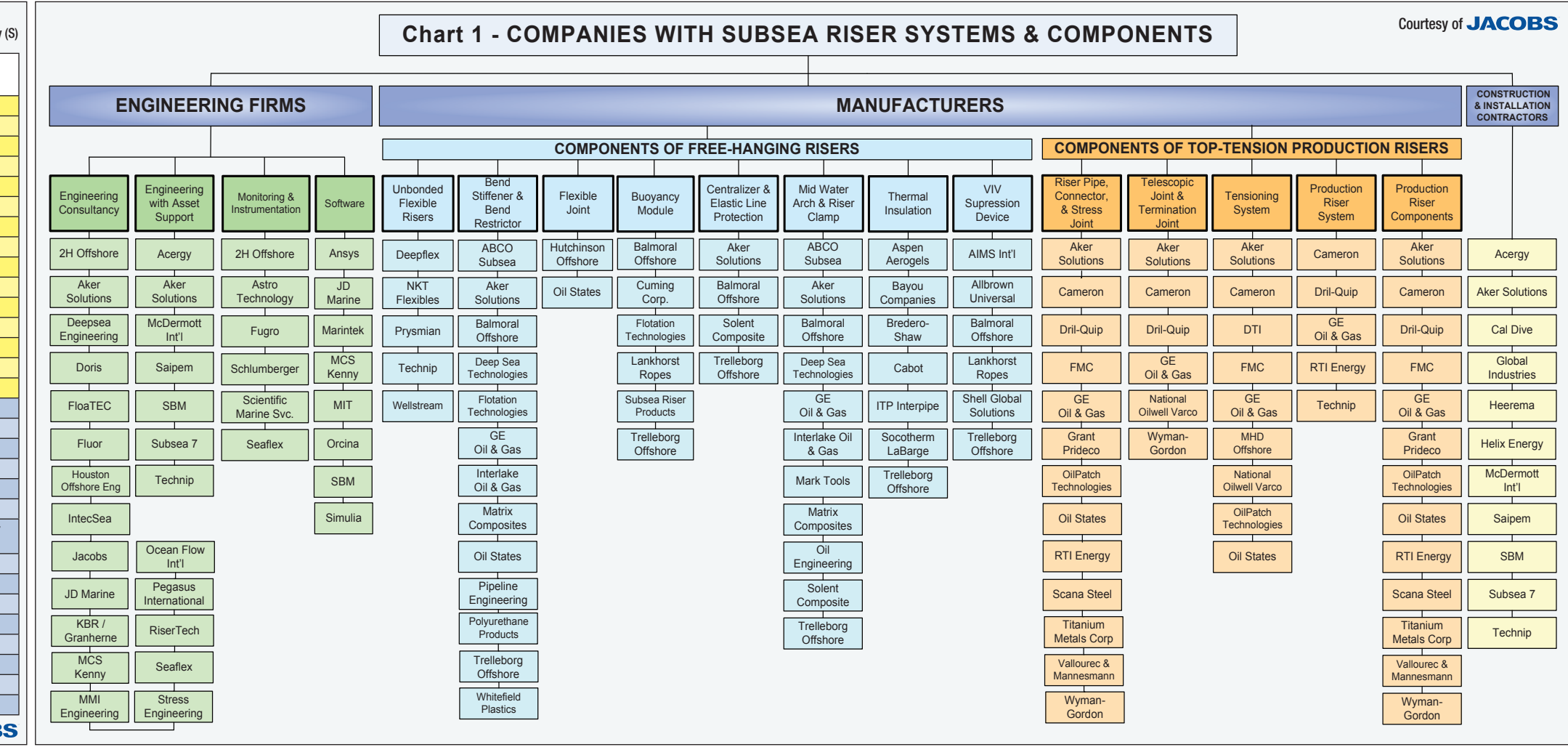
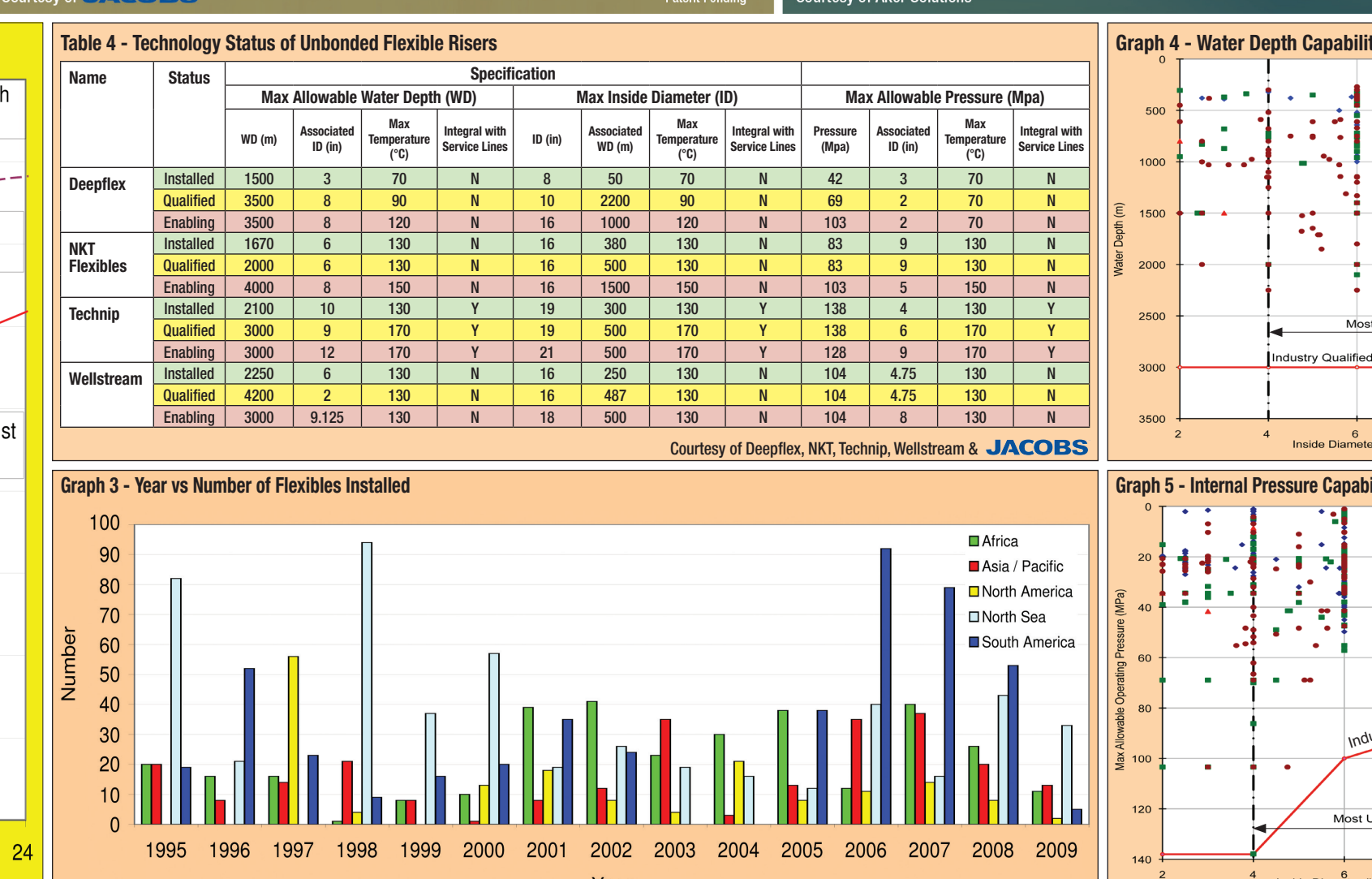
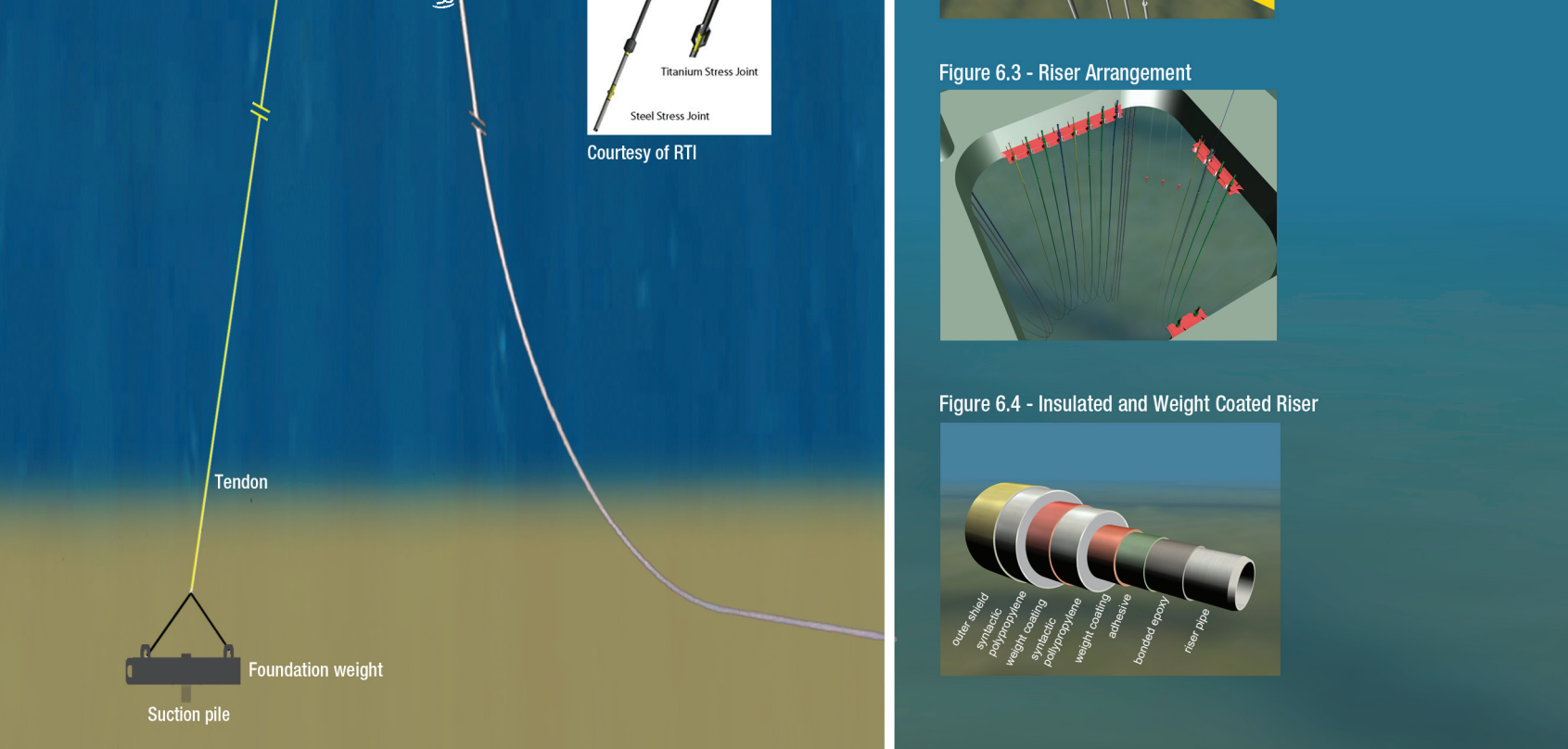
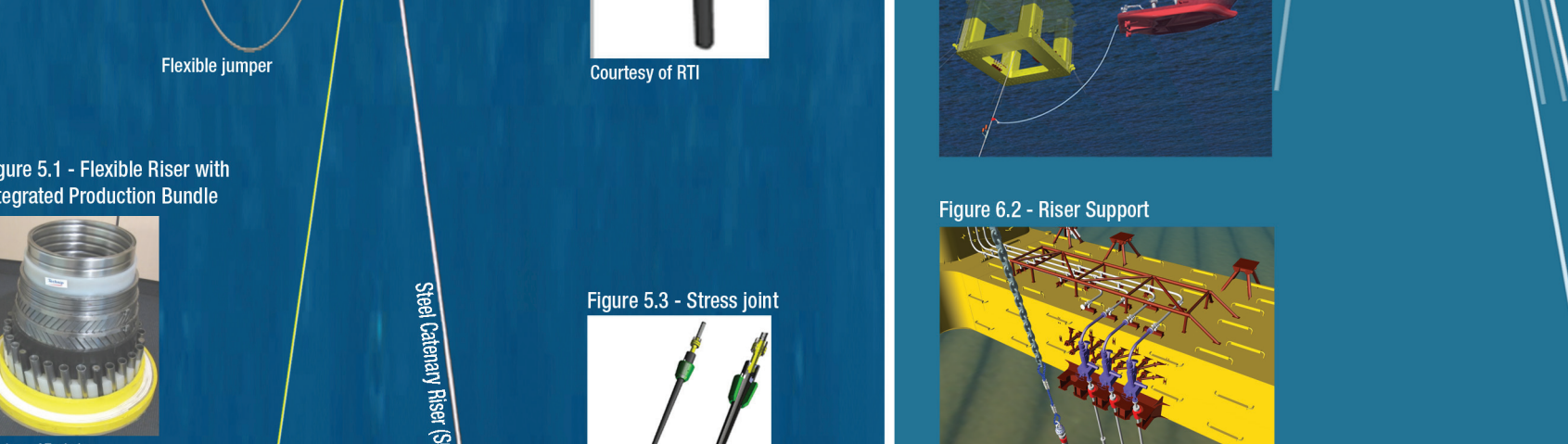
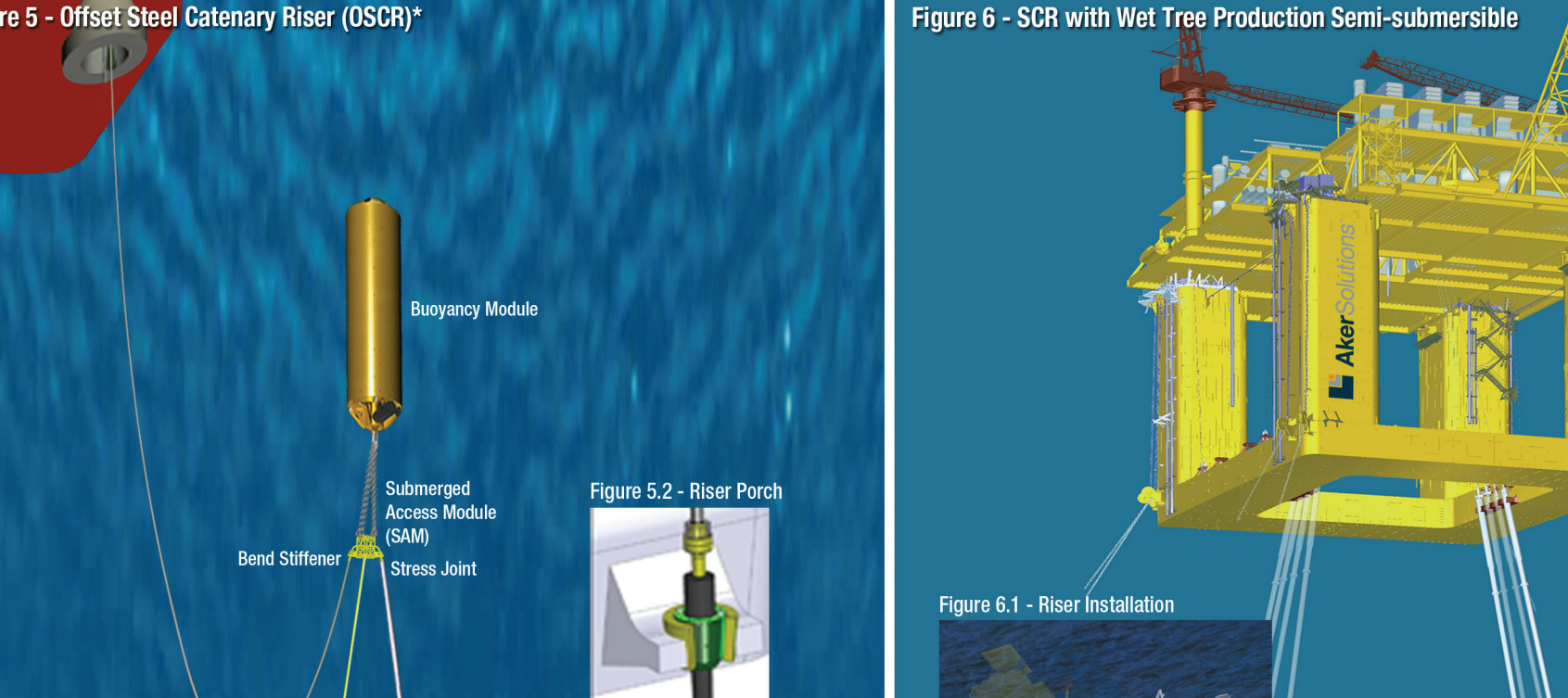
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Table 1 - Alternatives / New Concepts of Riser Systems & Components

#	COMPANY	CONCEPT NAME/TITLE	STAGE OF DEVELOPMENT (1)	PLATFORM TYPE (2)	DIAMETER (Inches)	WATER DEPTH (Meters)	INSTALLATION METHOD (3)
1.1	Intecsea WorleyParsons Group	TTR with Semi-Submersible Column (SCC)	C	Se	TTR up to 14"	1,000-3,000	DR
1.2	SEM	Riser with Wet Tree Mooring	C	Sh	TTR & SCR	1,000-3,000	DR
1.3	Technip	Dry Tree & TTR, external, with BMFSD (Bury Moored FPSO)	C	Sh	20"	300-3,000	DR
1.4	Technip	Dry Tree & TTR, external, with BMFSD (Bury Moored FPSO)	C	Sh	20"	300-3,000	DR
1.5	KBR-Granherne	Compliant Vertical Access Riser (CVAR)	C	All	4-14"	300-3,000	R, L, D
1.6	Aker Solutions	Lightweight Riser Tower	M	Se, Sh	4-14"	10,000-3,000	R, L, D
1.7	SAIEM	Single Integrated Riser (SIR) with FPSO	C	Sh	20"	300-3,000	J
1.8	Moving Systems, Ltd.	TMSP-Fin Catenary Mooring Systems, with flexible risers	F	Sh	6-10"	300-3,000	R
1.9	Shell Global Solutions	Steel-Leg Riser for FPSO in harsh environment	F	FPD	6-12"	1,000-3,000	R
1.10	SAIEM	Dry Tree & TTR System FPSO	C	Sh	20"	300-3,000	DR
1.11	Sevenson companies	Jumpers Links between two floating platforms	F	FPD	2-20"	300-3,000	DR
1.12	Alerey	Buried Hybrid Offshore Riser (BHOR)	F	FPD	2-20"	1,000-3,000	DR
1.13	Petroleum	SCR with Sub-Surface Bury (SSB)	M	All	4-14"	300-3,000	R, L, D
1.14	OSP Offshore Inc.	A cylindrical riser with production & storage, & TTR	M	All	4-14"	300-3,000	R, L, D
1.15	2H Offshore	Ground Single Line Offshore Riser	F	FPD	2-20"	1,000-3,000	DR
1.16	Technip	Carbon fiber armor tendon layer and steel unbonded flexible riser	C	Se, Sh, T, Sp	4-10"	1,000-3,000	R
1.17	DeepTech	Unbonded flexible composite riser	F	Sh	4-10"	1,000-3,000	R
1.18	RTI Energy	Reels-Fit Riser Hanger Basket	F	Any	2-20"	1,000-3,000	Attached to riser
1.19	Hutchinson Offshore	Rotatable, stab & lock for riser & tendon	F	Any	2-20"	1,000-3,000	stab-on
1.20	Hutchinson Offshore	Export Line Flexible Joint, RISER Hanger Basket, stab & lock installation	F	Any	2-20"	1,000-3,000	stab-on
1.21	Hutchinson Offshore	Flexible Joint with RISER Hanger Basket, double barrier for HPT	F	Any	2-20"	1,000-3,000	stab-on
1.22	Balboard	Flange protector	F	Any	NA	Unlimited	Attached to riser, flexible or various structures
1.23	Aker Solutions	Aker clip riser joints	F	Se, Sh	16-21"	3,000	DR
1.24	Aker Solutions	Aker telescopic joint	F	Se, Sh	16-21"	3,000	DR
1.25	Aker Solutions	Hydraulic RAM tensioner	F	Sp, T	TTR	1,000-3,000	DR
1.26	Aker Solutions	Hydraulic line for riser tensioning system	F	Sp, T	TTR	1,000-3,000	DR
1.27	Aker Solutions	PSIR (Integrated Production Umbilical)	F	All	4-12"	3,000	DR
1.28	Aker Solutions	Reels-Fit riser tensioners	F	T, Se, Sh	16-21"	3,000	DR
1.29	Aker Solutions	Wireline tensioner	F	Se, Sh	16-21"	3,000	DR
1.30	Verdigr	Diversus Pull-in Riser Connection System	F	Any	2-20"	1,000-3,000	Attached to riser



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