

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]								
Hurricane Wind Only		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]								
Test 902001 (1 hr)												MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-8.56	0.35			-7.39	-9.53	-8.06	0.33	0.33	0.00	-7.29	-8.82	24%	-5%			5%	33%	-28%
Y COG sway	m	-5.68	0.60			-4.15	-7.20	-5.31	0.49	0.49	0.00	-4.16	-6.45	12%	-18%			0%	25%	-25%
Z COG heave	m	0.12	0.02			0.20	-0.04	0.06	0.01	0.01	0.00	0.08	0.05	-24%	-57%			-51%	37%	-87%
Rotations of Spar																				
Roll	deg	0.60	0.13			1.01	0.21	0.67	0.07	0.07	0.00	0.88	0.46	9%	-48%			-17%	32%	-48%
Pitch	deg	-0.93	0.14			-0.47	-1.38	-1.12	0.06	0.06	0.00	-0.93	-1.30	-20%	-57%			-50%	9%	-60%
Yaw	deg	0.22	0.29			1.13	-0.65	0.21	0.28	0.28	0.00	1.08	-0.65	-1%	-3%			-3%	0%	-3%
Spar-Waterline Rel Motion	m	0.10	0.02			0.18	-0.05	-0.17	0.01	0.01	0.00	NaN	NaN	-117%	-50%			#VALUE!	#VALUE!	#VALUE!
Wave Elev in Moonpool	m	-0.12	0.04			0.04	-0.25	-0.17	0.01	0.01	0.00	-0.16	-0.18	-17%	-75%			-69%	24%	-93%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	3518	20			3582	3446	3540	23	23	0	3595	3486	17%	13%			9%	30%	-20%
F line 2 (HTM)	kN	3377	22			3444	3316	3393	26	26	0	3460	3336	13%	18%			12%	15%	-3%
F line 3	kN	3252	23			3318	3179	3160	28	28	0	3226	3106	-66%	22%			-66%	-53%	-13%
F line 4	kN	2987	19			3047	2928	2965	20	20	0	3011	2918	-19%	3%			-30%	-8%	-22%
F line 5	kN	2890	16			2935	2842	2838	11	11	0	2865	2811	-56%	-30%			-75%	-33%	-42%
F line 6	kN	2832	13			2876	2793	2817	7	7	0	2835	2800	-18%	-44%			-50%	9%	-59%
F line 7 (LTM)	kN	2838	11			2881	2796	2790	5	5	0	2803	2778	-55%	-52%			-91%	-21%	-70%
F line 8 (LTM)	kN	2865	10			2907	2826	2827	9	9	0	2848	2807	-46%	-14%			-73%	-24%	-49%
F line 9 (LTM)	kN	2887	13			2931	2841	2874	15	15	0	2912	2845	-14%	10%			-21%	5%	-26%
F line 10	kN	3080	23			3155	3013	3065	20	20	0	3113	3017	-11%	-11%			-30%	3%	-32%
F line 11	kN	3306	29			3388	3227	3336	27	27	0	3400	3272	19%	-5%			8%	28%	-20%
F line 12	kN	3420	33			3512	3332	3425	30	30	0	3495	3373	3%	-9%			-9%	23%	-32%
F line 13	kN	3635	33			3734	3550	3654	19	19	0	3699	3608	10%	-42%			-19%	32%	-50%
F line 14 (HTM)	kN	3610	26			3681	3526	3669	14	14	0	3703	3635	38%	-44%			14%	71%	-56%
Riser Top Tensions																				
Production riser A1	kN	2158	41			2229	2084	2108	0	0	0	2109	2108	-34%	-100%			-83%	16%	-100%
Gas Export E1	kN	901	28			961	850	905	0	0	0	905	905	4%	-100%			-50%	49%	-99%
Production riser C5	kN	2111	29			2168	2051	2107	0	0	0	2107	2106	-4%	-100%			-52%	47%	-99%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]								
Hurricane Current Only		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]								
Test 902002 (1 hr)												MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-9.59	1.75			-4.83	-14.70	-8.89	1.68	1.68	0.00	-4.87	-12.81	7%	-4%			0%	19%	-20%
Y COG sway	m	5.80	2.01			11.20	2.19	5.64	1.97	1.97	0.00	10.28	0.98	-2%	-2%			-10%	-13%	3%
Z COG heave	m	-0.02	0.04			-0.07	-0.34	-0.09	0.04	0.04	0.00	-0.02	-0.21	-27%	0%			19%	48%	-30%
Rotations of Spar																				
Roll	deg	0.10	0.07			0.14	-0.29	-0.11	0.04	0.04	0.00	0.01	-0.24	-49%	-43%			-30%	12%	-42%
Pitch	deg	-0.21	0.05			-0.02	-0.40	-0.13	0.04	0.04	0.00	-0.02	-0.24	21%	-20%			0%	42%	-42%
Yaw	deg	-0.41	0.13			0.02	0.76	-0.74	0.92	0.92	0.00	2.08	-3.57	45%	608%			-278%	585%	-864%
Spar-Waterline Rel Motion	m	-0.18	0.04			-0.07	-0.34	0.07	0.04	0.04	0.00	NaN	NaN	93%	0%			#VALUE!	#VALUE!	#VALUE!
Wave Elev in Moonpool	m	0.03	0.02			0.11	-0.02	0.07	0.04	0.04	0.00	0.15	-0.01	31%	100%			31%	8%	23%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	3595	115			3980	3321	3574	125	125	0	3893	3325	-3%	9%			-13%	1%	-14%
F line 2 (HTM)	kN	3759	129			4214	3505	3757	148	148	0	4107	3486	0%	15%			-15%	-3%	-12%
F line 3	kN	3817	139			4337	3572	3697	144	144	0	4050	3417	-16%	3%			-37%	-20%	-17%
F line 4	kN	3460	108			3805	3263	3472	132	132	0	3796	3230	2%	23%			-2%	-6%	5%
F line 5	kN	3265	91			3542	3110	3246	109	109	0	3521	3037	-4%	19%			-5%	-17%	12%
F line 6	kN	3079	74			3298	2932	3099	95	95	0	3333	2918	5%	27%			10%	-4%	13%
F line 7 (LTM)	kN	2939	58			3107	2796	2911	71	71	0	3078	2783	-9%	22%			-9%	-4%	-5%
F line 8 (LTM)	kN	2828	47			2965	2690	2808	47	47	0	2928	2704	-7%	0%			-13%	5%	-18%
F line 9 (LTM)	kN	2720	41			2825	2590	2727	42	42	0	2828	2637	3%	2%			1%	20%	-19%
F line 10	kN	2769	42			2872	2630	2768	45	45	0	2874	2666	0%	5%			1%	15%	-14%
F line 11	kN	2878	54			2995	2721	2873	66	66	0	3033	2756	-2%	21%			14%	13%	1%
F line 12	kN	2954	65			3092	2786	2942	76	76	0	3121	2797	-4%	16%			10%	4%	6%
F line 13	kN	3194	86			3398	2980	3156	106	106	0	3407	2971	-9%	24%			2%	-2%	4%
F line 14 (HTM)	kN	3379	102			3691	3131	3375	122	122	0	3676	3143	-1%	19%			-3%	2%	-5%
Riser Top Tensions																				
Production riser A1	kN	2156	45			2247	2059	2101	1	1	0	2105	2098	-29%	-97%			-76%	21%	-97%
Gas Export E1	kN	897	28			956	848	886	1	1	0	889	883	-11%	-95%			-62%	33%	-94%
Production riser C5	kN	2093	19			2132	2050	2104	1	1	0	2107	2101	13%	-92%			-30%	62%	-92%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]								
Hurricane Wind & Current On Test 902003 (1 hr)		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]								
												MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-17.00	1.71			-13.60	-21.70	-15.37	1.46	1.46	0.00	-11.74	-18.78	20%	-15%			23%	36%	-13%
Y COG sway	m	0.06	2.70			7.10	-5.55	0.54	1.89	1.89	0.00	4.99	-3.94	4%	-30%			-17%	13%	-29%
Z COG heave	m	-0.05	0.05			0.08	-0.22	-0.06	0.01	0.01	0.00	-0.04	-0.09	-3%	-80%			-40%	43%	-83%
Rotations of Spar																				
Roll	deg	0.51	0.13			0.92	0.07	0.58	0.06	0.06	0.00	0.77	0.39	8%	-54%			-18%	38%	-55%
Pitch	deg	-1.12	0.11			-0.77	-1.55	-1.15	0.05	0.05	0.00	-1.01	-1.29	-4%	-55%			-31%	33%	-64%
Yaw	deg	-0.11	0.23			0.68	-0.88	-0.58	0.80	0.80	0.00	1.84	-3.00	-30%	248%			74%	-136%	210%
Spar-Waterline Rel Motion	m	-0.07	0.05			0.07	-0.23	-0.07	0.01	0.01	0.00	NaN	NaN	0%	-80%			#VALUE!	#VALUE!	#VALUE!
Wave Elev in Moonpool	m	-0.05	0.05			0.14	-0.24	-0.07	0.01	0.01	0.00	-0.05	-0.09	-5%	-80%			-50%	39%	-89%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	4218	195			4853	3882	4191	192	192	0	4683	3815	-3%	-2%			-18%	-7%	-11%
F line 2 (HTM)	kN	4126	136			4490	3859	4137	204	204	0	4653	3755	2%	50%			26%	-16%	42%
F line 3	kN	3830	137			4221	3515	3707	158	158	0	4093	3412	-17%	15%			-18%	-15%	-4%
F line 4	kN	3277	109			3616	3050	3275	101	101	0	3533	3071	0%	-8%			-15%	4%	-18%
F line 5	kN	3009	91			3278	2821	2972	70	70	0	3136	2830	-8%	-23%			-31%	2%	-33%
F line 6	kN	2818	71			3015	2660	2817	49	49	0	2945	2709	0%	-31%			-20%	14%	-34%
F line 7 (LTM)	kN	2704	58			2842	2553	2681	42	42	0	2781	2598	-8%	-28%			-21%	15%	-36%
F line 8 (LTM)	kN	2650	40			2741	2526	2635	36	36	0	2726	2559	-7%	-12%			-7%	15%	-22%
F line 9 (LTM)	kN	2627	32			2702	2543	2633	38	38	0	2730	2552	4%	20%			18%	6%	12%
F line 10	kN	2777	45			2920	2653	2768	47	47	0	2881	2659	-3%	6%			-15%	2%	-17%
F line 11	kN	3003	82			3222	2795	3007	71	71	0	3186	2855	1%	-13%			-8%	14%	-22%
F line 12	kN	3241	132			3563	2948	3213	96	96	0	3445	3028	-5%	-27%			-19%	13%	-32%
F line 13	kN	3711	209			4273	3291	3650	140	140	0	4009	3376	-6%	-33%			-27%	9%	-36%
F line 14 (HTM)	kN	4061	249			4822	3619	4030	178	178	0	4477	3685	-3%	-29%			-29%	5%	-34%
Riser Top Tensions																				
Production riser A1	kN	2170	37			2259	2093	2105	2	2	0	2110	2102	-39%	-95%			-90%	5%	-95%
Gas Export E1	kN	920	29			981	865	903	2	2	0	908	900	-14%	-94%			-63%	30%	-93%
Production riser C5	kN	2107	26			2162	2052	2105	2	2	0	2110	2102	-1%	-93%			-47%	45%	-93%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted											Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]							
Hurricane WWC		2. All tests use API "net loads best estimate algorithm" unless otherwise noted											Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]							
Test 902004													MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]							
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-19.32	2.08	1.85	0.95	-12.38	-26.02	-17.91	1.59	1.49	0.57	-12.75	-23.43	10%	-23%	-19%	-40%	-3%	19%	-22%
Y COG sway	m	-0.16	2.70	2.70	0.16	7.72	-7.33	1.30	1.65	1.65	0.00	5.95	-3.27	10%	-39%	-39%	-100%	-12%	27%	-39%
Z COG heave	m	-0.21	0.11	0.10	0.04	0.24	-0.57	-0.13	0.05	0.02	0.04	0.08	-0.34	9%	-55%	-80%	0%	-20%	29%	-48%
Rotations of Spar																				
Roll	deg	0.55	0.24	0.21	0.09	1.40	-0.37	0.51	0.23	0.23	0.00	1.26	-0.25	-2%	-2%	10%	-100%	-8%	7%	-15%
Pitch	deg	-1.20	0.78	0.48	0.60	1.36	-4.89	-1.47	0.71	0.37	0.61	1.91	-5.13	-4%	-9%	-23%	2%	9%	-4%	13%
Yaw	deg	-0.26	0.44	0.35	0.25	1.93	-1.69	-0.27	0.88	0.88	0.00	2.67	-3.21	0%	99%	151%	-100%	21%	-42%	63%
Spar-Waterline Rel Motion	m	-0.23	0.12			0.23	-0.60	0.19	3.13	0.02	3.13	14.32	-9.22	51%	2508%			1698%	-1039%	2736%
Wave Elev in Moonpool	m	0.13	0.43			1.73	-1.82	0.00	0.13	0.02	0.13	0.51	-0.50	-4%	-70%			-34%	37%	-72%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	4500	390	250	298	6125	3335	4534	361	260	250	6530	2652	1%	-8%	4%	-16%	15%	-24%	39%
F line 2 (HTM)	kN	4351	325			5737	3320	4488	367	300	210	6370	2776	6%	13%			26%	-23%	49%
F line 3	kN	3912	217			4902	3281	3908	220	194	105	5009	2910	0%	1%			7%	-23%	29%
F line 4	kN	3295	119	116	28	3769	2974	3344	105	103	16	3706	3070	6%	-12%	-11%	-43%	-8%	12%	-20%
F line 5	kN	2949	88			3275	2715	2978	58	56	12	3162	2811	5%	-34%			-20%	17%	-37%
F line 6	kN	2780	79			3095	2520	2790	52	34	40	3088	2491	2%	-34%			-1%	-5%	4%
F line 7 (LTM)	kN	2651	86			2985	2351	2632	67	30	60	3064	2208	-3%	-21%			13%	-23%	35%
F line 8 (LTM)	kN	2597	83	43	70	2956	2267	2575	76	34	68	3075	2081	-3%	-7%	-21%	-2%	17%	-27%	44%
F line 9 (LTM)	kN	2577	76			2886	2260	2573	71	40	58	3010	2139	-1%	-8%			20%	-19%	39%
F line 10	kN	2746	69			3043	2474	2707	63	50	38	3025	2402	-7%	-9%			-3%	-13%	10%
F line 11	kN	2980	89			3333	2715	2956	66	65	12	3162	2778	-4%	-25%			-28%	10%	-38%
F line 12	kN	3279	133			3762	2932	3203	80	78	15	3454	2995	-9%	-40%			-37%	8%	-45%
F line 13	kN	3819	238			4771	3182	3721	149	116	94	4577	2922	-6%	-37%			-12%	-16%	4%
F line 14 (HTM)	kN	4300	362			5849	3273	4263	268	169	208	5865	2714	-1%	-26%			1%	-22%	22%
Riser Top Tensions																				
Production riser A1	kN	2160	50	15	46	2317	1967	2102	6	2	6	2127	2077	-17%	-88%	-86%	-88%	-54%	32%	-86%
Gas Export E1	kN	919	43	17	38	1094	782	905	6	2	6	930	885	-4%	-86%	-87%	-85%	-53%	33%	-85%
Production riser C5	kN	2092	44	16	38	2253	1923	2105	4	2	4	2123	2089	4%	-90%	-86%	-91%	-40%	50%	-90%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted											Figures of Merit (FOM): Mean FOM = $\frac{\text{measured mean} - \text{simulation mean}}{\text{measured (Max-Min)}}$							
Hurricane Wave Only Test 905002		2. All tests use API "net loads best estimate algorithm" unless otherwise noted											Std. Dev. FOM = $\frac{\text{measured Std. Dev.} - \text{simulation Std. Dev.}}{\text{measured Std. Dev.}}$							
													MaxMin FOM = $\frac{\text{measured MaxMin} - \text{simulation MaxMin}}{\text{measured (Max-Min)}}$							
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-1.22	1.50	1.18	0.92	3.38	-8.20	-2.13	1.55	1.41	0.63	3.05	-7.47	-8%	3%	19%	-32%	-3%	6%	-9%
Y COG sway	m	0.08	0.26	0.24	0.11	0.97	-0.72	-0.01	0.00	0.00	0.00	0.00	-0.03	-5%	-100%	-100%	-100%	-57%	41%	-98%
Z COG heave	m	-0.09	0.06	0.06	0.02	0.23	-0.40	-0.01	0.05	0.01	0.05	0.18	-0.21	12%	-22%	-83%	150%	-8%	30%	-38%
Rotations of Spar																				
Roll	deg	0.03	0.09	0.06	0.02	0.41	-0.33	-0.05	0.00	0.00	0.00	-0.05	-0.05	-10%	-100%	-100%	-100%	-62%	38%	-100%
Pitch	deg	-0.13	0.71	0.36	0.60	2.65	-4.02	-0.23	0.72	0.32	0.65	3.12	-3.75	-1%	1%	-11%	8%	7%	4%	3%
Yaw	deg	0.01	0.38	0.26	0.26	2.02	-1.73	0.00	0.00	0.00	0.00	0.00	0.00	0%	-100%	-100%	-100%	-54%	46%	-100%
Spar-Waterline Rel Motion	m	-0.09	0.06			0.21	-0.40	0.20	3.15	0.01	3.15	14.37	-9.26	48%	5150%			2321%	-1452%	3774%
Wave Elev in Moonpool	m	0.03	0.42			1.69	-2.08	0.01	0.13	0.01	0.13	0.50	-0.49	-1%	-69%			-32%	42%	-74%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	3140	118	45	109	3785	2645	3188	164	72	147	4292	2107	4%	38%	62%	35%	45%	-47%	92%
F line 2 (HTM)	kN	3185	109			3788	2744	3225	141	65	125	4177	2285	4%	29%			37%	-44%	81%
F line 3	kN	3206	76			3599	2913	3178	77	45	62	3671	2699	-4%	1%			10%	-31%	42%
F line 4	kN	3121	28	14	24	3274	3026	3109	18	12	14	3197	3020	-5%	-35%	-13%	-43%	-31%	-2%	-29%
F line 5	kN	3074	20			3173	2993	3066	18	12	13	3151	2982	-4%	-10%			-12%	-6%	-6%
F line 6	kN	3109	59			3408	2866	3090	66	35	57	3522	2667	-3%	12%			21%	-37%	58%
F line 7 (LTM)	kN	3105	95			3593	2668	3045	113	48	102	3817	2277	-6%	18%			24%	-42%	66%
F line 8 (LTM)	kN	3108	110			3667	2590	3030	133	53	122	3942	2121	-7%	21%			26%	-44%	69%
F line 9 (LTM)	kN	3009	92	35	85	3462	2567	2984	107	48	96	3713	2258	-3%	16%	37%	13%	28%	-35%	63%
F line 10	kN	3063	66			3375	2743	3045	63	33	54	3451	2640	-3%	-4%			12%	-16%	28%
F line 11	kN	3114	29			3223	2982	3130	20	14	14	3225	3042	7%	-31%			1%	25%	-24%
F line 12	kN	3097	20			3182	3029	3093	18	12	14	3179	3006	-3%	-10%			-2%	-15%	13%
F line 13	kN	3146	61			3426	2894	3169	76	45	62	3656	2697	4%	25%			43%	-37%	80%
F line 14 (HTM)	kN	3138	101			3648	2724	3190	137	65	121	4117	2283	6%	36%			51%	-48%	99%
Riser Top Tensions																				
Production riser A1	kN	2123	48	15	44	2274	2006	2102	5	0	5	2122	2082	-8%	-89%	-98%	-88%	-57%	28%	-85%
Gas Export E1	kN	890	38	10	36	1041	779	887	6	0	6	908	876	-1%	-85%	-97%	-84%	-50%	37%	-88%
Production riser C5	kN	2104	38	14	32	2313	1970	2104	3	0	3	2115	2094	0%	-92%	-98%	-91%	-58%	36%	-94%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]								
Loop Wind Only		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]								
Test 911001; .5 hr												MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-0.40	0.22			0.16	-1.00	-0.01	0.00	0.00	0.00	-0.01	-0.01	34%	-100%			-15%	85%	-100%
Y COG sway	m	3.46	0.44			5.05	2.25	2.44	0.39	0.39	0.00	3.25	1.63	-36%	-11%			-64%	-22%	-42%
Z COG heave	m	-0.11	0.02			-0.05	-0.19	-0.01	0.00	0.00	0.00	0.00	-0.01	71%	-100%			36%	129%	-93%
Rotations of Spar																				
Roll	deg	-0.32	0.09			-0.09	-0.54	-0.36	0.08	0.08	0.00	-0.14	-0.59	-9%	-11%			-11%	-11%	0%
Pitch	deg	-0.05	0.07			0.18	-0.28	-0.03	0.00	0.00	0.00	-0.03	-0.03	4%	-100%			-46%	54%	-100%
Yaw	deg	-0.02	0.19			0.71	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	2%	-100%			-59%	41%	-100%
Spar-Waterline Rel Motion	m	-0.11	0.02			-0.05	-0.19	0.01	0.00	0.00	0.00	NaN	NaN	86%	-100%			#VALUE!	#VALUE!	#VALUE!
Wave Elev in Moonpool	m	-0.08	0.02			0.00	-0.14	0.01	0.00	0.00	0.00	0.01	0.00	64%	-100%			7%	100%	-93%
Forces in mooring lines at fairlead																				
F line 1 (LTM)	kN	3121	9			3145	3098	3093	0	0	0	3093	3093	-60%	-100%			-111%	-11%	-100%
F line 2 (LTM)	kN	3205	9			3234	3181	3181	9	9	0	3200	3163	-45%	-8%			-65%	-33%	-32%
F line 3	kN	3243	14			3288	3205	3211	16	16	0	3243	3178	-39%	13%			-54%	-33%	-21%
F line 4	kN	3240	19			3311	3187	3200	20	20	0	3241	3159	-32%	1%			-57%	-22%	-34%
F line 5	kN	3395	23			3492	3324	3191	20	20	0	3232	3150	-121%	-14%			-155%	-103%	-52%
F line 6	kN	3272	24			3374	3189	3243	16	16	0	3276	3211	-15%	-35%			-53%	12%	-65%
F line 7 (HTM)	kN	3121	16			3178	3074	3167	9	9	0	3185	3149	44%	-45%			7%	72%	-65%
F line 8 (HTM)	kN	3047	18			3104	2983	3111	0	0	0	3111	3111	53%	-100%			6%	106%	-100%
F line 9 (HTM)	kN	3136	13			3175	3098	3016	6	6	0	3029	3003	-156%	-53%			-189%	-123%	-66%
F line 10	kN	2937	20			3002	2872	3021	11	11	0	3045	2998	65%	-44%			33%	97%	-64%
F line 11	kN	3057	15			3111	2998	3056	14	14	0	3086	3027	-1%	-8%			-22%	26%	-48%
F line 12	kN	2918	15			2966	2864	2983	14	14	0	3012	2953	63%	-3%			45%	88%	-42%
F line 13	kN	2996	14			3044	2942	3036	11	11	0	3060	3013	39%	-17%			15%	69%	-54%
F line 14 (LTM)	kN	3049	12			3086	3005	3062	6	6	0	3075	3049	16%	-46%			-13%	54%	-68%
Riser Top Tensions																				
Production riser A1	kN	2141	30			2213	2071	2101	0	0	0	2101	2101	-28%	-100%			-79%	21%	-100%
Gas Export E1	kN	859	25			936	845	883	0	0	0	884	883	27%	-100%			-58%	42%	-100%
Production riser C5	kN	2126	20			2165	2087	2106	0	0	0	2106	2106	-25%	-100%			-75%	25%	-100%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]								
Loop Current Only		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]								
Test 911002 (.5 hr; w/strakes)												MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	35.28	0.57			37.68	33.70	34.06	0.65	0.65	0.00	35.97	32.10	-31%	14%			-43%	-40%	-3%
Y COG sway	m	-5.93	2.49			2.24	-13.80	-6.29	2.24	2.24	0.00	0.20	-12.77	-2%	-10%			-13%	6%	-19%
Z COG heave	m	-1.83	0.08			-1.61	-2.26	-1.32	0.08	0.08	0.00	-1.14	-1.61	78%	0%			72%	100%	-28%
Rotations of Spar																				
Roll	deg	0.03	0.16			0.62	-0.56	0.01	0.09	0.09	0.00	0.31	-0.29	-2%	-44%			-26%	23%	-49%
Pitch	deg	-0.54	0.09			-0.19	-0.87	-0.25	0.03	0.03	0.00	-0.13	-0.36	43%	-67%			9%	75%	-66%
Yaw	deg	0.03	0.17			0.86	-0.66	0.02	0.58	0.58	0.00	2.02	-1.99	-1%	241%			76%	-88%	164%
Spar-Waterline Rel Motion	m	-1.83	0.08			-1.61	-2.27	1.32	0.08	0.08	0.00	NaN	NaN	477%	0%			#VALUE!	#VALUE!	#VALUE!
Wave Elev in Moonpool	m	1.18	0.07			1.46	0.98	1.32	0.08	0.08	0.00	1.48	1.16	29%	14%			4%	38%	-33%
Forces in mooring lines at fairlead																				
F line 1 (LTM)	kN	2189	15			2237	2125	2229	12	12	0	2266	2195	35%	-18%			26%	62%	-36%
F line 2 (LTM)	kN	2248	24			2320	2121	2256	18	18	0	2311	2205	4%	-24%			-5%	42%	-47%
F line 3	kN	2420	43			2542	2257	2395	36	36	0	2498	2300	-9%	-17%			-15%	15%	-30%
F line 4	kN	2696	64			2878	2516	2660	52	52	0	2824	2518	-10%	-18%			-15%	1%	-16%
F line 5	kN	3374	113			3832	3072	3128	108	108	0	3471	2889	-32%	-4%			-47%	-24%	-23%
F line 6	kN	4534	303			6033	3865	4374	303	303	0	5392	3776	-7%	0%			-30%	-4%	-25%
F line 7 (HTM)	kN	6768	531			9327	5665	7262	644	644	0	9276	5854	13%	21%			-1%	5%	-7%
F line 8 (HTM)	kN	10732	378			12367	9757	10694	465	465	0	12096	9394	-1%	23%			-10%	-14%	4%
F line 9 (HTM)	kN	9818	625			12412	8311	9296	607	607	0	11157	7716	-13%	-3%			-31%	-15%	-16%
F line 10	kN	6098	579			8693	4838	6305	668	668	0	8504	5007	5%	15%			-5%	4%	-9%
F line 11	kN	4010	216			4916	3484	4081	273	273	0	5005	3543	5%	27%			6%	4%	2%
F line 12	kN	2938	85			3225	2689	3006	88	88	0	3289	2799	13%	3%			12%	20%	-9%
F line 13	kN	2581	55			2730	2382	2611	45	45	0	2748	2485	9%	-17%			5%	30%	-25%
F line 14 (LTM)	kN	2292	34			2398	2142	2354	26	26	0	2433	2280	24%	-23%			14%	54%	-40%
Riser Top Tensions																				
Production riser A1	kN	2217	34			2304	2131	2080	2	2	0	2086	2074	-79%	-94%			-126%	-33%	-93%
Gas Export E1	kN	989	26			1086	911	864	2	2	0	869	858	-72%	-92%			-123%	-30%	-93%
Production riser C5	kN	2196	21			2268	2139	2082	2	2	0	2088	2076	-89%	-91%			-140%	-49%	-91%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]								
Loop Wind & Current Only		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]								
Test 911003 (1.5 hr)												MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	35.32	0.50			37.23	33.96	34.16	0.63	0.63	0.00	35.88	32.40	-35%	26%			-41%	-48%	6%
Y COG sway	m	-4.78	2.21			2.45	-10.50	-5.18	2.29	2.29	0.00	0.87	-11.24	-3%	4%			-12%	-6%	-6%
Z COG heave	m	-1.77	0.07			-1.59	-2.00	-1.31	0.07	0.07	0.00	-1.16	-1.56	112%	0%			105%	107%	-2%
Rotations of Spar																				
Roll	deg	-0.23	0.16			0.31	-0.77	-0.28	0.20	0.20	0.00	0.32	-0.89	-5%	25%			1%	-11%	12%
Pitch	deg	-0.57	0.08			-0.32	-0.84	-0.25	0.04	0.04	0.00	-0.14	-0.35	62%	-50%			35%	94%	-60%
Yaw	deg	0.11	0.19			0.90	-0.55	-0.03	0.52	0.52	0.00	1.63	-1.69	-10%	174%			50%	-79%	129%
Spar-Waterline Rel Motion	m	-1.77	0.07			-1.59	-2.00	1.31	0.07	0.07	0.00	NaN	NaN	751%	0%			#VALUE!	#VALUE!	#VALUE!
Wave Elev in Moonpool	m	1.10	0.06			1.27	0.93	1.31	0.07	0.07	0.00	1.46	1.17	62%	17%			56%	71%	-15%
Forces in mooring lines at fairlead																				
F line 1 (LTM)	kN	2188	14			2246	2127	2227	12	12	0	2260	2197	33%	-19%			12%	58%	-46%
F line 2 (LTM)	kN	2257	21			2316	2169	2265	19	19	0	2317	2215	5%	-9%			0%	31%	-31%
F line 3	kN	2436	39			2556	2310	2414	37	37	0	2511	2322	-9%	-5%			-18%	5%	-23%
F line 4	kN	2718	62			2889	2593	2686	58	58	0	2844	2551	-11%	-7%			-15%	-14%	-1%
F line 5	kN	3423	106			3840	3174	3185	115	115	0	3518	2946	-36%	8%			-48%	-34%	-14%
F line 6	kN	4643	293			5963	4062	4510	345	345	0	5543	3896	-7%	18%			-22%	-9%	-13%
F line 7 (HTM)	kN	6956	496			9133	6061	7535	676	676	0	9440	6166	19%	36%			10%	3%	7%
F line 8 (HTM)	kN	10764	325			11993	9949	10766	456	456	0	12030	9578	0%	40%			2%	-18%	20%
F line 9 (HTM)	kN	9557	521			11264	8425	9037	626	626	0	10771	7571	-18%	20%			-17%	-30%	13%
F line 10	kN	5853	451			7446	4808	6026	634	634	0	7907	4892	7%	41%			17%	3%	14%
F line 11	kN	3918	175			4463	3460	3960	252	252	0	4729	3497	4%	43%			26%	4%	23%
F line 12	kN	2903	74			3100	2697	2963	86	86	0	3210	2778	15%	15%			27%	20%	7%
F line 13	kN	2555	49			2668	2382	2588	45	45	0	2708	2473	11%	-6%			14%	32%	-18%
F line 14 (LTM)	kN	2275	32			2371	2140	2342	26	26	0	2412	2275	29%	-21%			18%	58%	-41%
Riser Top Tensions																				
Production riser A1	kN	2220	33			2301	2143	2079	2	2	0	2084	2073	-89%	-94%			-137%	-44%	-93%
Gas Export E1	kN	989	27			1096	913	862	2	2	0	867	857	-70%	-93%			-125%	-31%	-94%
Production riser C5	kN	2201	22			2270	2140	2084	2	2	0	2090	2079	-90%	-91%			-139%	-47%	-92%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted											Figures of Merit (FOM): Mean FOM = [measured mean - simulation mean]/[measured (Max-Min)]							
Loop WW&C		2. All tests use API "net loads best estimate algorithm" unless otherwise noted											Std. Dev. FOM = [measured Std. Dev. - simulation Std. Dev.]/[measured Std. Dev.]							
Test 911004													MaxMin FOM = [measured MaxMin - simulation MaxMin]/[measured (Max-Min)]							
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	35.55	0.53	0.53	0.05	37.47	33.85	34.28	0.62	0.62	0.00	36.18	32.39	-35%	16%	17%	-100%	-36%	-40%	5%
Y COG sway	m	-4.37	2.44	2.42	0.32	3.49	-12.47	-4.80	2.22	2.21	0.19	2.00	-11.60	-3%	-9%	-9%	-41%	-9%	5%	-15%
Z COG heave	m	-1.83	0.08	0.08	0.02	-1.55	-2.19	-1.32	0.07	0.07	0.00	-1.15	-1.59	81%	-17%	-13%	-100%	63%	94%	-31%
Rotations of Spar																				
Roll	deg	-0.21	0.31	0.20	0.24	0.84	-1.43	-0.36	0.29	0.15	0.25	1.10	-1.91	-7%	-7%	-25%	4%	12%	-21%	33%
Pitch	deg	-0.56	0.11	0.10	0.04	-0.12	-1.00	-0.20	0.04	0.04	0.00	-0.07	-0.39	40%	-64%	-60%	-100%	5%	69%	-64%
Yaw	deg	0.19	0.21	0.19	0.08	1.04	-0.65	-0.05	0.52	0.52	0.00	1.70	-1.79	-14%	143%	174%	-100%	39%	-67%	106%
Spar-Waterline Rel Motion	m							1.40	1.51	0.07	1.51	8.21	-3.42							
Wave Elev in Moonpool	m	1.21	0.26			2.26	0.13	1.32	0.07	0.07	0.01	1.51	1.14	5%	-73%			-35%	47%	-83%
Forces in mooring lines at fairlead																				
F line 1 (LTM)	kN	2181	15	12	8	2243	2125	2224	11	11	0	2261	2190	37%	-24%	-5%	-96%	15%	56%	-40%
F line 2 (LTM)	kN	2254	27			2362	2141	2265	22	19	11	2344	2188	5%	-20%			-8%	21%	-29%
F line 3	kN	2438	46			2637	2238	2419	42	36	22	2583	2258	-5%	-10%			-14%	5%	-19%
F line 4	kN	2725	70	52	47	3021	2485	2694	67	57	35	2970	2436	-6%	-5%	10%	-26%	-9%	-9%	0%
F line 5	kN	3447	125	115	49	4021	3075	3205	124	112	53	3722	2738	-26%	-1%	-3%	9%	-32%	-36%	4%
F line 6	kN	4720	326	315	87	6121	3901	4565	345	343	41	5801	3810	-7%	6%	9%	-53%	-14%	-4%	-10%
F line 7 (HTM)	kN	7109	529	524	71	8969	5839	7680	660	657	61	9873	6065	18%	25%	25%	-14%	29%	7%	22%
F line 8 (HTM)	kN	10897	349	348	28	12105	9875	10857	452	452	2	12270	9573	-2%	29%	30%	-92%	7%	-14%	21%
F line 9 (HTM)	kN	9563	609	604	76	12132	7830	9001	621	617	71	11058	7301	-13%	2%	2%	-6%	-25%	-12%	-13%
F line 10	kN	5818	525	513	112	8242	4423	5951	602	598	67	8124	4625	3%	15%	17%	-40%	-3%	5%	-8%
F line 11	kN	3896	205	187	84	4797	3227	3922	250	239	72	4887	3155	2%	22%	28%	-14%	6%	-5%	10%
F line 12	kN	2888	86			3260	2559	2948	92	81	44	3329	2595	8%	7%			10%	5%	5%
F line 13	kN	2544	55			2773	2333	2579	50	44	25	2770	2391	8%	-8%			-1%	13%	-14%
F line 14 (LTM)	kN	2262	33			2373	2124	2336	27	24	11	2433	2242	30%	-20%			24%	48%	-23%
Riser Top Tensions																				
Production riser A1	kN	2221	39	14	36	2332	2110	2078	3	2	2	2088	2068	-64%	-93%	-87%	-95%	-110%	-19%	-91%
Gas Export E1	kN	988	30	14	25	1103	893	861	3	2	2	871	850	-60%	-91%	-86%	-93%	-110%	-20%	-90%
Production riser C5	kN	2199	27	13	23	2314	2104	2084	3	2	2	2095	2074	-54%	-90%	-85%	-92%	-104%	-14%	-90%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = $\frac{\text{measured mean} - \text{simulation mean}}{\text{measured (Max-Min)}}$								
Hurricane WWC		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = $\frac{\text{measured Std. Dev.} - \text{simulation Std. Dev.}}{\text{measured Std. Dev.}}$								
9 hour Composite												MaxMin FOM = $\frac{\text{measured MaxMin} - \text{simulation MaxMin}}{\text{measured (Max-Min)}}$								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-19.20	2.30			-11.18	-28.89	-17.91	1.59	1.49	0.57	-12.39	-24.07	7%	-31%			-7%	27%	-34%
Y COG sway	m	-0.09	2.97			15.78	-9.16	1.30	1.65	1.65	0.00	6.57	-3.88	6%	-44%			-37%	21%	-58%
Z COG heave	m	-0.22	0.12			0.42	-0.72	-0.13	0.05	0.02	0.04	0.09	-0.35	8%	-58%			-29%	32%	-61%
Rotations of Spar																				
Roll	deg	0.56	0.23			1.53	-0.44	0.51	0.23	0.23	0.00	1.33	-0.32	-2%	-2%			-10%	6%	-16%
Pitch	deg	-1.17	0.78			1.63	-4.89	-1.47	0.71	0.37	0.61	2.26	-5.55	-5%	-9%			10%	-10%	20%
Yaw	deg	-0.25	0.45			2.36	-2.93	-0.27	0.88	0.88	0.00	2.94	-3.48	0%	97%			11%	-10%	21%
Spar-Waterline Rel Motion	m	-0.24	0.12			0.41	-0.85	0.19	3.13	0.02	3.13	15.71	-9.75	34%	2444%			1213%	-706%	1919%
Wave Elev in Moonpool	m	0.13	0.43			2.09	-1.84	0.00	0.13	0.02	0.13	0.55	-0.54	-3%	-70%			-39%	33%	-72%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	4488	421			7247	3106	4534	361	260	250	6700	2482	1%	-14%			-13%	-15%	2%
F line 2 (HTM)	kN	4352	356			6197	3220	4488	366	300	210	6520	2625	5%	3%			11%	-20%	31%
F line 3	kN	3915	249			5845	3190	3908	220	193	105	5100	2819	0%	-12%			-28%	-14%	-14%
F line 4	kN	3299	138			4507	2935	3344	105	103	16	3754	3046	3%	-24%			-48%	7%	-55%
F line 5	kN	2952	99			3699	2666	2978	58	56	12	3191	2796	3%	-42%			-49%	13%	-62%
F line 6	kN	2783	85			3279	2395	2790	52	34	40	3121	2459	1%	-39%			-18%	7%	-25%
F line 7 (LTM)	kN	2653	90			3095	2200	2632	67	30	60	3118	2154	-2%	-25%			3%	-5%	8%
F line 8 (LTM)	kN	2599	86			3037	2139	2575	76	34	68	3138	2017	-3%	-12%			11%	-14%	25%
F line 9 (LTM)	kN	2578	81			2939	2212	2573	71	40	58	3062	2087	-1%	-13%			17%	-17%	34%
F line 10	kN	2751	75			3072	2445	2707	63	50	38	3055	2371	-7%	-16%			-3%	-12%	9%
F line 11	kN	2979	95			3384	2546	2956	66	65	12	3194	2759	-3%	-31%			-23%	25%	-48%
F line 12	kN	3273	142			3916	2722	3203	80	78	15	3493	2975	-6%	-44%			-35%	21%	-57%
F line 13	kN	3805	255			5703	3004	3721	149	116	94	4661	2838	-3%	-41%			-39%	-6%	-32%
F line 14 (HTM)	kN	4284	390			7327	3034	4263	268	169	208	6014	2565	0%	-31%			-31%	-11%	-20%
Riser Top Tensions																				
Production riser A1	kN	2159	50			2331	1927	2102	6	2	6	2129	2076	-14%	-88%			-50%	37%	-87%
Gas Export E1	kN	917	43			1102	779	905	6	2	6	932	884	-4%	-86%			-53%	33%	-85%
Production riser C5	kN	2091	43			2275	1923	2105	4	2	4	2124	2088	4%	-90%			-43%	47%	-90%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = $\frac{\text{measured mean} - \text{simulation mean}}{\text{measured (Max-Min)}}$								
Hurricane Wave Only		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = $\frac{\text{measured Std. Dev.} - \text{simulation Std. Dev.}}{\text{measured Std. Dev.}}$								
9 hour Composite												MaxMin FOM = $\frac{\text{measured MaxMin} - \text{simulation MaxMin}}{\text{measured (Max-Min)}}$								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	-1.15	1.55			4.36	-8.38	-2.13	1.55	1.41	0.63	3.16	-7.95	-8%	0%			-9%	3%	-13%
Y COG sway	m	0.02	0.36			1.42	-1.57	-0.01	0.00	0.00	0.00	0.01	-0.03	-1%	-100%			-47%	52%	-99%
Z COG heave	m	-0.10	0.07			0.25	-0.43	-0.01	0.05	0.01	0.05	0.19	-0.22	13%	-26%			-9%	31%	-40%
Rotations of Spar																				
Roll	deg	0.02	0.12			0.57	-0.60	-0.05	0.00	0.00	0.00	-0.05	-0.05	-6%	-100%			-53%	47%	-100%
Pitch	deg	-0.14	0.75			2.65	-4.06	-0.23	0.72	0.32	0.65	3.36	-4.01	-1%	-4%			11%	1%	10%
Yaw	deg	0.00	0.41			2.02	-2.22	0.00	0.00	0.00	0.00	0.00	0.00	0%	-100%			-48%	52%	-100%
Spar-Waterline Rel Motion	m	-0.10	0.07			0.25	-0.45	0.20	3.15	0.01	3.15	15.26	-9.61	44%	4526%			2147%	-1310%	3458%
Wave Elev in Moonpool	m	0.03	0.45			2.00	-2.05	0.01	0.13	0.01	0.13	0.52	-0.51	-1%	-71%			-37%	38%	-75%
Forces in mooring lines at fairlead																				
F line 1 (HTM)	kN	3135	124			3818	2589	3188	164	72	147	4375	2024	4%	32%			45%	-46%	91%
F line 2 (HTM)	kN	3180	117			3827	2684	3225	141	65	125	4249	2213	4%	20%			37%	-41%	78%
F line 3	kN	3202	84			3671	2856	3178	77	45	62	3707	2662	-3%	-8%			4%	-24%	28%
F line 4	kN	3118	34			3289	2966	3109	18	12	14	3202	3015	-3%	-46%			-27%	15%	-42%
F line 5	kN	3073	20			3173	2993	3066	18	12	13	3155	2978	-3%	-11%			-10%	-9%	-1%
F line 6	kN	3109	59			3408	2866	3090	66	35	57	3555	2634	-3%	13%			27%	-43%	70%
F line 7 (LTM)	kN	3106	96			3593	2668	3045	113	48	102	3878	2216	-7%	17%			31%	-49%	80%
F line 8 (LTM)	kN	3110	113			3670	2590	3030	133	53	122	4015	2048	-7%	18%			32%	-50%	82%
F line 9 (LTM)	kN	3012	99			3505	2537	2984	107	48	96	3770	2201	-3%	8%			27%	-35%	62%
F line 10	kN	3069	75			3423	2701	3045	63	33	54	3482	2609	-3%	-15%			8%	-13%	21%
F line 11	kN	3117	35			3309	2964	3130	20	14	14	3230	3038	4%	-44%			-23%	21%	-44%
F line 12	kN	3101	20			3185	3025	3093	18	12	14	3184	3001	-5%	-12%			0%	-15%	15%
F line 13	kN	3146	60			3426	2894	3169	76	45	62	3693	2660	4%	26%			50%	-44%	94%
F line 14 (HTM)	kN	3134	102			3665	2715	3190	137	65	121	4188	2213	6%	35%			55%	-53%	108%
Riser Top Tensions																				
Production riser A1	kN	2123	49			2289	1980	2102	5	0	5	2123	2081	-7%	-89%			-54%	33%	-86%
Gas Export E1	kN	890	39			1071	765	887	6	0	6	909	875	-1%	-86%			-53%	36%	-89%
Production riser C5	kN	2102	40			2313	1960	2104	3	0	3	2116	2093	1%	-93%			-56%	38%	-94%

DeepStar Spar		1. All tests of 3 hour duration unless otherwise noted										Figures of Merit (FOM): Mean FOM = $\frac{\text{measured mean} - \text{simulation mean}}{\text{measured (Max-Min)}}$								
Loop WW&C		2. All tests use API "net loads best estimate algorithm" unless otherwise noted										Std. Dev. FOM = $\frac{\text{measured Std. Dev.} - \text{simulation Std. Dev.}}{\text{measured Std. Dev.}}$								
9 hour Composite												MaxMin FOM = $\frac{\text{measured MaxMin} - \text{simulation MaxMin}}{\text{measured (Max-Min)}}$								
Response	Unit	MARIN Model Tests						SeaSoft Version 6.80						Figures of Merit						
		Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Mean	St. Dev.	LF	WF	Max	Min	Stroke
				St. Dev.	St. Dev.					St. Dev.	St. Dev.					St. Dev.	St. Dev.			(Max - Min)
Translations of Spar (Earth fixed)																				
X COG surge	m	35.55	0.53			37.47	33.85	34.28	0.62	0.62	0.00	36.40	32.18	-35%	16%			-30%	-46%	17%
Y COG sway	m	-4.37	2.44			3.49	-12.47	-4.80	2.22	2.21	0.19	2.78	-12.37	-3%	-9%			-4%	1%	-5%
Z COG heave	m	-1.83	0.08			-1.55	-2.19	-1.32	0.07	0.07	0.00	-1.14	-1.63	81%	-16%			65%	88%	-23%
Rotations of Spar																				
Roll	deg	-0.21	0.31			0.84	-1.43	-0.36	0.29	0.15	0.25	1.24	-2.08	-7%	-7%			18%	-29%	46%
Pitch	deg	-0.56	0.11			-0.12	-1.00	-0.20	0.04	0.04	0.00	-0.05	-0.42	40%	-64%			8%	65%	-58%
Yaw	deg	0.19	0.21			1.04	-0.65	-0.05	0.52	0.52	0.00	1.85	-1.94	-14%	143%			48%	-76%	124%
Spar-Waterline Rel Motion	m	-1.84	0.08			-1.56	-2.20	1.40	1.51	0.07	1.51	8.83	-3.69	507%	1697%			1626%	-233%	1859%
Wave Elev in Moonpool	m	1.21	0.26			2.26	0.13	1.32	0.07	0.07	0.01	1.51	1.14	5%	-73%			-35%	48%	-83%
Forces in mooring lines at fairlead																				
F line 1 (LTM)	kN	2181	15			2243	2125	2224	11	11	0	2265	2186	37%	-24%			19%	52%	-34%
F line 2 (LTM)	kN	2254	27			2362	2141	2265	22	19	11	2350	2184	5%	-20%			-5%	19%	-25%
F line 3	kN	2438	46			2637	2238	2419	42	36	22	2592	2248	-5%	-10%			-11%	3%	-14%
F line 4	kN	2725	70			3021	2485	2694	67	57	35	2988	2418	-6%	-5%			-6%	-13%	6%
F line 5	kN	3447	125			4021	3075	3205	124	112	53	3756	2704	-26%	-1%			-28%	-39%	11%
F line 6	kN	4720	326			6121	3901	4565	345	343	41	5989	3772	-7%	6%			-6%	-6%	0%
F line 7 (HTM)	kN	7109	529			8969	5839	7680	660	658	61	10163	5920	18%	25%			38%	3%	36%
F line 8 (HTM)	kN	10897	349			12105	9875	10857	452	452	2	12437	9436	-2%	29%			15%	-20%	35%
F line 9 (HTM)	kN	9563	609			12132	7830	9001	621	617	71	11306	7146	-13%	2%			-19%	-16%	-3%
F line 10	kN	5818	525			8242	4423	5951	602	598	67	8441	4509	3%	15%			5%	2%	3%
F line 11	kN	3896	205			4797	3227	3922	250	239	72	5016	3106	2%	22%			14%	-8%	22%
F line 12	kN	2888	86			3260	2559	2948	92	81	44	3354	2569	8%	7%			13%	1%	12%
F line 13	kN	2544	55			2773	2333	2579	50	44	25	2781	2380	8%	-8%			2%	11%	-9%
F line 14 (LTM)	kN	2262	33			2373	2124	2336	27	24	11	2442	2233	30%	-20%			28%	44%	-16%
Riser Top Tensions																				
Production riser A1	kN	2221	39			2332	2110	2078	3	2	2	2089	2067	-64%	-93%			-110%	-19%	-90%
Gas Export E1	kN	988	30			1103	893	861	3	2	2	872	850	-60%	-91%			-110%	-20%	-90%
Production riser C5	kN	2199	27			2314	2104	2084	3	2	2	2096	2073	-54%	-90%			-104%	-14%	-89%