

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Hurricane Wind Only		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = simulation mean - measured mean /measured (Max-Min)																
Test 52001 (1 hr)		2. WF St.Dev. Includes all frequencies > .032 Hz		Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. / [measured Std. Dev.]																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted		MaxMin FOM = simulation MaxMin - measured 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.									(Max - Min)
Translations (Earth fixed)																				
X COG surge	m	-62.60	1.25			-58.60	-65.80	-62.73	2.25	2.25	0.00	-57.05	-67.98	-2%	80%			22%	-30%	52%
Y COG sway	m	-37.70	2.25			-32.90	-43.10	-36.31	2.28	2.28	0.00	-30.66	-41.60	14%	1%			22%	15%	7%
Z COG heave	m	-1.31	0.07			-1.06	-1.53	-1.41	0.12	0.12	0.00	-1.13	-1.69	-21%	71%			-15%	-34%	19%
Rotations																				
Roll	deg	-0.18	0.05			-0.02	-0.38	-0.10	0.00	0.00	0.00	-0.10	-0.10	22%	-100%			-22%	78%	-100%
Pitch	deg	-0.07	0.07			0.14	-0.26	-0.17	0.00	0.00	0.00	-0.17	-0.17	-25%	-100%			-78%	23%	-100%
Yaw	deg	3.80	0.77			5.80	1.83	3.99	0.88	0.88	0.00	5.69	2.35	5%	14%			-3%	13%	-16%
Forces in Tendons & Risers																				
F Tendon 1	kN	13109	161			13716	12589	12697	117	117	0	12981	12450	-37%	-28%			-65%	-12%	-53%
F Tendon 2	kN	13478	178			14162	12880	12756	116	116	0	13039	12512	-56%	-35%			-88%	-29%	-59%
F Tendon 3	kN	13336	161			13960	12786	12761	117	117	0	13041	12519	-49%	-27%			-78%	-23%	-55%
F Tendon 4	kN	12295	116			12708	11874	12223	95	95	0	12448	12048	-9%	-19%			-31%	21%	-52%
F Tendon 5	kN	11858	116			12268	11467	12138	92	92	0	12354	11969	35%	-20%			11%	63%	-52%
F Tendon 6	kN	12420	126			12841	11941	12030	91	91	0	12241	11867	-43%	-28%			-67%	-8%	-58%
F Tendon 7	kN	11575	102			11927	11155	10971	72	72	0	11141	10841	-78%	-29%			-102%	-41%	-61%
F Tendon 8	kN	11121	107			11499	10719	10916	71	71	0	11085	10788	-26%	-34%			-53%	9%	-62%
F Tendon 9	kN	11361	106			11752	10938	10909	72	72	0	11081	10774	-56%	-33%			-82%	-20%	-62%
F Tendon 10	kN	11918	128			12380	11522	11433	101	101	0	11666	11239	-57%	-21%			-83%	-33%	-50%
F Tendon 11	kN	11790	135			12277	11306	11521	102	102	0	11759	11324	-28%	-24%			-53%	2%	-55%
F Tendon 12	kN	11830	136			12295	11346	11624	103	103	0	11869	11417	-22%	-24%			-45%	7%	-52%
F Tendon 11 Bottom	kN	7897	152			8423	7375													
F Riser 1	kN	3841	23			3917	3775	3912	32	32	0	3977	3833	50%	37%			43%	41%	2%
F Riser 2	kN	3843	28			3931	3757	3920	32	32	0	3987	3841	44%	13%			32%	48%	-16%
F Riser 3	kN	3784	23			3852	3708	3905	33	33	0	3970	3824	84%	44%			82%	80%	2%
F Riser 4	kN	3844	27			3933	3753	3913	32	32	0	3979	3831	38%	19%			26%	44%	-18%
F Riser 5	kN	3859	26			3937	3773	3898	33	33	0	3963	3814	24%	26%			16%	25%	-9%
F Riser 6	kN	3776	21			3851	3705	3906	33	33	0	3972	3822	89%	61%			83%	80%	3%
F Riser 7	kN	3851	26			3934	3767	3896	31	31	0	3959	3818	27%	18%			15%	31%	-15%
F Riser 8	kN	3883	25			3969	3806	3904	31	31	0	3968	3825	13%	24%			0%	12%	-12%
F Riser 9	kN	3843	20			3903	3775	3889	32	32	0	3952	3809	36%	60%			39%	27%	12%
F Riser 10	kN	3679	20			3735	3614	3883	33	33	0	3945	3800	168%	69%			174%	154%	20%
F Riser 11	kN	3829	18			3882	3770	3890	33	33	0	3954	3807	55%	82%			64%	33%	31%
F Riser 12	kN	7794	54			7984	7596	7681	58	58	0	7814	7545	-29%	8%			-44%	-13%	-31%

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Hurricane Current Only Test 52004 (1 hr)		1. All tests of 3 hour duration unless otherwise noted				Mean FOM = simulation mean - measured mean /measured (Max-Min)														
		2. WF St.Dev. Includes all frequencies > .032 Hz				Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. / (measured Std. Dev.)														
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted				MaxMin FOM = simulation MaxMin - measured 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 (Earth fixed)																				
X COG surge	m	-42.80	3.86			-33.40	-49.40	-40.37	4.22	4.22	0.00	-29.90	-50.01	15%	9%			22%	-4%	26%
Y COG sway	m	28.02	2.83			34.63	20.54	25.67	2.71	2.71	0.00	31.85	18.97	-17%	-4%			-20%	-11%	-9%
Z COG heave	m	-0.88	0.14			-0.50	-1.13	-0.63	0.13	0.13	0.00	-0.35	-0.96	40%	-7%			24%	27%	-3%
Rotations																				
Roll	deg	0.09	0.06			0.29	-0.11	0.13	0.00	0.00	0.00	0.13	0.13	10%	-100%			-40%	60%	-100%
Pitch	deg	-0.03	0.06			0.16	-0.22	-0.08	0.00	0.00	0.00	-0.08	-0.08	-13%	-100%			-63%	37%	-100%
Yaw	deg	-5.66	2.16			-0.49	-10.90	-5.73	2.14	2.14	0.00	-2.11	-9.42	-1%	-1%			-16%	14%	-30%
Forces in Tendons & Risers																				
F Tendon 1	kN	11525	86			11729	11271	11238	98	98	0	11502	11142	-63%	15%			-50%	-28%	-22%
F Tendon 2	kN	11614	80			11815	11382	11246	102	102	0	11522	11153	-85%	28%			-68%	-53%	-15%
F Tendon 3	kN	11529	72			11707	11305	11245	105	105	0	11525	11144	-71%	45%			-45%	-40%	-5%
F Tendon 4	kN	11302	82			11503	11044	11277	116	116	0	11607	11147	-6%	42%			23%	22%	0%
F Tendon 5	kN	10890	68			11101	10674	11279	117	117	0	11618	11151	91%	72%			121%	112%	9%
F Tendon 6	kN	11394	82			11627	11132	11272	117	117	0	11607	11142	-25%	43%			-4%	2%	-6%
F Tendon 7	kN	11585	73			11832	11372	11223	94	94	0	11503	11142	-79%	28%			-71%	-50%	-21%
F Tendon 8	kN	11218	95			11512	10963	11222	92	92	0	11501	11153	1%	-3%			-2%	35%	-37%
F Tendon 9	kN	11655	85			11921	11423	11215	89	89	0	11482	11142	-88%	4%			-88%	-57%	-32%
F Tendon 10	kN	11350	69			11536	11156	11193	68	68	0	11398	11168	-41%	-1%			-36%	3%	-39%
F Tendon 11	kN	11290	69			11461	11103	11197	67	67	0	11407	11178	-26%	-3%			-15%	21%	-36%
F Tendon 12	kN	11331	69			11514	11139	11196	67	67	0	11401	11166	-36%	-3%			-30%	7%	-37%
F Tendon 11 Bottom	kN	7406	69			7580	7204													
F Riser 1	kN	3651	35			3732	3548	3674	61	61	0	3765	3535	13%	73%			18%	-7%	25%
F Riser 2	kN	3641	38			3726	3530	3672	62	62	0	3765	3533	16%	62%			20%	2%	18%
F Riser 3	kN	3611	45			3712	3485	3678	60	60	0	3769	3541	30%	32%			25%	25%	1%
F Riser 4	kN	3678	40			3771	3567	3677	60	60	0	3769	3539	-1%	50%			-1%	-14%	13%
F Riser 5	kN	3636	49			3740	3499	3683	58	58	0	3774	3546	19%	18%			14%	20%	-5%
F Riser 6	kN	3583	52			3724	3384	3681	59	59	0	3773	3545	29%	12%			15%	47%	-33%
F Riser 7	kN	3642	54			3746	3482	3678	59	59	0	3768	3542	14%	9%			8%	23%	-15%
F Riser 8	kN	3679	51			3782	3535	3676	60	60	0	3766	3538	-1%	19%			-6%	1%	-8%
F Riser 9	kN	3670	45			3758	3546	3683	58	58	0	3772	3547	6%	28%			7%	0%	6%
F Riser 10	kN	3526	41			3611	3404	3688	56	56	0	3777	3552	78%	39%			80%	71%	9%
F Riser 11	kN	3636	35			3713	3539	3685	58	58	0	3775	3549	28%	67%			36%	6%	30%
F Riser 12	kN	7356	92			7552	7091	7264	81	81	0	7423	7075	-20%	-12%			-28%	-4%	-25%

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Hurricane Wind & Current On Test 52005 (1 hr)		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = simulation mean - measured mean /measured (Max-Min)												Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. / [measured Std. Dev.]				
		2. WF St.Dev. Includes all frequencies > .032 Hz		MaxMin FOM = simulation MaxMin - measured MaxMin /measured (Max-Min)																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted																		
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 (Earth fixed)																				
X COG surge	m	-96.20	2.75			-89.40	-102.00	-93.97	4.13	4.13	0.00	-83.26	-103.55	18%	50%			49%	-12%	61%
Y COG sway	m	-10.70	2.88			-5.41	-18.50	-12.55	3.41	3.41	0.00	-3.81	-20.11	-14%	18%			12%	-12%	25%
Z COG heave	m	-2.49	0.14			-2.08	-2.87	-2.38	0.23	0.23	0.00	-1.85	-2.94	14%	64%			29%	-9%	38%
Rotations																				
Roll	deg	0.14	0.13			0.51	-0.19	0.22	0.00	0.00	0.00	0.22	0.22	11%	-100%			-41%	59%	-100%
Pitch	deg	-0.03	0.05			0.14	-0.19	-0.06	0.00	0.00	0.00	-0.06	-0.06	-9%	-100%			-61%	39%	-100%
Yaw	deg	-4.16	2.18			0.81	-9.74	-3.10	2.07	2.07	0.00	1.09	-7.28	10%	-5%			3%	23%	-21%
Forces in Tendons & Risers																				
F Tendon 1	kN	14093	205			14875	13357	13510	228	228	0	14066	12987	-38%	11%			-53%	-24%	-29%
F Tendon 2	kN	14425	218			15285	13671	13564	230	230	0	14126	13038	-53%	5%			-72%	-39%	-33%
F Tendon 3	kN	14175	200			14925	13485	13560	227	227	0	14117	13042	-43%	14%			-56%	-31%	-25%
F Tendon 4	kN	13054	161			13633	12530	12939	187	187	0	13391	12519	-10%	16%			-22%	-1%	-21%
F Tendon 5	kN	12497	152			13092	11963	12846	185	185	0	13299	12437	31%	21%			18%	42%	-24%
F Tendon 6	kN	13174	165			13802	12579	12739	180	180	0	13181	12341	-36%	9%			-51%	-19%	-31%
F Tendon 7	kN	12272	133			12698	11752	11704	156	156	0	12093	11370	-60%	17%			-64%	-40%	-24%
F Tendon 8	kN	11833	157			12373	11224	11654	158	158	0	12044	11320	-16%	0%			-29%	8%	-37%
F Tendon 9	kN	12216	145			12701	11679	11656	157	157	0	12040	11316	-55%	8%			-65%	-36%	-29%
F Tendon 10	kN	12701	161			13224	12146	12264	190	190	0	12734	11829	-41%	18%			-45%	-29%	-16%
F Tendon 11	kN	12624	173			13204	12047	12354	197	197	0	12839	11910	-23%	14%			-32%	-12%	-20%
F Tendon 12	kN	12654	175			13230	12051	12457	201	201	0	12947	12007	-17%	15%			-24%	-4%	-20%
F Tendon 11 Bottom	kN	8755	188			9384	8114													
F Riser 1	kN	4094	28			4176	4001	4120	44	44	0	4215	4013	15%	57%			22%	7%	15%
F Riser 2	kN	4087	33			4192	3972	4129	45	45	0	4226	4021	19%	34%			16%	22%	-7%
F Riser 3	kN	4030	31			4117	3939	4116	45	45	0	4214	4007	48%	43%			54%	38%	16%
F Riser 4	kN	4122	34			4215	4011	4126	46	46	0	4225	4016	2%	35%			5%	2%	3%
F Riser 5	kN	4090	36			4193	3981	4113	46	46	0	4212	4002	11%	28%			9%	10%	-1%
F Riser 6	kN	4011	29			4090	3911	4123	46	46	0	4224	4011	62%	61%			75%	56%	19%
F Riser 7	kN	4099	34			4208	3987	4100	42	42	0	4192	3996	1%	25%			-7%	4%	-11%
F Riser 8	kN	4125	32			4213	4014	4110	43	43	0	4203	4004	-8%	36%			-5%	-5%	0%
F Riser 9	kN	4074	28			4156	3986	4097	43	43	0	4191	3990	14%	52%			21%	2%	18%
F Riser 10	kN	3929	28			4010	3838	4094	44	44	0	4191	3985	96%	54%			105%	85%	20%
F Riser 11	kN	4036	25			4104	3963	4104	45	45	0	4201	3993	48%	81%			69%	22%	48%
F Riser 12	kN	8269	70			8497	8053	8086	82	82	0	8269	7878	-46%	19%			-51%	-39%	-12%

DeepStar TLP		Notes:							Figures of Merit (FOM):												
Hurricane WWC		1. All tests of 3 hour duration unless otherwise noted							:Mean FOM = simulation mean - measured mean /measured (Max-Min)												
Test 502008		2. WF St.Dev. Includes all frequencies > .032 Hz							:Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. /[measured Std. Dev.]												
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted							:MaxMin FOM = simulation MaxMin - measured 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 (Earth fixed)																					
X COG surge	m	-112.22	6.14	5.88	1.79	-92.58	-134.65	-109.18	5.75	5.58	1.40	-92.33	-126.52	7%	-6%	-5%	-22%	1%	19%	-19%	
Y COG sway	m	-9.80	3.88	3.87	0.22	1.20	-22.06	-7.99	3.76	3.76	0.00	3.32	-17.62	8%	-3%	-3%	-100%	9%	19%	-10%	
Z COG heave	m	-3.44	0.38	0.36	0.11	-2.31	-4.97	-3.16	0.35	0.33	0.10	-2.15	-4.31	10%	-7%	-8%	-9%	6%	25%	-19%	
Rotations																					
Roll	deg	0.16	0.18	0.18	0.02	0.61	-0.36	0.26	0.01	0.00	0.01	0.28	0.23	10%	-94%	-100%	-59%	-34%	61%	-95%	
Pitch	deg	-0.10	0.05	0.02	0.05	0.12	-0.42	-0.08	0.07	0.00	0.07	0.18	-0.35	4%	36%	-100%	45%	11%	13%	-1%	
Yaw	deg	-1.94	2.72	2.71	0.12	5.18	-8.53	-3.34	1.93	1.93	0.05	1.55	-8.29	-10%	-29%	-29%	-60%	-26%	2%	-28%	
Forces in Tendons & Risers																					
F Tendon 1	kN	14913	659	422	506	18522	12432	14190	630	337	532	16863	11553	-12%	-4%	-20%	5%	-27%	-14%	-13%	
F Tendon 2	kN	15287	681	419	537	19041	12772	14255	652	339	557	17035	11508	-16%	-4%	-19%	4%	-32%	-20%	-12%	
F Tendon 3	kN	15091	647	404	506	18576	12674	14260	664	334	574	17096	11450	-14%	3%	-17%	13%	-25%	-21%	-4%	
F Tendon 4	kN	13940	655	333	564	17951	11538	13652	626	296	551	16332	11015	-4%	-4%	-11%	-2%	-25%	-8%	-17%	
F Tendon 5	kN	13269	601	328	504	17037	10923	13560	606	291	532	16152	11006	5%	1%	-11%	6%	-14%	1%	-16%	
F Tendon 6	kN	14082	622	324	530	17521	11740	13445	582	283	509	15929	10996	-11%	-6%	-13%	-4%	-28%	-13%	-15%	
F Tendon 7	kN	13026	798	293	742	17962	7884	12300	856	240	822	15847	8798	-7%	7%	-18%	11%	-21%	9%	-30%	
F Tendon 8	kN	12635	839	324	774	17943	7318	12241	905	240	873	15982	8546	-4%	8%	-26%	13%	-18%	12%	-30%	
F Tendon 9	kN	12907	903	300	852	18311	6803	12234	938	240	906	16106	8409	-6%	4%	-20%	6%	-19%	14%	-33%	
F Tendon 10	kN	13423	831	285	780	18483	8041	12816	945	280	902	16759	8911	-6%	14%	-2%	16%	-17%	8%	-25%	
F Tendon 11	kN	13378	821	288	769	18156	8126	12913	914	285	869	16738	9124	-5%	11%	-1%	13%	-14%	10%	-24%	
F Tendon 12	kN	13418	796	281	745	17969	8222	13025	865	289	815	16656	9430	-4%	9%	3%	9%	-13%	12%	-26%	
F Tendon 11 Bottom	kN	9503	848	286	798	14524	4023														
F Riser 1	kN	4208	117	61	100	4669	3539	4264	117	59	101	4710	3809	5%	0%	-4%	2%	4%	24%	-20%	
F Riser 2	kN	4175	127	67	107	4665	3494	4274	125	59	110	4727	3813	8%	-1%	-11%	2%	5%	27%	-22%	
F Riser 3	kN	4158	126	73	103	4634	3493	4260	133	59	120	4736	3776	9%	6%	-19%	16%	9%	25%	-16%	
F Riser 4	kN	4167	118	67	97	4626	3585	4270	141	60	128	4752	3780	10%	19%	-11%	32%	12%	19%	-7%	
F Riser 5	kN	4213	138	85	108	4732	3541	4257	148	60	135	4758	3747	4%	8%	-29%	25%	2%	17%	-15%	
F Riser 6	kN	3958	114	66	93	4402	3329	4267	155	60	143	4773	3752	29%	36%	-8%	53%	35%	39%	-5%	
F Riser 7	kN	4221	131	65	113	4754	3434	4243	152	58	141	4773	3705	2%	16%	-12%	24%	1%	21%	-19%	
F Riser 8	kN	4266	128	65	111	4752	3589	4253	128	58	114	4730	3769	-1%	0%	-11%	3%	-2%	15%	-17%	
F Riser 9	kN	4207	124	66	105	4698	3529	4240	166	58	156	4794	3677	3%	35%	-12%	49%	8%	13%	-5%	
F Riser 10	kN	3981	123	62	106	4477	3298	4237	178	59	168	4811	3653	22%	45%	-5%	58%	28%	30%	-2%	
F Riser 11	kN	4196	116	64	97	4641	3576	4247	157	59	146	4774	3710	5%	36%	-7%	51%	13%	13%	0%	
F Riser 12	kN	8576	329	157	289	9767	7002	8363	130	111	69	8997	7712	-8%	-60%	-30%	-76%	-28%	26%	-54%	

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Hurricane Wave Only		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = simulation mean - measured mean /measured (Max-Min)																
Test 505001		2. WF St.Dev. Includes all frequencies > .032 Hz		Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. / (measured Std. Dev.)																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted		MaxMin FOM = simulation MaxMin - measured 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.									(Max - Min)
Translations (Earth fixed)																				
X COG surge	m	-14.69	4.17	3.74	1.83	-3.31	-34.34	-15.51	6.19	6.01	1.48	2.16	-36.19	-3%	49%	61%	-19%	18%	-6%	24%
Y COG sway	m	0.19	0.64	0.60	0.22	2.32	-1.89	0.00	0.00	0.00	0.00	0.00	0.00	-4%	-100%	-100%	-100%	-55%	45%	-100%
Z COG heave	m	-0.10	0.07	0.04	0.05	0.13	-0.55	-0.07	0.07	0.05	0.05	0.19	-0.41	4%	4%	26%	-8%	8%	20%	-12%
Rotations																				
Roll	deg	0.06	0.03	0.01	0.03	0.17	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	-23%	-100%	-100%	-100%	-69%	31%	-100%
Pitch	deg	-0.01	0.05	0.01	0.05	0.24	-0.41	-0.01	0.07	0.00	0.07	0.25	-0.27	0%	31%	-100%	32%	2%	21%	-19%
Yaw	deg	-1.01	0.67	0.67	0.09	2.02	-3.25	0.00	0.00	0.00	0.00	0.00	0.00	19%	-100%	-100%	-100%	-38%	62%	-100%
Forces in Tendons & Risers																				
F Tendon 1	kN	11228	423	77	416	14065	8878	11079	499	39	498	13008	9149	-3%	18%	-49%	20%	-20%	5%	-26%
F Tendon 2	kN	11366	489	93	480	14553	8671	11087	527	42	526	13133	9041	-5%	8%	-54%	9%	-24%	6%	-30%
F Tendon 3	kN	11377	440	91	431	14613	9225	11092	546	44	544	13214	8969	-5%	24%	-51%	26%	-26%	-5%	-21%
F Tendon 4	kN	11060	468	101	457	14256	9313	11092	546	44	544	13214	8969	1%	17%	-56%	19%	-21%	-7%	-14%
F Tendon 5	kN	10693	443	93	433	13708	8402	11087	527	42	526	13133	9041	7%	19%	-54%	21%	-11%	12%	-23%
F Tendon 6	kN	11092	439	83	432	13724	8609	11079	499	39	498	13008	9150	0%	14%	-52%	15%	-14%	11%	-25%
F Tendon 7	kN	11243	818	54	816	15628	7086	10970	775	19	775	13926	8020	-3%	-5%	-64%	-5%	-20%	11%	-31%
F Tendon 8	kN	10963	860	52	859	15542	6637	10962	827	19	826	14119	7810	0%	-4%	-63%	-4%	-16%	13%	-29%
F Tendon 9	kN	11200	961	63	959	15960	6088	10957	857	19	857	14234	7687	-2%	-11%	-70%	-11%	-17%	16%	-34%
F Tendon 10	kN	11058	901	54	899	15783	6220	10957	857	19	857	14234	7687	-1%	-5%	-64%	-5%	-16%	15%	-32%
F Tendon 11	kN	10979	898	50	896	15822	6719	10962	826	19	826	14119	7810	0%	-8%	-62%	-8%	-19%	12%	-31%
F Tendon 12	kN	11014	874	54	872	15336	6219	10970	775	19	775	13925	8021	0%	-11%	-65%	-11%	-15%	20%	-35%
F Tendon 11 Bottom	kN	7075	923	49	922	12091	2680													
F Riser 1	kN	3385	87	21	84	3788	2890	3407	88	46	75	3779	3058	2%	1%	119%	-11%	-1%	19%	-20%
F Riser 2	kN	3388	86	22	83	3772	2846	3408	85	47	71	3768	3071	2%	0%	115%	-14%	0%	24%	-25%
F Riser 3	kN	3289	81	24	77	3641	2908	3407	88	46	75	3779	3058	16%	9%	94%	-3%	19%	20%	-2%
F Riser 4	kN	3367	81	20	79	3725	2900	3408	85	47	71	3768	3071	5%	5%	134%	-9%	5%	21%	-15%
F Riser 5	kN	3389	81	23	78	3739	2955	3407	88	46	75	3779	3058	2%	9%	106%	-4%	5%	13%	-8%
F Riser 6	kN	3281	84	22	81	3626	2803	3408	85	47	71	3768	3071	15%	2%	113%	-12%	17%	33%	-15%
F Riser 7	kN	3351	102	21	99	3798	2942	3404	97	46	86	3816	3016	6%	-4%	113%	-14%	2%	9%	-7%
F Riser 8	kN	3395	87	26	84	3786	2995	3405	92	46	80	3795	3040	1%	5%	79%	-5%	1%	6%	-4%
F Riser 9	kN	3405	81	20	79	3795	3021	3404	97	46	86	3816	3016	0%	19%	127%	9%	3%	-1%	3%
F Riser 10	kN	3226	88	19	86	3628	2779	3404	97	46	86	3816	3016	21%	11%	139%	0%	22%	28%	-6%
F Riser 11	kN	3399	83	19	80	3776	2937	3405	92	46	80	3795	3040	1%	11%	143%	-1%	2%	12%	-10%
F Riser 12	kN	6848	186	46	181	7785	5906	6940	192	62	181	7726	6216	5%	3%	37%	0%	-3%	16%	-20%

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Loop Wind Only		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = simulation mean - measured mean /measured (Max-Min)																
Test 508002 (1 hr)		2. WF St.Dev. Includes all frequencies > .032 Hz		Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. /[measured Std. Dev.]																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted		MaxMin FOM = simulation MaxMin - measured 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.									(Max - Min)
Translations (Earth fixed)																				
X COG surge	m	0.21	0.50			1.47	-1.89	0.21	0.52	0.52	0.00	1.43	-1.00	0%	4%			-1%	26%	-28%
Y COG sway	m	20.15	0.87			22.05	17.87	19.51	0.86	0.86	0.00	21.56	17.66	-15%	-1%			-12%	-5%	-7%
Z COG heave	m	-0.08	0.03			0.00	-0.17	-0.10	0.01	0.01	0.00	-0.08	-0.13	-12%	-67%			-47%	24%	-71%
Rotations																				
Roll	deg	-0.04	0.02			0.03	-0.11	-0.02	0.00	0.00	0.00	-0.02	-0.02	14%	-100%			-36%	64%	-100%
Pitch	deg	0.04	0.04			0.15	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	-17%	-100%			-65%	35%	-100%
Yaw	deg	0.65	0.47			1.78	-0.79	0.59	0.67	0.67	0.00	1.52	-0.38	-2%	43%			-10%	16%	-26%
Forces in Tendons & Risers																				
F Tendon 1	kN	11022	35			11155	10908	10886	12	12	0	10913	10885	-55%	-67%			-98%	-9%	-89%
F Tendon 2	kN	11115	40			11265	10970	10901	11	11	0	10927	10900	-73%	-72%			-115%	-24%	-91%
F Tendon 3	kN	11150	35			11292	11037	10922	11	11	0	10948	10923	-89%	-70%			-135%	-45%	-90%
F Tendon 4	kN	11236	35			11376	11115	11192	9	9	0	11220	11195	-17%	-74%			-60%	31%	-91%
F Tendon 5	kN	10878	37			11010	10752	11212	10	10	0	11241	11212	129%	-73%			89%	178%	-89%
F Tendon 6	kN	11183	38			11315	11049	11221	10	10	0	11251	11219	14%	-73%			-24%	64%	-88%
F Tendon 7	kN	11487	37			11613	11352	11189	10	10	0	11221	11175	-114%	-72%			-150%	-68%	-82%
F Tendon 8	kN	11216	38			11359	11087	11175	10	10	0	11206	11160	-15%	-74%			-56%	27%	-83%
F Tendon 9	kN	11452	40			11590	11318	11153	9	9	0	11182	11140	-110%	-77%			-150%	-66%	-84%
F Tendon 10	kN	10911	34			11034	10769	10881	6	6	0	10893	10884	-11%	-83%			-53%	43%	-97%
F Tendon 11	kN	10856	33			10985	10719	10862	7	7	0	10876	10863	2%	-79%			-41%	54%	-95%
F Tendon 12	kN	10940	33			11059	10807	10853	8	8	0	10869	10853	-35%	-76%			-75%	18%	-94%
F Tendon 11 Bottom	kN	6977	38			7110	6820													
F Riser 1	kN	3393	10			3424	3359	3432	5	5	0	3443	3422	60%	-52%			30%	97%	-67%
F Riser 2	kN	3419	9			3446	3392	3433	5	5	0	3443	3422	25%	-44%			-5%	55%	-60%
F Riser 3	kN	3360	6			3379	3339	3435	5	5	0	3446	3424	187%	-17%			168%	214%	-45%
F Riser 4	kN	3403	9			3432	3372	3436	5	5	0	3446	3425	54%	-45%			24%	88%	-64%
F Riser 5	kN	3389	7			3413	3366	3438	5	5	0	3449	3427	104%	-32%			78%	130%	-53%
F Riser 6	kN	3323	6			3349	3304	3438	5	5	0	3450	3427	257%	-12%			223%	274%	-51%
F Riser 7	kN	3373	12			3419	3324	3431	5	5	0	3443	3421	61%	-61%			25%	102%	-77%
F Riser 8	kN	3397	10			3428	3364	3431	5	5	0	3443	3422	54%	-51%			24%	90%	-66%
F Riser 9	kN	3418	9			3447	3389	3433	5	5	0	3446	3424	27%	-46%			-1%	60%	-62%
F Riser 10	kN	3253	10			3285	3218	3436	5	5	0	3449	3427	274%	-49%			245%	312%	-66%
F Riser 11	kN	3423	8			3448	3396	3437	5	5	0	3449	3427	27%	-40%			3%	60%	-57%
F Riser 12	kN	7004	18			7064	6938	6981	10	10	0	7008	6962	-18%	-42%			-44%	19%	-63%

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Loop Wind & Current Only Test 508004 (1 hr)		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = simulation mean - measured mean /measured (Max-Min)												Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. [measured Std. Dev.]				
		2. WF St.Dev. Includes all frequencies > .032 Hz		MaxMin FOM = simulation MaxMin - measured MaxMin /measured (Max-Min)																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted																		
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 (Earth fixed)																				
X COG surge	m	139.90	3.85			147.70	128.70	140.64	2.60	2.60	0.00	147.46	134.25	4%	-32%			-1%	29%	-30%
Y COG sway	m	13.18	2.69			21.66	7.27	10.46	3.15	3.15	0.00	17.80	2.48	-19%	17%			-27%	-33%	6%
Z COG heave	m	-5.45	0.29			-4.59	-6.08	-5.21	0.21	0.21	0.00	-4.73	-5.77	16%	-28%			-9%	21%	-30%
Rotations																				
Roll	deg	-0.44	0.17			0.02	-0.89	-0.40	0.00	0.00	0.00	-0.40	-0.40	4%	-100%			-46%	54%	-100%
Pitch	deg	-0.05	0.05			0.11	-0.26	-0.04	0.00	0.00	0.00	-0.04	-0.04	3%	-100%			-41%	59%	-100%
Yaw	deg	-4.92	2.08			0.36	-9.76	-4.81	0.58	0.58	0.00	-3.39	-6.10	1%	-72%			-37%	36%	-73%
Forces in Tendons & Risers																				
F Tendon 1	kN	14571	294			15405	13377	14877	174	174	0	15284	14543	15%	-41%			-6%	57%	-63%
F Tendon 2	kN	15234	281			16073	14152	14891	172	172	0	15295	14558	-18%	-39%			-41%	21%	-62%
F Tendon 3	kN	15858	268			16681	14959	14906	170	170	0	15308	14572	-55%	-37%			-80%	-22%	-57%
F Tendon 4	kN	15802	371			16926	14588	15101	186	186	0	15547	14728	-30%	-50%			-59%	6%	-65%
F Tendon 5	kN	14424	291			15402	13344	15117	192	192	0	15575	14735	34%	-34%			8%	68%	-59%
F Tendon 6	kN	15200	271			16119	14234	15121	196	196	0	15588	14731	-4%	-28%			-28%	26%	-55%
F Tendon 7	kN	15423	294			16376	14380	15107	232	232	0	15662	14626	-16%	-21%			-36%	12%	-48%
F Tendon 8	kN	15137	298			16273	13948	15100	235	235	0	15660	14613	-2%	-21%			-26%	29%	-55%
F Tendon 9	kN	15154	313			15999	13800	15082	235	235	0	15644	14596	-3%	-25%			-16%	36%	-52%
F Tendon 10	kN	14827	325			15906	13674	14884	217	217	0	15401	14442	3%	-33%			-23%	34%	-57%
F Tendon 11	kN	14786	322			15837	13709	14875	211	211	0	15386	14437	4%	-34%			-21%	34%	-55%
F Tendon 12	kN	15246	402			16415	13847	14866	206	206	0	15367	14437	-15%	-49%			-41%	23%	-64%
F Tendon 11 Bottom	kN	10926	338			12049	9743													
F Riser 1	kN	4560	71			4731	4344	4565	52	52	0	4683	4453	1%	-28%			-13%	28%	-41%
F Riser 2	kN	4601	78			4760	4370	4565	51	51	0	4681	4454	-9%	-35%			-20%	22%	-42%
F Riser 3	kN	4520	62			4704	4305	4564	52	52	0	4682	4453	11%	-17%			-6%	37%	-43%
F Riser 4	kN	4481	69			4653	4221	4564	51	51	0	4680	4454	19%	-25%			6%	54%	-48%
F Riser 5	kN	4521	65			4692	4300	4564	52	52	0	4681	4453	11%	-20%			-3%	39%	-42%
F Riser 6	kN	4459	63			4626	4241	4563	52	52	0	4680	4454	27%	-17%			14%	55%	-41%
F Riser 7	kN	4651	66			4804	4467	4566	52	52	0	4686	4452	-25%	-21%			-35%	-4%	-31%
F Riser 8	kN	4620	67			4835	4395	4565	52	52	0	4684	4453	-12%	-22%			-34%	13%	-47%
F Riser 9	kN	4647	69			4799	4463	4565	53	53	0	4684	4452	-24%	-23%			-34%	-3%	-31%
F Riser 10	kN	4531	55			4672	4375	4564	53	53	0	4684	4452	11%	-4%			4%	26%	-22%
F Riser 11	kN	4573	85			4762	4301	4564	53	53	0	4682	4453	-2%	-38%			-17%	33%	-50%
F Riser 12	kN	9401	140			9714	8894	8993	115	115	0	9246	8758	-50%	-18%			-57%	-17%	-40%

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Loop WW&C		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = $\frac{\text{simulation mean} - \text{measured mean}}{\text{measured (Max-Min)}}$																
Test 508005		2. WF St.Dev. Includes all frequencies > .032 Hz		Std. Dev. FOM = $\frac{\text{simulation Std. Dev.} - \text{measured Std. Dev.}}{\text{measured Std. Dev.}}$																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted		MaxMin FOM = $\frac{\text{simulation MaxMin} - \text{measured MaxMin}}{\text{measured (Max-Min)}}$																
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.									(Max - Min)
Translations (Earth fixed)																				
X COG surge	m	143.12	3.05	3.05	0.13	149.76	131.83	142.97	2.63	2.63	0.00	150.65	135.55	-1%	-14%	-14%	-100%	5%	21%	-16%
Y COG sway	m	12.99	2.86	2.81	0.55	22.45	3.24	12.81	3.26	3.23	0.47	22.49	2.24	-1%	14%	15%	-15%	0%	-5%	5%
Z COG heave	m	-5.72	0.24	0.23	0.03	-4.82	-6.26	-5.39	0.22	0.22	0.04	-4.74	-6.13	23%	-7%	-6%	29%	5%	9%	-4%
Rotations																				
Roll	deg	-0.37	0.16	0.15	0.03	0.21	-0.89	-0.41	0.05	0.00	0.05	-0.24	-0.57	-4%	-68%	-100%	92%	-41%	29%	-70%
Pitch	deg	-0.05	0.05	0.03	0.04	0.12	-0.25	-0.05	0.01	0.00	0.01	-0.03	-0.07	0%	-79%	-100%	-74%	-40%	49%	-89%
Yaw	deg	-3.84	1.88	1.88	0.12	2.26	-10.21	-4.84	0.57	0.57	0.07	-3.09	-6.41	-8%	-70%	-70%	-41%	-43%	31%	-73%
Forces in Tendons & Risers																				
F Tendon 1	kN	14707	409	256	319	16470	12315	15016	438	179	400	16896	13204	7%	7%	-30%	25%	10%	21%	-11%
F Tendon 2	kN	15331	442	275	346	16837	13149	15027	419	176	380	16829	13291	-8%	-5%	-36%	10%	0%	4%	-4%
F Tendon 3	kN	15942	410	268	310	17440	14020	15040	389	175	348	16713	13429	-26%	-5%	-35%	12%	-21%	-17%	-4%
F Tendon 4	kN	16121	367	280	238	17634	14723	15251	341	197	278	16695	13877	-30%	-7%	-29%	17%	-32%	-29%	-3%
F Tendon 5	kN	14646	340	257	223	16137	13378	15272	367	199	309	16839	13771	23%	8%	-23%	39%	25%	14%	11%
F Tendon 6	kN	15370	335	235	239	16697	13953	15281	384	201	327	16923	13704	-3%	14%	-15%	37%	8%	-9%	17%
F Tendon 7	kN	15535	350	271	222	16867	14073	15291	397	241	316	16978	13671	-9%	13%	-11%	42%	4%	-14%	18%
F Tendon 8	kN	15267	346	260	227	16647	13818	15285	384	243	297	16906	13731	1%	11%	-7%	31%	9%	-3%	12%
F Tendon 9	kN	15306	354	275	224	16851	13898	15269	359	240	267	16771	13830	-1%	1%	-13%	19%	-3%	-2%	0%
F Tendon 10	kN	14942	419	255	333	16650	13105	15057	425	221	363	16868	13307	3%	1%	-13%	9%	6%	6%	0%
F Tendon 11	kN	14917	450	275	355	16592	12900	15042	451	220	394	16970	13180	3%	0%	-20%	11%	10%	8%	3%
F Tendon 12	kN	15468	475	323	348	17352	13442	15029	465	216	411	17017	13108	-11%	-2%	-33%	18%	-9%	-9%	0%
F Tendon 11 Bottom	kN	11071	469	274	381	12877	8958													
F Riser 1	kN	4576	80	51	62	4890	4282	4589	70	54	45	4865	4325	2%	-12%	7%	-28%	-4%	7%	-11%
F Riser 2	kN	4617	96	52	81	4946	4289	4589	70	53	44	4862	4328	-4%	-28%	2%	-45%	-13%	6%	-19%
F Riser 3	kN	4537	68	54	42	4857	4293	4589	68	53	43	4854	4335	9%	0%	-1%	2%	-1%	7%	-8%
F Riser 4	kN	4484	73	53	49	4792	4241	4589	68	53	42	4852	4336	19%	-7%	-1%	-14%	11%	17%	-6%
F Riser 5	kN	4547	71	49	51	4851	4280	4589	66	53	40	4845	4343	7%	-6%	7%	-21%	-1%	11%	-12%
F Riser 6	kN	4478	62	49	38	4753	4236	4589	66	52	40	4845	4343	22%	7%	7%	6%	18%	21%	-3%
F Riser 7	kN	4692	75	47	58	5167	4399	4590	72	55	47	4873	4320	-13%	-4%	16%	-20%	-38%	-10%	-28%
F Riser 8	kN	4646	74	51	53	4979	4354	4590	71	54	46	4869	4322	-9%	-4%	6%	-14%	-18%	-5%	-13%
F Riser 9	kN	4692	74	48	56	5079	4426	4590	69	54	43	4859	4332	-16%	-6%	13%	-23%	-34%	-14%	-19%
F Riser 10	kN	4564	57	43	38	4836	4343	4591	67	54	40	4846	4345	5%	16%	24%	5%	2%	0%	2%
F Riser 11	kN	4616	75	56	50	4961	4317	4590	67	53	40	4845	4344	-4%	-11%	-5%	-20%	-18%	4%	-22%
F Riser 12	kN	9472	143	114	86	9949	8881	9048	160	114	112	9683	8430	-40%	12%	0%	30%	-25%	-42%	17%

DeepStar TLP		Notes:							Figures of Merit (FOM):												
Hurricane WWC		1. All tests of 3 hour duration unless otherwise noted							Mean FOM = $\frac{\text{simulation mean} - \text{measured mean}}{\text{measured (Max-Min)}}$												
9 hr Composite		2. WF St. Dev. Includes all frequencies > .032 Hz							Std. Dev. FOM = $\frac{\text{simulation Std. Dev.} - \text{measured Std. Dev.}}{\text{measured Std. Dev.}}$												
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted							MaxMin FOM = $\frac{\text{simulation MaxMin} - \text{measured MaxMin}}{\text{measured (Max-Min)}}$												
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 (Earth fixed)																					
X COG surge	m	-111.67	5.98	5.72	1.76	-92.58	-139.76	-109.18	5.75	5.58	1.40	-91.13	-128.73	5%	-4%	-2%	-20%	3%	23%	-20%	
Y COG sway	m	-9.98	4.19	4.19	0.25	1.95	-23.46	-7.99	3.76	3.76	0.00	4.88	-18.78	8%	-10%	-10%	-100%	12%	18%	-7%	
Z COG heave	m	-3.40	0.37	0.35	0.11	-2.31	-5.38	-3.16	0.35	0.33	0.10	-2.12	-4.46	8%	-5%	-6%	-7%	6%	30%	-24%	
Rotations																					
Roll	deg	0.14	0.17	0.17	0.02	0.63	-0.42	0.26	0.01	0.00	0.01	0.28	0.23	12%	-94%	-100%	-59%	-33%	62%	-95%	
Pitch	deg	-0.10	0.05	0.02	0.05	0.14	-0.42	-0.08	0.07	0.00	0.07	0.20	-0.37	4%	37%	-100%	46%	12%	9%	3%	
Yaw	deg	-1.60	2.56	2.56	0.13	6.60	-8.53	-3.34	1.93	1.93	0.05	2.17	-8.90	-11%	-25%	-25%	-63%	-29%	-2%	-27%	
Forces in Tendons & Risers																					
F Tendon 1	kN	14876	650	418	499	18849	12432	14190	630	337	532	17012	11404	-11%	-3%	-19%	7%	-29%	-16%	-13%	
F Tendon 2	kN	15250	674	417	530	19414	12772	14255	652	339	557	17191	11352	-15%	-3%	-19%	5%	-33%	-21%	-12%	
F Tendon 3	kN	15060	636	397	497	19024	12654	14260	664	334	574	17256	11289	-13%	4%	-16%	15%	-28%	-21%	-6%	
F Tendon 4	kN	13919	642	324	554	18422	11439	13652	626	296	551	16486	10862	-4%	-3%	-9%	-1%	-28%	-8%	-19%	
F Tendon 5	kN	13241	590	321	495	17485	10921	13560	606	291	532	16301	10857	5%	3%	-9%	7%	-18%	-1%	-17%	
F Tendon 6	kN	14052	609	319	519	18158	11444	13445	582	283	509	16071	10854	-9%	-4%	-11%	-2%	-31%	-9%	-22%	
F Tendon 7	kN	12993	784	293	727	18140	7884	12300	856	240	822	16080	8565	-7%	9%	-18%	13%	-20%	7%	-27%	
F Tendon 8	kN	12599	828	325	761	17943	7318	12241	905	240	873	16229	8299	-3%	9%	-26%	15%	-16%	9%	-25%	
F Tendon 9	kN	12875	888	296	837	18311	6803	12234	938	240	906	16362	8153	-6%	6%	-19%	8%	-17%	12%	-29%	
F Tendon 10	kN	13393	819	282	768	18683	8041	12816	945	280	902	17014	8657	-5%	15%	-1%	17%	-16%	6%	-21%	
F Tendon 11	kN	13340	811	287	758	18370	8126	12913	914	285	869	16983	8879	-4%	13%	-1%	15%	-14%	7%	-21%	
F Tendon 12	kN	13384	784	275	734	18085	8222	13025	865	289	815	16886	9200	-4%	10%	5%	11%	-12%	10%	-22%	
F Tendon 11 Bottom	kN	9471	837	286	787	14762	4023														
F Riser 1	kN	4229	115	61	98	4870	3539	4264	117	59	101	4734	3785	3%	2%	-3%	4%	-10%	18%	-29%	
F Riser 2	kN	4182	124	65	106	4846	3494	4274	125	59	110	4750	3789	7%	1%	-8%	4%	-7%	22%	-29%	
F Riser 3	kN	4210	121	66	101	4889	3493	4260	133	59	120	4761	3751	4%	11%	-10%	18%	-9%	18%	-28%	
F Riser 4	kN	4173	117	68	96	4795	3534	4270	141	60	128	4776	3757	8%	20%	-12%	33%	-2%	18%	-19%	
F Riser 5	kN	4177	128	70	106	4853	3498	4257	148	60	135	4783	3722	6%	16%	-15%	27%	-5%	17%	-22%	
F Riser 6	kN	3990	111	62	92	4607	3329	4267	155	60	143	4797	3729	22%	40%	-3%	56%	15%	31%	-16%	
F Riser 7	kN	4210	128	63	112	4957	3415	4243	152	58	141	4800	3678	2%	19%	-8%	26%	-10%	17%	-27%	
F Riser 8	kN	4257	126	62	110	4948	3579	4253	128	58	114	4755	3743	0%	2%	-6%	4%	-14%	12%	-26%	
F Riser 9	kN	4200	120	62	103	4920	3529	4240	166	58	156	4822	3649	3%	38%	-6%	51%	-7%	9%	-16%	
F Riser 10	kN	3977	121	60	105	4716	3298	4237	178	59	168	4840	3625	18%	47%	-2%	60%	9%	23%	-14%	
F Riser 11	kN	4183	113	61	95	4864	3568	4247	157	59	146	4801	3684	5%	39%	-2%	53%	-5%	9%	-14%	
F Riser 12	kN	8567	322	153	284	10403	6975	8363	130	111	69	9047	7663	-6%	-60%	-27%	-76%	-40%	20%	-60%	

DeepStar TLP		Notes:							Figures of Merit (FOM):												
Hurricane Wave Only		1. All tests of 3 hour duration unless otherwise noted							Mean FOM = $\frac{\text{simulation mean} - \text{measured mean}}{\text{measured (Max-Min)}}$												
9 hr Composite		2. WF St.Dev. Includes all frequencies > .032 Hz							Std. Dev. FOM = $\frac{\text{simulation Std. Dev.} - \text{measured Std. Dev.}}{\text{measured Std. Dev.}}$												
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted							MaxMin FOM = $\frac{\text{simulation MaxMin} - \text{measured MaxMin}}{\text{measured (Max-Min)}}$												
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 (Earth fixed)																					
X COG surge	m	-14.33	4.25	3.86	1.79	-1.44	-34.34	-15.51	6.19	6.01	1.48	2.59	-39.71	-4%	46%	56%	-17%	12%	-16%	29%	
Y COG sway	m	-0.48	0.71	0.68	0.22	2.32	-4.55	0.00	0.00	0.00	0.00	0.00	0.00	7%	-100%	-100%	-100%	-34%	66%	-100%	
Z COG heave	m	-0.09	0.07	0.04	0.05	0.13	-0.58	-0.07	0.07	0.05	0.05	0.20	-0.47	3%	6%	26%	-6%	9%	15%	-6%	
Rotations																					
Roll	deg	0.06	0.03	0.01	0.03	0.20	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	-21%	-100%	-100%	-100%	-72%	28%	-100%	
Pitch	deg	-0.01	0.05	0.01	0.05	0.24	-0.41	-0.01	0.07	0.00	0.07	0.27	-0.29	0%	31%	-100%	33%	5%	18%	-13%	
Yaw	deg	-1.22	0.72	0.71	0.09	2.20	-4.41	0.00	0.00	0.00	0.00	0.00	0.00	18%	-100%	-100%	-100%	-33%	67%	-100%	
Forces in Tendons & Risers																					
F Tendon 1	kN	11216	417	77	410	14065	8821	11079	499	39	498	13147	9010	-3%	20%	-49%	21%	-18%	4%	-21%	
F Tendon 2	kN	11353	487	91	479	14553	8495	11087	527	42	526	13279	8895	-4%	8%	-53%	10%	-21%	7%	-28%	
F Tendon 3	kN	11366	438	89	429	14613	9016	11092	546	44	544	13366	8817	-5%	25%	-51%	27%	-22%	-4%	-19%	
F Tendon 4	kN	11046	463	98	452	14256	8893	11092	546	44	544	13366	8818	1%	18%	-55%	20%	-17%	-1%	-15%	
F Tendon 5	kN	10678	441	91	431	13708	8341	11087	527	42	526	13279	8895	8%	20%	-53%	22%	-8%	10%	-18%	
F Tendon 6	kN	11083	436	81	428	13737	8549	11079	499	39	498	13147	9011	0%	14%	-52%	16%	-11%	9%	-20%	
F Tendon 7	kN	11232	807	53	806	15628	6922	10970	775	19	775	14144	7802	-3%	-4%	-64%	-4%	-17%	10%	-27%	
F Tendon 8	kN	10955	851	52	850	15542	5945	10962	827	19	826	14352	7578	0%	-3%	-63%	-3%	-12%	17%	-29%	
F Tendon 9	kN	11191	947	63	945	15960	5734	10957	857	19	857	14475	7446	-2%	-10%	-69%	-9%	-15%	17%	-31%	
F Tendon 10	kN	11056	889	54	888	15783	5850	10957	857	19	857	14475	7446	-1%	-4%	-64%	-4%	-13%	16%	-29%	
F Tendon 11	kN	10974	882	50	880	15822	6095	10962	826	19	826	14352	7578	0%	-6%	-62%	-6%	-15%	15%	-30%	
F Tendon 12	kN	11008	855	51	853	15336	5860	10970	775	19	775	14143	7802	0%	-9%	-63%	-9%	-13%	20%	-33%	
F Tendon 11 Bottom	kN	7081	907	50	906	12091	2039														
F Riser 1	kN	3380	85	21	82	3788	2890	3407	88	46	75	3800	3037	3%	4%	126%	-9%	1%	16%	-15%	
F Riser 2	kN	3390	84	21	81	3772	2846	3408	85	47	71	3788	3051	2%	2%	124%	-12%	2%	22%	-20%	
F Riser 3	kN	3280	78	23	74	3654	2907	3407	88	46	75	3800	3037	17%	13%	105%	1%	19%	17%	2%	
F Riser 4	kN	3368	80	20	77	3725	2900	3408	85	47	71	3788	3051	5%	7%	137%	-8%	8%	18%	-11%	
F Riser 5	kN	3386	81	22	77	3756	2955	3407	88	46	75	3800	3037	3%	9%	108%	-3%	6%	10%	-5%	
F Riser 6	kN	3280	79	21	76	3627	2803	3408	85	47	71	3788	3051	15%	8%	122%	-6%	20%	30%	-11%	
F Riser 7	kN	3350	100	21	98	3812	2942	3404	97	46	86	3840	2992	6%	-3%	120%	-12%	3%	6%	-3%	
F Riser 8	kN	3388	84	23	81	3800	2995	3405	92	46	80	3818	3017	2%	9%	101%	-2%	2%	3%	-1%	
F Riser 9	kN	3404	80	20	77	3804	3021	3404	97	46	86	3840	2992	0%	22%	132%	11%	5%	-4%	8%	
F Riser 10	kN	3222	86	19	84	3631	2779	3404	97	46	86	3840	2992	21%	13%	146%	2%	25%	25%	0%	
F Riser 11	kN	3395	81	18	79	3776	2937	3405	92	46	80	3818	3017	1%	14%	157%	1%	5%	10%	-5%	
F Riser 12	kN	6840	183	45	178	7785	5906	6940	192	62	181	7777	6165	5%	4%	40%	2%	0%	14%	-14%	

DeepStar TLP		Notes:		Figures of Merit (FOM):																
Loop WW&C		1. All tests of 3 hour duration unless otherwise noted		Mean FOM = simulation mean - measured mean /measured (Max-Min)																
9 hr Composite		2. WF St.Dev. Includes all frequencies > .032 Hz		Std. Dev. FOM = simulation Std. Dev. - measured Std. Dev. /[measured Std. Dev.]																
		3. All tests use API "net loads best estimate algorithm" unless otherwise noted		MaxMin FOM = simulation MaxMin - measured 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 (Earth fixed)																				
X COG surge	m	142.88	3.49	3.49	0.13	154.39	130.05	142.97	2.63	2.63	0.00	151.47	134.55	0%	-25%	-25%	-100%	-12%	18%	-31%
Y COG sway	m	13.16	3.16	3.11	0.55	24.33	1.38	12.81	3.26	3.23	0.47	23.56	0.97	-2%	3%	4%	-15%	-3%	-2%	-2%
Z COG heave	m	-5.70	0.27	0.27	0.03	-4.71	-6.65	-5.39	0.22	0.22	0.04	-4.67	-6.21	16%	-18%	-17%	29%	2%	23%	-21%
Rotations																				
Roll	deg	-0.38	0.18	0.18	0.03	0.29	-1.15	-0.41	0.05	0.00	0.05	-0.22	-0.59	-2%	-72%	-100%	93%	-36%	39%	-74%
Pitch	deg	-0.05	0.05	0.03	0.04	0.12	-0.28	-0.05	0.01	0.00	0.01	-0.03	-0.07	1%	-79%	-100%	-75%	-37%	53%	-90%
Yaw	deg	-3.99	2.10	2.10	0.12	3.43	-12.57	-4.84	0.57	0.57	0.07	-2.89	-6.57	-5%	-73%	-73%	-40%	-39%	37%	-77%
Forces in Tendons & Risers																				
F Tendon 1	kN	14690	425	283	317	16470	12315	15016	438	179	400	17007	13094	8%	3%	-37%	26%	13%	19%	-6%
F Tendon 2	kN	15332	458	303	343	16970	12954	15027	419	176	380	16934	13186	-8%	-8%	-42%	11%	-1%	6%	-7%
F Tendon 3	kN	15943	414	278	308	17440	14020	15040	389	175	348	16809	13333	-26%	-6%	-37%	13%	-18%	-20%	2%
F Tendon 4	kN	16096	393	313	239	17780	14541	15251	341	197	278	16772	13800	-26%	-13%	-37%	17%	-31%	-23%	-8%
F Tendon 5	kN	14616	357	278	223	16137	13124	15272	367	199	309	16924	13685	22%	3%	-29%	38%	26%	19%	7%
F Tendon 6	kN	15359	353	259	240	16873	13803	15281	384	201	327	17013	13614	-3%	9%	-23%	36%	5%	-6%	11%
F Tendon 7	kN	15520	365	293	219	17066	14067	15291	397	241	316	17065	13585	-8%	9%	-18%	44%	0%	-16%	16%
F Tendon 8	kN	15246	358	279	224	16647	13780	15285	384	243	297	16987	13649	1%	7%	-13%	32%	12%	-5%	16%
F Tendon 9	kN	15288	370	297	221	16851	13674	15269	359	240	267	16844	13757	-1%	-3%	-19%	21%	0%	3%	-3%
F Tendon 10	kN	14925	441	287	335	16730	13086	15057	425	221	363	16969	13206	4%	-4%	-23%	8%	7%	3%	3%
F Tendon 11	kN	14894	459	287	358	16799	12870	15042	451	220	394	17080	13070	4%	-2%	-23%	10%	7%	5%	2%
F Tendon 12	kN	15430	487	340	348	17352	13030	15029	465	216	411	17131	12994	-9%	-5%	-37%	18%	-5%	-1%	-4%
F Tendon 11 Bottom	kN	11058	479	286	385	13153	8867													
F Riser 1	kN	4575	85	56	64	4968	4223	4589	70	54	45	4878	4313	2%	-17%	-3%	-29%	-12%	12%	-24%
F Riser 2	kN	4619	97	56	79	5005	4266	4589	70	53	44	4874	4316	-4%	-28%	-5%	-44%	-18%	7%	-24%
F Riser 3	kN	4536	72	59	41	4906	4278	4589	68	53	43	4866	4323	9%	-5%	-9%	3%	-6%	7%	-14%
F Riser 4	kN	4483	76	59	49	4867	4224	4589	68	53	42	4863	4325	17%	-11%	-10%	-13%	-1%	16%	-16%
F Riser 5	kN	4543	74	54	51	4892	4265	4589	66	53	40	4856	4332	7%	-11%	-3%	-21%	-6%	11%	-17%
F Riser 6	kN	4470	72	55	46	4850	4178	4589	66	52	40	4856	4332	18%	-8%	-4%	-13%	1%	23%	-22%
F Riser 7	kN	4689	75	49	57	5176	4399	4590	72	55	47	4886	4307	-13%	-5%	11%	-18%	-37%	-12%	-25%
F Riser 8	kN	4644	78	55	55	5047	4337	4590	71	54	46	4882	4310	-8%	-8%	-1%	-16%	-23%	-4%	-19%
F Riser 9	kN	4688	74	50	54	5124	4426	4590	69	54	43	4871	4321	-14%	-6%	8%	-21%	-36%	-15%	-21%
F Riser 10	kN	4559	60	47	37	4873	4329	4591	67	54	40	4857	4334	6%	11%	14%	7%	-3%	1%	-4%
F Riser 11	kN	4608	78	62	48	4978	4317	4590	67	53	40	4856	4333	-3%	-15%	-14%	-17%	-18%	2%	-21%
F Riser 12	kN	9455	148	121	86	10038	8878	9048	160	114	112	9711	8401	-35%	8%	-5%	31%	-28%	-41%	13%