SHIPMOOR
Mooring Analysis for the 21st Century

DETAILED REPORT - Dynamic Calculation

Berth: Demo Terminal

North Berth [test]   120°

Vessel: Flex Polaris [test]   7654321

Port Side, Fully laden, MEG 4

Date and Time: 05 Sep 2022   15:00   LT

Wind: 30 knot(s)   050° (from True N)
From 290° relative to ship
at 10 metres, steady wind. No gusts

Current: 1.5 knot(s)   180°N (to)   At half draught
From 240° relative to ship

Waves	Heading (From) Rel. North	Rel. Ship	Significant Height	Period	Spectrum	Gamma
Primary	200°	080°	0.5 m	10 sec	JONSWAP	3.3
No Secondary Waves						

Water/Tide Level: 1.00 m from LAT   (vertical datum)

Controlled Depth: 11.7 m   (below vertical datum)

Draught: 12.10 m   Trim: 0.00 m   UKC: 0.60 m

Water Depth/Draught: 1.05

Hull Current Coefficients:

Coefficient Set: MEG4 LNG Carrier 1.05

Hull Wind Coefficients:

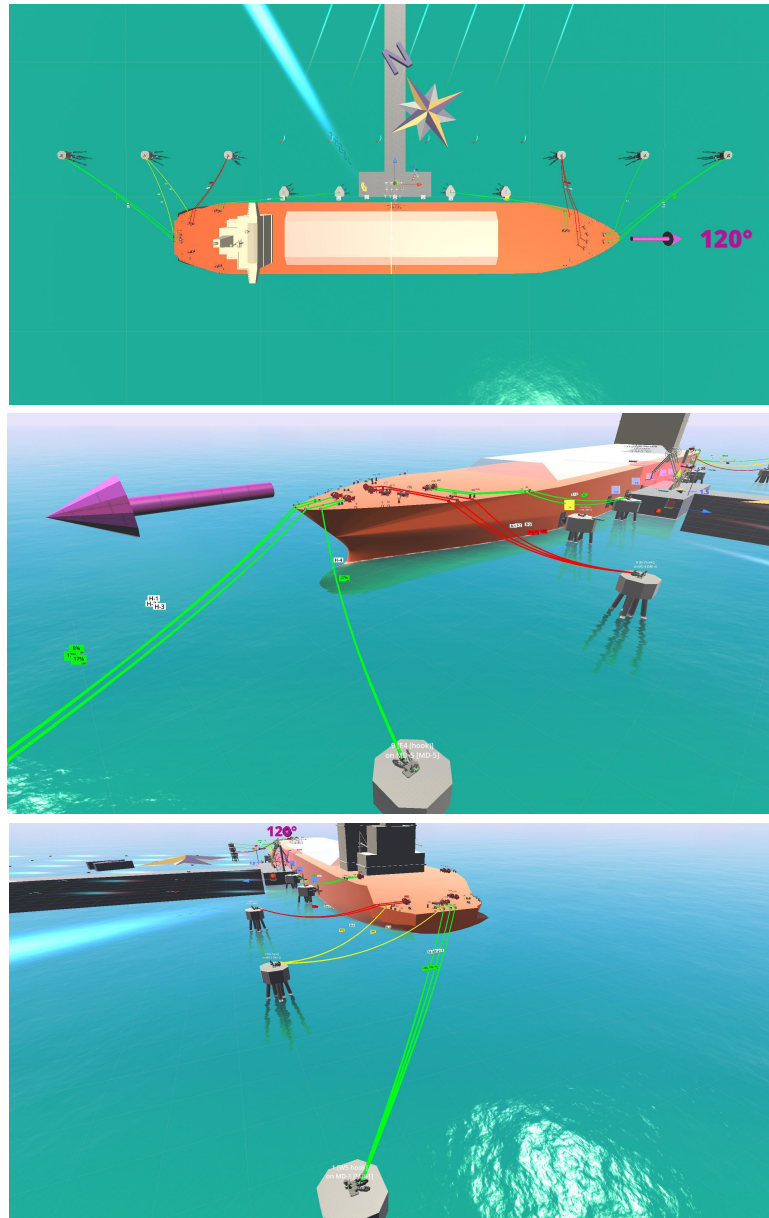Coefficient Set: MEG4 SIGTTO 2007 Prismatic

Definitions

The Minimum, Significant and Maximum values referred to in this report are defined as:

Minimum   Minimum motions (movement and rotation), line loads, fender loads, etc.
These are the minimum values reached for the full 3-hour time-series results.

Significant   Motions (movement, velocity, acceleration and rotation), line loads, fender loads, etc. corresponding to the mean of the highest third of peak to trough events over the full 3-hour time-series, usually defined as four times the standard deviation and, in the case of waves, corresponding to the height that a skilled observer would perceive.

Maximum   Maximum motions (movement and rotation), line loads, fender loads, etc.
These are the maximum values reached for the full 3-hour time-series results.

The full time-series results are available in HTML format from:

https://www.shipmoor.com/admin/Report.aspx?SessionID=DEMOQFLX-24-15-12-130-000001&ReportType=DynamicTimeSeries

Selected mooring configuration:

	Head Lines	Fwd Lines		Aft Lines		Stern Lines	Total Lines	Capacity
		Breast	Spring	Spring	Breast			
Selected Configuration	**4**	**3**	**2**	**2**	**3**	**4**	**18**	
Terminal Requirement	4	3	2	2	3	4	18	<= 217000 m3

Vessel motion at spotting line:

Surge:

Minimum	-0.3 m	(AFT)
Significant	0.1 m	
Maximum	-0.1 m	(AFT)

Sway:

Minimum	-2.0 m	(OUTWARD, TO STARBOARD)
Significant	0.3 m	
Maximum	-1.2 m	(OUTWARD, TO STARBOARD)

Heave:

Minimum	0.0 m	(DOWN)
Significant	0.0 m	
Maximum	0.0 m	(UP)

Yaw:

Minimum	-0.2°	(STBD)
Significant	0.2°	
Maximum	+0.1°	(PORT)

Roll:

Minimum	-0.4°	(PORT)
Significant	0.1°	
Maximum	-0.1°	(PORT)

Pitch:

Minimum	0°	
Significant	0°	
Maximum	0°	(FWD)

Maximum permissible values at berth:

Surge	±2.00 m	Sway	±2.00 m
Heave	±1.00 m	Yaw	±3°

Static Environmental Load

23 t applied to the stern

410 t applied to the port side

5925 t·m to starboard

Wind Load

5 t applied to the bow

118 t applied to the port side

369 t·m to port

Current Load

28 t applied to the stern

292 t applied to the port side

6294 t·m to starboard

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Main Deck Elevation:

Minimum heave	7.86 m	above central jetty
Maximum heave	7.93 m	above central jetty

Gangway vertical range above central jetty:

Shore Gangway (1)	2.0 m to 17.0 m

Ship Target Manifold:

Displacement [m]

	Minimum	Significant	Maximum
X	-0.30	0.12	-0.09
Y	-1.90	0.30	-1.12
Z	-0.18	0.04	-0.05

	Velocity [m/s]		Acceleration [m/s²]	
	Significant	*Absolute Maximum	Significant	*Absolute Maximum
X	0.07	0.06	0.05	0.04
Y	0.15	0.13	0.09	0.09
Z	0.02	0.01	0.01	0.01

The higher of the absolute value of the maximum and minimum values

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Mooring Line (Pre-Tension)	From Winch	Via Fairlead	To Berth Mooring	Material (Line / Tail)	Line LDBF [t]	Line tension [t]	Line % LDBF	
Headline 1 (0t)	1	1	10 [E5 (hook)] on 6 [MD-6]	Dyneema/Nylon Tail	93	4	5%	Minimum
						4	4%	Significant
						13	**14%**	**Maximum**
Headline 2 (5t)	3	0	10 [E5 (hook)] on 6 [MD-6]	Dyneema/Nylon Tail	93	11	12%	Minimum
						6	7%	Significant
						23	**25%**	**Maximum**
Headline 3 (5t)	4	2	10 [E5 (hook)] on 6 [MD-6]	Dyneema/Nylon Tail	93	11	11%	Minimum
						6	6%	Significant
						22	**24%**	**Maximum**
Headline 4 (0t)	2	4	9 [E4 (hook)] on 5 [MD-5]	Dyneema/Nylon Tail	93	13	14%	Minimum
						15	16%	Significant
						43	**46%**	**Maximum**
Fwd Breast 1 (5t)	7	12	8 [E3 (hook)] on 4 [MD-4]	Dyneema/Nylon Tail	93	32	35%	Minimum
						29	31%	Significant
						82	**88%**	**Maximum**
Fwd Breast 2 (5t)	9	14	8 [E3 (hook)] on 4 [MD-4]	Dyneema/Nylon Tail	93	32	34%	Minimum
						26	28%	Significant
						77	**82%**	**Maximum**
Fwd Breast 3 (0t)	16	16	8 [E3 (hook)] on 4 [MD-4]	Dyneema/Nylon Tail	93	27	29%	Minimum
						44	47%	Significant
						93	**100%**	**Maximum**
Fwd Spring 1 (0t)	18	18	6 [E1 (hook)] on 3 [BD-3]	Dyneema/Nylon Tail	93	2	3%	Minimum
						2	2%	Significant
						6	**7%**	**Maximum**
Fwd Spring 2 (5t)	22	20	6 [E1 (hook)] on 3 [BD-3]	Dyneema/Nylon Tail	93	8	8%	Minimum
						3	3%	Significant
						13	**14%**	**Maximum**
Aft Spring 1 (5t)	116	120	5 [W1 hook] on 2 [BD-2]	Dyneema/Nylon Tail	93	4	4%	Minimum
						2	2%	Significant
						7	**7%**	**Maximum**
Aft Spring 2 (5t)	118	122	5 [W1 hook] on 2 [BD-2]	Dyneema/Nylon Tail	93	4	4%	Minimum
						2	2%	Significant
						7	**7%**	**Maximum**

Aft Breast 1 (5t)	114	118	3 [W3 hook] on 3 [MD-3]	Dyneema/Nylon Tail	*93*	36	38%	Minimum
						27	29%	Significant
						86	**92%**	**Maximum**
Aft Breast 2 (5t)	112	116	3 [W3 hook] on 3 [MD-3]	Dyneema/Nylon Tail	*93*	34	37%	Minimum
						26	28%	Significant
						83	**89%**	**Maximum**
Aft Breast 3 (0t)	110	114	2 [W4 hook] on 2 [MD-2]	Dyneema/Nylon Tail	*93*	28	30%	Minimum
						19	21%	Significant
						64	**69%**	**Maximum**
Sternline 1 (5t)	103	103	1 [W5 hook] on 1 [MD-1]	Dyneema/Nylon Tail	*93*	22	23%	Minimum
						6	7%	Significant
						34	**36%**	**Maximum**
Sternline 2 (5t)	101	101	1 [W5 hook] on 1 [MD-1]	Dyneema/Nylon Tail	*93*	22	23%	Minimum
						6	6%	Significant
						33	**36%**	**Maximum**
Sternline 3 (5t)	106	102	1 [W5 hook] on 1 [MD-1]	Dyneema/Nylon Tail	*93*	21	23%	Minimum
						6	6%	Significant
						33	**35%**	**Maximum**
Sternline 4 (0t)	102	104	2 [W4 hook] on 2 [MD-2]	Dyneema/Nylon Tail	*93*	30	32%	Minimum
						24	26%	Significant
						71	**76%**	**Maximum**

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Berth Mooring Point	Hook Nr		* Horiz / Vertical Direction (Static) [°]	Horizontal Force [t]	Uplift Force [t]	Total Force [t]	% SWL	
1 [W5 hook] on 1 [MD-1]	1	Sternline 1	157	8	0	8	7	Significant
			1	**43**	**1**	**43**	**36**	**Maximum**
1 [W5 hook] on 1 [MD-1]	2	Sternline 2	156	8	0	8	6	Significant
			1	**43**	**1**	**43**	**36**	**Maximum**
1 [W5 hook] on 1 [MD-1]	3	Sternline 3	155	7	0	7	6	Significant
			1	**42**	**1**	**42**	**35**	**Maximum**
2 [W4 hook] on 2 [MD-2]	1	Sternline 4	188	33	1	33	28	Significant
			2	**100**	**3**	**100**	**83**	**Maximum**
2 [W4 hook] on 2 [MD-2]	2	Aft Breast 3	171	27	1	27	22	Significant
			2	**90**	**3**	**90**	**75**	**Maximum**
3 [W3 hook] on 3 [MD-3]	1	Aft Breast 2	241	18	1	18	15	Significant
			2	**55**	**4**	**55**	**46**	**Maximum**
3 [W3 hook] on 3 [MD-3]	2	Aft Breast 1	240	19	1	19	16	Significant
			2	**60**	**4**	**60**	**50**	**Maximum**
5 [W1 hook] on 2 [BD-2]	1	Aft Spring 1	294	1	0	1	1	Significant
			5	**4**	**1**	**4**	**3**	**Maximum**
5 [W1 hook] on 2 [BD-2]	2	Aft Spring 2	294	1	0	1	1	Significant
			5	**4**	**1**	**4**	**3**	**Maximum**
6 [E1 (hook)] on 3 [BD-3]	1	Fwd Spring 2	128	2	0	2	2	Significant
			7	**11**	**2**	**11**	**9**	**Maximum**
6 [E1 (hook)] on 3 [BD-3]	2	Fwd Spring 1	128	2	0	2	2	Significant
			7	**5**	**1**	**5**	**5**	**Maximum**
8 [E3 (hook)] on 4 [MD-4]	1	Fwd Breast 3	209	54	9	55	46	Significant
			11	**115**	**20**	**117**	**97**	**Maximum**
8 [E3 (hook)] on 4 [MD-4]	2	Fwd Breast 2	203	34	5	35	29	Significant
			11	**100**	**15**	**101**	**84**	**Maximum**
8 [E3 (hook)] on 4 [MD-4]	3	Fwd Breast 1	201	38	6	39	32	Significant
			11	**109**	**16**	**111**	**92**	**Maximum**
9 [E4 (hook)] on 5 [MD-5]	1	Headline 4	236	12	2	12	10	Significant
			7	**33**	**6**	**34**	**28**	**Maximum**
10 [E5 (hook)] on 6 [MD-6]	1	Headline 3	266	0	0	1	1	Significant
			4	**2**	**2**	**2**	**2**	**Maximum**

10 [E5 (hook)] on 6 [MD-6]	2	Headline 2	265	1	1	1	1	Significant
			4	**3**	**2**	**3**	**3**	**Maximum**
10 [E5 (hook)] on 6 [MD-6]	3	Headline 1	264	1	0	1	0	Significant
			4	**2**	**1**	**2**	**2**	**Maximum**

* Force directions are based on the static equilibrium position and does not consider ship motions caused by dynamic loading

Excessive vertical line inclinations are highlighted in red. Horizontal directions outwith the OCIMF recommended limits are highlighted in orange

Deck Mooring Point	% Max Brake Load	% SWL	Total Force [t]	
1 (Bollard)	-	4	4	Significant
	-	**13**	**13**	**Maximum**
2 (Bollard)	-	15	15	Significant
	-	**43**	**43**	**Maximum**
3 (Fwd mooring (SB))	12	6	6	Significant
	41	**23**	**23**	**Maximum**
4 (Fwd mooring (PS))	11	6	6	Significant
	40	**22**	**22**	**Maximum**
7 (Fwd Anchor 2 (SB))	52	29	29	Significant
	147	**82**	**82**	**Maximum**
9 (Fwd Anchor (SB))	47	26	26	Significant
	137	**77**	**77**	**Maximum**
16 (Bollard)	-	44	44	Significant
	-	**93**	**93**	**Maximum**
18 (Fwd (centre))	4	2	2	Significant
	11	**6**	**6**	**Maximum**
22 (Fwd (centre))	5	3	3	Significant
	23	**13**	**13**	**Maximum**
101 (Aft Centre)	11	6	6	Significant
	59	**33**	**33**	**Maximum**
102 (Aft Centre)	-	24	24	Significant
	-	**71**	**71**	**Maximum**
103 (Aft Centre)	11	6	6	Significant
	60	**34**	**34**	**Maximum**
106 (Aft Centre)	10	6	6	Significant
	58	**33**	**33**	**Maximum**
110 (Aft PS)	-	19	19	Significant
	-	**64**	**64**	**Maximum**
112 (Aft PS)	47	26	26	Significant
	148	**83**	**83**	**Maximum**
114 (Aft PS)	48	27	27	Significant
	153	**86**	**86**	**Maximum**
116 (Aft Spring (PS))	3	2	2	Significant
	12	**7**	**7**	**Maximum**
118 (Aft Spring (PS))	3	2	2	Significant
	12	**7**	**7**	**Maximum**

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Fender	Buckling Exceeded	Max Reaction Exceeded	Reaction Force [t]	Compression [m]	% Buckling Compression	* Hull Pressure [t/m²]	** Contact Area % (Static)	
1 (F1)	No	No	0	-	0	-		Minimum
	No	No	0	-	0	-	100	Significant
	No	**No**	**0**	**-**	**0**	**-**		**Maximum**
2 (F2)	No	No	0	-	0	-		Minimum
	No	No	0	-	0	-	100	Significant
	No	**No**	**0**	**-**	**0**	**-**		**Maximum**
3 (F3-Jetty)	No	No	0	-	0	-		Minimum
	No	No	0	-	0	-	100	Significant
	No	**No**	**0**	**-**	**0**	**-**		**Maximum**
4 (F4-Jetty)	No	No	0	-	0	-		Minimum
	No	No	0	-	0	-	100	Significant
	No	**No**	**0**	**-**	**0**	**-**		**Maximum**
5 (F5-Jetty)	No	No	0	-	0	-		Minimum
	No	No	0	-	0	-	100	Significant
	No	**No**	**0**	**-**	**0**	**-**		**Maximum**
6 (F6)	No	No	0	-	0	-		Minimum
	No	No	0	-	0	-	100	Significant
	No	**No**	**0**	**-**	**0**	**-**		**Maximum**
7 (F7)	-	-	-	-	-	-		Minimum
	-	-	-	-	-	-	No Contact	Significant
	-	**-**	**-**	**-**	**-**	**-**		**Maximum**

* Hull pressure is approximated based on contact area at the static equilibrium position and does not consider changes to the contact area that may occur due to movements of the fender or the ship due to dynamic loading

** Fender contact areas are based on the static equilibrium position and do not consider ship motions caused by dynamic forces.

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Fendering from: -86.44 (Aft)　　　　　　　　　　　Fendering to: 67.7 (Fwd)

View from sea-side
NB: Grey Polygon represents Parallel Body (PMB) only

Main Spotting Line (Jetty centre)

Jetty Height: 8m

Water Level: 1m　　　　　　　　　　　　　　　　　　　　　　　　　　　Chart Datum

Fender	1 (F1)	2 (F2)	3 (F3-Jetty)	4 (F4-Jetty)	5 (F5-Jetty)	6 (F6)	7 (F7)
Thrust (Significant)	0t	0t	0t	0t	0t	0t	-
Compression (Significant)	0m	0m	0m	0m	0m	0m	-
* Pressure (Significant)	0t/m²	0t/m²	0t/m²	0t/m²	0t/m²	0t/m²	-
* % Max FCP (Significant)	0%	0%	0%	0%	0%	0%	-
** Contact Area	100%	100%	100%	100%	100%	100%	No Contact
Position X	-80m	-40m	-20m	0m	20m	40m	80m
Position Z	5.9m	5.9m	5.9m	5.9m	5.9m	5.9m	5.9m
Panel Width	3.6m	3.6m	3.6m	3.6m	3.6m	3.6m	3.6m
Panel Height	4.2m	4.2m	4.2m	4.2m	4.2m	4.2m	4.2m