

Annex D – Results of tests of maritime lashings in the main study

Annex to Report from Pulling Tests with Used Lashing Equipment








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Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
1	WWL CAR RORO PES	2000		DL 0.5	ED	1	 01-1  01-2	 01-1  01-2	Edge damage, only transverse fibres Broke at winch	2040		208	2002-09
2	WWL CAR RORO PES	2000		DL 0.5	WE TE	1 1	 02-1  02-2	 02	Broke in damage	1360		139	-








Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
3	WWL CAR RORO PES	2000		DL 0.5	ED	3	 03	 03	10 of 25 mm cut 40% of transverse fibres	770		78	
4	WWL CAR RORO PES	2000		DL 0.5	FD	2	 04	 04		830		85	
5	WWL CAR RORO PES	2000		DL 0.5	ED	0.2	 05	 05	Broke at winch, not at edge damage	1740		177	
6	WWL CAR RORO PES	2000		DL 0.5	ED	0.5	 06	 06	Broke at hook, not at edge damage	1300		133	
7	WWL ROLLASH PES	5000		DL 1.5			 07	 07	No damages Broke at winch	4900		200	








Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
8	WWL ROLLASH PES	5000		DL 1	BR TE	1 1	 08	 08	Generally worn	4060		166	
9	WWL ROLLASH PES	5000		DL 1	WE	2	 09	 09	Broke at winch, not at damage	4360		178	
10	WWL ROLLASH PES	5000		DL 1.5	ED ED WE	1 1 0.5	 10	 10	15 years Broke at winch, not at damage	5010		204	
11	WWL ROLLASH PES	5000		DL 0.5	ED WE	0.5 1.5	 11-1  611-2	 11		3550		145	2007-10







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/LC %	Break/0.5 BL %	Manufact date
12	WWL ROLLASH PES	5000		DL 1.5			 12	 12	Broke at winch not at damage	4850		198	2004-03
13	Scandlines PES	12 000		DL 1.5	FD	2	 13-1  13-2	 13	Broke at hook not in damage	7950		135	
14	Scandlines PES	12 000		DL 1	WE	0.3	 14	 14	Broke at hook not in damage	6530		111	
15	Scandlines PES	12 000		DL 1	ED	1	 15	 15	Broke at damage	5840		99	









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
16	FL RORO PES	12 000		DL 1	WE	0.5	 16-1  16-2	 16	Broke at hook	9160		156	1999-04
17	FL2 RORO PES	12 000		DL 2			 17-1  17-2	 17	Swollen, no visible damages Broke at seam by winch	6770		115	2002-04







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
18	FL3 RORO 600 PES	12 000		DL 1	ED	0.5	 18-1  18-2	 18	<p>Broke at hook, not in edge damage</p> <p>No transverse fibres damaged</p>	5910		100	2004-03
19	FL4 PES	12 000		DL 2.5	TE WE	1 1	 19-1  19-2	 19	Broke at hook	7470		127	2005-12







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
20	FL5 RORO PES	12 000		DL 1	TE ED	1.5 0.5	 20-1  20-2	 636	Broke at hook	8510		145	2006-02
21	FL6 RORO PES	12 000		DL 1	ED ED	1.5 1.5	 21-1  21-2  21-3	 638	Edge damages 3 mm and 4 mm	8710		148	2006-04







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
22	FL7 RORO PES	12 000		DL 1	WE	1	 22-1  22-2	 22	Did not break at hook or damage	9640		164	2006-07
23	FL8 RORO PES	12 000		DL 1	ED WE	1 0.3	 23-1  23-2  23-3	 23	Broke at hook	8270		141	2007-02








Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
24	FL9 RORO PES	12 000		DL 0.5	TE	1.5	 24-1  24-2	 24		10530		179	2007-07
25	FL10 RORO PES	12 000		DL 0.5	ED	2	 25-1  25-2	 25	Edge damage 8 mm	5510		94	2007-12








Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
26	FL11 RORO PES	12 000		DL 0.5	WE		 26-1  26-2	 26	Broke at hook	8770		149	2006-02
27	FL12 RORO PES	12 000		DL 1			 27-1  27-2	 27	No damages Broke at hook	10350		176	2006-04
28	FL13 RORO PES	12 000		DL 0.5			 28	 28	No damages Broke at hook	11000		187	2006-05







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
29	FL14 RORO PES	12 000		DL 0.5			 29-1  29-2	 29	No damages Broke at hook	10630		181	2006-11
30	FL15 RORO PES	12 000		DL 1	BR WE	0.3 0.3	 30-1  30-2	 30	Broke at hook	9620		163	2007-01








Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/LC %	Break/0.5 BL %	Manufact date
31	FL16 RORO PES	12 000		DL 1	TE	0.5	 31-1  31-2	 31	Broke at hook, not at damage	10500		178	2007-01
32	FL18 RORO PES	12 000		DL 0.5			 32-1  32-2	 32	No damages Broke at seam	11320		192	2007-12





Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
33	FL17 RORO PES	12 000		DL 0.5			 33-1  33-2	 33	No damages Broke at hook	10350		176	2007-12
34	FL19 RORO PES	12 000		DL 0.5			 34-1  34-2	 34	No damages Broke at hook	11210		190	2008-01







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/LC %	Break/0.5 BL %	Manufact date
35	FL20 RORO PES	12 000		DL 0.5			 35-1  35-2	 35	No damages Broke at hook	11250		191	2008-01
36	FL21 RORO PES	14 000		DL 0.5	WE	0,5	 36	 36	Broke at hook	10330		176	2008-03
37	FL22 RORO PES	14 000		DL 0.5			 37	 37	Almost no damages Broke at hook	9840		167	2008-03








Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
38	TT LINE LOAD LOCK UNMARKED PES	12 000		DL 1.5	FD ED	2 1.5	 38-1  38-2	 38	ED 5 mm Broke at hook, not at damages	5980		102	1997
39	TT LINE LOAD LOCK PES	12 000		DL 2	ED	2	 39-1  39-2  39-3	 39	ED 8 mm Broke at hook, not at damages	6990		119	1997




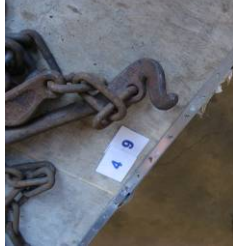



Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/LC %	Break/0.5 BL %	Manufact date
40	TT LINE LOAD LOCK PES	12 000		DL 2	FD	4	 40-1  40-2	 40	FD 25 mm of 55 mm	3020		51	2001-05
41	TT LINE LOAD LOCK PES	12 000		DL 1.5	CU	4	 41-1  41-2	 41	Broke in seam at elephant foot Straightened hook	10260		175	2001-05







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
42	TT LINE LOAD LOCK PES	12 000		DL 3	FD WE	1	 42-1  42-2	 42	Broke at hook	7050		150	2001-05
43	TT LINE LOAD LOCK PES	12 000		DL 2.5	FD	0.5	 43-1  43-2  43-3	 43	Damaged hook Not able to attach, changed hook	8840		120	2005-01









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
44	TT LINE LOAD LOCK PES	12 000		DL 1.5	FD WE	0.5 1.5	 44-1  44-2  44-3	 44		10760		183	2005-01






Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
45	TT LINE LOAD LOCK PES	12 000		DL 2.5	FD	1.5	 45-1 before  45-2 before  45-3 before	 45		5900		100	2005-01
46	TT LINE Other model	12 000		DL 2			 46	 46	Other hook Broke at hook	7060		120	







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
47	WWL CHAIN ORSA 11 mm	15 000					 47-1  47-2  47-3	 47	Small deformation in link Tensioner broke	14800		201	2001-12
48	RORO NEW FINNLINES PES	14 000					 48-1  48-2	 48	New Broke in seam by elephant foot	12610		184	2009-03









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
49	WWL CHAIN ORSA 11 mm	15 000					 49-1  49-2	 49-1  49-2	Somewhat torn link Tensioner broke	14380		195	
50	WWL CHAIN ORSA 11 mm	15 000					 50-1  50-2	 50	Rusty No damages Broke in hook The tensioner was strained to 90° tensioner/securing chain i.e. little more then 90 ° to the main chain	12130		165	









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
51	WWL WILHELMSE ORSA 11-E	15 000					 51-1  51-2	 51	Somewhat rusty Broke in link Pre-stained to 90 ° between tensioner and securing chain	12350		168	
52	WWL CHAIN ORSA 11 mm	15 000					 52-1  52-2	 52	Rusty No tensioner Link broke	11000		150	









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
53	WWL CHAIN ORSA 11 mm	15 000					 53-1  53-2	 53	Rusty No tensioner Broke in hook	15080		205	
54	RORO NEW FINNLINES PES	14 000					 54-1  54-2	 54	Broke in seam by elephant foot	13310		194	2009-03
55	WWL CHAIN ORSA 11 mm	15 000					 55-1	 55	Deformed link Broke in deformed link	7930		108	











Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
56	WWL CHAIN ORSA 11 mm	15 000					 56	 56	Deformed link Broke in deformed link	6750		92	
57	RORO New web (No 48)						 57		Test of one part of the webbing	8880			
58	Scand lines one part of web only (No 13)						 58	 57	Test of one part of the webbing	3790			









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/LC %	Break/0.5 BL %	Manufact date
59	Tor Line RORO PES	20 000		DL 1.5	ED ED	2 1	 59-1  59-2	 59	ED 2:20 mm ED 1: 3 mm	6520		66	
60	Tor Line RORO PES	20 000		DL 1.5	ED	0.5	 60-1  60-2	 60		10920		111	







Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
62	Tor Line RORO PES	20 000		DL 0.8	WE	0.5	 62-1  62-2	 62	Hook in winch broke	9060		92	
63	Tor Line RORO PES	20 000		DL 1.8			 63-1  63-2	 63	Swollen No apparent damages Broke at hook	11210		114	
64	Tor Line RORO PES	20 000		DL 1.5	CU	1.5	 64	 64		12330		126	









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
65	Tor Line RORO PES	20 000		DL 2	WE CU	1 1.3	 65-1  65-2	 65	Broke in seam	12260		125	
67	Tor Line RORO PES	20 000		DL 0.8	ED WE	1 1	 67-1  67-2	 67	ED 5 mm Broke close to hook	13860		141	
68	Tor Line RORO PES	20 000		DL 1.2			 68	 68	Small small damages Sandy	12890		131	









Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/LC %	Break/0.5 BL %	Manufact date
69	WWL CHAIN ORSA 11 mm	15 000						 69	Chain around 25 mm round bar Broke at hook	16790		228	
70	WWL CHAIN ORSA 11 mm	15 000					 70	 70	Chain around 25 mm round bar, strained to 7.5 ton and then released. Broke at 106.3 kN Small deformation Did not break in the deformed link Deformed link broke at 129,2 kN	10630 12920		144 176	
71	RORO NEW FINNLINES PES	14 000					 71	 71	Hook broke	13220		193	
72	Tor Line RORO PES	20 000		DL 2			 72	 72	Very rusty hook Broke at hook	11830		121	




Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
73	Tor Line RORO PES	20 000		DL 2.5			 73	 73	Swollen Rusty hook else no damages Broke at hook	9640		98	
74	Tor Line RORO PES	20 000		DL 2			 74	 74	No damages Rusty hook Broke at hook	10250		104	
75	Tor Line RORO PES	20 000		DL 1.2			 75	 75	Almost no damages Rusty hook Broke at hook	10530		107	
76	Tor Line RORO PES	20 000		DL 1.0			 76	 76	Almost no damages Very rusty hook Hook in winch broke	11130		113	
77	Tor Line RORO PES	20 000		DL 1.7			 77	 77	Small damages Rusty hook Broke at hook	12840		130	

Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
78	Tor Line RORO PES	20 000		DL 0.5	ED	,5	 78	 78	Relatively new lash Somewhat rusty hook Broke in small ED (0.5 mm) close to hook	12760		131	
79	Tor Line RORO PES	20 000		DL 0.6			 79	 79	No rust on hook Hook in winch broke	7570		77	
80	Tor Line RORO PES	20 000		DL 1.2			 80	 80	Small damages Very rusty hook Broke at hook	13510		138	
81	Tor Line RORO PES	20 000		DL 2.1	TE	0.3	 81	 81	Rusty hook Broke in seam	11860		121	

Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
82	Tor Line RORO PES	20 000		DL 1.5	ED	0.3	 82	 82	Somewhat rusty hook Broke at hook	11140		116	
83	Tor Line RORO PES	20 000		DL 2	WE FD	2.5 3	 83-1  83-2  83-3	 83	Very rusty hook Lash broke, not in damage or at hook	6610		67	

Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
1	Tor Line RORO PES	20 000		DL 1	CU CU		 K1-1  K1-2	 K1	Broke at hook	17600		179	
2	Tor Line RORO PES	20 000		DL 2			 K2	 K2	Worn Broke in lash	7630		78	
3	Tor Line RORO PES	20 000		DL 1	BR BR		 K2-1  K2-2	 K3	Broke at hook	16350		167	

Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
4	Tor Line RORO PES	20 000		DL 1.5	ED		 K4	 K4-1  K4-2	ED 10 mm Broke at hook	12150		124	
5	Tor Line RORO PES	20 000		DL 2	ED		 K5	 K5	ED 5 mm Broke at hook	13130		134	
6	Tor Line RORO PES	20 000		DL 2	ED ED	3 2	 K6-1  K6-2	 K6	ED 25 mm ED 10 mm Broke in ED 25 mm	6850		70	

Test No	Make Material	Marked BL (kg)	Marked LC (daN)	Dirt level	Dam type	Dam level	Photo before	Photo after	Note	Break Load (daN)	Break/ LC %	Break/ 0.5 BL %	Manufact date
7	Tor Line RORO PES	20 000		DL 1.5	WE WE		 K7-1  K7-2	 K7 after	Broke at hook	14740		150	