WIRECO
A World Ahead

CASAR

OLIVEIRA

DRIVING PROGRESS AROUND THE WORLD

Special steel wire ropes for container and harbour applications

INTRODUCTION

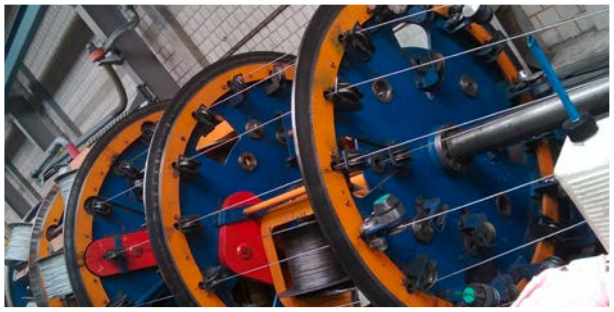
WIRECO

Quality Products, Outstanding Service and Comprehensive Technical Support – It's what today's industries expect from their supplier partners. And that's what WireCo WorldGroup is all about.

WireCo is the global market, manufacturing and technical leader in wire and synthetic rope manufacturing, providing a consultative approach to offer customers a single, reliable source for performance matched solutions to fit their specific application and budget needs. But it doesn't stop there. WireCo offers clients the education and expertise needed to enhance product performance and value. With our comprehensive range of trusted, global brands we deliver unmatched technical expertise and innovation as well as unparalleled quality assurance meeting and exceeding international quality certifications. WireCo is on the ground everywhere you are – with manufacturing and distribution facilities all around the world and more than 4,000 global employees supporting these efforts. Our customers enjoy global availability for a consistent, responsive supply no matter where and when they need it.

CASAR

Mission critical applications call for the best rope. The Casar products engineered in Germany deliver according to your specific needs. Challenge us with your requirements and our specialists will fulfil.



OLIVEIRA

Already in the 6th generation Oliveira's goal is to provide valuable solutions to our customers. Our products meet the international standards and offer an excellent value to your application.

ROPE TECHNOLOGY

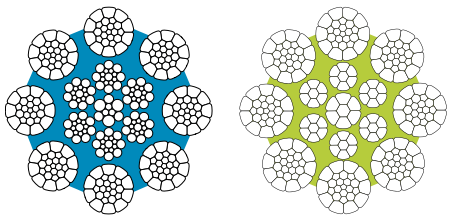
ROPES WITH PLASTIC COVERED STEEL CORE

The benefit of an internal plastic layer is diversified:

- Prevents internal wire breaks
- Prevents metal-to-metal contact
- Stabilizes the rope structure during installation and operation
- Seals in lubricant, reduces the maintenance effort
- Keeps out water and abrasive elements
- Absorbs dynamic energy
- Resistant to many chemical substances

In a CASAR PLAST rope, the proportion of plastic to the steel components is thoroughly harmonized in order to create a perfect rope geometry. A plastic coating with a very constant thickness and quality is extruded around the steel core. A thermal after treatment just before the closing of the rope ensures that the outer strands are deeply implanted in the plastic jacket, thus forming plastic edges which separate the strands. First ropes of this kind went into harbours already in the 70's with great success.

An OLIVEIRA PPI rope follows the common way of extruding the plastic layer during the closing process between the core and the outer strands.

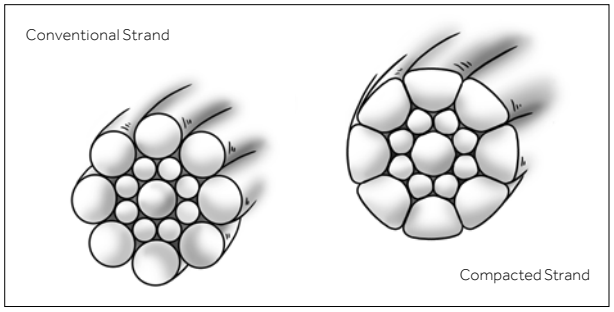


CASAR PLAST ROPE OLIVEIRA PPI ROPE

ROPES WITH COMPACTED STRANDS

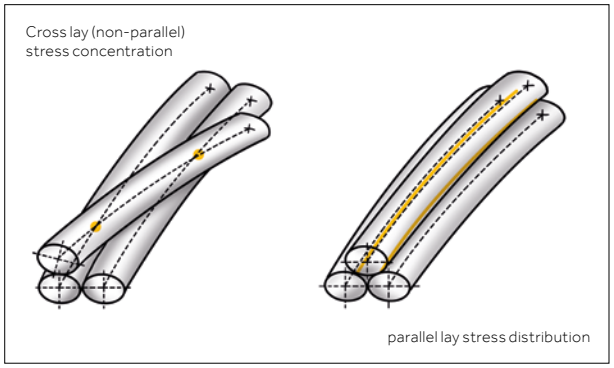
Ropes made of compacted strands have a higher breaking load, a greater flexibility and better rope to rope contact conditions than comparable ropes made out of conventional strands. Because of the thicker outer wires and the smaller exposed area they are more resistant toabrasion and corrosion.

The formation of negative impressions is significantly impaired. The rope life time on multiple layer drums is optimized. In order to produce a compacted strand, a conventional strand made of round wires is drawn through a compacting tool. During this procedure, the wires are plastically deformed, the strand diameter is reduced and the surface is made smooth. Resulting the contact conditions between the individual wires and the strand to-strand contacts are improved.



PARALLEL LAY ROPES

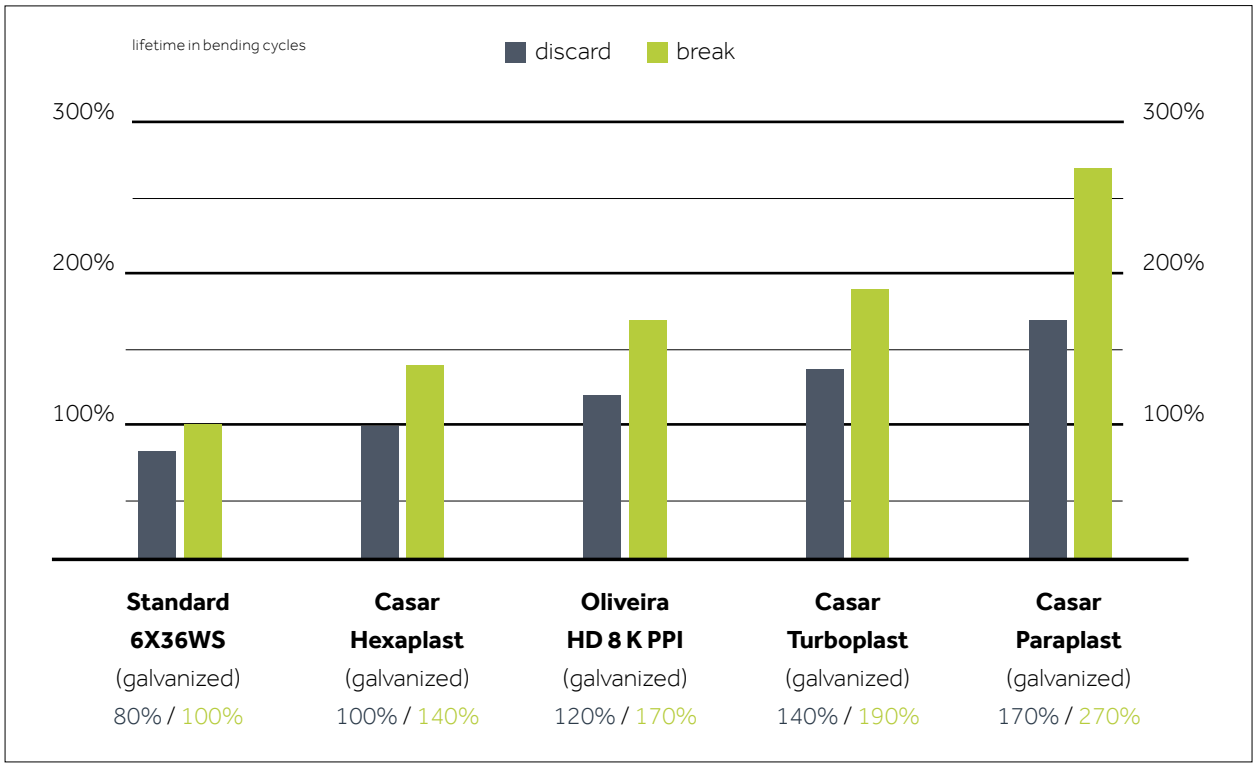
In a standard rope all wires and strands have different lay lengths. The high stress concentration at the crossover point leads to an early internal failure. In a parallel lay rope all wires and strands have the same lay length. The linear contact leads to an optimal stress distribution. Furthermore the compacted parallel design leads to a higher fill factor and breaking strength. This combination of longer service life and higher breaking strength fulfills the growing demand of up-to-date container handling equipment.



THE IMPORTANCE OF RE-LUBRICATION AND THE USE OF GALVANIZED ROPES

There are new findings in the performance differences between ungalvanized and galvanized ropes which are important to know. Most of the ropes can be ordered in both executions and in the past the strategy was mainly to recommend galvanized ropes if corrosion resistance is of importance. The fact that galvanized is more expensive and corrosion was not an important point in the application, mostly led to a use of blank ropes.

Based on recent internal tests on the current performance difference between galvanized and ungalvanized ropes and also related to some feedback from the field use we have realized that the difference is in many cases quite significantly. An additional performance increase can be achieved with the CASAR PARAPLAST due to its specific parallel rope design.



Test results show a strong increase in bending fatigue cycles. Please note that the blue bar shows discard and the green bar shows rope break. Feedback from the field showed some differences too. In this respect another important fact plays a critical role. In many cases a proper relubrication hasn't been done and the progressive corrosion reduced the life of the rope dramatically.

Corroded Ropes

NEW LUBRICATIONS FOR BETTER CORROSION PROTECTION

Here ongoing research led to improved grease additives which reduce the corrosion significantly. Many of our CASAR ropes have this additive as a standard component included.

The pictures to the left show corrosion after a 21 day test in a salt spray chamber. The new additive leads to an impressive improvement on corrosion resistance.

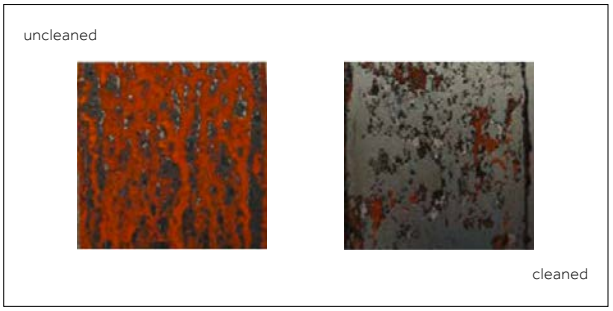
All those facts make us to propose to the sales organization that in many cases galvanized ropes could be the better choice, especially if those **requirements** exist:

- High number of bending cycles
- High humidity, risk of corrosion
- Relubrication doubtful, risk of dry rope (please note: Galvanized ropes need relubrication too!)

There are three **important restrictions** for the use of galvanized ropes.

- If the rope is used in an atmosphere containing hydrochlorid acid the zinc will be dissolved. This is the case if the rope runs for instance on a factory crane or hoist in a galvanization plant.
- Very high temperatures can weaken or even melt the zinc coating, this can happen in steel work cranes if the ropes are exposed to high heat radiation.
- Abrasive particles can destroy quite quickly the relatively soft zinc layer. This could be the case in a material handling crane processing ore or sand.

OLD PRODUCT



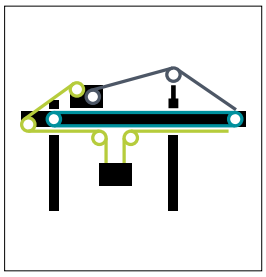
NEW PRODUCT

Based on all these findings we suggest to select galvanized ropes if the above mentioned requirements exist. This is typically the case in applications like container handling equipment (STS, straddle carrier, RTG, RMG), ship and offshore cranes and in some special high performance equipment like process cranes. There is a slightly higher price but the improved performance and corrosion resistance gives a strong argumentation in favour of galvanized ropes. For more information don't hesitate to contact the WireCo organization.

WIRECO ROPES IN STS CRANES

The use of ropes in ship unloading cranes is certainly one of the most demanding tasks in a container terminal. The high time pressure in the discharge cycles requires a high speed of movement, both in picking the container as well as in the movement to the unloading point. High dynamic forces additionally burden the ropes. The most important aspect of this application is certainly the required high reliability and long life of the cables in use. Any unplanned downtime causes big problems and thus costs. Here, CASAR and OLIVEIRA ropes have proven themselves in ports all over the world. Our rope specialists analyze your system and can suggest the optimum rope for your system through their deep knowledge in order to improve your STS crane significantly.

ROPE RECOMMENDATIONS FOR STS CRANES



HOIST ROPE
CASAR HEXAPLAST
CASAR TURBOPLAST
CASAR PARAPLAST
OLIVEIRA HD 8 K PPI

BOOM HOIST
CASAR HEXAPLAST
CASAR TURBOPLAST
CASAR PARAPLAST
OLIVEIRA HD 8 K PPI

TROLLEY
CASAR HEXAPLAST
CASAR TURBOPLAST
OLIVEIRA HD 8 K PPI

BREAKING STRENGTH:

CASAR's double parallel rope constructions allow high breaking strength combined with an increased service life. The CASAR PARAFIT offers here the highest breaking strength.

WEAR RESISTANCE:

WireCo generally recommends compacted ropes for such heavy duty applications as the advantages of the smoother surface are significantly. Due to the increased contact surface between rope and drum/ sheaves wear is reduced strongly.

BENDING CYCLES:

Due to the same length of double parallel ropes there is a perfect contact between the wires and the strands which avoids crossing points and hence improves the achievable bending cycles. Such ropes deliver a higher service life compared to standard rope designs.

FLEXIBILITY:

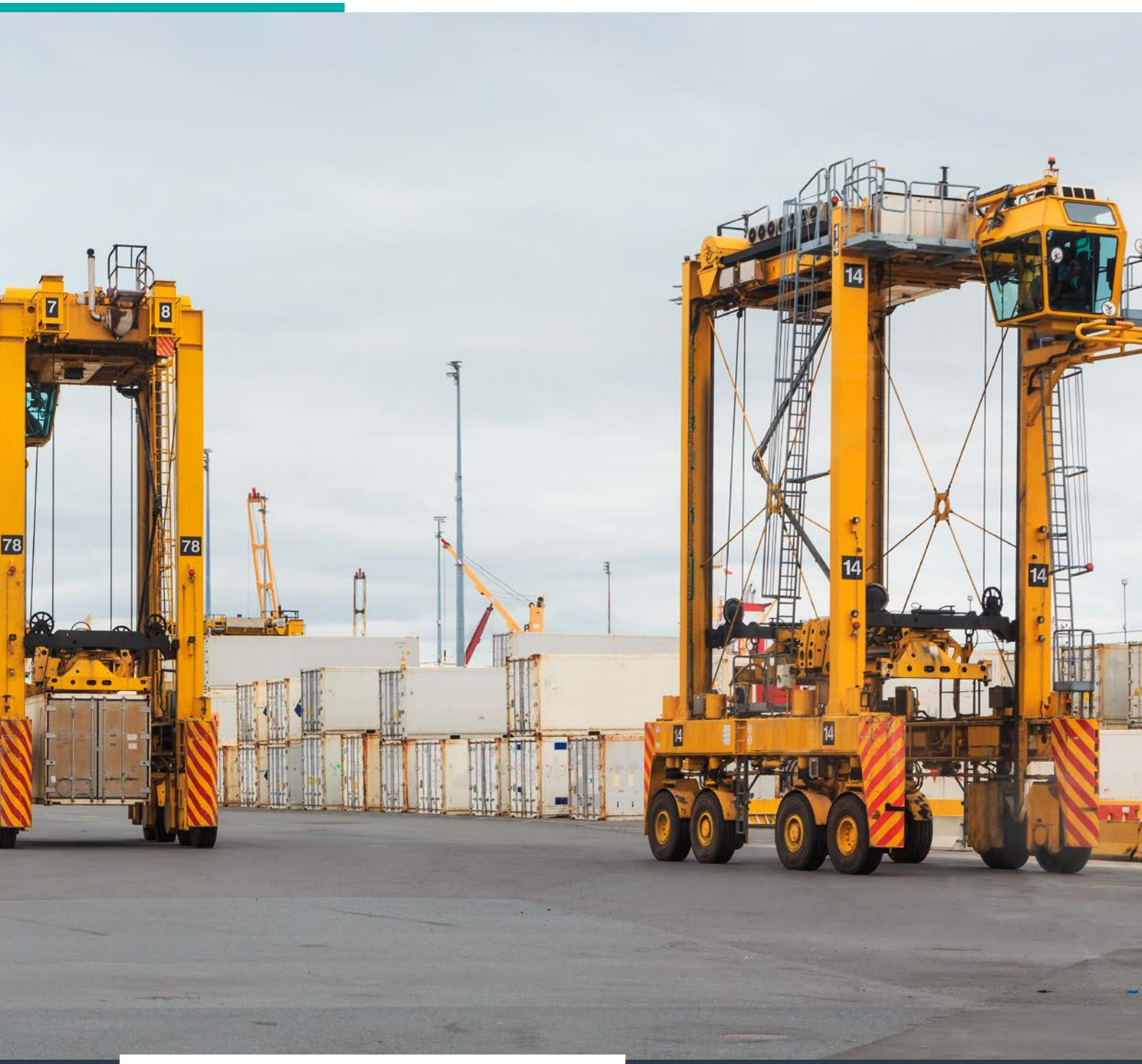
A higher number of outer strands as well as a double parallel construction improve the rope's flexibility. The CASAR PARAPLAST offers superior performance.

SHOCK LOADS:

The very robust design of the CASAR TURBOPLAST delivers the highest resistance to shock loads.

	STS	STANDARD 6X36	HEXAPLAST	TURBOPLAST	PARAPLAST	HD 8 K PPI
Breaking Strength	●●	●	●	●●	●●●	●●
Wear Resistance	●●	●	●●●	●●	●●	●●
Bending Cycles	●●●	●	●●	●●	●●●	●●
Flexibility	●●	●	●	●●	●●	●●
Shock Loads	●●	●	●●	●●●	●●	●●

The standard GP rope 6x36 is with no plastic, ungalvanized and uncompacted.

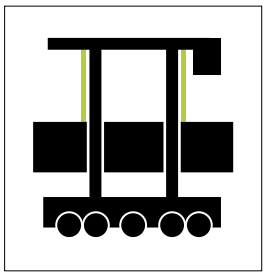


WIRECO ROPES IN STRADDLE CARRIERS

Even if it doesn't look that way on a first glance, ropes in straddle carriers are heavily used lifting elements. Due to the very compact design of the straddle carrier a quite sophisticated system of a winch and sheaves is used to lift the container. This compactness often leads to high fleet angles especially in the upper lifting position. Here a robust and flexible rope is needed to cope with these requirements. Another challenge are the shock loads generated by the driving of the straddle carrier.

The uneven ground of the harbour's driveways causes heavy vibrations in the whole system and the ropes have to act like shock absorbers. Here our CASAR TURBOPLAST offers a very good combination of a very robust rope construction along with a thick plastic layer around the core which helps dampening the shock loads. A CASAR PARAFIT offers higher bending cycles on a similar robustness level.

ROPE RECOMMENDATIONS FOR STRADDLE CARRIERS



HOIST ROPE

CASAR HEXAPLAST
CASAR TURBOPLAST
CASAR PARAPLAST
OLIVEIRA HD 8 K PPI

BREAKING STRENGTH:

CASAR's double parallel rope constructions allow high breaking strength combined with an increased service life. The CASAR PARAPLAST offers here the highest breaking strength.

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FLEXIBILITY:

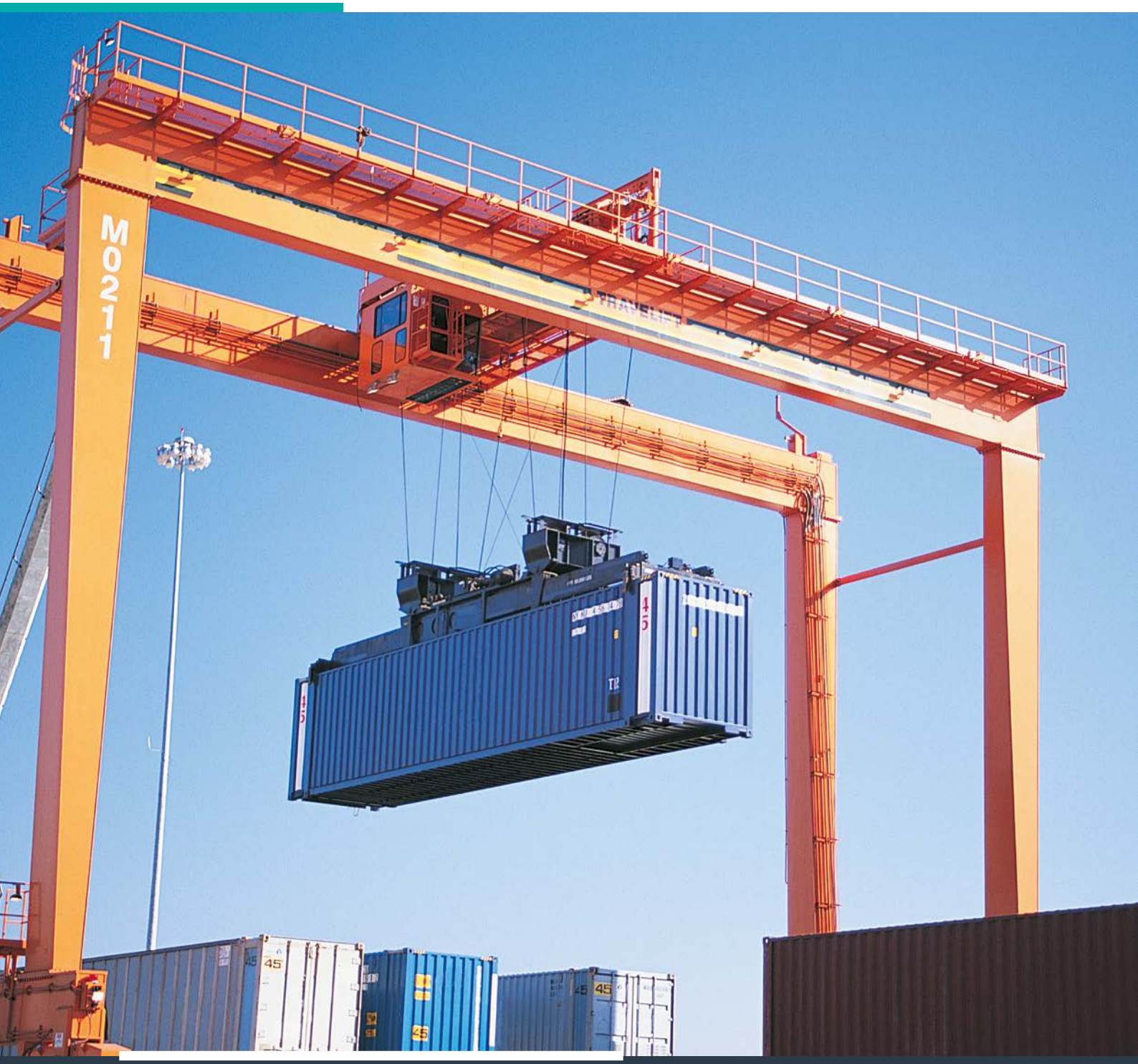
A higher number of outer strands as well as a double parallel construction improve the rope's flexibility. The CASAR PARAPLAST offers superior performance.

SHOCK LOADS:

The very robust design of the CASAR TURBOPLAST delivers the highest resistance to shock loads.

	STRADDLE	STANDARD 6X36	HEXAPLAST	TURBOPLAST	PARAPLAST	HD 8 K PPI
Breaking Strength	●●	●	●	●●	●●●	●●
Wear Resistance	●●	●	●●●	●●	●●	●●
Bending Cycles	●●	●	●●	●●	●●●	●●
Flexibility	●	●	●	●●	●●	●●
Shock Loads	●●●	●	●●	●●●	●●	●●

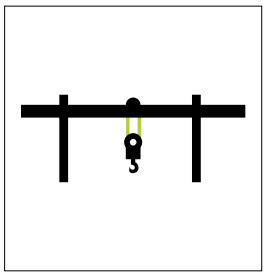
The standard GP rope 6x36 is with no plastic, ungalvanized and uncompacted.



WIRECO ROPES IN PORTAL CRANES RTG AND RMG

Those portal cranes keep the ball rolling in a container terminal and are essential in the interface between the stored containers on one side and the means of transport. This can be trucks or freight trains which get the containers to their final destination inlands. As on the STS cranes we talk here about a very frequent use with a lot of bending cycles under rough working conditions. A very proven solution comes with the CASAR TURBOPLAST which is the rope of choice in many terminals around the world. An interesting alternative which offers higher possible bending cycles is the CASAR PARAPLAST.

ROPE RECOMMENDATIONS FOR RTG / RMG



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OLIVEIRA HD 8 K PPI

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BENDING CYCLES:

Due to the same length of double parallel ropes there is a perfect contact between the wires and the strands which avoids crossing points and hence improves the achievable bending cycles. Such ropes deliver a higher service life compared to standard rope designs. Double Parallel ropes as the CASAR PARAPLAST are top players here.

FLEXIBILITY:

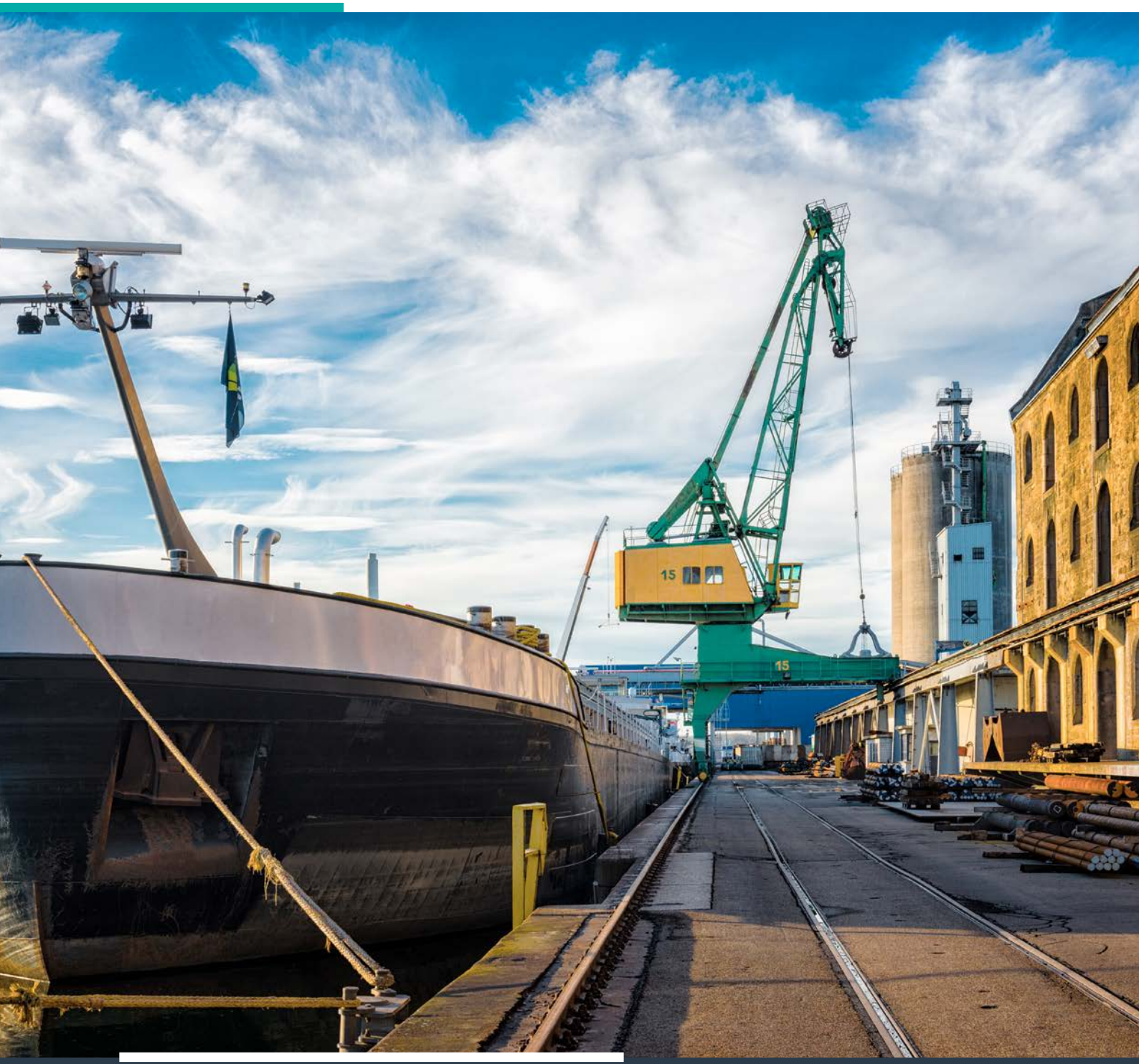
A higher number of outer strands as well as a double parallel construction improve the rope's flexibility. The CASAR PARAPLAST with its combination of both offers superior performance.

SHOCK LOADS:

The very robust design of the CASAR TURBOPLAST delivers the highest resistance to shock loads.

	RTG/RMG	STANDARD 6X36	HEXAPLAST	TURBOPLAST	PARAPLAST	HD 8 K PPI
Breaking Strength	●	●	●	● ●	● ● ●	● ●
Wear Resistance	● ●	●	● ● ●	● ●	● ●	● ●
Bending Cycles	● ● ●	●	● ●	● ●	● ● ●	● ●
Flexibility	●	●	●	● ●	● ●	● ●
Shock Loads	● ●	●	● ●	● ● ●	● ●	● ●

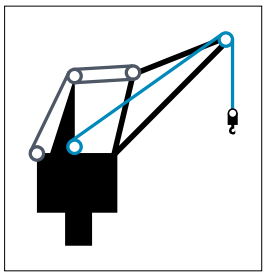
The standard GP rope 6x36 is with no plastic, ungalvanized and uncompacted.



WIRECO ROPES IN HARBOUR MOBILE CRANES

Harbour mobile cranes are a very flexible lifting equipment in a harbour environment. Often they have to fullfil multiple tasks as to move containers, general cargo, bulk or assembly work in a ship yard. There are lifting ropes for the hoist work but the ropes used to offset the boom are a challenging application too. Many cranes are equipped with both CASAR TURBOPLAST for both operational areas thus providing excellent performance day by day.

ROPE RECOMMENDATIONS FOR HARBOUR MOBILE CRANES



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OLIVEIRA HD 8 K PPI

BOOM HOIST
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BREAKING STRENGTH:

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WEAR RESISTANCE:

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	HMC	STANDARD 6X36	HEXAPLAST	TURBOPLAST	PARAPLAST	HD 8 K PPI
Breaking Strength	●●	●	●	●●	●●●	●●
Wear Resistance	●●●	●	●●●	●●	●●	●●
Bending Cycles	●●	●	●●	●●	●●●	●●
Flexibility	●	●	●	●●	●●	●●
Shock Loads	●●●	●	●●	●●●	●●	●●

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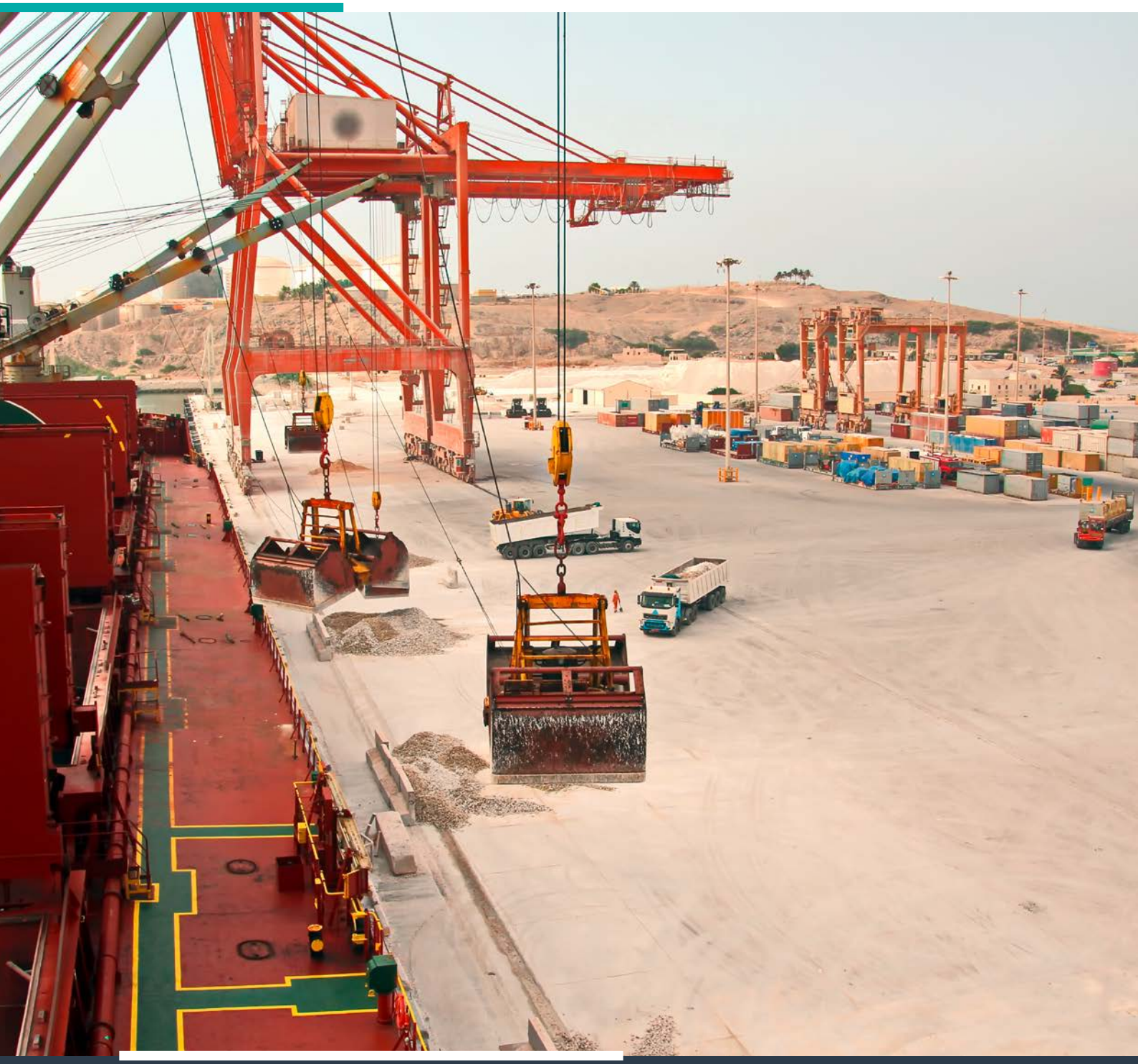


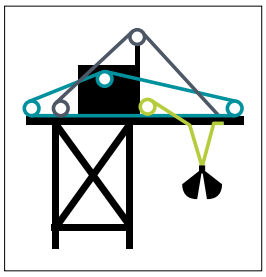
WIRECO ROPES IN GRAB CRANES

Ropes in such bulk unloading applications are those with the most critical performance needs. Frequent shock loads and the permanent duty cycles demand a great deal of the ropes in use. The greatest challenge is with the hoisting ropes as they have to deal with the shock loads when the grab is falling into the ore or coal and is then activated by the hoist ropes. For this the CASAR ropes with their special plastic covered core guarantee an excellent structural stability and keeps dirt and humidity out of the rope.

ATTENTION:

Ropes used in loading terminals for ironore have to be selected very carefully. Here WireCo offers special rope designs to cope with those specific requirements. For more info, please contact WireCo directly.

ROPE RECOMMENDATIONS FOR GRAB CRANES



HOIST ROPE
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SHOCK LOADS:

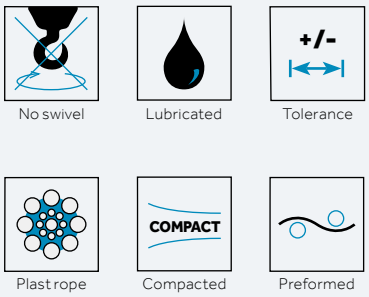
The very robust design of the CASAR TURBOPLAST delivers the highest resistance to shock loads.

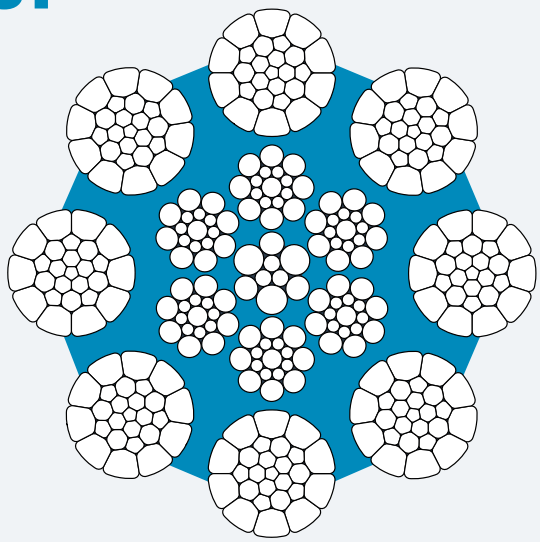
	GRAB	STANDARD 6X36	HEXAPLAST	TURBOPLAST	PARAPLAST	HD 8 K PPI
Breaking Strength	●●	●	●	●●	●●●	●●
Wear Resistance	●●●	●	●●●	●●	●●	●●
Bending Cycles	●●	●	●●	●●	●●●	●●
Flexibility	●	●	●	●●	●●	●●
Shock Loads	●●●	●	●●	●●●	●●	●●

The standard GP rope 6x36 is with no plastic, ungalvanized and uncompacted.

CASAR **TURBOPLAST**

PROPERTIES

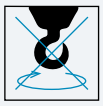




Nominal Diameter		WEIGHT		MINIMUM BREAKING FORCE											
				1770 N/mm²				1960 N/mm²				2160 N/mm²			
mm	inch	kg/m	lb/ft	kN	t[metric]	lbs	t[2000lbs]	kN	t[metric]	lbs	t[2000lbs]	kN	t[metric]	lbs	t[2000lbs]
12		0,67	0,45	**117,0**	11,93	26.303	13,15	**130,0**	13,26	29.225	14,61	**144,0**	14,68	32.372	16,19
	1/2	0,75	0,51	**131,0**	13,36	29.450	14,72	**146,0**	14,89	32.822	16,41	**161,8**	16,50	36.374	18,19
13		0,76	0,51	**135,0**	13,77	30.349	15,17	**147,0**	14,99	33.047	16,52	**161,7**	16,49	36.352	18,18
14		0,91	0,61	**161,0**	16,42	36.194	18,10	**177,0**	18,05	39.791	19,90	**196,0**	19,99	44.063	22,03
15		1,06	0,71	**187,0**	19,07	42.039	21,02	**205,0**	20,90	46.086	23,04	**226,0**	23,05	50.807	25,40
16	5/8	1,21	0,81	**212,0**	21,62	47.659	23,83	**232,0**	23,66	52.156	26,08	**252,0**	25,70	56.652	28,33
17		1,34	0,90	**236,0**	24,07	53.055	26,53	**259,0**	26,41	58.226	29,11	**283,0**	28,86	63.621	31,81
18		1,51	1,02	**266,0**	27,12	59.799	29,90	**292,0**	29,78	65.644	32,82	**314,0**	32,02	70.590	35,29
19	3/4	1,67	1,12	**299,0**	30,49	67.218	33,61	**327,0**	33,35	73.513	36,76	**351,0**	35,79	78.908	39,45
20		1,87	1,26	**329,0**	33,55	73.962	36,98	**361,0**	36,81	81.156	40,58	**391,0**	39,87	87.900	43,95
21		2,04	1,37	**359,0**	36,61	80.706	40,35	**394,0**	40,18	88.575	44,29	**421,0**	42,93	94.645	47,32
22		2,23	1,50	**401,0**	40,89	90.148	45,07	**439,0**	44,77	98.691	49,35	**468,0**	47,72	105.211	52,61
	7/8	2,25	1,51	**410,0**	41,81	92.172	46,09	**449,0**	45,79	100.939	50,47	**478,0**	48,74	107.459	53,73
23		2,44	1,64	**436,0**	44,46	98.017	49,01	**478,0**	48,74	107.459	53,73	**511,0**	52,11	114.877	57,44
24		2,66	1,78	**464,5**	47,37	104.424	52,21	**514,3**	52,44	115.619	57,81	**556,0**	56,70	124.994	62,50
25		2,84	1,91	**516,0**	52,62	116.001	58,00	**566,0**	57,72	127.242	63,62	**602,0**	61,39	135.335	67,67
	1	2,92	1,96	**533,4**	54,39	119.913	59,96	**584,6**	59,61	131.423	65,71	**621,6**	63,39	139.741	69,87
26		3,13	2,11	**562,0**	57,31	126.343	63,17	**616,0**	62,82	138.482	69,24	**655,0**	66,79	147.250	73,62
27		3,38	2,27	**599,0**	61,08	134.661	67,33	**657,0**	67,00	147.699	73,85	**702,0**	71,58	157.816	78,91
28		3,60	2,42	**645,0**	65,77	145.002	72,50	**707,0**	72,09	158.940	79,47	**748,0**	76,28	168.157	84,08
	1 1/8	3,79	2,55	**671,9**	68,52	151.049	75,52	**736,5**	75,10	165.572	82,79	**779,2**	79,46	175.171	87,59
29		3,87	2,60	**695,0**	70,87	156.242	78,12	**760,0**	77,50	170.855	85,43	**807,0**	82,29	181.421	90,71
30		4,15	2,79	**745,0**	75,97	167.483	83,74	**813,0**	82,90	182.770	91,38	**871,0**	88,82	195.809	97,90
31		4,44	2,98	**796,0**	81,17	178.948	89,47	**869,0**	88,61	195.359	97,68	**930,0**	94,83	209.072	104,54
32	1 1/4	4,75	3,19	**848,0**	86,47	190.638	95,32	**938,0**	95,65	210.871	105,44	**988,0**	100,75	222.111	111,06
33		5,06	3,40	**897,0**	91,47	201.654	100,83	**979,0**	99,83	220.088	110,04	**1.059,0**	107,99	238.073	119,04
34		5,36	3,60	**959,0**	97,79	215.592	107,80	**1.055,0**	107,58	237.173	118,59	**1.114,0**	113,60	250.437	125,22
35	1 3/8	5,66	3,81	**1.012,3**	103,23	227.574	113,79	**1.113,9**	113,59	250.415	125,21	**1.175,7**	119,89	264.308	132,15
36		5,95	4,00	**1.066,0**	108,70	239.646	119,82	**1.164,0**	118,70	261.678	130,84	**1.242,0**	126,65	279.213	139,61
38	1 1/2	6,68	4,49	**1.192,0**	121,55	267.972	133,99	**1.301,0**	132,67	292.476	146,24	**1.395,0**	142,25	313.608	156,80
40		7,40	4,97	**1.317,0**	134,30	296.073	148,04	**1.438,0**	146,64	323.275	161,64	**1.552,0**	158,26	348.903	174,45
	1 5/8	7,88	5,29	**1.402,3**	143,00	315.249	157,62	**1.531,1**	156,13	344.212	172,11	**1.652,5**	168,51	371.500	185,75
42		8,11	5,45	**1.457,0**	148,57	327.547	163,77	**1.591,0**	162,24	357.671	178,84	**1.694,0**	172,74	380.826	190,41
44		8,96	6,02	**1.593,0**	162,44	358.121	179,06	**1.739,0**	177,33	390.943	195,47	**1.873,0**	190,99	421.067	210,53
	1 3/4	9,08	6,10	**1.626,5**	165,86	365.652	182,83	**1.775,5**	181,05	399.148	199,57	**1.911,0**	194,87	429.610	214,80
46		9,78	6,57	**1.755,0**	178,96	394.540	197,27	**1.916,0**	195,38	430.734	215,37	**2.042,0**	208,23	459.060	229,53
48	1 7/8	10,65	7,16	**1.905,0**	194,26	428.261	214,13	**2.079,0**	212,00	467.378	233,69	**2.225,0**	226,89	500.200	250,10
50		11,57	7,77	**2.036,0**	207,62	457.711	228,86	**2.265,0**	230,97	509.192	254,60	2.423,0	247,08	544.712	272,36

CASAR **PARAPLAST**

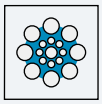
PROPERTIES


No swivel


Lubricated

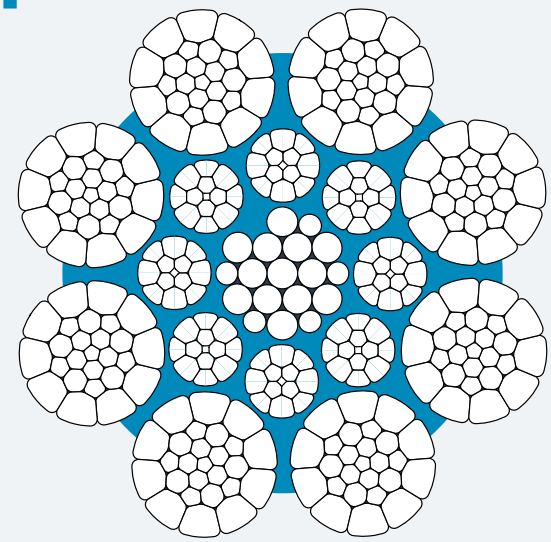
Tolerance


Parallel Construction


Plast rope

Compacted


Preformed

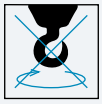


Very High Breaking Force

Nominal Diameter		WEIGHT		MINIMUM BREAKING FORCE 1960 N/mm²				2160 N/mm²			
mm	inch	kg/m	lb/ft	kN	t [metric]	lbs	t [2000 lbs]	kN	t [metric]	lbs	t [2000 lbs]
12		0,72	0,48	**137,2**	13,99	30.844	15,42	**147,8**	15,07	33.227	16,61
	1/2	0,80	0,54	**152,4**	15,54	34.261	17,13	**164,1**	16,73	36.891	18,45
13		0,83	0,56	**159,7**	16,29	35.902	17,95	**172,0**	17,54	38.667	19,33
14		0,96	0,65	**184,8**	18,84	41.545	20,77	**199,0**	20,29	44.737	22,37
15		1,12	0,75	**212,3**	21,65	47.727	23,86	**228,6**	23,31	51.391	25,70
16	5/8	1,27	0,86	**240,4**	24,51	54.044	27,02	**258,9**	26,40	58.203	29,10
17		1,42	0,96	**273,3**	27,87	61.440	30,72	**294,4**	30,02	66.184	33,09
18		1,61	1,08	**304,3**	31,03	68.409	34,20	**327,7**	33,42	73.670	36,83
19	3/4	1,78	1,20	**342,0**	34,87	76.885	38,44	**368,4**	37,57	82.820	41,41
20		2,01	1,35	**379,7**	38,72	85.360	42,68	**408,9**	41,70	91.924	45,96
21		2,20	1,48	**414,7**	42,29	93.228	46,61	**446,6**	45,54	100.400	50,20
22		2,40	1,61	**456,8**	46,58	102.693	51,35	**491,9**	50,16	110.583	55,29
	7/8	2,44	1,64	**466,1**	47,53	104.783	52,39	**502,0**	51,19	112.854	56,43
23		2,64	1,77	**517,1**	52,73	116.249	58,12	**556,9**	56,79	125.196	62,60
24		2,87	1,93	**561,8**	57,29	126.298	63,15	**605,0**	61,69	136.009	68,00
25		3,11	2,09	**609,0**	62,10	136.909	68,45	**655,9**	66,88	147.452	73,73
	1	3,18	2,13	**628,7**	64,11	141.337	70,67	**677,1**	69,05	152.218	76,11
26		3,38	2,27	**662,2**	67,53	148.868	74,43	**713,1**	72,72	160.311	80,16
27		3,63	2,44	**711,0**	72,50	159.839	79,92	**765,8**	78,09	172.159	86,08
28		3,89	2,61	**760,6**	77,56	170.990	85,49	**819,1**	83,53	184.141	92,07
	1 1/8	4,08	2,74	**792,2**	80,78	178.094	89,05	**853,1**	86,99	191.784	95,89
29		4,18	2,81	**820,3**	83,65	184.411	92,21	**883,5**	90,09	198.619	99,31
30		4,49	3,02	**884,0**	90,14	198.731	99,37	**952,0**	97,08	214.018	107,01
31		4,78	3,21	**821,4**	83,76	184.658	92,33	**1.003,6**	102,34	225.618	112,81
32	1 1/4	5,11	3,43	**978,3**	99,76	219.931	109,97	**1.065,6**	108,66	239.556	119,78
33		5,45	3,66	**1.042,5**	106,31	234.363	117,18	**1.135,6**	115,80	255.293	127,65
34		5,75	3,86	**1.097,0**	111,86	246.615	123,31	**1.194,9**	121,85	268.624	134,31
35	1 3/8	6,11	4,11	**1.163,9**	118,69	261.655	130,83	**1.267,7**	129,27	284.990	142,50
36		6,42	4,32	**1.233,8**	125,81	277.369	138,68	**1.343,9**	137,04	302.121	151,06
38	1 1/2	7,20	4,84	**1.377,2**	140,44	309.607	154,80	**1.500,1**	152,97	337.236	168,62
40		7,98	5,36	**1.533,5**	156,38	344.744	172,37	**1.670,3**	170,32	375.498	187,75
	1 5/8	8,38	5,63	**1.632,8**	166,50	367.068	183,53	**1.778,5**	181,36	399.823	199,91
42		8,78	5,90	**1.680,1**	171,32	377.701	188,85	**1.830,1**	186,62	411.423	205,71
44		9,64	6,48	**1.851,4**	188,79	416.211	208,11	**2.016,6**	205,64	453.350	226,67
	1 3/4	9,77	6,56	**1.889,5**	192,68	424.776	212,39	**2.058,1**	209,87	462.679	231,34
46		10,54	7,08	**2.022,8**	206,27	454.743	227,37	**2.203,3**	224,68	495.321	247,66
48	1 7/8	11,46	7,70	**2.202,0**	224,54	495.029	247,51	**2.398,5**	244,58	539.204	269,60
50		12,52	8,41	**2.365,3**	241,20	531.740	265,87	**2.576,4**	262,72	579.198	289,60

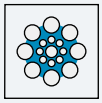
CASAR **HEXAPLAST**

PROPERTIES


No swivel

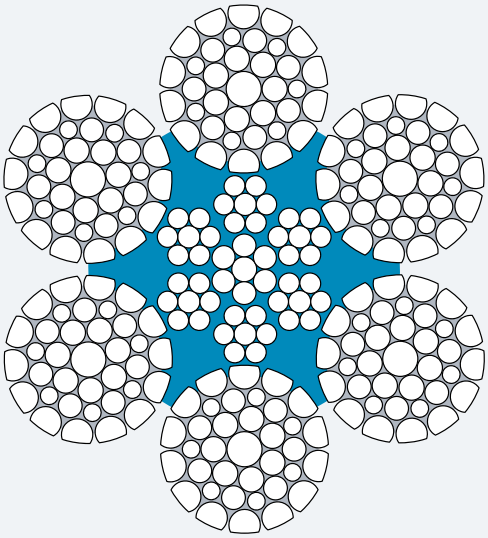

Lubricated

Tolerance


Plast rope

Compacted


Preformed



Nominal Diameter		WEIGHT		MINIMUM BREAKING FORCE 1960 N/mm²			
mm	inch	kg/m	lb/ft	kN	t [metric]	lbs	t[2000lbs]
12		0,66	0,44	**125,8**	12,83	28.281	14,14
	1/2	0,74	0,50	**138,0**	14,07	31.024	15,51
13		0,78	0,52	**150,0**	15,30	33.721	16,86
14		0,92	0,62	**169,3**	17,26	38.060	19,03
15		1,02	0,68	**190,9**	19,47	42.916	21,46
16	5/8	1,17	0,79	**218,8**	22,31	49.188	24,59
17		1,33	0,90	**250,5**	25,54	56.315	28,16
18		1,49	1,00	**276,7**	28,22	62.205	31,10
19	3/4	1,68	1,13	**311,1**	31,72	69.938	34,97
20		1,85	1,24	**344,8**	35,16	77.514	38,76
22		2,23	1,50	**419,0**	42,73	94.195	47,10
	7/8	2,27	1,53	**420,0**	42,83	94.420	47,21
24		2,62	1,76	**504,3**	51,42	113.371	56,69
25		2,90	1,95	**542,5**	55,32	121.959	60,98
	1	2,96	1,99	**565,2**	57,63	127.062	63,53
26		3,14	2,11	**598,2**	61,00	134.481	67,24
28		3,65	2,45	**681,6**	69,50	153.230	76,61
	1 1/8	3,77	2,53	**687,0**	70,05	154.444	77,22
29		3,95	2,65	**737,7**	75,22	165.842	82,92
30		4,16	2,80	**786,6**	80,21	176.835	88,42
32	1 1/4	4,76	3,20	**890,9**	90,85	200.282	100,14
34		5,36	3,60	**1012,0**	103,20	227.507	113,75
35	1 3/8	5,66	3,80	**1050,0**	107,07	236.049	118,02
36		6,04	4,06	**1132,0**	115,43	254.484	127,24
38	1 1/2	6,61	4,44	**1261,0**	128,59	283.484	141,74
40		7,41	4,98	**1390,0**	141,74	312.484	156,24
	1 5/8	7,89	5,30	**1450,0**	147,86	325.973	162,99
42		8,03	5,40	**1510,0**	153,98	339.461	169,73
44		8,93	6,00	**1680,0**	171,31	377.679	188,84
	1 3/4	9,09	6,11	**1705,0**	173,86	383.299	191,65
46		9,69	6,51	**1825,0**	186,10	410.276	205,14
48	1 7/8	10,56	7,09	**1988,0**	202,72	446.920	223,46
50		11,49	7,72	**2178,0**	222,09	489.634	244,82

OLIVEIRA **HD 8 K PPI**

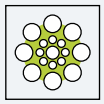
PROPERTIES

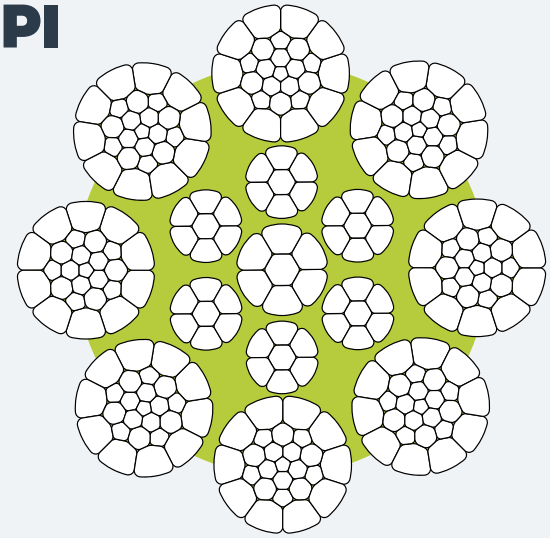

No swivel


Lubricated

Tolerance

Compacted


PPI



Nominal Diameter		WEIGHT		MINIMUM BREAKING FORCE 1770 N/mm²				1960 N/mm²				2160 N/mm²			
mm	inch	kg/m	lb/ft	kN	t[metric]	lbs	t[2000lbs]	kN	t[metric]	lbs	t[2000lbs]	kN	t[metric]	lbs	t[2000lbs]
12		0,65	0,44	**115,1**	11,74	25.876	12,94	**126,4**	12,89	28.415	14,21	**132,6**	13,52	29.800	14,90
12,70	1/2	0,71	0,48	**124,4**	12,69	27.966	13,98	**138,0**	14,07	31.015	15,51	**144,7**	14,76	32.530	16,26
13		0,77	0,52	**136,6**	13,93	30.709	15,35	**149,0**	15,19	33.491	16,75	**156,2**	15,93	35.123	17,56
14		0,90	0,61	**157,9**	16,10	35.497	17,75	**174,8**	17,82	39.297	19,65	**187,0**	19,07	42.039	21,02
15		1,03	0,69	**180,0**	18,35	40.466	20,23	**202,7**	20,67	45.569	22,78	**214,0**	21,82	48.109	24,05
15,88	5/8	1,15	0,77	**200,0**	20,39	44.962	22,48	**220,0**	22,43	49.458	24,73	**235,0**	23,96	52.830	26,42
16		1,16	0,78	**204,0**	20,80	45.861	22,93	**229,4**	23,39	51.571	25,79	**242,4**	24,72	54.494	27,25
17		1,30	0,87	**227,0**	23,15	51.032	25,52	**250,0**	25,49	56.202	28,10	**267,0**	27,23	60.024	30,01
18		1,49	1,00	**260,2**	26,53	58.495	29,25	**288,2**	29,39	64.790	32,39	**307,0**	31,31	69.016	34,51
19	3/4	1,64	1,10	**292,1**	29,79	65.667	32,83	**323,5**	32,99	72.726	36,36	**342,0**	34,87	76.885	38,44
20		1,84	1,23	**321,0**	32,73	72.164	36,08	**355,5**	36,25	79.920	39,96	**379,0**	38,65	85.203	42,60
22		2,21	1,49	**391,7**	39,94	88.058	44,03	**433,7**	44,23	97.500	48,75	**458,5**	46,75	103.075	51,54
22,23	7/8	2,26	1,52	**394,9**	40,27	88.784	44,39	**435,0**	44,36	97.792	48,90	**462,0**	47,11	103.862	51,93
24		2,63	1,77	**464,5**	47,37	104.424	52,21	**514,3**	52,44	115.619	57,81	**556,0**	56,70	124.994	62,50
25		2,86	1,92	**504,2**	51,41	113.349	56,67	**558,2**	56,92	125.488	62,74	**602,0**	61,39	135.335	67,67
25,40	1	2,94	1,98	**519,0**	52,92	116.676	58,34	**572,0**	58,33	128.591	64,30	**611,0**	62,30	137.358	68,68
26		3,13	2,10	**548,9**	55,97	123.398	61,70	**607,8**	61,98	136.639	68,32	**655,0**	66,79	147.250	73,62
28		3,60	2,42	**629,6**	64,20	141.540	70,77	**697,3**	71,10	156.759	78,38	**748,0**	76,27	168.157	84,08
28,58	1 1/8	3,67	2,46	**638,0**	65,06	143.428	71,71	**707,0**	72,09	158.940	79,47	**751,0**	76,58	168.831	84,42
30		4,12	2,77	**727,1**	74,14	163.459	81,73	**803,0**	81,88	180.522	90,26	**864,0**	88,10	194.235	97,12
31,75	1 1/4	4,59	3,09	**812,0**	82,80	182.545	91,27	**895,0**	91,26	201.204	100,60	**951,0**	96,98	213.793	106,90
32		4,67	3,14	**828,0**	84,43	186.142	93,07	**911,0**	92,90	204.801	102,40	**968,0**	98,71	217.615	108,81
34		5,29	3,56	**936,4**	95,49	210.511	105,26	**1.025**	104,52	230.429	115,21	**1.091**	111,25	245.267	122,63
34,93	1 3/8	5,51	3,70	**954,0**	97,28	214.468	107,23	**1.057**	107,78	237.623	118,81	**1.109**	113,09	249.313	124,66
36		5,84	3,93	**1.040**	106,05	233.801	116,90	**1.150**	117,27	258.530	129,27	**1.217**	124,10	273.592	136,80
38	1 1/2	6,58	4,42	**1.159**	118,19	260.554	130,28	**1.271**	129,61	285.732	142,87	**1.332**	135,83	299.445	149,72
40		7,30	4,90	**1.285**	131,03	288.879	144,44	**1.410**	143,78	316.981	158,49	**1.478**	150,71	332.268	166,13
41,28	1 5/8	7,47	5,02	**1.305**	133,07	293.376	146,69	**1.464**	149,29	329.120	164,56	**1.535**	156,53	345.082	172,54
42		7,98	5,36	**1.403**	143,07	315.407	157,70	**1.538**	156,83	345.756	172,88	**1.613**	164,48	362.617	181,31
44		9,00	6,05	**1.554**	158,46	349.353	174,68	**1.736**	177,02	390.268	195,13	**1.820**	185,59	409.152	204,58
44,45	1 3/4	9,04	6,08	**1.572**	160,30	353.400	176,70	**1.743**	177,74	391.842	195,92	**1.828**	186,40	410.951	205,48
46		9,78	6,57	**1.713**	174,68	385.098	192,55	**1.883**	192,01	423.315	211,66	**1.975**	201,39	443.998	222,00
47,63	1 7/8	10,40	6,99	**1.774**	180,90	398.811	199,41	**1.964**	200,27	441.525	220,76	**2.112**	215,36	474.796	237,40
48		10,61	7,13	**1.858**	189,46	417.695	208,85	**2.055**	209,55	461.982	230,99	**2.155**	219,75	484.463	242,23
50		11,62	7,81	**1.986**	202,52	446.470	223,24	**2.253**	229,74	506.494	253,25	**2.362**	240,86	530.999	265,50

Product specifications are subject to change without notice or obligation. The shown photographs, drawings or cross sections are only for illustrative purposes, the images can vary depending on requested diameter and current status of technical development.

The information supplied in this brochure is only a guideline for rope selection. Please contact us for any information or advice on the use of our ropes or if you have any doubt in selecting a rope for a specific application.

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