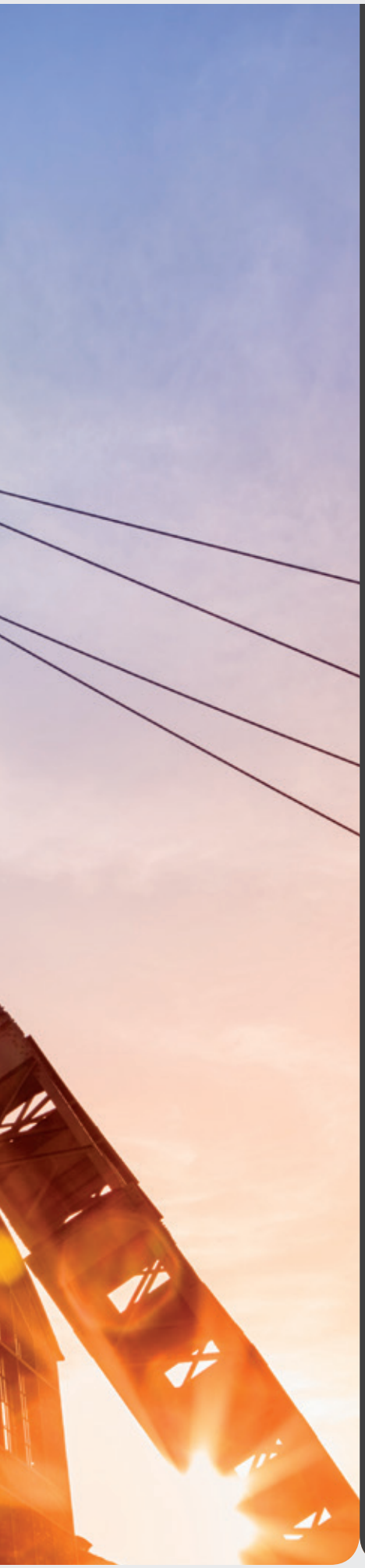
ArcelorMittal ROPES

ENGINEERING EXCELLENCE

ArcelorMittal

High performance **Mining Ropes** for the most demanding environments



Contents

Klondike®

A new breed of non-rotating rope engineered for more aggressive, deep shaft mining environments.

p14

Notorplast®

The low maintenance, fatigue resistant rope that is engineered to last.

p18

NRHD 24/24 CS

Versatile ropes for multiple applications.

p22

FLC Z-Lock

Full Lock Coil, Z-Lock is engineered for the demanding requirements of deep shaft mining and aerial transportation.

p30

HLC X-Lock

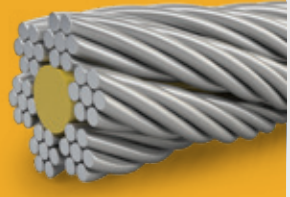
Half Lock Coil, X-Lock is a precision guidance rope with long service life.

p36

NCR6

The stable steel rope for aerial transportation and open pit mining.

p40



ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Productivity depends on efficiencies

ArcelorMittal ROPES is part of the ArcelorMittal Group – one of the largest steel producers in the world and the manufacturer of premium quality steel wire ropes for the mining, hoisting, ropeway and mooring sectors.

Recognised worldwide for the quality of its corrosion resistant products, ArcelorMittal manufactures and supplies some of the most technologically advanced steel wire ropes in the world.

Designed, developed and manufactured for strength, flexibility and endurance, ArcelorMittal ROPES delivers lasting value and safety for the most demanding environments.

ArcelorMittal ROPES will be recognised as the steel wire ropes service provider of choice across the mining, hoisting, ropeway and mooring markets.

Our 4 core markets are:

MINING ROPES

HOISTING ROPES

ROPEWAY ROPES

MOORING ROPES

ArcelorMittal

"Our vertically integrated business model enables us to efficiently track and trace the origins of the materials we use, improving quality controls and reducing costs"

Morten Breddam
Business Line Manager, ArcelorMittal ROPES

Vertical integration. Unparalleled value.

Our mining, steel production, wire rod handling, wire drawing and rope manufacture is all undertaken by ArcelorMittal.

Our fully integrated business model gives us complete control over the quality of our raw materials and the highest levels of confidence in our production methods and processes, saving us time and resources.

This, combined with our world class technical expertise, provides our customers with unparalleled value.

New levels of performance

Operating for all ArcelorMittal group units, ArcelorMittal ROPES benefits from the Group's worldwide research and development resources.

Research and development are the cornerstone of sustainable development and innovation and this ensures the continuous renewal of our product offer. Worldwide we have 1400 full time researchers and 13 research centres.

Working together with customers to optimise solutions

With increased focus on new product development, innovation and optimisation, our production and quality control teams work with our customers to deliver high performance solutions that meet their requirements. ArcelorMittal ROPES is your strategic partner. We offer much more than high quality, competitively priced steel wire ropes. Our purpose is to work with our customers to fulfil their technical requirements, quickly, safely and efficiently. Your success is our success.

ArcelorMittal ROPES
ENGINEERING EXCELLENCE

"Our international reputation for precision engineering extends beyond the manufacture of the highest quality steel mining ropes. We are working with our customers to manufacture bespoke solutions that address the specific challenges that they face."

Matthieu Beranger
Mining Ropes Sales Manager,
ArcelorMittal ROPES

ArcelorMittal

Unrivalled technical experience

Established in 1906, our manufacturing capability is backed up by over 100 years experience, providing our customers with a complete manufacturing solution that creates optimum value.

We exist to manufacture steel wire ropes that exceed the expectations of our worldwide customer base.

Engineering Excellence is what ArcelorMittal ROPES stands for. Our commitment to quality and the highest product performance standards is based on our process of continuous improvement.

ArcelorMittal ROPES runs an internal DNV-Certified Quality Assurance System complying with the requirements of ISO 9001.

Our continuous improvement process means that we are certified ISO 45001 for safety management. Thanks to this commitment, our production plant can implement an optimised process control environment, creating world-class steel wire rope products.

Full traceability every step of the way

Improving quality and adding value.

Our vertically integrated business model enables us to efficiently track and trace the origins of the materials we use, improving quality controls and reducing costs.

From the sourcing of raw materials to the manufacture of our wire rod, and from the drawing of our steel wire to the manufacture of our ropes, we guarantee full traceability every step of the way.

ArcelorMittal ROPES
ENGINEERING EXCELLENCE

Helping our customers to exceed

Located in Bourg-en-Bresse, France, our specialist teams, comprising of more than 300 people, continue to build on our international reputation for engineering the highest quality wire ropes.

More than just a steel wire ropes company, our purpose is to help our customers deliver their projects quickly, safely and efficiently. We achieve this by working with our customers to identify, develop and deliver optimum solutions.

Why choose ArcelorMittal ROPES?

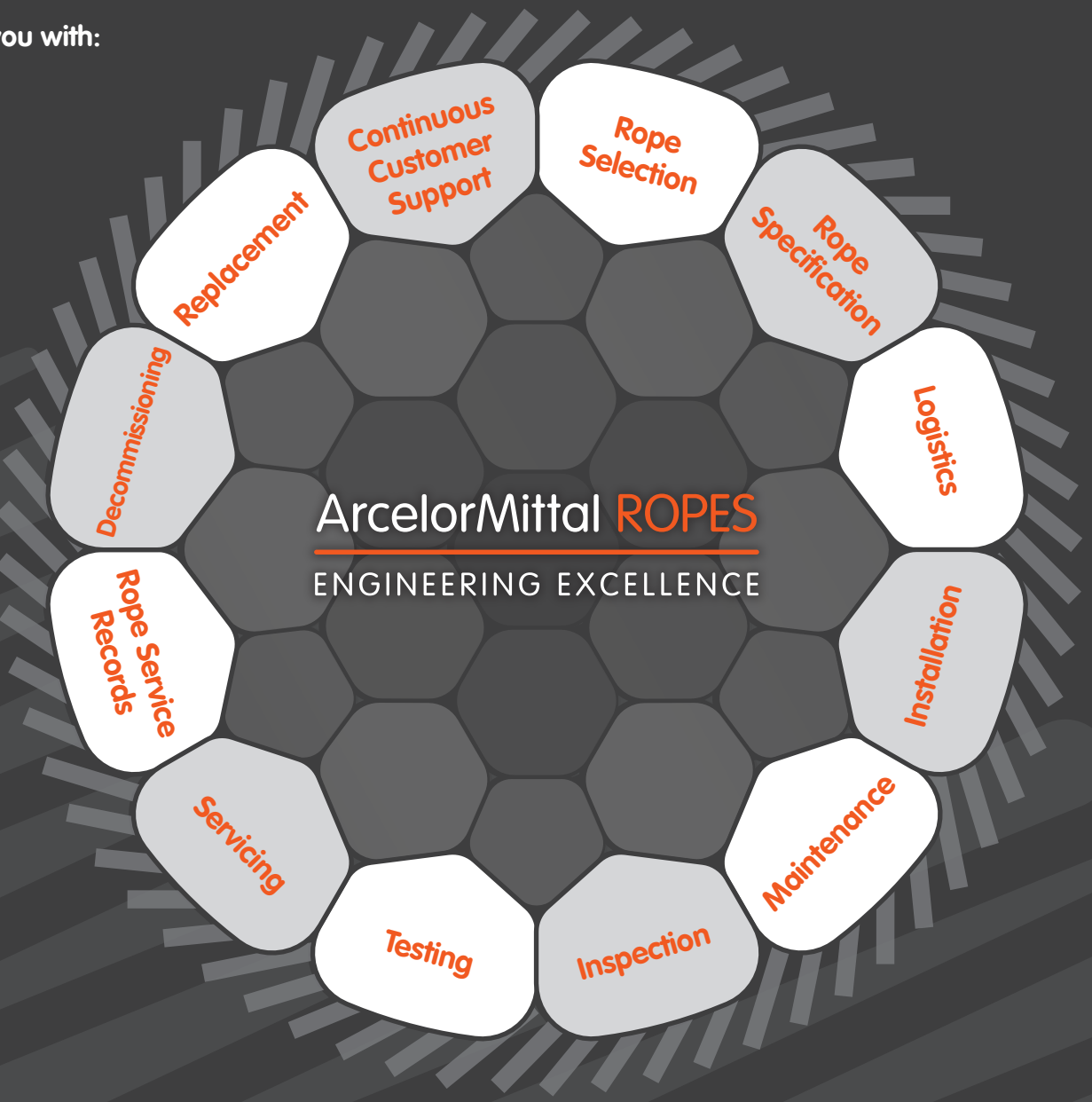
- Engineering Excellence
- Innovation
- Continuous investment in product innovation and development
- Comprehensive solutions
- Established for more than 100 years
- Delivering all around the world
- Vertically integrated business model
- Full materials traceability
- Your expert strategic partner
- Ongoing customer support

ArcelorMittal

Technical expertise and support for the long term

ArcelorMittal ROPES provides a comprehensive support network for new and existing customers.

We can help you with:



Improving the effects of our activities on the environment

We recognise the importance for sustainable development and we continually aim to improve the environmental effect of our activities.

To help achieve our aims we:

- Meet, and wherever possible, improve upon relevant legislative, regulatory and environmental codes of practice.
- Develop objectives that target environmental improvements.
- Consider environmental issues in our decision-making processes.
- Develop our relationships with suppliers and contractors so that we all understand and recognise our environmental responsibilities.
- Educate employees so that they can carry out their activities in an environmentally responsible manner.
- Promote our environmental performance and achievements amongst customers, employees, suppliers, contractors and the public.

We make sure that we use resources efficiently by:

- Advising staff on how best to use energy and other utilities.
- Promoting waste minimisation, recycling and the creation of by-products.
- Promoting the efficient use of resources, energy and fuel throughout our manufacturing, processing, sales and distribution operations.

We are active participants who co-operate with:

- The communities in which we operate.
- The government, regulatory bodies and other interested parties who share our vision of being a responsible and trusted neighbour.

Our commitment to health, safety and wellbeing

"Everyone has the right to good health and safety. Equally, everyone has the responsibility to make this happen at home and at work. Leaders, machinery operators, office workers, contractors – we all need to believe that Journey to Zero is achievable and to feel responsible for health and safety".

Lakshmi Mittal
Chairman and CEO, ArcelorMittal

The health, safety and wellbeing of all our employees and contractors is at the core of our commitment to produce high performance ropes.

Journey to Zero is the name of ArcelorMittal's ongoing campaign to work vigorously towards a sustainable goal of zero accidents and injuries.

We work every day in dangerous conditions, where accidents are always possible. With our Journey to Zero campaign to reduce workplace accidents, injuries and occupational health problems to zero, we have set ourselves the challenge of becoming the safest steel wire ropes manufacturer in the world.

Wire Rope Properties

Every demanding situation requires a rope with particular performance characteristics. These requirements are determined by the physical environment and the level and type of usage.

Lubrication

Extends the life and increases rope performance.

Compaction

Smoother outer surface with increased strength and reduced wear.

Resistance to Crushing

Ropes designed to withstand or resist external forces.

Bending Fatigue Resistance

Ropes designed to cope with bending repeatedly under stress.

High Breaking Resistance

Ropes featuring a high breaking force.

Rotation Resistance

Resistance to spin and rotation whilst under load.

Plastic Inserts

Polyethylene inserts absorb pressure, facilitate rope deformation and extend service life.

Pre-shaped

This process reduces the opening of the rope strands when they are cut and helps to make handling and installation easier.

Bright Wire

Drawn steel, pickled and phosphated and suitable for non corrosive environments.

Galvanised Wire Coating

Zinc coating suitable for corrosive environments.

Corzal® Wire Coating

Corzal® is an eutectic alloy of 95% zinc and 5% aluminium that resists corrosion up to 3 times longer than a pure zinc coating.

Electromagnetic inspection

An electromagnetic test is performed at the final stage of the production process.

Stretch Resistant

Due to our optimum design and manufacturing process, rope elongation after stabilisation is between 0.1% and 0.3%.

ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Rope Application Guide

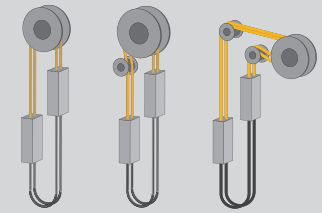
Which rope, which application?

Our steel wire ropes are widely used in deep shaft mining and aerial transportation.

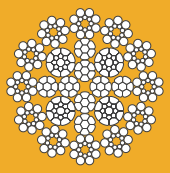
When selecting a rope, several factors must be considered such as your requirements for strength, fatigue and abrasion resistance, crushing resistance, resistance to rotation and the operating conditions and physical environment. The kind of machinery you are using is, of course, a key consideration.

All our wire ropes have been engineered with safety, strength and longevity in mind. Using the right rope for your application will maximise operational performance and enhance productivity.

FRICTION WINDER, KOEPE

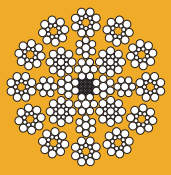


EXTRACTION AND BALANCE



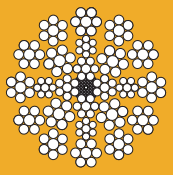
Klondike®

PAGE 14



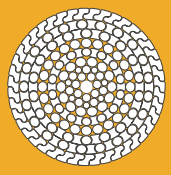
Notorplast®

PAGE 18



NRHD 24

PAGE 22



Full Lock Coil, Z-Lock

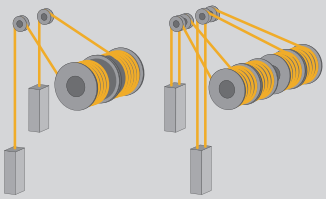
PAGE 30

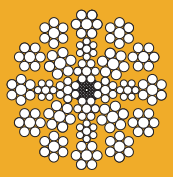
EXTRACTION

NRHD 24 CS

PAGE 22

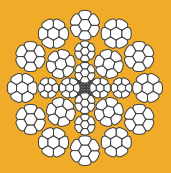
DRUM WINDER





NRHD 24

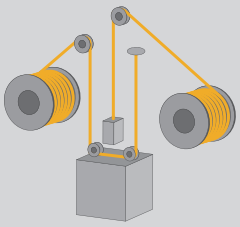
PAGE 22

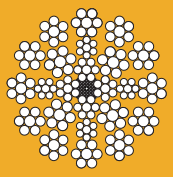


NRHD 24 CS

PAGE 22

SHAFT SINKING



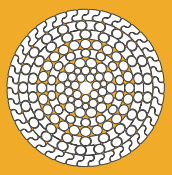


NRHD 24

PAGE 22

NRHD 24 CS

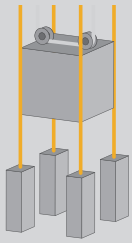
PAGE 22

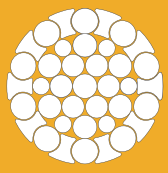


Full Lock Coil, Z-Lock

PAGE 30

GUIDE ROPES

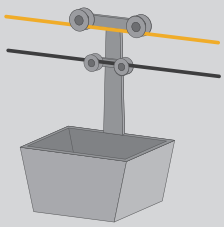




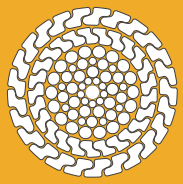
Half Lock Coil, X-Lock

PAGE 36

AERIAL TRANSPORTATION



TRACK ROPE



Full Lock Coil, Z-Lock

PAGE 30

HAULING ROPE

NCR6

PAGE 40

QUALITY

All our Mining Ropes are supplied with an ArcelorMittal internal lab report.

An independant lab report is available on request.

ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Klondike®

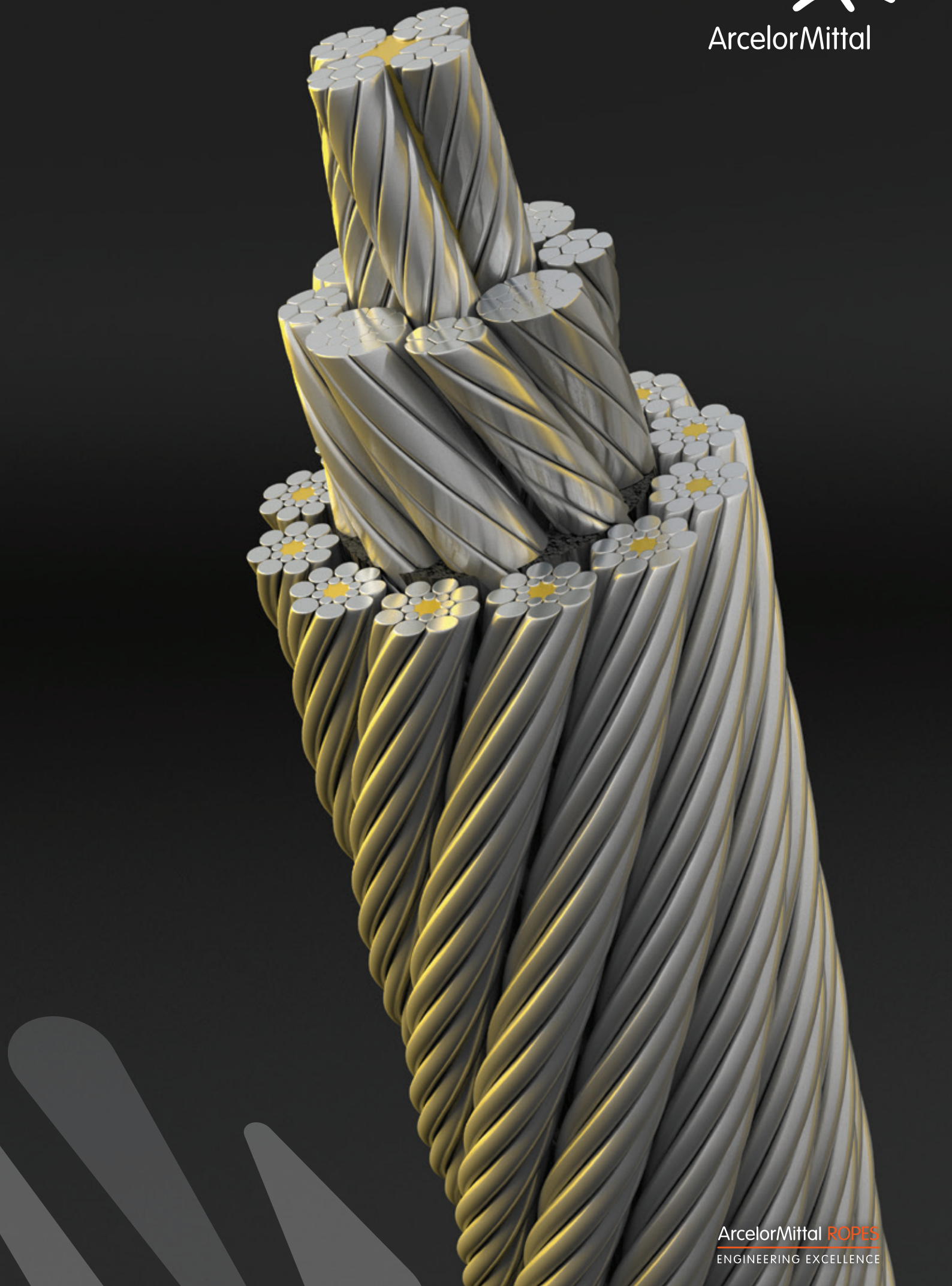
A new breed of non-rotating rope for aggressive, deep shaft mining environments.

Klondike® is a hybrid rope that combines the fatigue proofed Notorplast® with compacted strand technology.

Strong and efficient, Klondike® integrates several innovations that are key to performance, safety and longevity. The outer strand structure is highly adaptable to friction sheaves, even in the case of very difficult hoists (fleet angles or high dynamic effects) providing a low and even tread pressure on linings.

The combination of compacted strands and polypropylene and textile inserts, decrease internal stresses and improve MBL and fatigue resistant properties.

ArcelorMittal



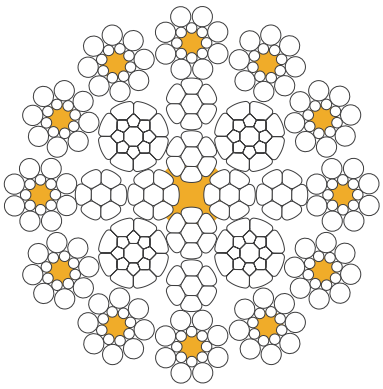
ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Klondike®

A new breed of non-rotating rope engineered for more aggressive, deep shaft mining environments.

Klondike® is a hybrid rope that combines the fatigue proofed Notorplast® with compacted strand technology. Strong and efficient, Klondike® integrates several innovations that are key to performance, safety and longevity. The outer strand structure is highly adaptable to friction sheaves, even in the case of very difficult hoists (fleet angles or high dynamic effects) providing a low and even tread pressure on linings. The combination of compacted strands and polypropylene and textile inserts, decrease internal stresses and improve MBL and fatigue resistant properties.



Notes:

- To enhance operating efficiency and service life Klondike® should be lubricated periodically.
- Please contact us for advice.

QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report.
An independant lab report is available on request.

Advantages

Higher strength performance

High tensile, fatigue resistant steel delivers a flexible, abrasion resistant rope with exceptional MBL.

MBL is increased by 5% compared to Notorplast®.

Low stretch, higher stability

Minimal stretching under load with fast stretch stabilisation. When compared to Notorplast®, elongation is reduced up to 35% and reduction of diameter is reduced up to 20%.

Higher fatigue performance

Engineered for overall performance, the tensile strength of Klondike® is key to this rope's superior fatigue resistant properties. High ductility wires, and pressure absorbing polyethylene inserts, minimise the occurrence of internal wire breaks caused by dynamic stresses.

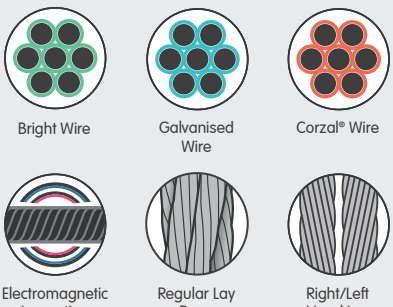
Fatigue performance is improved by 25% compared to Notorplast®.

Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of Klondike®.

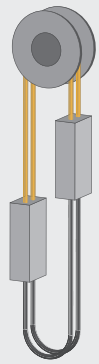
On Demand

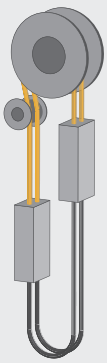
The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.

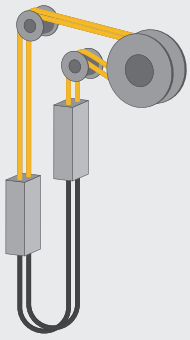


Applications

Specifically designed for aggressive deep shaft mining environments, Klondike® is highly adaptable to friction sheaves. Low and even tread pressure on linings minimises friction and extends service life.







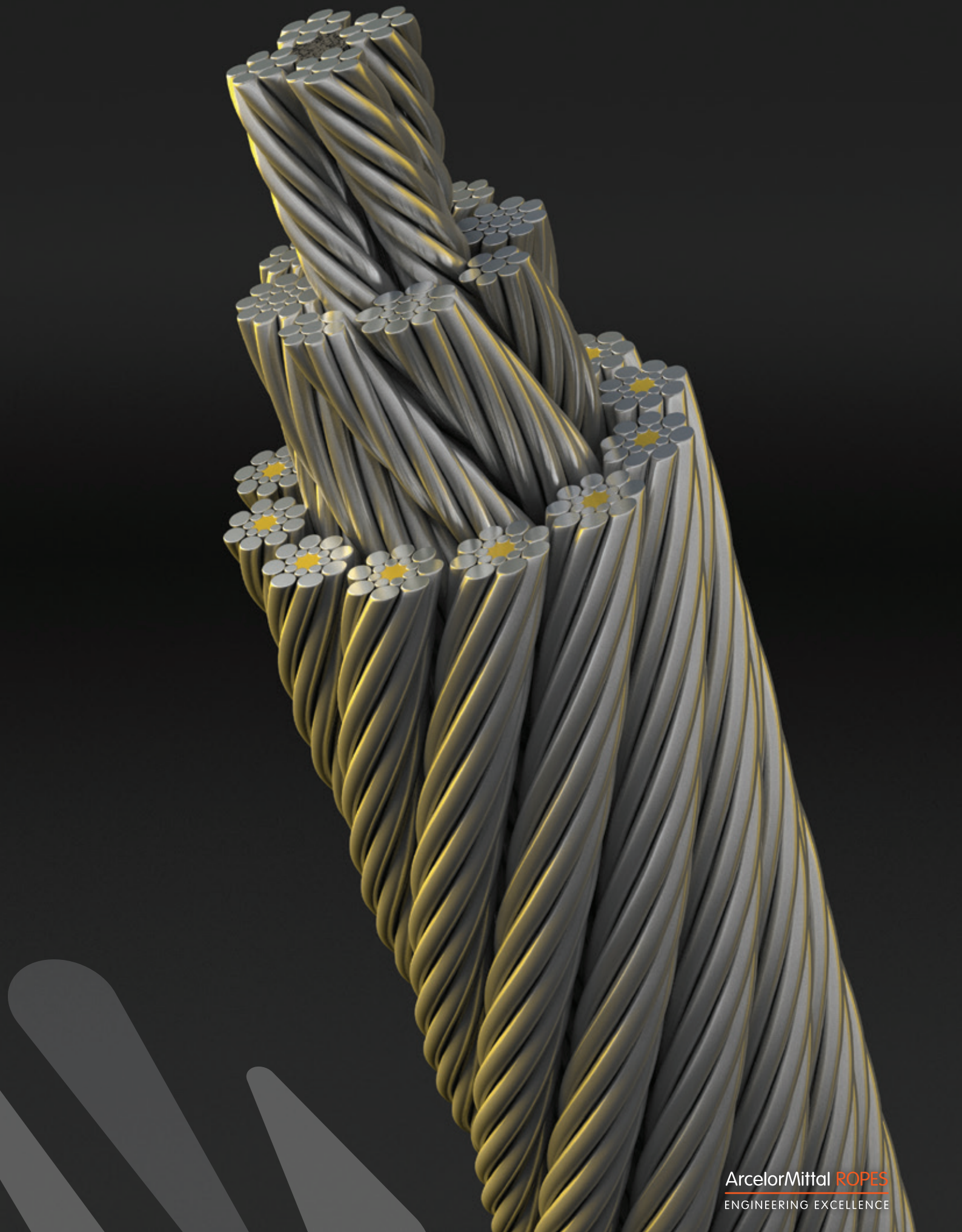
Diameter		Weight		Minimum breaking load			
mm	inch	kg/m	lbs/ft	kN	kN	kN	kN
				1570 MPa	**1960 MPa**	**2060 MPa**	**2160 MPa**
36	-	5.69	3.83	787	976	1024	1073
37	-	6.03	4.05	834	1035	1087	1138
38	1" 1/2	6.37	4.28	883	1095	1150	1204
39	-	6.71	4.51	931	1155	1213	1270
40	-	7.06	4.74	980	1216	1276	1337
41	1" 5/8	7.42	4.98	1029	1277	1341	1404
42	-	7.78	5.23	1079	1339	1406	1472
43	-	8.15	5.47	1130	1402	1472	1541
44	1"3/4	8.52	5.73	1181	1466	1539	1611
45	-	8.90	5.98	1233	1530	1607	1683
46	-	9.29	6.24	1287	1596	1676	1755
47	-	9.69	6.51	1341	1663	1746	1829
48	1" 7/8	10.10	6.78	1396	1732	1818	1904
49	-	10.51	7.06	1452	1802	1891	1981
50	-	10.94	7.35	1510	1873	1966	2059
51	2"	11.37	7.64	1568	1946	2043	2140
52	-	11.81	7.94	1629	2021	2121	2222
53	-	12.27	8.24	1690	2097	2202	2306
54	2" 1/8	12.73	8.55	1754	2176	2284	2392
55	-	13.21	8.87	1819	2256	2369	2481
56	-	13.69	9.20	1885	2339	2455	2572
57	2" 1/4	14.19	9.54	1954	2424	2544	2665
58	-	14.70	9.88	2024	2511	2636	2761
59	-	15.22	10.23	2096	2601	2730	2859
60	2" 3/8	15.76	10.59	2170	2693	2827	2961
61	-	16.31	10.96	2247	2788	2926	3065
62	-	16.87	11.34	2325	2885	3029	3172
63	-	17.45	11.72	2406	2985	3134	3282
64	2" 1/2	18.04	12.12	2489	3089	3242	3396

Notorplast®

The low maintenance, fatigue resistant rope that is engineered to last.

Polyethylene inserts in the outer strands absorb pressure and reduce internal dynamic stresses, making Notorplast® highly adaptable to friction sheaves. The textile core absorbs pressure from surrounding strands and assists lubrication. With no rotational stresses being transferred to the guiding system, Notorplast® is a highly efficient rope.

ArcelorMittal



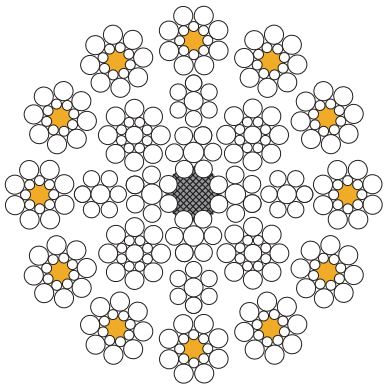
ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Notorplast®

The low maintenance, fatigue resistant rope that is engineered to last.

Polyethylene inserts in the outer strands absorb pressure and reduce internal dynamic stresses, making Notorplast® highly adaptable to friction sheaves. The textile core absorbs pressure from surrounding strands and assists lubrication. With no rotational stresses being transferred to the guiding system, Notorplast® is a highly efficient rope.



Notes:

- To enhance operating efficiency and service life Notorplast® should be lubricated periodically.
- Please contact us for advice.

QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report. An independant lab report is available on request.

Advantages

Higher strength performance
Engineered for overall performance, the tensile strength of Notorplast® is key to this rope's superior fatigue resistant properties. High ductility wires, and pressure absorbing polyethylene inserts, minimise the occurrence of internal wire breaks caused by dynamic stresses.

Easy installation
The non-rotating structure of Notorplast® makes installation easy and straightforward.

Long service life
The outer strands of Notorplast® incorporate pressure absorbing polyethylene inserts. These absorb the internal stresses on rope wires and improve MBL and fatigue resistance.

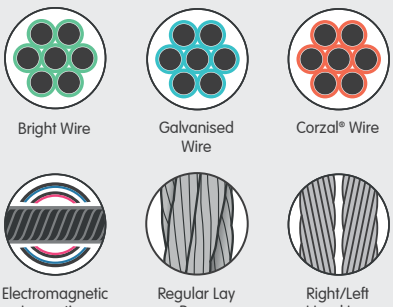
Cost effective
High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses, improve performance and extend service life.

Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of Notorplast®.

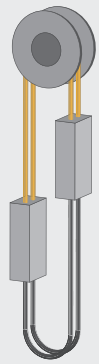
On Demand

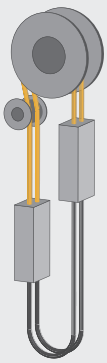
The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.

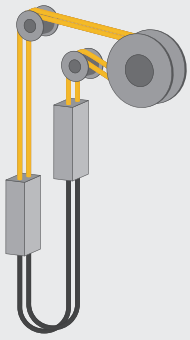


Applications

Notorplast® is specifically designed for friction sheaves. Its special outer strands provide a low and even tread pressure on linings.







NOTORPLAST/2018/v1.0

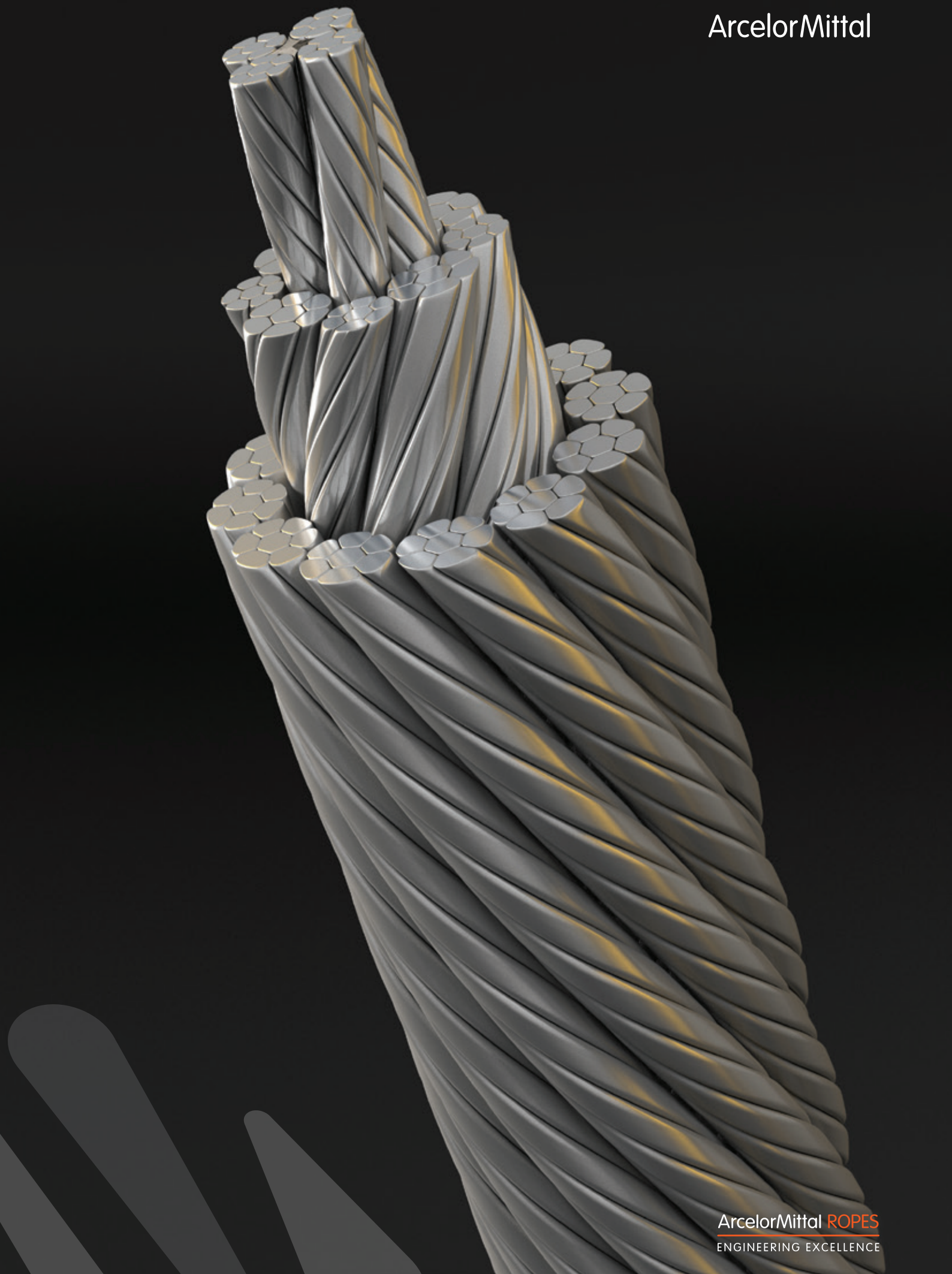
Diameter		Weight		Minimum breaking load			
mm	inch	kg/m	lbs/ft	kN	kN	kN	kN
				1570 MPa	1960 MPa	2060 MPa	2160 MPa
36	-	5.44	3.65	735	912	957	1003
37	-	5.75	3.86	779	967	1015	1063
38	1" 1/2	6.07	4.08	824	1023	1074	1125
39	-	6.40	4.30	870	1080	1134	1187
40	-	6.74	4.53	917	1138	1195	1251
41	1" 5/8	7.08	4.76	965	1197	1257	1317
42	-	7.43	5.00	1014	1258	1320	1383
43	-	7.79	5.24	1063	1319	1385	1451
44	1" 3/4	8.16	5.49	1114	1382	1451	1519
45	-	8.54	5.74	1165	1446	1518	1589
46	-	8.92	6.00	1217	1510	1586	1661
47	-	9.31	6.26	1270	1576	1655	1733
48	1" 7/8	9.71	6.53	1324	1643	1725	1807
49	-	10.12	6.80	1379	1711	1796	1882
50	-	10.53	7.08	1435	1780	1869	1958
51	2"	10.96	7.36	1492	1851	1943	2035
52	-	11.39	7.65	1549	1922	2018	2113
53	-	11.83	7.95	1607	1994	2094	2193
54	2" 1/8	12.27	8.25	1667	2068	2171	2274
55	-	12.73	8.55	1727	2142	2249	2356
56	-	13.19	8.86	1788	2218	2329	2439
57	2" 1/4	13.66	9.18	1850	2295	2409	2523
58	-	14.14	9.50	1912	2373	2491	2609
59	-	14.62	9.82	1976	2452	2574	2696
60	2" 3/8	15.11	10.16	2041	2532	2658	2784
61	-	15.62	10.49	2106	2613	2743	2873
62	-	16.12	10.84	2172	2695	2829	2963
63	-	16.64	11.18	2239	2779	2917	3055
64	2" 1/2	17.17	11.53	2307	2863	3005	3148

NRHD 24/24 CS

Versatile ropes for multiple applications.

Engineered to address the physical challenges of the mining industry, NRHD 24 and NRHD 24 CS ropes are used for Koepe friction winders, drum winders and sinking shafts.

ArcelorMittal



ArcelorMittal ROPES

ENGINEERING EXCELLENCE

NRHD 24

A versatile rope engineered specifically for deep shaft mining applications.

Engineered to address the physical challenges encountered in deep shaft mining, NRHD 24 is engineered for use as a Koepe extraction or balance rope, drum winder rope or sinking rope. The textile core absorbs pressure from surrounding strands and assists lubrication.

Notes:

- To enhance operating efficiency and service life NRHD 24 should be lubricated periodically.
- Please contact us for advice.

Advantages

Easy installation

The non-rotating structure of NRHD 24 makes the installation of this rope easy and straightforward.

High stability performance

Minimal stretch under load with fast stretch stabilisation is a characteristic of NRHD 24.

Cost effective

High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses, improve performance and extend service life.

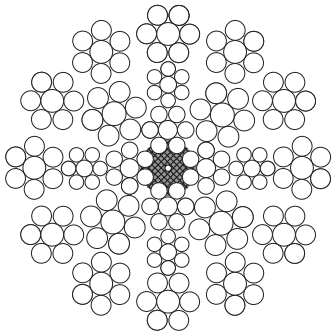
Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of NRHD 24.

On Demand

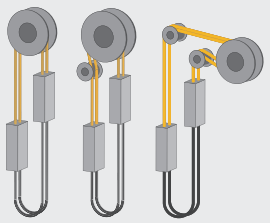
The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.

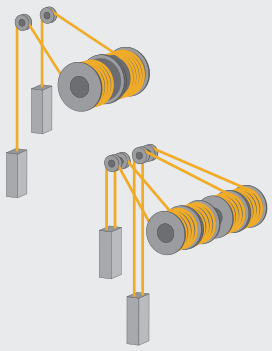
QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report.
An independant lab report is available on request.

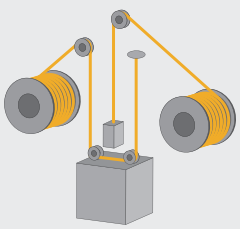


Applications

NRHD 24 is an exceptionally versatile rope designed for use as a Koepe extraction or balance rope, drum winder rope or sinking rope.







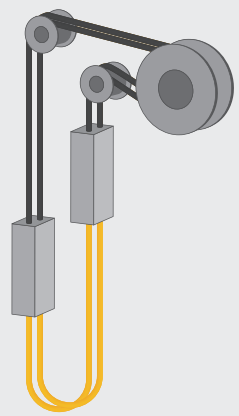
EXTRACTION

NRHD 24/2018/v1.0

Diameter		Weight		Minimum breaking load			
mm	inch	kg/m	lbs/ft	kN	kN	kN	kN
				1570 MPa	1960 MPa	2060 MPa	2160 MPa
20	-	1.76	1.18	246	306	321	336
21	-	1.94	1.31	273	338	355	372
22	7/8	2.14	1.44	300	373	391	410
23	-	2.35	1.58	329	408	428	449
24	15/16	2.56	1.72	359	445	467	489
25	-	2.79	1.87	389	483	507	531
26	1"	3.02	2.03	421	522	548	574
27	-	3.26	2.19	454	563	591	619
28	-	3.50	2.36	488	605	636	666
29	1" 1/8	3.76	2.53	523	649	681	713
30	-	4.03	2.71	559	694	728	763
31	-	4.30	2.89	596	740	777	813
32	1" 1/4	4.58	3.08	635	787	826	866
33	-	4.87	3.27	674	836	878	919
34	-	5.17	3.47	714	886	930	974
35	1" 3/8	5.47	3.68	756	938	984	1031
36	-	5.79	3.89	798	991	1040	1089

Applications

NRHD 24 balance ropes are engineered for use in Koepe winders.



BALANCE

NRHD 24/2018/v1.0

Diameter		Weight		Minimum breaking load	
mm	inch	kg/m	lbs/ft	kN	kN
				1370 MPa	1570 MPa
28	-	3.54	2.38	429	489
29	1" 1/8	3.79	2.55	459	524
30	-	4.05	2.72	491	560
31	-	4.31	2.90	523	597
32	1" 1/4	4.59	3.08	557	635
33	-	4.88	3.28	592	675
34	-	5.17	3.47	628	716
35	1" 3/8	5.47	3.68	665	758
36	-	5.78	3.89	703	802
37	-	6.11	4.10	742	847
38	1" 1/2	6.44	4.32	783	893
39	-	6.77	4.55	824	940
40	-	7.12	4.79	867	989
41	1" 5/8	7.48	5.03	911	1039
42	-	7.85	5.27	956	1090
43	-	8.22	5.52	1002	1143
44	1"3/4	8.60	5.78	1049	1196
45	-	9.00	6.05	1097	1251
46	-	9.40	6.32	1146	1308
47	-	9.81	6.59	1197	1365
48	1" 7/8	10.23	6.87	1248	1424
49	-	10.66	7.16	1301	1484
50	-	11.10	7.46	1355	1546
51	2"	11.54	7.76	1410	1609
52	-	12.00	8.06	1466	1673
53	-	12.47	8.38	1523	1738
54	2" 1/8	12.94	8.70	1582	1804
55	-	13.42	9.02	1641	1872
56	-	13.92	9.35	1702	1941
57	2" 1/4	14.42	9.69	1763	2011
58	-	14.93	10.03	1826	2083
59	-	15.45	10.38	1890	2156
60	2" 3/8	15.97	10.73	1955	2230
61	-	16.51	11.09	2021	2306
62	-	17.06	11.46	2088	2382
63	-	17.61	11.83	2157	2460
64	2" 1/2	18.18	12.21	2226	2540
65	-	18.75	12.60	2297	2620
66	-	19.33	12.99	2368	2702
67	2" 5/8	19.92	13.39	2441	2785
68	-	20.52	13.79	2515	2870
69	-	21.13	14.20	2590	2955
70	2" 3/4	21.75	14.62	2667	3042

NRHD 24 for the largest deep copper ore mine in Europe

Located in Lower Silesia, north of Polkowice city, the Rudna mine is the largest copper ore mine in Europe and one of the largest deep copper ore mines in the world.

Part of KGHM Polska Miedź S.A. the annual ore extraction by the Rudna mine is estimated at 12 million tonnes.

Mining is carried out in three mining regions within Rudna with shafts ranging in depth from 950m to 1150m.

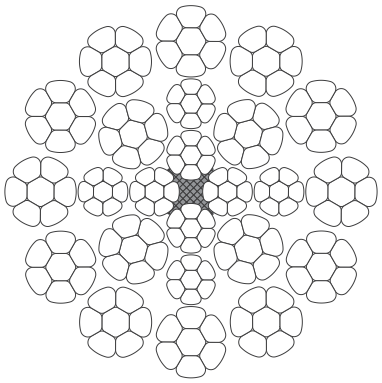
ArcelorMittal ROPES has supplied mining ropes to KGHM for 20 years, including Corzal® coated 48mm **NRHD 24** balance ropes.

Our partnership with KGHM has assisted our product development, and contributed to KGHM's efficient operations and position as a global leader in copper and silver production.

NRHD 24 CS

A compacted rope engineered specifically for deep shaft mining applications.

Engineered for use in deep shaft mining, NRHD 24 CS is a compacted rope for Koepe extraction, drum winders and sinking shafts. The compacted strands deliver increased rope density, decrease the internal stresses and improve MBL and fatigue resistance. The textile core absorbs pressure from surrounding strands and assists lubrication.



Notes:

- To enhance operating efficiency and service life NRHD 24 CS should be lubricated periodically.
- Please contact us for advice.

QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report.
An independant lab report is available on request.

Advantages

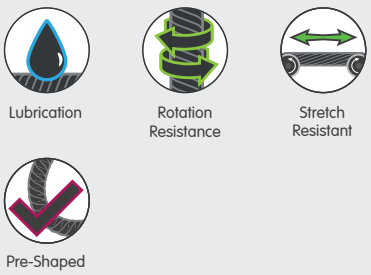
Long service life
The compacted strands of NRHD 24 CS increase contact surface and rope density, reducing internal stresses and making the rope more resistant to crushing.

Cost effective
High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses, improve performance and extend service life.

Easy installation
The non-rotating structure of NRHD 24 CS make the installation of this rope easy and straightforward.

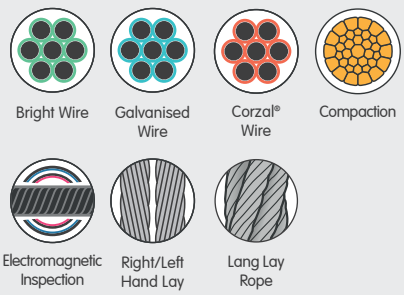
Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of NRHD 24 CS.



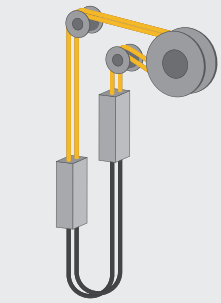
On Demand

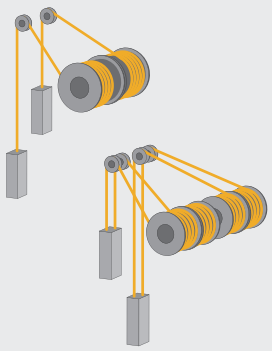
The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.

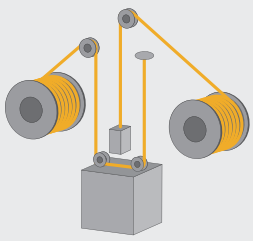


Applications

NRHD 24 CS can be used on new installations as well as a replacement product. The extreme modularity of the NRHD design makes this rope adaptable for most applications, from sinking to extraction, on all types of installations. Please contact us to evaluate your needs and let us offer you the best solution.





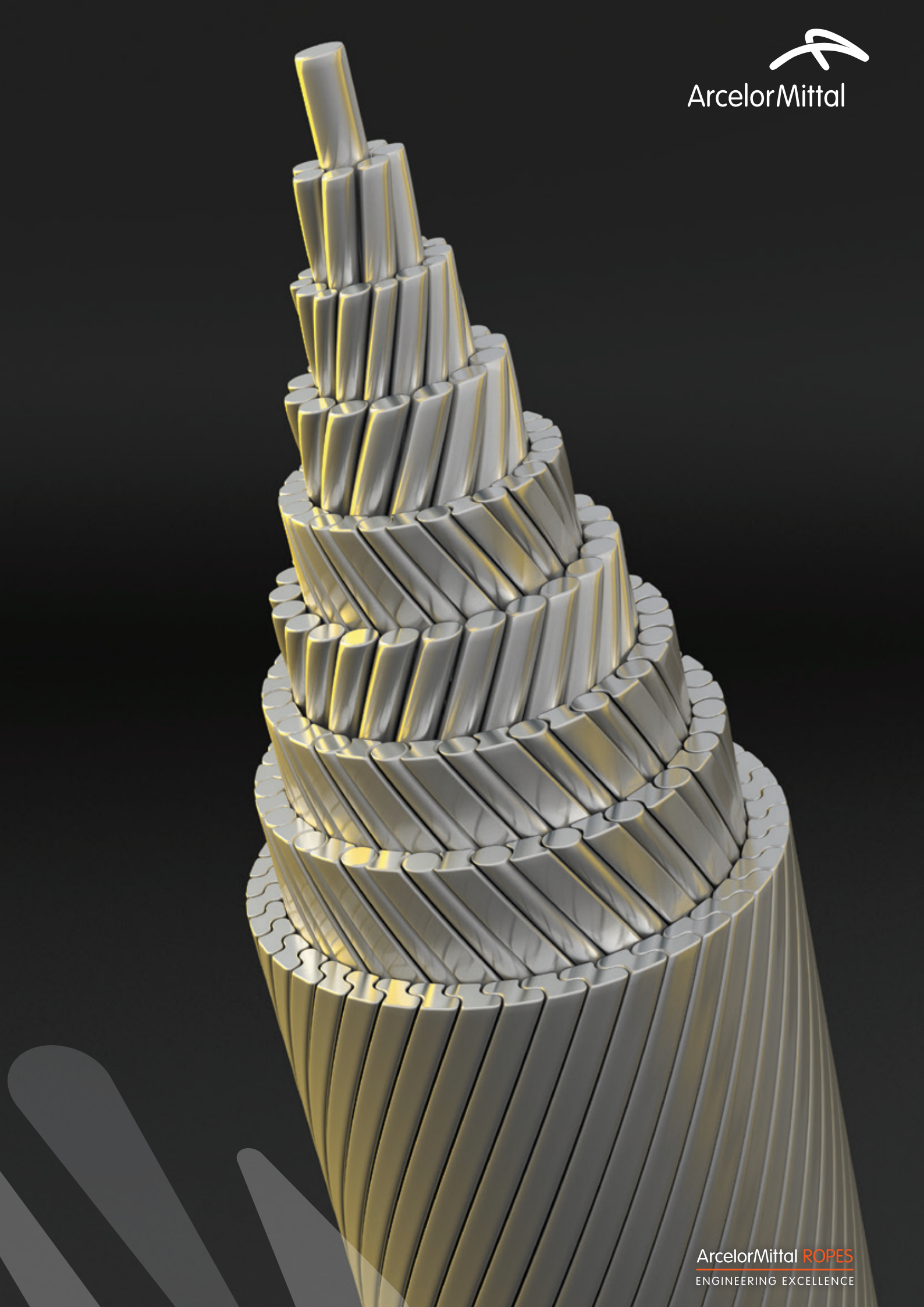


Diameter		Weight		Minimum breaking load			
mm	inch	kg/m	lbs/ft	kN	kN	kN	kN
				1570 MPa	1960 MPa	2060 MPa	2160 MPa
20	-	1.91	1.28	250	321	354	390
21	-	2.09	1.41	274	351	388	426
22	7/8	2.29	1.54	299	384	424	466
23	-	2.50	1.68	326	418	461	507
24	15/16	2.72	1.83	354	454	501	551
25	-	2.95	1.98	383	491	543	597
26	1"	3.19	2.14	414	531	586	645
27	-	3.44	2.31	447	572	632	695
28	-	3.70	2.49	480	615	680	747
29	1" 1/8	3.98	2.67	515	660	729	802
30	-	4.26	2.86	552	707	781	859
31	-	4.55	3.06	589	755	834	917
32	1" 1/4	4.86	3.26	629	806	890	978
33	-	5.17	3.48	669	857	947	1041
34	-	5.50	3.69	711	911	1006	1106
35	1" 3/8	5.83	3.92	754	966	1067	1173
36	-	6.18	4.15	798	1023	1130	1243
37	-	6.53	4.39	844	1082	1195	1314
38	1" 1/2	6.90	4.63	891	1142	1261	1387
39	-	7.27	4.89	940	1204	1330	1462
40	-	7.66	5.15	989	1268	1400	1539
41	1" 5/8	8.05	5.41	1040	1333	1472	1619
42	-	8.46	5.68	1092	1400	1546	1700
43	-	8.87	5.96	1146	1468	1622	1783
44	1"3/4	9.30	6.25	1200	1538	1699	1868
45	-	9.73	6.54	1256	1610	1778	1955
46	-	10.18	6.84	1313	1683	1859	2044
47	-	10.63	7.14	1372	1758	1942	2135
48	1" 7/8	11.09	7.45	1431	1834	2026	2227
49	-	11.57	7.77	1492	1912	2112	2322
50	-	12.05	8.10	1554	1992	2200	2418
51	2"	12.54	8.43	1617	2073	2289	2517
52	-	13.04	8.76	1681	2155	2380	2617
53	-	13.55	9.11	1747	2239	2473	2719
54	2" 1/8	14.07	9.46	1813	2324	2567	2822
55	-	14.60	9.81	1881	2411	2663	2928
56	-	15.14	10.17	1950	2500	2761	3035
57	2" 1/4	15.69	10.54	2020	2589	2860	3144
58	-	16.24	10.92	2091	2681	2960	3255
59	-	16.81	11.30	2164	2773	3063	3367
60	2" 3/8	17.38	11.68	2237	2867	3167	3482
61	-	17.97	12.07	2312	2963	3272	3598
62	-	18.56	12.47	2387	3060	3379	3715
63	-	19.16	12.88	2464	3158	3488	3835
64	2" 1/2	19.77	13.29	2542	3257	3598	3956
65	-	20.39	13.70	2620	3358	3709	4078
66	-	21.02	14.13	2700	3461	3822	4202
67	2" 5/8	21.66	14.55	2781	3564	3937	4328
68	-	22.30	14.99	2863	3669	4052	4456
69	-	22.96	15.43	2946	3776	4170	4585
70	2" 3/4	23.62	15.87	3030	3883	4289	4715

Full Lock Coil, Z-Lock

Engineered for the demanding requirements of deep shaft mining and aerial transportation.

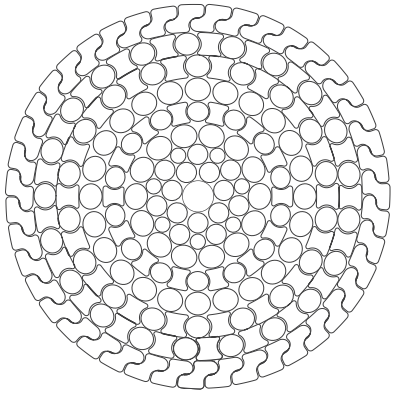
ArcelorMittal ROPES has developed two variants of the Full Lock Coil, Z-Lock rope. One variant has been engineered specifically for use in deep shaft mining, whilst the other is used specifically for aerial ropeways and open pit mining.


ArcelorMittal
ArcelorMittal ROPES
ENGINEERING EXCELLENCE

Full Lock Coil, Z-Lock

A powerful, high strength rope for deep shaft mining applications.

Full Lock Coil, Z-Lock for deep shaft mining is a high strength, low stretch, stable, non-rotating rope. With its characteristic Z wires, designed to prevent unlocking, its smooth outer surface makes it highly compatible with sheave linings (drum and Koepe). Z-Lock ropes can be designed and manufactured to be compatible with specific drum grooves.



Notes:

- To enhance operating efficiency and service life FLC Z-Lock should undergo light periodic lubrication.
- Please contact us for advice.

QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report.
An independant lab report is available on request.

Advantages

Precision engineering

Our engineers continuously strive to optimise rope performance and safety, enhance operating efficiencies, reduce costs and extend service life.

High fatigue performance

Engineered for overall performance, the tensile strength of FLC's interlocking Z wires is key to this rope's superior fatigue resistance.

High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses.

Long service life

With its characteristic steel Z wires, designed to prevent unlocking, the FLC Z-Lock has an exceptionally smooth outer surface making it highly compatible with sheave linings and resistant to friction, abrasion and fatigue.

Cost effective

High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses, improve performance and extend service life.

Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of Full Lock Coil, Z-Lock.


Rotation Resistance


Stretch Resistant

On Demand

The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.


Bright Wire

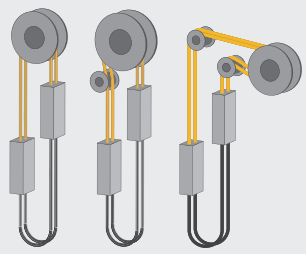

Galvanised Wire

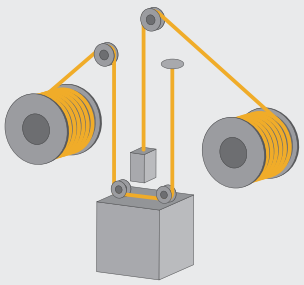

Electromagnetic Inspection


Right/Left Hand Lay

Applications

The outer layer of interconnecting Z profile wires give the Full Lock Coil, Z-Lock rope an extremely smooth outer surface that is suitable for Koepe friction winders and drum winders.



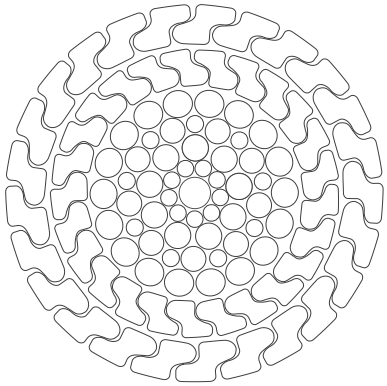


Diameter		Weight		Minimum breaking load		
mm	inch	kg/m	lbs/ft	kN	kN	kN
				1570 MPa	1770 MPa	1960 MPa
22	7/8	2.78	1.87	407	440	486
23	-	3.03	2.03	443	480	529
24	15/16	3.29	2.21	482	521	575
25	-	3.56	2.39	522	564	623
26	1"	3.85	2.58	563	609	673
27	-	4.15	2.79	607	656	725
28	-	4.46	3.00	652	706	779
29	1" 1/8	4.78	3.21	700	757	835
30	-	5.12	3.44	747	815	892
31	-	5.47	3.68	798	871	952
32	1" 1/4	5.83	3.92	850	928	1015
33	-	6.21	4.17	904	987	1079
34	-	6.59	4.43	960	1047	1146
35	1" 3/8	6.99	4.70	1018	1110	1214
36	-	7.40	4.97	1077	1175	1285
37	-	7.82	5.26	1137	1241	1357
38	1" 1/2	8.25	5.55	1200	1309	1431
39	-	8.70	5.84	1263	1378	1507
40	-	9.15	6.15	1329	1450	1586
41	1" 5/8	9.62	6.46	1396	1523	1666
42	-	10.10	6.79	1463	1600	1744
43	-	10.59	7.11	1533	1676	1827
44	1"3/4	11.08	7.45	1604	1754	1912
45	-	11.59	7.79	1677	1834	1999
46	-	12.11	8.14	1752	1916	2088
47	-	12.65	8.50	1828	1999	2179
48	1" 7/8	13.19	8.86	1905	2083	2271
49	-	13.74	9.23	1984	2169	2365
50	-	14.30	9.61	2064	2257	2460
51	2"	14.87	9.99	2145	2346	2558
52	-	15.45	10.38	2228	2437	2656
53	-	16.04	10.78	2313	2529	2757
54	2" 1/8	16.64	11.18	2398	2623	2859
55	-	17.25	11.59	2498	2747	2988
56	-	17.86	12.00	2587	2845	3094
57	2" 1/4	18.49	12.42	2677	2944	3202
58	-	19.12	12.85	2768	3044	3311
59	-	19.77	13.28	2861	3146	3421
60	2" 3/8	20.42	13.72	2954	3249	3533
61	-	21.08	14.17	3049	3353	3647
62	-	21.75	14.62	3145	3459	3762
63	-	22.43	15.07	3243	3566	3878
64	2" 1/2	23.12	15.53	3341	3674	3996

Full Lock Coil, Z-Lock

A fatigue resistant track rope for aerial transportation and open pit mining.

Full Lock Coil, Z-Lock for aerial transportation and open pit mining is a high strength, low stretch, stable, non-rotating rope. Engineered to ensure the best resistance to wear, the high fill factor of the core guarantees that the rope will remain round under load, preventing abnormal wear and ensuring smooth rolling and transportation of carriers.

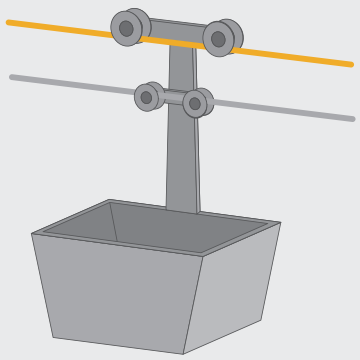


Notes:

- To enhance operating efficiency and service life FLC Z-Lock should undergo light periodic lubrication.
- Please contact us for advice.

Applications

The outer layer of interconnecting Z profile wires gives the Full Lock Coil, Z-Lock rope an extremely smooth outer surface, making the aerial transportation of skips highly efficient.



FLC Z-LOCK/2018/v1.0

Diameter		Weight		Minimum breaking load
mm	inch	kg/m	lbs/ft	kN
				1570 MPa
28	-	4.65	3.12	714
29	1" 1/8	4.94	3.32	762
30	-	5.24	3.52	813
31	-	5.57	3.74	865
32	1" 1/4	5.91	3.97	919
33	-	6.26	4.21	975
34	-	6.64	4.46	1034
35	1" 3/8	7.03	4.72	1094
36	-	7.43	4.99	1156
37	-	7.85	5.27	1220
38	1" 1/2	8.28	5.56	1286
39	-	8.73	5.87	1354
40	-	9.19	6.17	1424
41	1" 5/8	9.66	6.49	1496
42	-	10.15	6.82	1570
43	-	10.65	7.16	1645
44	1"3/4	11.16	7.50	1722
45	-	11.69	7.85	1801
46	-	12.22	8.21	1882
47	-	12.77	8.58	1965
48	1" 7/8	13.32	8.95	2049
49	-	13.89	9.33	2135
50	-	14.47	9.72	2223
51	2"	15.06	10.12	2312
52	-	15.65	10.52	2403
53	-	16.25	10.92	2496
54	2" 1/8	16.87	11.33	2590
55	-	17.49	11.75	2686
56	-	18.12	12.17	2783
57	2" 1/4	18.75	12.60	2882
58	-	19.39	13.03	2983
59	-	20.04	13.47	3085
60	2" 3/8	20.69	13.91	3188
61	-	21.35	14.35	3294
62	-	22.02	14.80	3400
63	-	22.69	15.25	3508
64	2" 1/2	23.36	15.70	3617
65	-	24.04	16.15	3728
66	-	24.72	16.61	3840
67	2" 5/8	25.41	17.07	3954
68	-	26.10	17.54	4068
69	-	26.79	18.00	4184
70	2" 3/4	27.48	18.46	4302

Advantages

Precision engineering

Our engineers continuously strive to optimise rope performance and safety, enhance operating efficiencies, reduce costs and extend service life.

High fatigue performance

Engineered for overall performance, the tensile strength of FLC's interlocking Z wires is key to this rope's superior fatigue resistance.

High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses.

Long service life

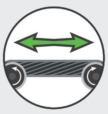
With its characteristic steel Z wires, designed to prevent unlocking, the FLC Z-Lock has an exceptionally smooth outer surface making it highly compatible with sheave linings and resistant to friction, abrasion and fatigue.

Cost effective

High ductility wires minimise the occurrence of internal wire breaks caused by dynamic stresses, improve performance and extend service life.

Properties

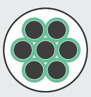
Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of Full Lock Coil, Z-Lock.



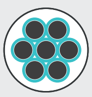
Stretch Resistant

On Demand

The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.

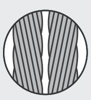


Bright Wire



Galvanised Wire

Electromagnetic Inspection



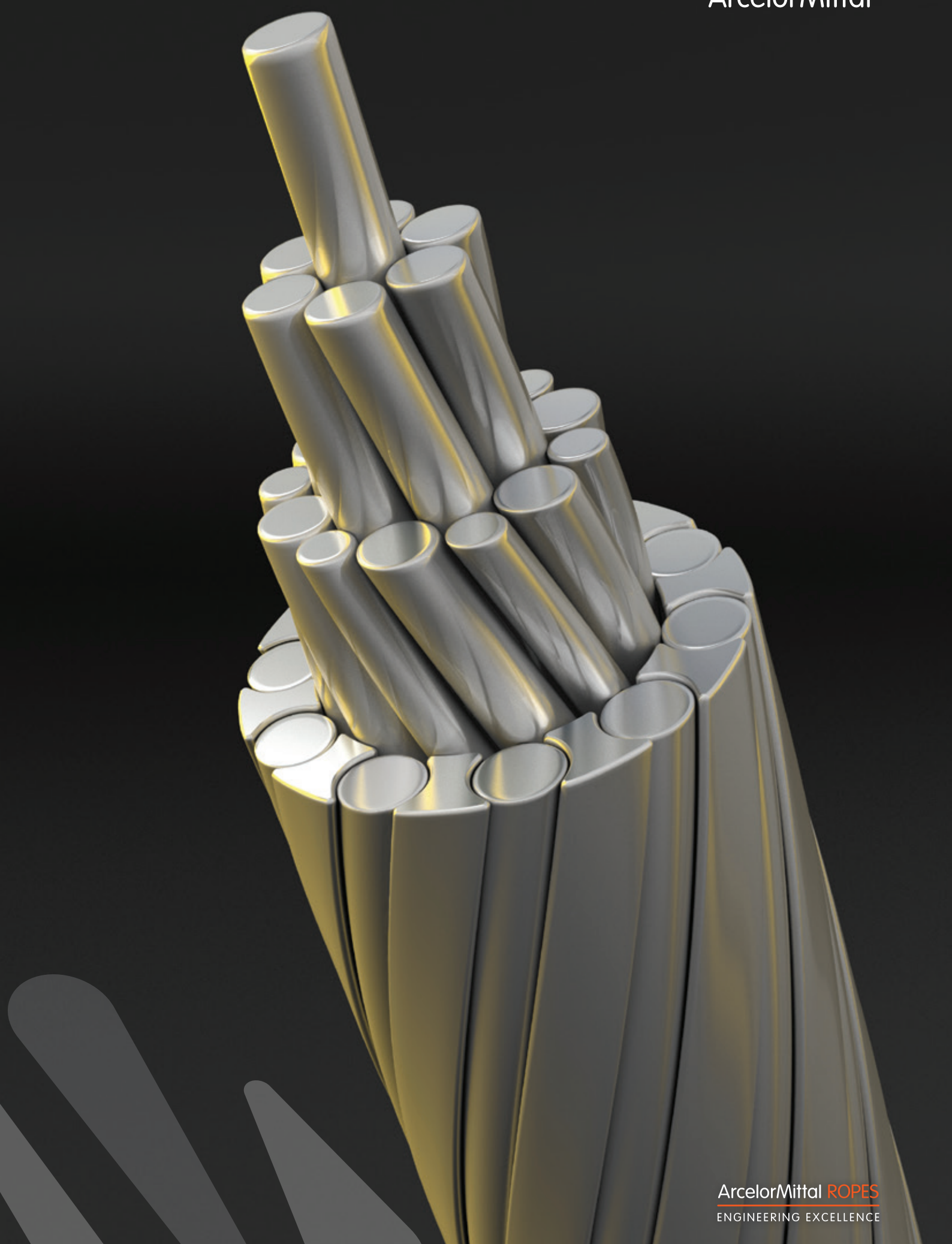
Right/Left Hand Lay

Half Lock Coil, X-Lock

The precision guidance rope with long service life.

Half Lock Coil, X-Lock is a non-rotating, low stretch, high strength rope that is designed for use as a guide rope in deep mine shafts. The smooth and closed outer surface reduces friction and increases resistance to the ingress of dirt particles.

ArcelorMittal



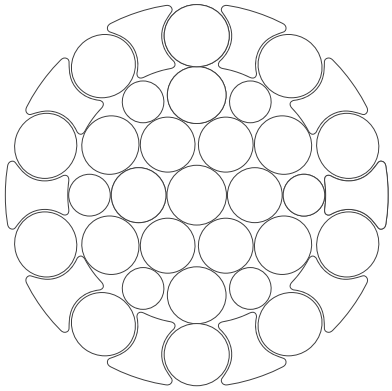
ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Half Lock Coil, X-Lock

The precision guidance rope with long service life.

Half Lock Coil, X-Lock is a non-rotating, low stretch, high strength rope that is designed for use as a guide rope in deep mine shafts. The smooth and closed outer surface reduces friction and increases resistance to the ingress of dirt particles.



Notes:

- To enhance operating efficiency and service life HLC X-Lock should undergo light periodic lubrication.
- Please contact us for advice.

QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report.
An independant lab report is available on request.

Advantages

High service life
HLC X-Lock's unique structure, with interlocking X and O profile wires, provides a smooth outer surface that reduces friction and is resistant to the ingress of damaging dust and debris particles.

Easy installation
The non-rotating structure of HLC X-Lock make installation straightforward.

Precision engineering
Our engineers strive continuously to optimise performance and operating efficiencies, reduce costs and extend service life.

Cost effective
High ductility wires minimise the occurrence of internal wire breaks, improving performance and extending service life.

Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of Half Lock Coil, X-Lock.


Rotation Resistance


Stretch Resistant

On Demand

The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.


Bright Wire


Galvanised Wire

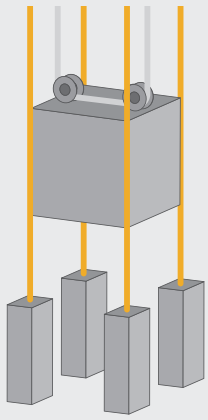

Corzal® Wire Coating


Electromagnetic Inspection


Right/Left Hand Lay

Applications

The outer layer of interconnecting X and O profile wires give the HLC, X-Lock rope an extremely smooth outer surface that is designed for use as a guide rope for skips and cages in deep mine shafts.



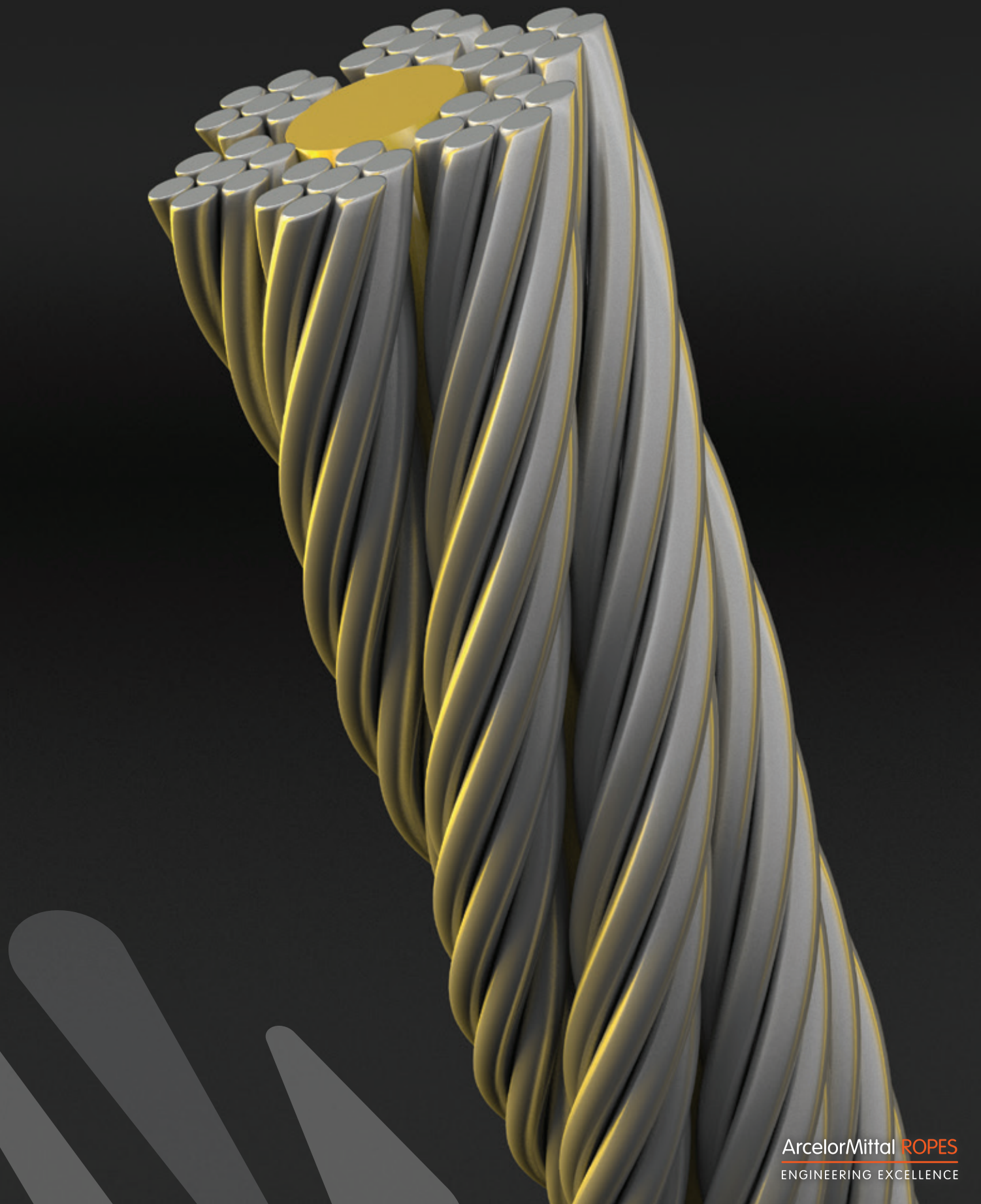
Diameter		Weight		Minimum breaking load		
mm	inch	kg/m	lbs/ft	kN	kN	kN
				980 MPa	**1080 MPa**	**1370 / 1180 MPa**
29	1" 1/8	4.64	3.12	494	542	631
30	-	5.00	3.36	531	582	678
31	-	5.37	3.61	568	623	726
32	1" 1/4	5.74	3.86	607	666	775
33	-	6.13	4.12	646	709	826
34	-	6.52	4.38	687	754	878
35	1" 3/8	6.92	4.65	729	800	931
36	-	7.33	4.92	772	847	986
37	-	7.74	5.20	816	895	1042
38	1" 1/2	8.17	5.49	861	945	1100
39	-	8.60	5.78	907	995	1159
40	-	9.05	6.08	955	1047	1219
41	1" 5/8	9.50	6.38	1003	1100	1281
42	-	9.96	6.69	1052	1155	1344
43	-	10.42	7.00	1103	1210	1409
44	1"3/4	10.90	7.32	1154	1267	1474
45	-	11.38	7.65	1207	1324	1542
46	-	11.88	7.98	1261	1383	1610
47	-	12.38	8.32	1316	1443	1680
48	1" 7/8	12.89	8.66	1372	1505	1752
49	-	13.41	9.01	1429	1567	1825
50	-	13.93	9.36	1487	1631	1899
51	2"	14.47	9.72	1546	1696	1974
52	-	15.01	10.09	1606	1762	2051

NCR6

The stable steel rope for aerial transportation and open pit mining.

The NCR6 features a solid plastic core making this rope an exceptionally stable rope with reduced stretch resistance. Designed for aerial transportation of skips and open pit mining, the NCR6 is a fatigue resistant rope that delivers a long service life.

ArcelorMittal



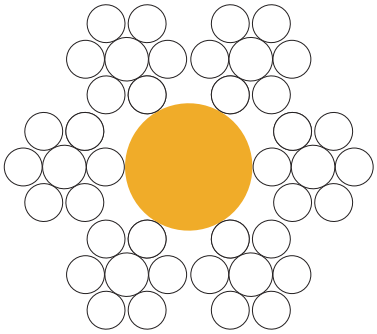
ArcelorMittal ROPES

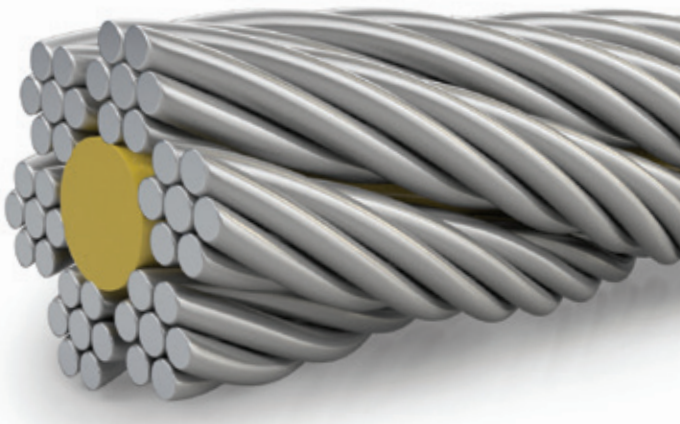
ENGINEERING EXCELLENCE

NCR6

The stable steel rope for aerial transportation and open pit mining.

The NCR6 features a solid plastic core making this rope an exceptionally stable rope with reduced stretch resistance. Designed for aerial transportation of skips and open pit mining, the NCR6 is a fatigue resistant rope that delivers a long service life.





Notes:

- To enhance operating efficiency and service life NCR6 should be lubricated periodically.
- Please contact us for advice.

QUALITY
All our Mining Ropes are supplied with an ArcelorMittal internal lab report.
An independant lab report is available on request.

Advantages

Cost effective

High ductility wires minimise the occurrence of internal wire breaks caused by internal dynamic stresses, resulting in longer service life.

Low stretch

Minimal stretching under load with fast stretch stabilisation.

High fatigue performance

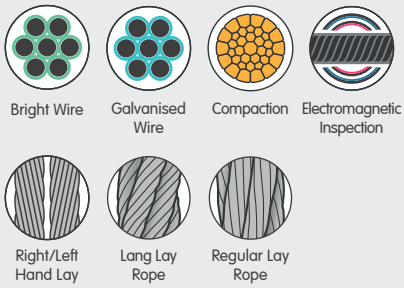
Engineered for overall performance, the tensile strength of NCR6 is key to this rope's superior fatigue resistant properties. High ductility wires minimise the occurrence of internal wire breaks that are caused by internal dynamic stresses.

Properties

Every demanding situation requires a rope with specific performance characteristics. The following properties are a key feature of NCR6.

On Demand

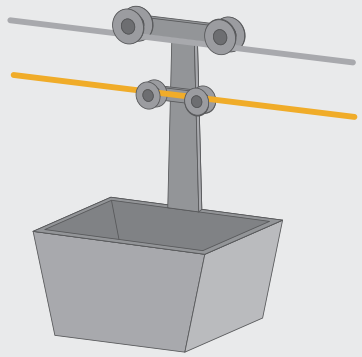
The properties and values illustrated for each rope are our standard specifications. Bespoke options and adaptations can be manufactured on request.



ArcelorMittal

Applications

NCR6 is a fatigue resistant rope widely used for the aerial transportation of skips.



NCR6/2018/v1.0

Diameter		Section	Weight		MBL
mm	inch	mm²	kg/m	lbs/ft	kN
					1770 MPa
SL17					
23	-	217	1.931	1.298	346
24	15/16	236	2.103	1.413	376
25	-	256	2.282	1.534	408
26	1"	277	2.469	1.659	441
27	-	299	2.663	1.790	476
28	-	321	2.865	1.925	511
29	1" 1/8	344	3.073	2.065	548
30	-	368	3.289	2.210	587
31	-	393	3.513	2.360	626
32	1" 1/4	419	3.743	2.515	667
33	-	445	3.981	2.675	709
34	-	473	4.226	2.840	753
35	1" 3/8	501	4.479	3.010	798
36	-	530	4.739	3.184	844
37	-	560	5.006	3.364	891
38	1" 1/2	590	5.281	3.549	940
39	-	622	5.563	3.738	990
40	-	654	5.852	3.932	1041
SLR17					
21	-	206	1.782	1.197	323
22	7/8	227	1.960	1.317	355
23	-	248	2.146	1.442	389
24	15/16	271	2.341	1.573	424
25	-	294	2.544	1.709	461
26	1"	319	2.755	1.851	499
27	-	344	2.974	1.999	539
28	-	371	3.202	2.152	580
29	1" 1/8	398	3.438	2.310	623
30	-	426	3.682	2.474	667
31	-	455	3.935	2.644	713
32	1" 1/4	486	4.195	2.819	760
33	-	517	4.465	3.000	809
34	-	549	4.742	3.186	859
35	1" 3/8	582	5.028	3.378	911
36	-	616	5.322	3.576	964
37	-	651	5.624	3.779	1019
38	1" 1/2	687	5.934	3.988	1075
39	-	724	6.253	4.202	1133
40	-	762	6.580	4.422	1192

Supporting KGHM with the extraction of 7.3 million tonnes of ore each year

The Lubin mine, operated by KGHM, is a large mine in the west of Poland, 347 km south-west of the capital, Warsaw. Lubin represents one of the largest copper and silver resources in Poland having estimated reserves of 347 million tonnes of ore.

Annual ore production is around 7.3 million tonnes from which 92,000 tonnes of copper and 423 tonnes of silver are extracted.

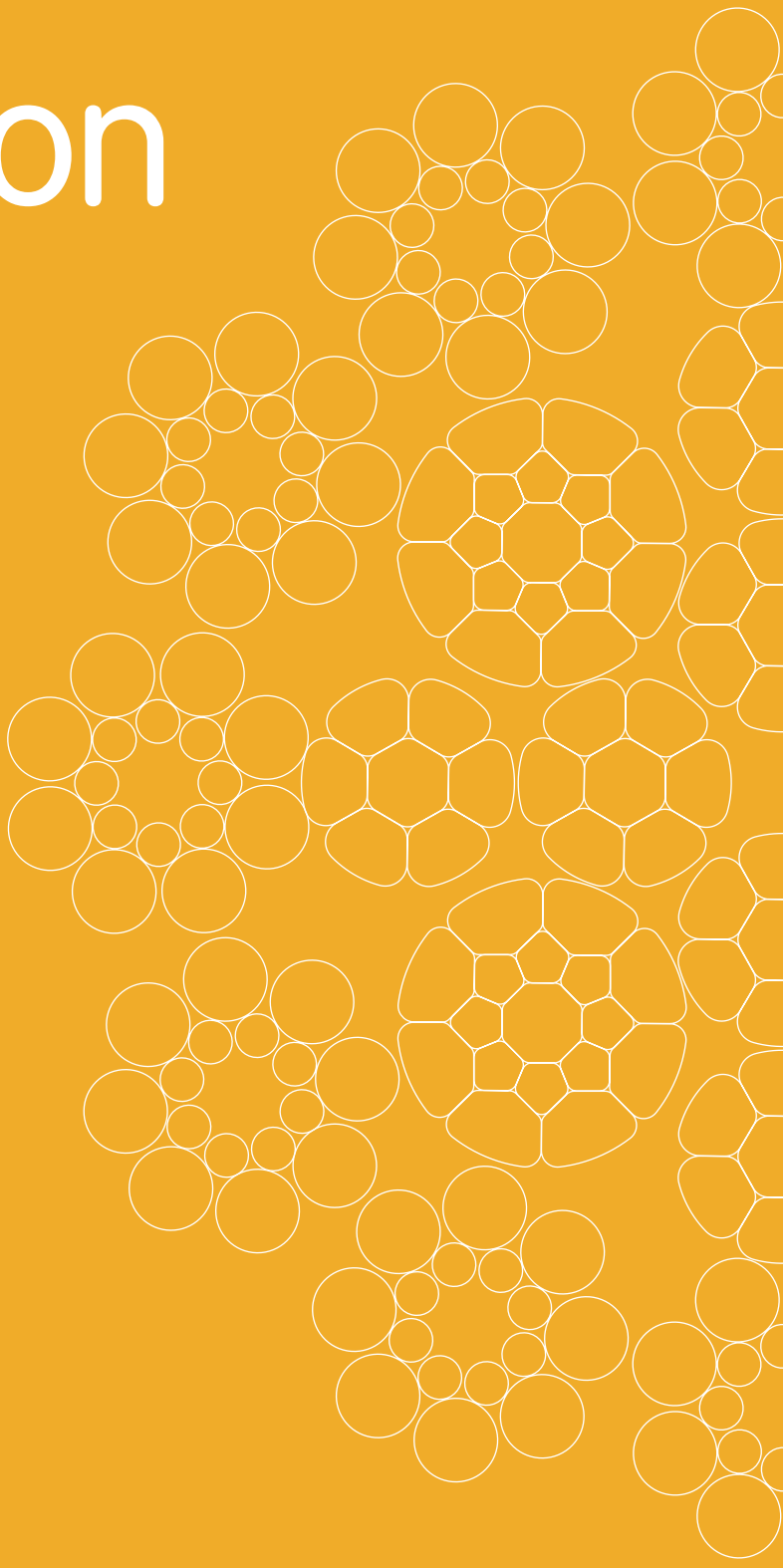
Mining operations in the Lubin mine are carried out over an area of 158 km^2. There are seven shafts ranging from 494 to 963m deep. One is an extraction shaft, while the other six are used for material transportation and ventilation purposes.

ArcelorMittal Mining Ropes are used in:

- Shaft L-II (Koepe tower). 890m of **Notorplast**® 38mm 4 is used for 18 tonne skips. This rope has lifted 79,000 skips in 43 months.
- Shaft L-V (Koepe tower). 840m of **NRHD 24** 59mm balance rope, with operating speeds up to 12 metres per second.

ArcelorMittal

Technical Information



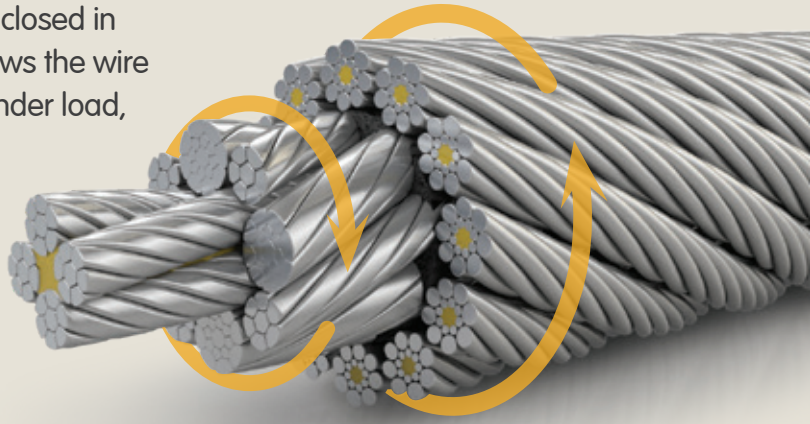
ArcelorMittal ROPES

ENGINEERING EXCELLENCE

Technical Information

Non-rotating properties

Non-rotating ropes are designed with a steel core closed in the opposite direction to the outer strands that allows the wire rope to be well balanced. When the wire rope is under load, the strands of the core are twisted in one direction while the outer strands tend to rotate in the opposite direction.



Torque factor

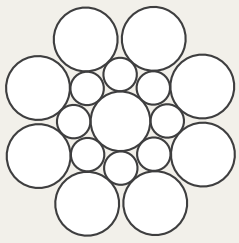
$$ftorque = \frac{C}{F \; x \; d}$$

With:

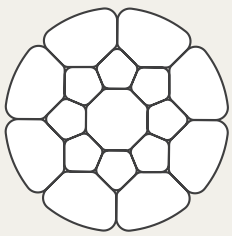
- ftorque = torque factor [Nm/mm/kN]
- C = moment of torsion [N.m]
- F = load [kN]
- d = rope diameter [mm]

Compaction

Thanks to the rope compaction, the metallic section is increased, which leads to a higher breaking load than a non compacted wire rope of the same diameter. The outside strand area is also increased and smoother, which decreases the contact pressure between the rope and the drum/sheaves, and thus increases the fatigue properties.



Round Wire Rope



Compacted Rope

Plastic inserts

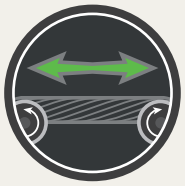
Polyethylene inserts absorb pressure, facilitate rope deformation and extend service life.

Electromagnetic inspection

An electromagnetic test is performed at the final stage of the production process. The test provides a benchmark for comparison with future electromagnetic tests that will be conducted during operations.

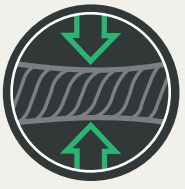
Stretch resistance

During standard operations it is normal to see some elongation of the rope during the first cycles after installation and before stabilisation. Due to our optimum design and manufacturing process, rope elongation after stabilisation is between 0.1% and 0.3%.



Crush resistance

Crushing is the effect of external pressure on a rope which damages the rope by distorting the cross-sectional shape of the rope, its strands or core or all three. Crush resistant ropes withstand or resist external forces.



Technical Information

Regular Lay or Lang Lay

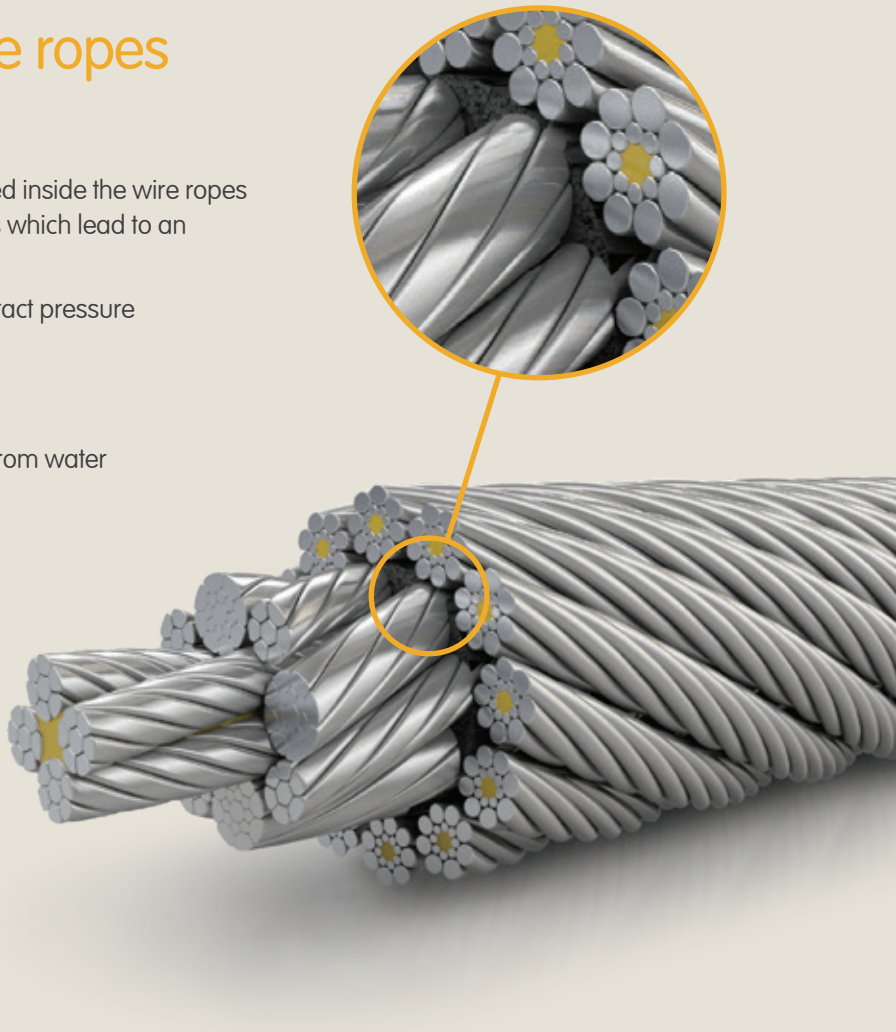
	Lang Lay	Regular Lay
		
Advantage	Wear resistance Flexibility	Core sensitivity Non-rotation property
Disadvantage	Core sensitivity Non-rotation property	Wear resistance

Textile strands inside wire ropes

In Klondike® and Notorplast®, textile strands are added inside the wire ropes in the core valleys. These strands bring 2 advantages which lead to an increased lifetime of the rope:

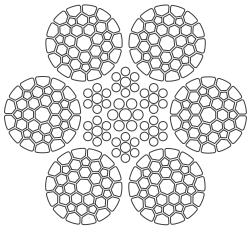
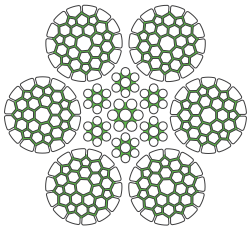
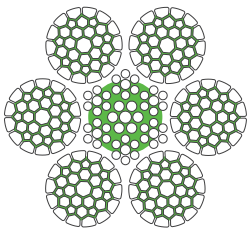
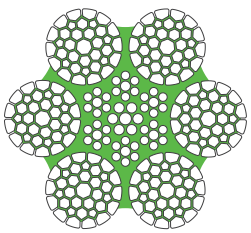
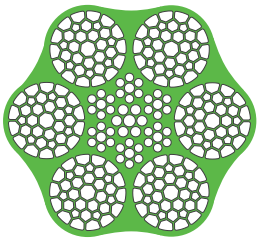
- A densification of the core, that decreases the contact pressure generated by the outer strands.
- A lubricant tank.

Moreover it is also noticed that they protect the core from water ingress and consequently against corrosion.



Lubrication and coatings

Lubrication types on ArcelorMittal steel wire ropes

Type of Lubrication	Lubrication Method		% mass	Note	Illustration
Dry	Closing	No grease slight oil only	0.0	For stainless wire ropes and specific demands (oil is applied to avoid trouble in the die during assembly)	
	Core				
	Stranding				
A-1	Closing	No grease, oil only	0.5	For ropeway ropes, mining ropes on Koepe sheave and plastified wire ropes	
	Core	No lubrication			
	Stranding	Lubrication + tight wipe			
A-2	Closing	No grease, oil only	0.75	Specific demands on plastified ropes	
	Core	Lubrication + tight wipe			
	Stranding	Lubrication + tight wipe			
A-3	Closing	Lubrication + wipe	1.5 - 1.75	Hoisting applications	
	Core	Lubrication + wipe			
	Stranding	Lubrication + wipe			
A-4	Closing	Lubrication + no wipe	2.0 - 2.5	Not available direct from the mill. (Can be performed by our distributors on specific demand)	
	Core	Lubrication + no wipe			
	Stranding	Lubrication + no wipe			

3 Grades of grease are available:

- Classic grease for onshore standard applications
- Improved grease for special applications
- Premium grease for aggressive environments

Technical Information

Groove characteristics for sheaves and grooved drums

Grooves in sheaves and drums should be circular and smooth.

Sheaves

To ensure good support, the rope must contact the groove for approx 130-140° of arc, which leads to the following recommendation for the groove diameter:

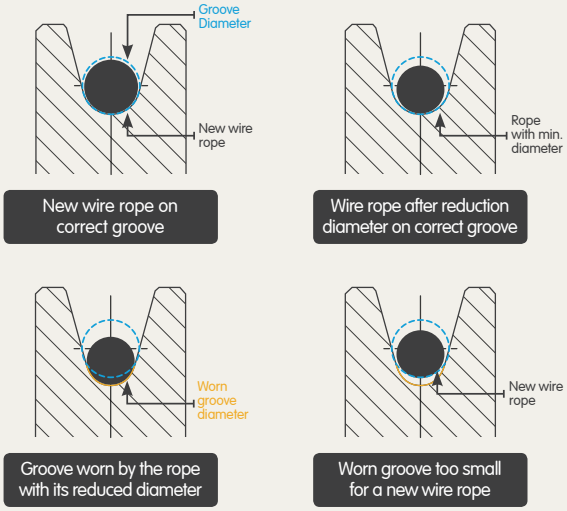
$$1.05d < d_g < 1.1d$$

$$Optimal\ value = 1.075$$

With:

- d = nominal rope diameter with 0/+4% tolerances;
- d_g = groove diameter.

During a wire rope's lifetime, the rope diameter will decrease. This is due to first the elongation of the rope and then the wear on the rope wires. This diameter variation begins quickly but then slows down. The wire rope will create a new groove in the sheave which corresponds to the reduced diameter. If a new wire rope is installed in a worn sheave, without resurfacing, the new rope will wear more quickly. The lifetime can be divided by 10.



Grooved drums

The groove diameter d_g and the pitch diameter p must comply with the following criteria:

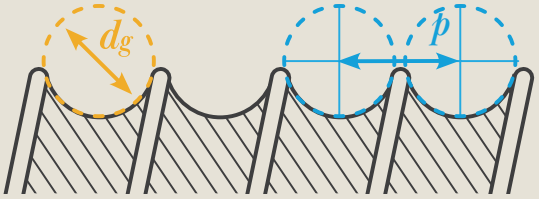
$$d_g = 1.0173d$$

$$1.035dg < p < 1.09dg$$

$$Optimal\ value = 1.06$$

With:

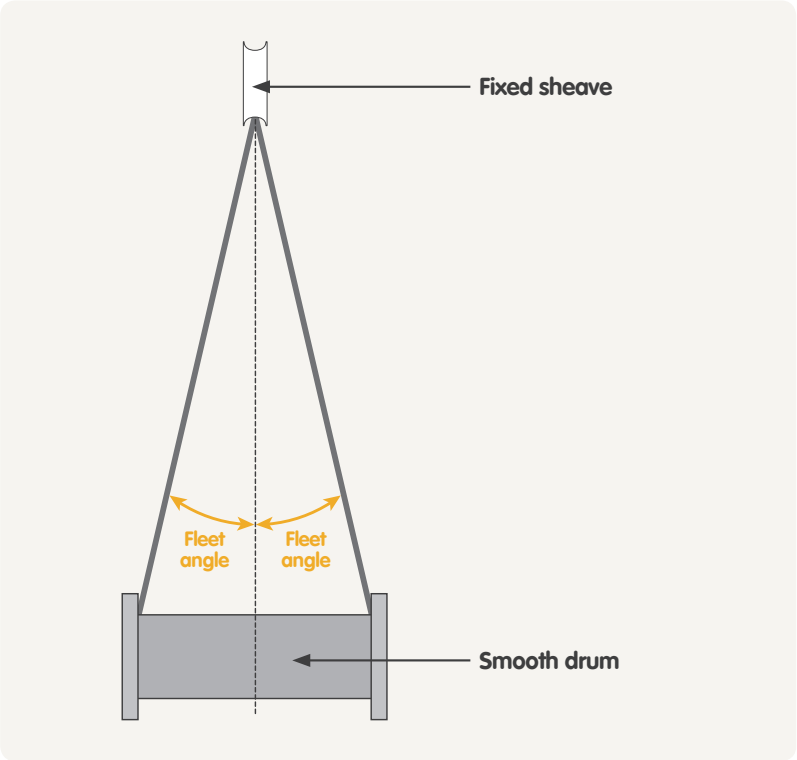
- d = rope diameter under tension of 5%MBL
- d_g = groove diameter
- p = pitch between 2 grooves



Fleet angles

When the wire rope comes from a drum to pass over a sheave, there is an angle between the rope and the centre line of the sheave.

It is recommended that the maximum fleet angle is 2.5°.



Recommendations

Discard criteria

Discard criteria are defined by current regulations or standards. Generally, the discard criteria is based on steel loss section detected by non-destructive testing. The used limit is quite often 10%.

ArcelorMittal ROPES recommend the follow-up of its ropes by non-destructive testing (steel section loss) together with diameter and elongation checking.

The elongation is representative of rope evolution and directly linked to:

- The nature of the ropes (examples: FLC or multistrand)
- The design of the ropes (examples: compacted strands, gap between the strands)
- The use conditions (examples: tension level, speed)

Regarding the elongation apparition speed, 1/3 appears very quickly (during the first 0.25% of its lifetime), another 1/3 appears during the following 5% of its lifetime and last third will slowly appear between 5% of the lifetime and the discard of the rope.

Technical Information

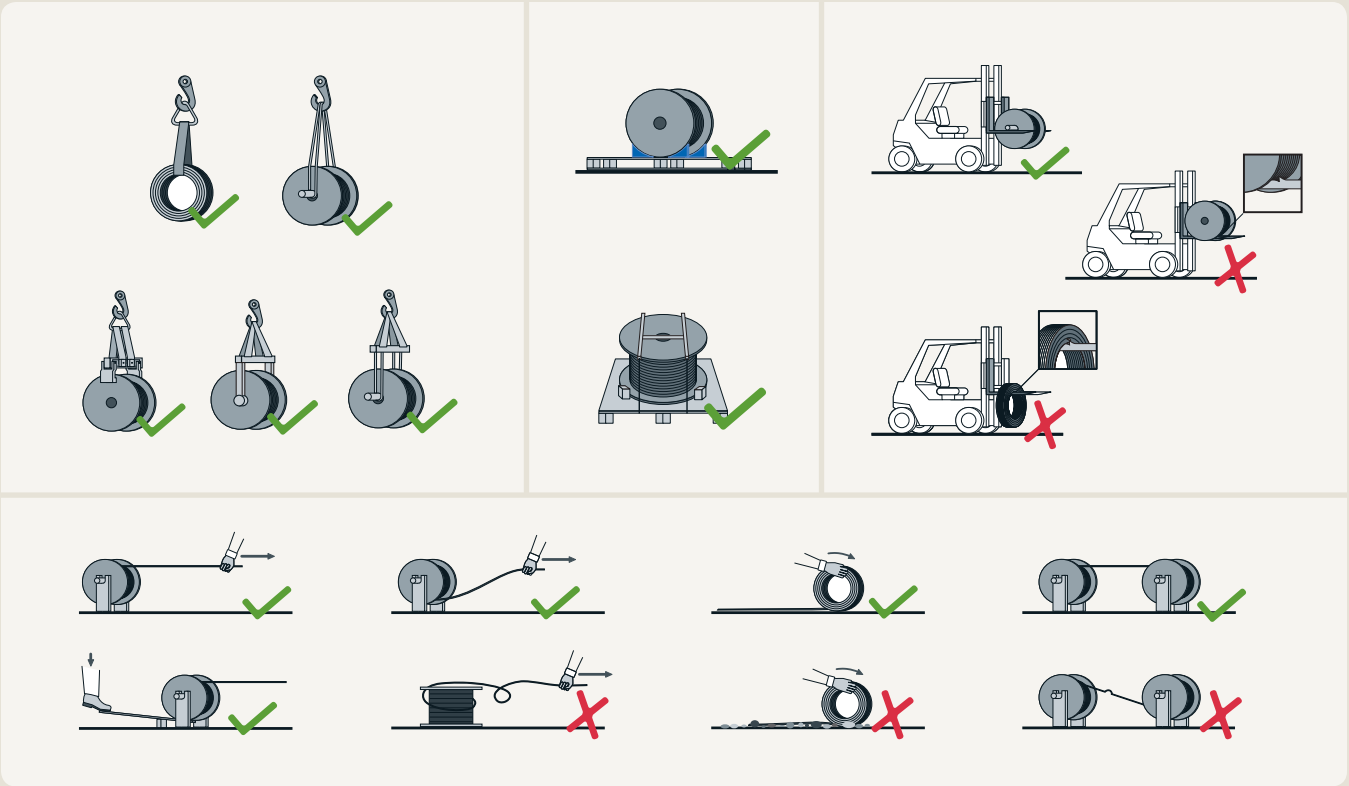
Recommendations

Storage and maintenance

The rope must be adequately maintained and regularly lubricated, as often as it is necessary, but at least when the rope works in extreme conditions and before/after prolonged inactivity. The lubricant must be compatible with the original grease. Before re-lubrication, the wire rope must be dry and cleaned by scraping. Cleaning by cloth, cryogenic spray, high pressure cleaner and solvents are forbidden.

When stored, the rope should be kept in a dry and ventilated environment with no direct contact with the floor and an air flow under the reel. Visual inspection is necessary before the use of a stored wire rope. In case of doubt of the quality of the wire rope, we can help you to find and make additional inspection analysis.

EWRIS handling recommendations



At all times, contact of the rope with any metallic pieces should be avoided to prevent early damage.

EWRIS
European Federation of Steel Wire Rope Industries

Tensions inequality

A tensions inequality between the ropes may result in slippage on the sheaves during a cycle. This will create structural damages in the ropes. The ropes tensions inequality will generate stress variations with big amplitude. This leads to a decrease of the cyclic loadings resistance.

Static tension equalisation

Set the conveyance equipped with fine tensioning gear at an appropriate lower level and equalise tension on all ropes. If not so equipped, chair the conveyance, slacken the ropes and adjust accordingly their individual lengths. It is obvious that the first described procedure is more accurate and expedient. Normally this procedure should be performed on a weekly basis. However, after a new rope or ropes have been installed, it should be performed more frequently as required and on a daily basis for the first week.

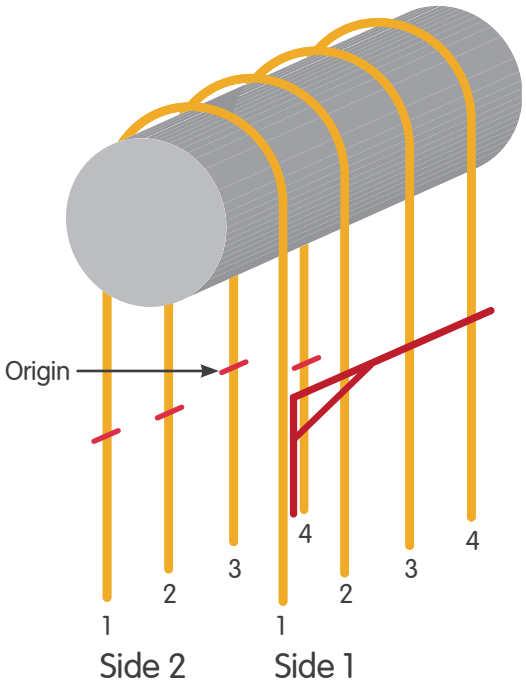
Equalisation of the lengths developed by sheaves

The developed lengths equalisation will be achieved by appropriate trimming of the friction hoist linings. The most common is the collar to collar check, as described hereinafter.

At this point, it should be kept in mind that dust build-up on the ropes can create differences in the lengths developed by the sheaves. A permanent rope cleaning device might be necessary under extreme conditions.

The equalisation check should be made on a weekly basis.

Collar to collar (bank to bank) check



1. Lower side 1 conveyance to midshaft (both conveyances empty).
2. Mark all 4 ropes side 1 at collar.
3. Raise side 1 conveyance slowly until the marks are at collar on side 2.
4. Measure variances using the rope that has the mark in the highest position above collar as being the origin, i.e. rope n°3.
5. Correct the tensions inequality by an appropriate method (groove machining).

Technical Information

Others

Incidents such as objects falling down shaft, unpredicted and numerous emergencies, or unusual rates of acceleration and deceleration ratios may cause structural damage to the ropes. Preventive actions must be taken to avoid these incidences.

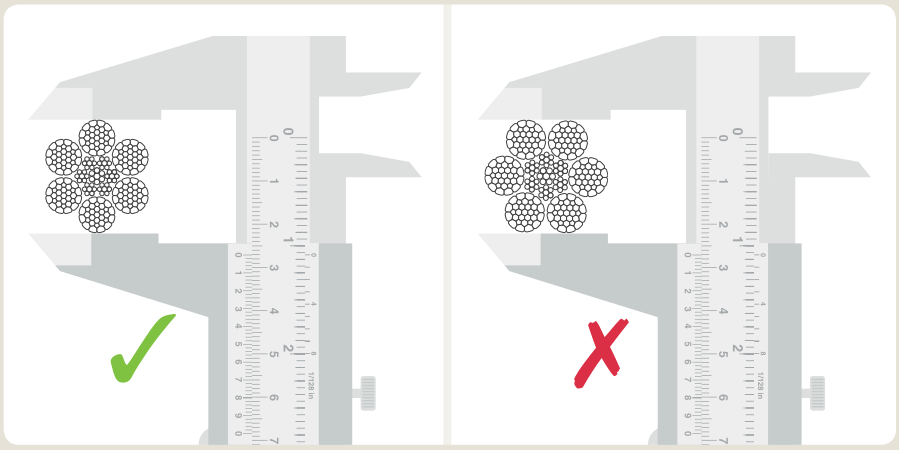
Individual rope stretch curves should be plotted at the time of temporary disconnections. The torque should also be evaluated and recorded for full locked coil hoist ropes. At the time of disconnection for stranded ropes, it will be necessary to retain any torque.

Dimensional control

Diameter (NF EN 12385-1)

The diameter must be measured with an appropriate measuring instrument covering at least 2 strands.

Measurements must be made at two positions spaced at least one metre apart and for each position, 2 measurements must be taken at right angles.



Lay Length

The lay length must be ideally measured on 5 lay lengths minimum.

Stick a paper strip on the rope, draw a straight line on it and pass a chalk stick to reveal the track. Then make the measurement directly on the paper strip.

Test resources

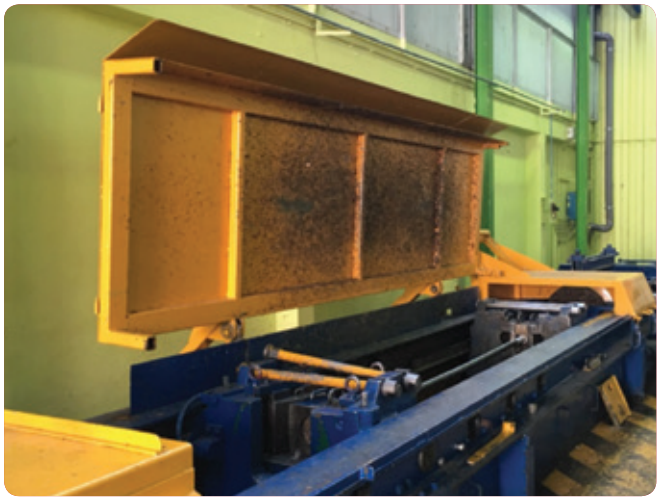
Wire

Prior to the manufacture of our ropes, samples are taken from each of the wires that we use. Using current international standards, the samples undergo a comprehensive:

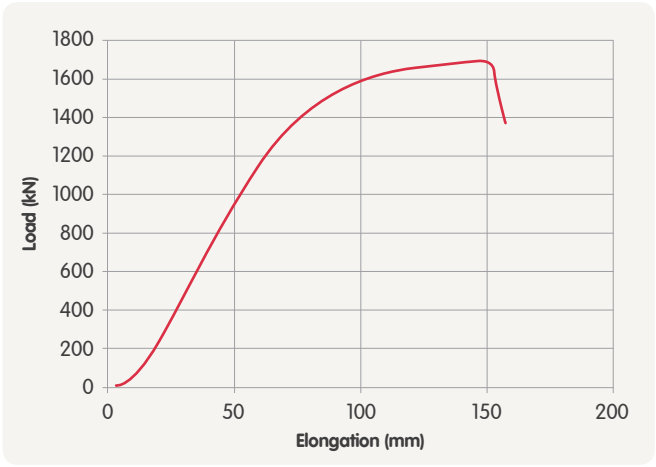
- Tensile test
- Torsion test
- Bending test

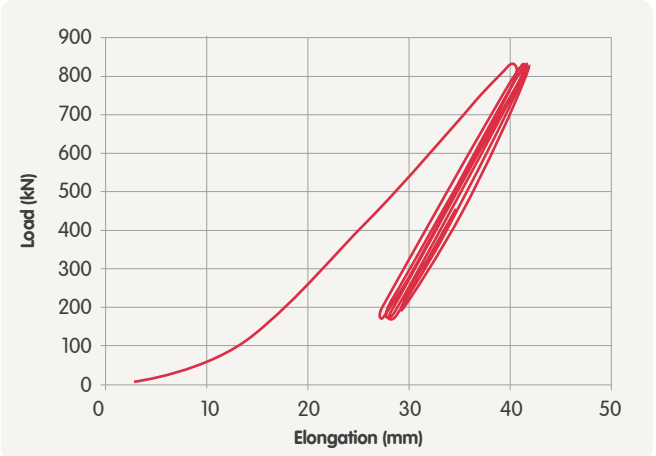
Wire rope

For each manufactured wire rope, the breaking load is checked with a test. During this test, the stress/strain curve is recorded and a modulus measurement can be made on request.



The Bourg-en-Bresse site has 3 test benches:
200 tons, 350 tons and 1500 tons.

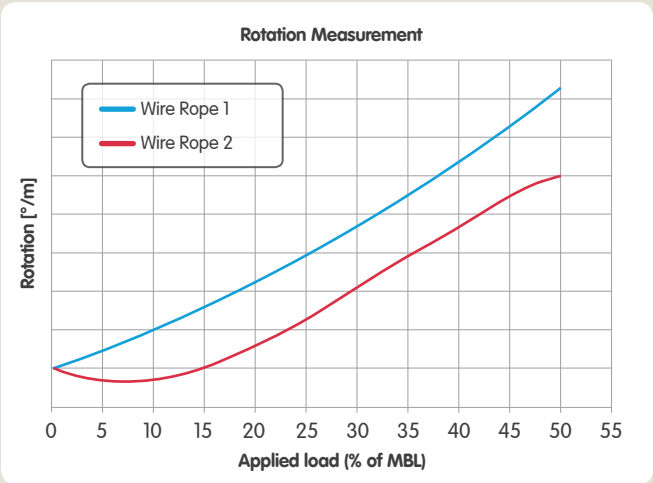


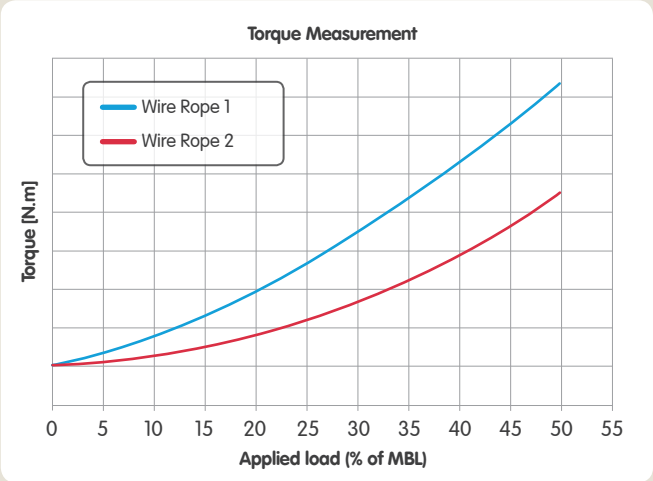


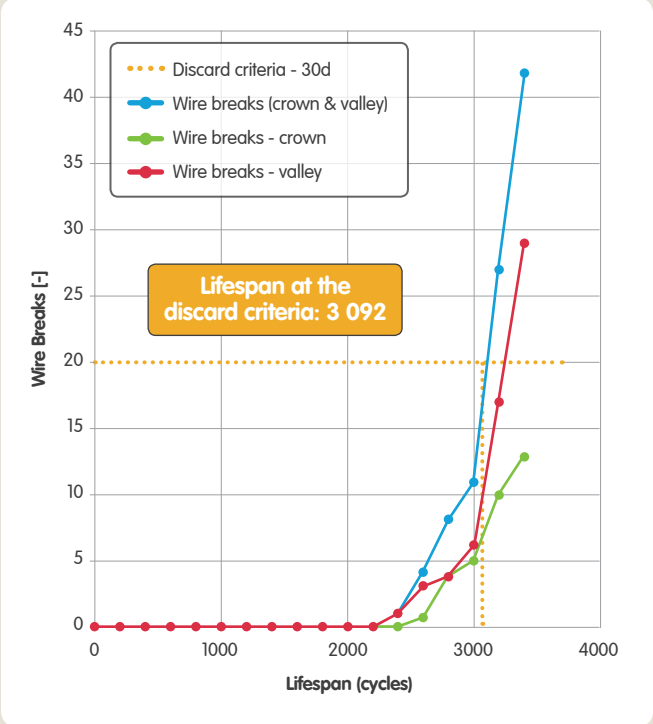
Technical Information

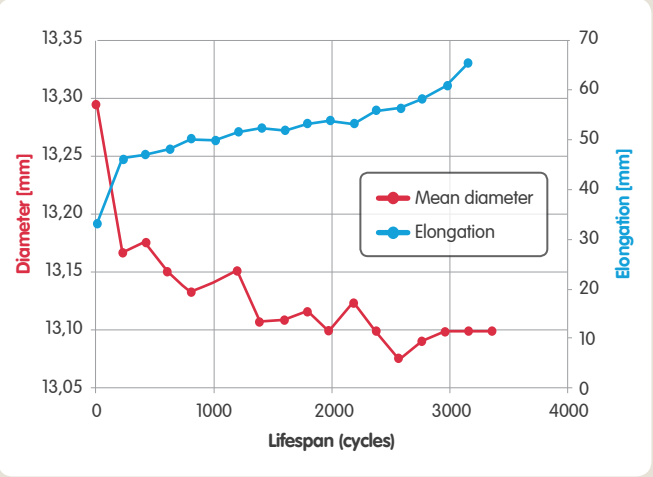
Test resources - continued

Wire Rope









On wire ropes, it is also possible to make:

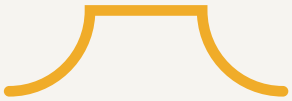
- Rotating test to determine the torque factor and the specific twist
- Bending fatigue test based on the discard criteria given in ISO 4309.

Bending fatigue properties

The wire rope lifespan depends on many parameters. The most important parameters being:

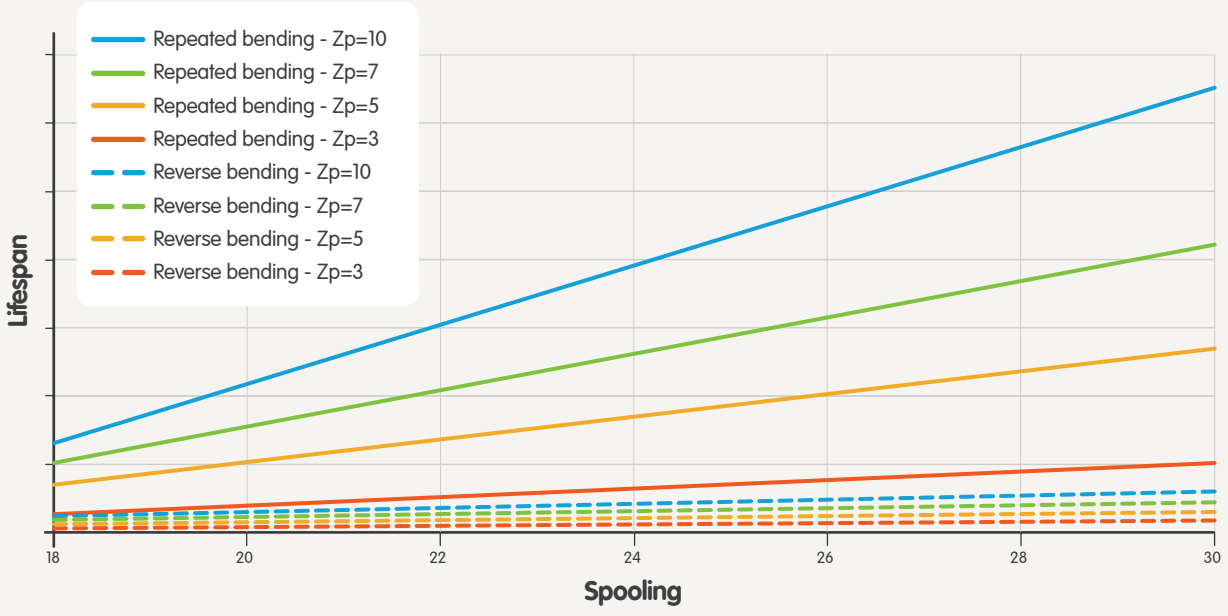
- Spooling ratio D/d
- Type of bending: repeated or reverse
- Load characteristics: safety coefficient (Zp)

Repeated Bending



Reverse Bending

Alternated Bending

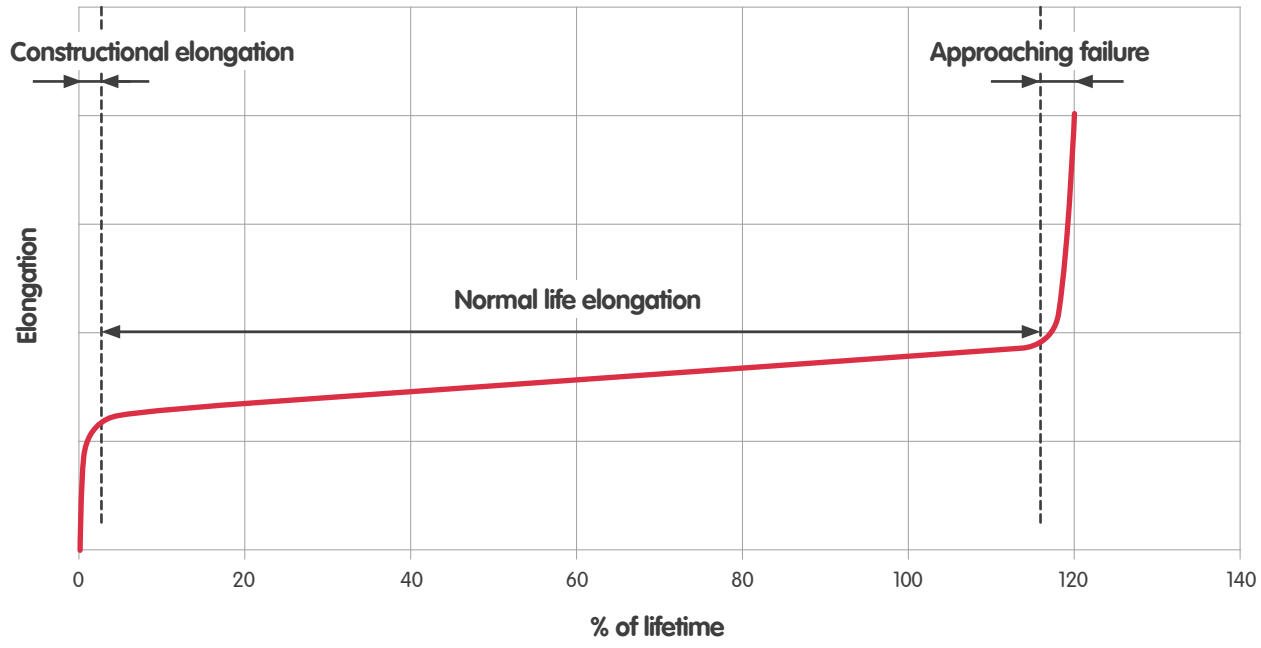


Pseudo-static properties

Elasticity modulus

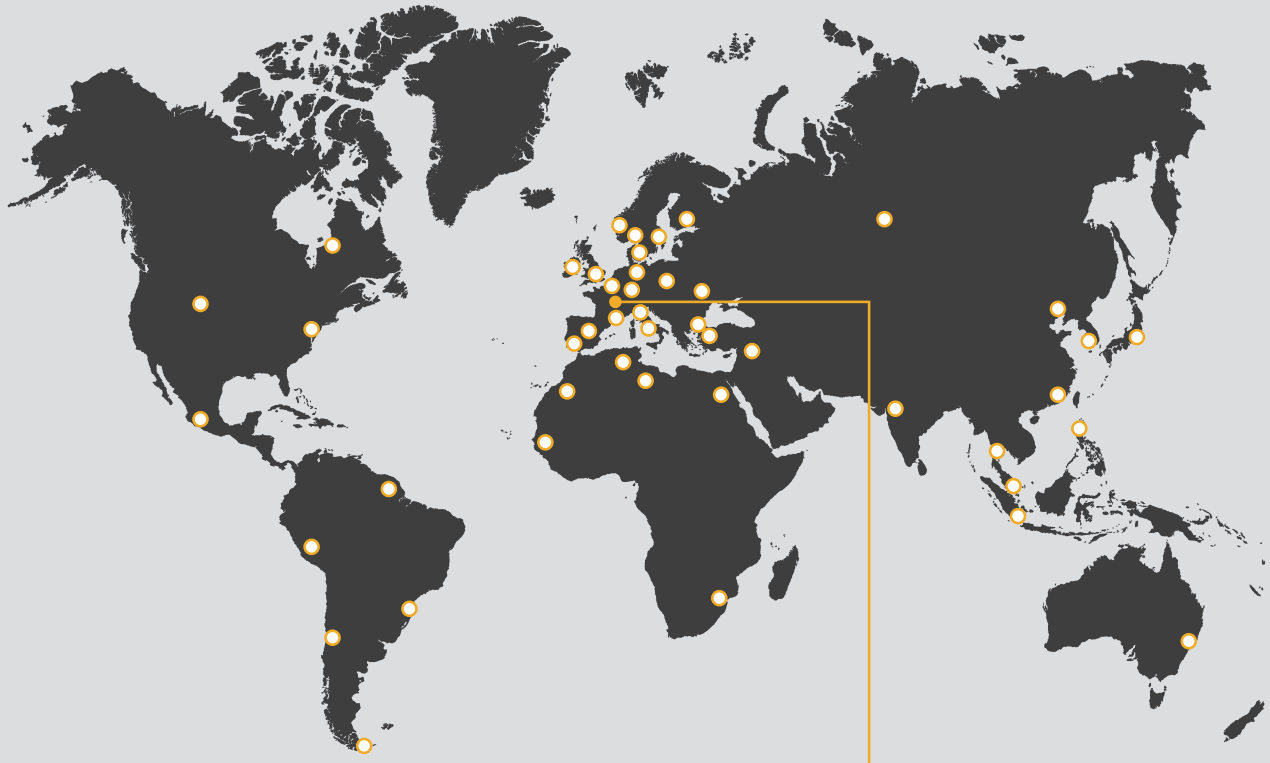
	Orders of magnitude (±10 000 MPa)
Wires	210 000 MPa
Strands	170 000 MPa
Wire ropes	110 000 MPa

Elongation



Worldwide Market

From our manufacturing base in Bourg-en-Bresse, France, ArcelorMittal ROPES distributes its premium quality Mining Ropes around the world.



Algeria
Andorra
Angola
Argentina
Australia
Austria
Belgium
Brazil
Bulgaria
Chile
China
Denmark
Egypt
Finland
France
Germany
Greece
Guadeloupe
Hong Kong
Hungary
India
Indonesia
Ireland
Italy
Japan
Jordan
Latvia
Lebanon
Luxembourg
Martinique
Morocco
Netherlands
New Caledonia
New Zealand
Norway
Peru
Poland
Portugal
Reunion
Russia
Senegal
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Turkey
United Kingdom
USA
Venezuela

ArcelorMittal ROPES
ENGINEERING EXCELLENCE

ArcelorMittal ROPES

ENGINEERING EXCELLENCE

25 Avenue de Lyon, BP 38
F-01002 Bourg-en-Bresse Cedex

T: +33 4 74 32 81 96
F: +33 4 74 32 81 05
E: mining.ropes@arcelormittal.com

www.arcelormittal.com/wireropes