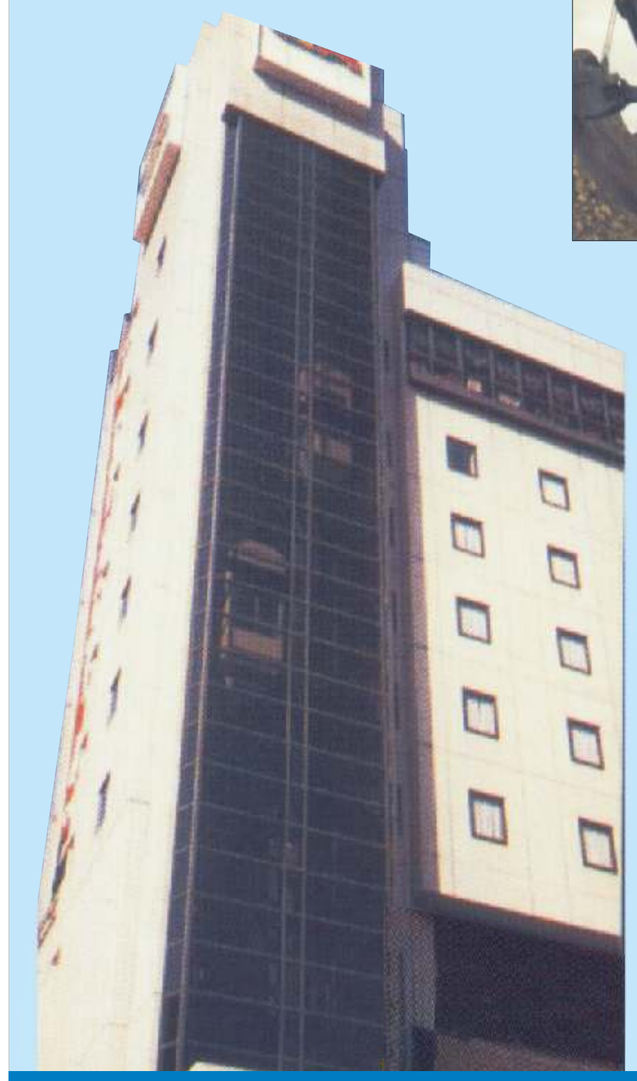

SHALIN MATERIAL HANDLING PVT.LTD.

An ISO 9001 - 2000 Company

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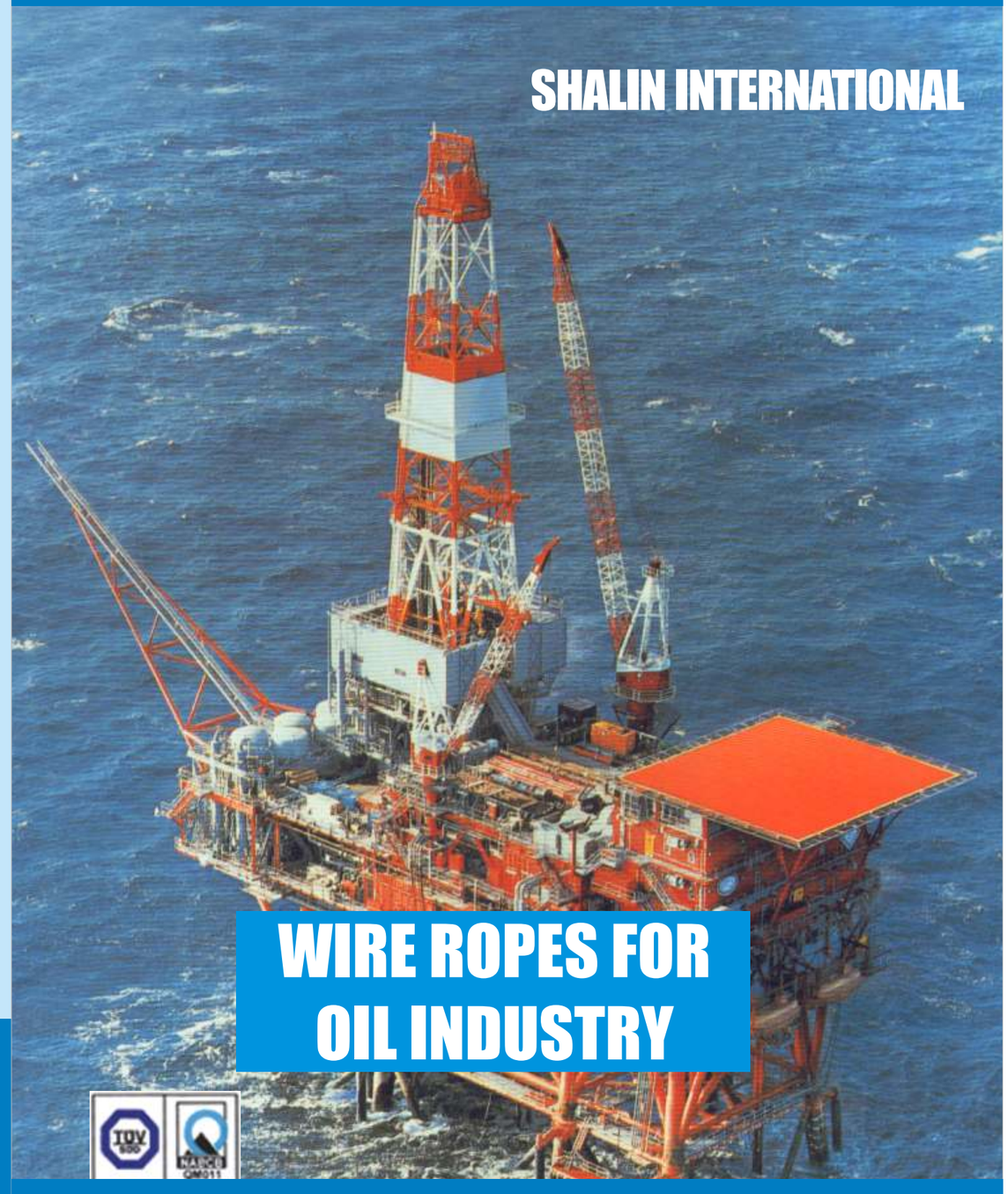
SHALIN STEEL WIRE ROPE

Shalin

SHALIN INTERNATIONAL



WIRE ROPES FOR OIL INDUSTRY

DIAMETER

The diameter of rope is the diameter of its circumference. To obtain the practical diameter, the average of two points at least one meter apart and two diameters measured at 90 Degrees from the other is taken when the rope is not under tension.

CONSTRUCTION & DESIGNATION

Strands are the simplest constructions, consisting of one or more layers of superimposed wires laid spirally around one or more central wires or around a fibre core. The construction of the strand is identified by the number of wires in the individual layers starting from the outer one like 12+6+1. Strands are of two types: Cross- laid and equal-laid.

A. Strands with Cross Laid Wires

All the wires in this type of strand are of equal diameter and each layer of wire is laid up a separate operation with a different length of lay resulting in the crossing of the various layers of wires. Consequently strong pressure occurs between the wires, which may break especially with variable loads.

B. Strands with Equal Laid Wires

The pitches of the various layers of wires are identical as stranding is carried out in a single operation. Therefore; the contacts between wires are linear. Seale, Warrington and Filler strands belong to this construction. Wires of different diameters are required for these constructions.

ROPES consist of a number of strands either laid around a fibre core [jute(FC) or polypropylene (PP)] or metallic core [Wire Strand Core (WSC) or an Independent Wire Rope Core (IWRC)]. A rope with 6 strands of 9+9+1 wires laid around a central fibre is designated as 6x(9+9+1)+FC, more concisely 6x19 Seale+FC. 7x7 or 7X(6+1) would indicate a metallic (WSC) core. Should the strands also contain a fibre core then the rope will be know for example as 6x(6+FC)+FC or 6x6+7FC. Lastly if the rope is formed of two or more layers of strands superimposed around a FC, then it will be known as: 12x[(6+1)+6x(6+1)]+FC or 18 x 7 FC.

LAY

Lay has three meanings in rope design. The first two meanings are descriptive of the wire and strand positions in the rope. The third meaning is a length measurement.

1. The **direction** of the strands in the rope right or left. When you look down a rope, strands of a right lay rope go away from you to the right. Left lay is the opposite. (It doesn't matter which direction you look.)
2. The **relationship** between the direction of the strands in the rope and the direction of the wires in the strands. In appearance, wires in **Ordinary (Regular)** Lay run straight down the length of the rope, and in **Lang's Lay**, they appear to angle across the rope. In Ordinary lay, wires are laid in the strand opposite the direction the strands lay in the rope. In Lang's lay, the wires are laid the same direction in the strand as the strands lay in the rope.
3. The **length** along the rope that a strand makes one complete spiral around the rope core.

The lay of a rope affects its operational characteristics. Ordinary Lay is more stable and more resistant to crushing than Lang's Lay. While Lang's Lay is more fatigue resistant and abrasion resistant, use is normally limited to single layer spooling and when the loads are restrained from rotation like passenger and freight elevators because wires have a longer contact with the sheave grooves thereby undergoing less wear. Given equal construction and diameter, Lang's Lay ropes are more flexible than Ordinary Lay ropes. The wire ropes we manufacture are preformed according to special methods which give them stability and eliminate internal stresses.

LUBRICATION

Wire ropes are lubricated as a protection against oxidization and to reduce frictions between wires and strands. Fibre cores are impregnated and during the stranding and roping operations, all wires forming the strand and all strands forming the rope are lubricated. The type of lubrication varies according to the application for the rope and the type of use for which it is intended. During the working life of the rope, lubrication should be carried out periodically with lubricants compatible with those used during manufacture. Lubricants used during manufacture are free from solvents, moisture, aromatic compounds, alkaline soaps and acidity both organic and inorganic. The lubricants we use for engineering applications are wax based and for fishing ropes bituminous based cadmium compound is used.

WIRE ROPE CORES

The core of a wire rope is the central member around which the main strands are laid to support the strands and maintain them in their proper position when loads are applied. The two types of cores commonly used in wire ropes are metallic cores [Independent Wire Rope Cores (IWRC) & Wire Strand Cores (WSC)] and fibre cores (FC) of either natural (jute, manila or sisal) or synthetic fibres like polypropylene (PP) or polyethylene. For ropes of dia 13mm and below, WSC is generally used as the metallic core unless otherwise specified. When fibre core is specified, jute is generally used except for fishing ropes where polypropylene is used.

ZINC-COATED WIRE ROPE

Galvanized ropes have their wires uniformly coated with zinc for protection against corrosion where atmospheric condition is saline or the rope is exposed to other corroding agents as well as when it is used in water. Where periodic lubrication is possible in engineering ropes, heavily lubricated bright ropes are usually preferred to galvanized ropes. Lion Brand Fishing Ropes are coated with an extra heavy coating of Zinc and heavily coated with cadmium compound.

PREFORMED WIRE ROPE

In a preformed wire rope, the individual wires in the strands and strands composing the rope, are properly pre-shaped by a preforming head before they are assembled into the finished rope. Preforming prevents the wire and strands from straightening and leaves them relaxed in their normal positions in the rope. Preformed ropes have the following merits as **compared** with non-preformed ropes;

A. Does not require seizing as they retain the rope structure. **B.** Superior flexibility **compared** to non-preformed ropes and wire ropes kinks scarcely ever occur during use. **C.** Longer life because preformed wire ropes have a great endurance to bending. **D.** Broken wire ends do not protrude to injure workmen's hand, distort adjacent wires, or cause wear to sheaves and drums.

GRADES OF WIRE ROPE

Wire Ropes are manufactured in various Tensile Grades to meet the varied requirements of many applications. Each grade provides a different combination of tensile strength, toughness, and endurance to abrasion and bending. The grades are 1230,1420, 1570,1770 & 1960 N/mm^2

SAFETY FACTORS

A Factor of safety is a multiplier of the Nominal Strenght to ensure the safety of the rope over its service life, by incorporating the normal rope wear and stresses that may occur in the course of general use.

$$\text{Max Safe working load} = \frac{\text{Breaking load of rope}}{\text{Factor of safety (min 5)}}$$

Nos.	Type of Service	Minimum Safety factor
1	Hoisting Equipment	5.0
2	Haulage Rope	6.0
3	Overhead & Gantry Cranes	6.0
4	Jib & Piller Cranes	6.0
5	Derricks	6.0
6	Small Electric & Air Hoists	7.0
7	Hot Ladle Cranes	8.0
8	Guy Rope	3.5
9	Wire Rope Slings	5.0
10	Mine Shafts	
	Depths to 500 ft	8.0
	Depths to 500 - 1000ft	7.0
	Depths to 1000 - 2000ft	6.0
	Depths to 2000 - 3000ft	5.0
	Depths to 3000 or more	4.0

RIGHT ROPES FOR THE RIGHT JOB

Types of ropes for various applications are listed below. The operating conditions, including the design and construction of the installation affect the service life of the wire rope.

1 General Engineering Rope	6 x 19, 6 x 21, 6 x 25, 6 x 36, 6 x 37
2 Earth Moving Equipment	6 x 21, 6 x 24, 6 x 25, 6 x 36, 8 x 31, 7 x 19, 7 x 37 Groups
3 Logging	6 x 19, 6 x 21, 6 x 25, 6 x 31 Groups
4 Shipping	6 x 12, 6 x 19, 6 x 24, 6 x 25, 6 x 36, 6 x 37, 7 x 7, 7 x 19, 8 x 31 Groups
5 Oil Industry	6 x 19, 6 x 21, 6 x 25, 6 x 26, 6 x 31, 6 x 37 Groups
6 Mining Industry	6 x 7, 6 x 19, 6 x 21, 6 x 25, 6 x 2

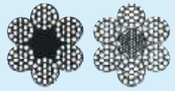
DISCARD FACTORS

Wire ropes can be discarded if the following conditions are noticed as failure may occur much below the ultimate tensile strength:

1. Wear and Tear	Internal - Wear & Tear of wires within strand and between strands External - Scrubbing of wire rope against external surfaces and due to drum with low speed
2. Corrosion	Loss of metal due to corrosive environment
3. Fatigue	Repeated reversal of stress leads to brittle fracture of wires
4. External Deformation	Presence of Corkscrew Formation, Cage Formation, Looping of Wires or strands, knots, construc-tion, flattening, curling, puffing & kinks
5. Action of heat	Excessive heat dries out ropes leading to risk of internal wire rupture
6. Type, Position & Number of Wire Ruptures	Wire ruptures in nests or strand break
7. Abnormal Stretching	Paralleling of the strand due to untwisting of the rope
8. Surface Embrittlement	Work hardening of the wire surface leading to fa-tigue failure
9. Core Collapse	Non-circular wire rope shape
10.Fitting Time	Expected rope life from previous experience
11. Accidental Damage	

TABLE 1

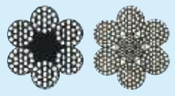
BREAKING LOAD AND MASS FOR 6 X 19 (12/6/1) CONSTRUCTION



Nom Dia	Approximate Mass		Minimum Breaking Load Corresponding to Tensile Designation of Wires of					
			1570		1770		1960	
	FC	SC	FC	SC	FC	SC	FC	SC
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
9	28.0	30.8	39.0	42.0	44.0	47.5	49.0	52.6
10	34.6	38.0	48.0	52.0	54.0	58.7	60.0	65.0
11	41.9	46.0	58.0	63.0	66.0	71.0	73.0	70.7
12	49.8	54.0	69	75	78	84.6	87	94
13	58.5	64.3	82	88	92	99	102	110
14	67.8	74.5	95	102	107	115	118	127
16	88.0	97.4	124	133	139	150	154	166
18	112	123	156	160	176	190	195	210
19	125	137	174	188	196	212	217	234
20	138	152	193	208	218	235	241	260
22	167	184	234	252	263	204	292	314
24	199	219	278	300	313	338	347	375
26	234	257	326	352	368	397	407	439
28	271	--	378	--	426	--	472	--
32	354	--	494	--	557	--	617	--
36	448	--	625	--	705	--	781	--
38	499	--	697	--	785	--	870	--
40	554	--	772	--	870	--	964	--
44	670	--	934	--	1053	--	1166	--
48	797	--	1112	--	1253	--	1388	--
52	936	--	1305	--	1471	--	1629	--

TABLE 2

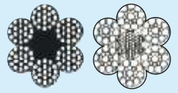
BREAKING LOAD AND MASS FOR 6 X 37 (18/12/6/1) CONSTRUCTION



Nom Dia	Approximate Mass		Minimum Breaking Load Corresponding to Tensile Designation of Wires of					
			1570		1770		1960	
	FC	SC	FC	SC	FC	SC	FC	SC
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
8	22.1	24.4	30	32	33	36	37	40
9	28	30.8	37	40	42	46	47	51
10	34.6	38.1	46	50	52	56	58	62
11	41.9	46.1	56	60	63	68	78	76
12	49.8	54.8	67	72	75	81	83	90
13	58.5	64.3	78	84	88	95	98	105
14	67.8	74.6	91	98	102	110	113	122
16	88.6	97.4	118	128	134	144	148	160
18	112	123	150	162	169	183	187	202
19	125	137	167	180	188	203	209	225
20	138	152	185	200	209	225	231	250
22	167	184	224	242	253	273	280	302
24	199	219	267	288	301	325	333	359
26	234	257	313	338	353	381	391	422
28	271	297	363	392	409	442	453	489
32	354	389	474	512	534	577	593	639
36	448	492	600	648	676	730	749	809
38	499	549	668	722	753	813	834	901
40	554	608	741	880	835	902	924	998
44	678	--	896	--	1010	--	1119	--
48	797	--	1066	--	1202	--	1331	--
52	936	--	1252	--	1411	--	1562	--

TABLE 3

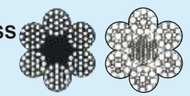
BREAKING LOAD AND MASS FOR 6 X 19 (9/9/1) CONSTRUCTION



Nom Dia	Approximate Mass		Minimum Breaking Load Corresponding to Tensile Designation of Wires of					
			1570		1770		1960	
	FC	SC	FC	SC	FC	SC	FC	SC
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
8	23.3	26.2	33	36	37	40	42	45
9	30.2	33.2	42	45	47	51	53	57
10	37.3	41	52	56	59	63	65	70
11	45.1	49.6	63	68	71	77	78	85
12	53.7	59	75	81	84	91	93	101
13	63	69.3	88	95	99	107	110	118
14	73	80.3	102	110	115	124	127	137
16	95.4	105	133	144	150	162	166	179
18	121	133	168	182	190	205	210	227
19	135	148	188	203	211	228	234	253
20	149	164	208	224	234	253	259	280
22	180	198	251	272	283	306	314	339
24	215	236	299	323	337	364	374	403
26	252	277	351	379	396	428	438	474
28	292	321	407	440	459	496	508	549
32	382	420	532	575	600	648	664	717
36	483	531	673	727	759	820	841	908
40	596	656	831	898	937	1052	1038	1121
44	721	794	1006	1086	1134	1225	1256	1356
48	858	944	1197	1293	1349	1458	1494	1614
52	1008	1108	1405	1517	1584	1711	1754	1894

TABLE 4

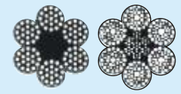
BREAKING LOAD AND MASS FOR 6 X 19(12/6+6F/1) CONSTRUCTION



Nom Dia	Approximate Mass		Minimum Breaking Load Corresponding to Tensile Designation of Wires of					
			1570		1770		1960	
	FC	SC	FC	SC	FC	SC	FC	SC
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
8	21.8	26.8	34	37	38	41	42	46
9	30.8	33.9	46	46	48	52	54	58
10	38	41.8	53	57	60	65	66	71
11	46	50.6	64	69	72	78	80	86
12	51.7	60.2	76	82	86	93	95	103
13	64.3	70.7	90	97	101	109	112	121
14	74.3	82	104	112	117	127	130	140
16	97.3	107	136	147	153	165	169	183
18	123	135	172	186	194	209	214	232
19	132	151	191	207	216	233	239	258
20	152	167	212	229	236	258	265	286
22	184	202	257	277	289	312	320	346
24	219	241	305	330	341	372	381	412
26	257	283	358	487	401	446	447	483
28	298	328	416	449	469	506	519	560
32	389	428	513	586	612	661	678	732
36	496	542	687	742	775	837	858	926
40	608	669	848	916	956	1033	1059	144
44	736	810	1026	1109	1157	1250	1281	384
48	876	964	1222	1319	1377	1487	1525	647
52	1028	1434	1434	1548	1616	1745	1790	933

TABLE 5

BREAKING LOAD AND MASS FOR 6 X 36 (14/7&7/7/1) & 6 X 41 (16/8&8/8/1) CONSTRUCTION



Nom Dia	Approximate Mass		Minimum Breaking Load Corresponding to Tensile Designation of Wires of					
			1570		1770		1960	
	FC	SC	FC	SC	FC	SC	FC	SC
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
9	30.8	33.9	42	45	47	51	52	57
10	38	41.8	52	56	58	63	65	70
11	46	50.8	64	68	71	76	78	85
12	54.7	60.2	75	81	84	92	93	100
13	64.3	70.7	88	97	99	106	109	118
14	74.5	82	102	112	114	124	127	137
16	97.3	107	133	143	149	161	166	178
18	123	135	168	181	189	204	210	226
19	137	151	187	202	211	228	233	252
20	152	167	207	224	234	252	259	279
22	184	202	251	271	283	305	313	338
24	219	241	298	322	336	363	372	402
26	257	283	350	378	395	426	437	472
28	298	328	406	439	458	494	507	547
32	389	428	530	573	598	616	662	715
36	493	542	671	725	757	817	840	905
40	608	669	829	895	934	1009	1035	1117
44	736	810	1003	1083	1131	1221	1252	1352
48	876	964	1193	1289	1345	1453	1490	1609
52	1028	1131	1401	1513	1578	1705	1748	1888

TABLE 6

BREAKING LOAD AND MASS FOR 8X19(9/9/1) CONSTRUCTION

Nom Dia	Approximate Mass		Minimum Breaking Load Corresponding to Tensile Designation of Wires of					
			1570		1770		1960	
	FC	SC	FC	SC	FC	SC	FC	SC
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
8	22.3		23		26		29	
9	28.2		29		33		37	
10	34.8		35		41		45	
11	42.2		43		49		55	
12	50.2		51		59		65	
13	58.9		60		69		76	
14	68.3		69		80		88	
16	89.2		90		104		115	
18	113		114		132		146	
19	126		127		147		163	
20	139		141		163		180	

NOTE

- FC - Fiber Core, SC - Steel Core
- To obtain calculated aggregate breaking load, multiply the figures given in col.4,6 and 8 by 1 163 and those in col.5,7 and 9 by 1 191
- Table 1-5: The following nominal diameters(in mm) are non-preferred: 15,17,21,23,25,27,29,30,31,33, 34, 35,37,39, 41 42, 43,45, 46, 47,49,50,51
- Table 6: The following nominal diameters (in mm) are non-preferred:19
- Equal lay is preferred to Cross lay for ropes above26mm diameter.

WIRE ROPES

Sizes	3 mm to 100 mm
Constructions	5X5,5X7 6X7,6X12,6X15,6X19,6X21, 6X24,6X25,6X29,6X36, 6X37,6X41 7X7,7X19,7X37 8X19,8X25,8X31,8X36,8X41 Multi-ropes 18 X 19,19 X 19,18/7 & 34/7
Cores	Metallic - IWRC, WSC Fibre - Jute, Manila, Sisal or Polypropylene
Finish	Black, Galvanized - Types A, AB, B
Tensile Grades	1230,1420,1570,1770,1960 N/mm^2

SLINGS

Slings can be custom-made to any requirement using ropes of any construction and length. Slings upto 38mm can be mechanically spliced and hand spliced upto 52mm.

Name your toughest requirement in wire rope! Our full-fledged Quality Control Department works closely with the Production Department to deliver the quality rope you need by assuring quality right from the selection of raw material to monitoring and controlling of all process parameters at each stage. Rigorous testing from simple tensile and torsion tests to salt-spray and other metallo-graphic tests ar carried out on the wire as good wire make good ropes. Samples are drawn from production lines to check strands for formation and pitch, which ensures a quality end product. A well equipped testing laboratory including a 100 ton wire rope break-load testing machine and a 100 ton proof load testing machine is in place to ensure you get only the best.

Give us a deadline. We can produce your orders quickly and economically, delivering to your doorstep at the time you set thanks in part to our central location in West-India.

As proof of our commitment to this industry is our efforts at continuous upgradation of our technology at Pune M.S. India. Covering 5 acres of land, it consolidates all our wire and wire rope products under one roof, streamlining the way your orders are produced, processed, packagedand shipped. Our sister concern Prabhu Lifiting Equipments produces wires of the finest grades and qualities supplying all the leading Original Equipment Manufacturers in the country.

Further the ropes can be produced to conform to various standards:

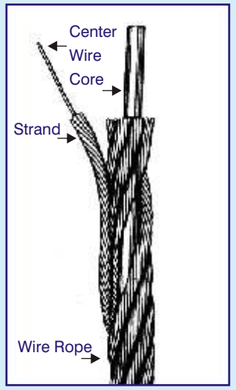
Indian Standard	IS
Dock Workers (Safety, Health & Welfare) Regulations	DWR
Mercantile Marine Department	MMD
American Petroleum Institute	API
American Society of Testing Materials	ASTM
British Standard Specification	BSS
Deutsche Industries Norm	DIN
Japanese Industrial Standard	JIS
Rules of American Bureau of Shipping	AB Rule
Rules of Bereau Veritas of Shipping	BV Rule
Russian Standard	GOST
Rules of Lloyd's Register of Shipping	Lloyd's Rule
International Standard Organization	ISO

KNOW YOUR WIRE ROPES

Wire Rope is a Machine

A wire rope is a machine, by dictionary definition : "An assemblage of parts..that transmit force, motion, and energy one to another in some predetermined manner and to some desired end."

A typical wire rope may contain hundreds of individual wires which are formed and fabricated to operate at close bearing tolerances one to another. When a wire rope bends, each of its many wires slides and adjusts in the bend to accomodate the difference in length between the inside and the outside bend. The sharper the bend, the greater the movement.



Every wire rope has three basic components :

(1) The wires which form the strands and collectively provide rope strength;

(2) The strands, which are helically around the core; and

(3) The core, which forms a foundation for the strands.

MEASURING DIAMETER OF WIRE ROPE

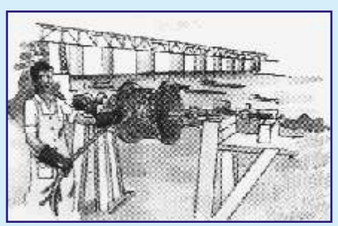
CORRECT INCORRECT

UNREELING AND UNCOILING WIRE ROPES

UNREELING : During the installation, the rope should be mounted on a reel if in coil form. The reel should be mounted on a horizontal shaft so that it is free to turn. One method is to put a shaft through the centre of the reel and jack it up so that the reel will revolve freely. The rope is pulled straight ahead keeping it tight to prevent it from loosening up on the reel. A board held against one flange may be used as a brake to keep the reel from revolving too fast.

The other method is to fix the reel on shaft and mount the shaft on bearing so that reel with shafting will revolve. In this method, a brake can be fixed on the shaft by the reel to see that the rope is tight during the installation.

UNCOILING : To Uncoil the newly received rope, it is placed on the turnable and the upright bars positioned to suit, The ties of the coil are now cut and the rope taken off the coil by walking away with the outer end of the rope while allowing the turnable to revolve.



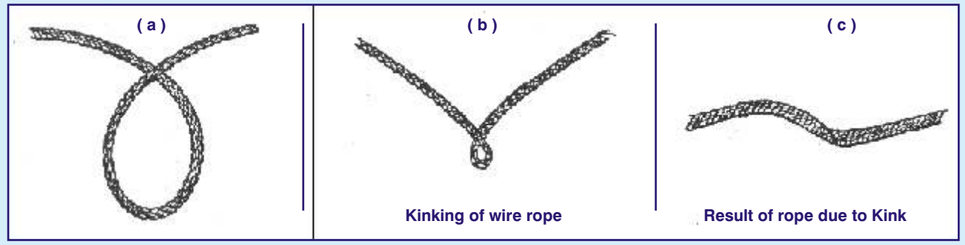
CORRECT WAY OF UNREELING

INCORRECT WAY OF UNREELING

KINKING

Kinking of wire rope can be avoided if ropes are properly handled and installed. Kinking is caused by the rope taking a spiral shape as a result of unnatural twist in the rope. One of the most common causes for this twist is improper unreeling and uncoiling.

Kinking may also occur in a rope in use if slack rope is allowed and is pulled before carefully coiling up the slack.



Kinking of wire rope — Result of rope due to Kink

PREPARING THE WIRE ROPE FOR USE

STORAGE OF THE WIRE ROPES

Wire rope is a steel product and as such is subject to rust and corrosion. Therefore, all precautions should be taken in storing both new and used ropes to ensure that the deterioration is minimum. The rope should be stored under cover, protected from rain and moisture. Used wire rope should be kept coiled up, lubricated and kept free of twists and kinks.

ECONOMICAL LENGTHS OF ROPES : Highly important is the economical length of the wire rope to be cut off the reel or coil. It should neither be very short as nothing will be left for cutoffs at the drum end to permit shifting the rope, nor should it be too long as the excess length will pile up in the multiple layers on the drum which cuts down service materially.

CUTTING A WIRE ROPE : A wire rope can be cut at a desired point by any suitable method which does not disturb the wires. Special care has to be taken in the case of percussive or shearing methods to ensure that the seizing or the rope lay is not disturbed. Oxy-acetylene cutting should not be employed as it is likely to affect the wire and lubrication.

SEIZING : A seizing is a wrapping of wire laid around a rope to prevent it wires from 'kinking' or moving to slacken themselves when the rope is cut between two adjacent seizing. Before cutting a wire rope, seizing should be placed on each side of the place where the rope is to be cut to prevent unlaying of the strands. The length of the seizing and the diameters of the wires used for seizing depends on the rope diameter.

WIRE ROPE INSPECTION

An inspection should include verification that none of these removal criteria are met by checking for such things as :

♦Surface wear, normal and unusual ♦Broken wires : Number and location ♦ Reduction in diameter ♦Rope stretch (elongation)
♦Integrity of attachments ♦Evidence of abuse or contact with other objects ♦ Heat damage ♦Corrosion

IMFORMATION TO BE GIVEN WITH THE ENQUIRY OR ORDER

The following particulars should be given with the enquiry or order:

a) Lengths and exact points between which the measurement is made (in the case of rope with terminal fittings);
b) Diameter;
c) Construction of rope;
d) The type of galvanizing required;
e) Preformed or Non-Preformed;
f) Tensile strength of wire;
g) Breaking Strength of rope;
h) Whether ordinary lay or Lang's lay, right-hand or left-hand;
j) Particulars of ends and fittings, whether spliced, socketed or plain, with dimensioned sketched if limiting conditions apply;
k) Particulars of inspection and tests required;
m) Whether to be delivered on reels or in coils; and
n) No. of Indian Standard