



# Parameter Sample Book

Cableways and Bridge wire rope



[www.gsrgroup.cn](http://www.gsrgroup.cn)

## Company overview

GSR is a leading company specializing in research, production, processing, sales, and import-export operations of wire ropes, wires, strands, and related products, equipment, materials, and technologies. The main products include wire ropes, bridge cables, commercial wires, wire rope accessories, and prestressed steel strands. The annual production capacity reaches 600,000 tons. The company excels in producing high-strength, high-toughness, extract, extra-long, special-structure, and special-purpose wire rope products. Therefore, GSR has become a technologically strong, high-capacity and market-leading Chinese industry leader.

For over 50 years, GSR has remained committed to the steel wire rope industry and has taken the initiative to lead its development, assuming both responsibility and mission. The company boasts inherent strengths that include production of various structural steel wire ropes, ranging in diameter 1.0mm to 264mm (reaching 200mm for zinc-aluminum alloy sealed steel wire ropes), as well as PC steel strands ranging in diameter from 5.0mm to 28.6mm, various purpose wires ranging in diameter from 0.15mm to 9.0mm, and deep-processed products such as pretensioned, coated, and rigged steel wire ropes that display high-strength, high-toughness, exceptional thickness, length, and unique structures for special purposes. The "Julong" brand wire ropes produced by GSR are widely used in an array of industries and fields, such as aerospace, national defense construction, building structures, bridge engineering, cable car transport, high-speed elevators, marine engineering, water conservancy engineering, ports, machinery, steel smelting, mining, petroleum drilling and more.

GSR has research platforms such as China National Enterprise Technology Center, China National Torch Program Key High tech Enterprise, High Performance Special Cable Manufacturing Technology and Application National and Local Joint Engineering Research Center, and has undertaken and completed multiple key technological innovation projects in China. The company have independently developed a series of high-tech products, including fully sealed steel wire ropes coated with zinc aluminum rare earth alloy, 264mm large-diameter marine engineering steel wire ropes, large-span bridge steel wire ropes, large electric shovel steel wire ropes, SPC manned steel wire ropes, etc. The technical indicators of these products are higher than the industry technical standards and have reached the international leading level.

The various types of steel wire ropes developed and produced by GSR are widely used in various industries and fields. A large number of difficult and high-tech steel wire rope products have been successfully used in the Gezhouba Water Conservancy Hub Project, Three Gorges Power Station, Shenzhen Yantian Port, Tianjin Port, Guangdong Humen Bridge, Guizhou Baling River Bridge, Beipanjiang Bridge, Hunan Aizhai Bridge, Hong Kong Zhuhai Macao Bridge, Zhenhua 30, the world's largest salvage crane ship, Heidaigou large open-pit coal mine, Kongtong Mountain tourist cableway, Tongren Olympic Sports Center,

Liaoning aircraft carrier Major projects and super projects such as China's "Heavenly Eye" and "Shenzhou" manned spacecraft No. 8, 9, 10, and 11. The company's products are also exported to more than 40 countries and regions in Europe, America, Asia, Africa, Oceania, etc., and have been successfully used in projects such as the Harrogate Bridge in Norway, Maputo Bridge in Mozambique, Heima Coal Mine in Türkiye, Chambishi Mine in Central Africa, Zambia, and Singapore Container Terminal, which are highly recognized in the international market.

GSR has consistently prioritized the strengthening of its technological innovation system and the conversion of its achievements, this makes the company a leader in the industry, and from being an enforcer of rules to a rule-maker. GSR has taken lead and participated in the revision of over 40 international standards, national standards in China, military, and industry standards. In June 2017, the company led the revision of ISO 2408:2017 "Wire ropes - Requirements," an international standard that was published and distributed.

GSR places great importance on the creation, utilization, and protection of intellectual property rights. The company has filed 303 patent technology achievements, which have been accepted by the Chinese National Intellectual Property Administration. Furthermore, GSR has been granted 135 patents.

GSR has obtained ISO 9001 quality management system, ISO 14001 environmental management system, GB/T 01 occupational health and safety management system, ISO 10012 measurement management system, GJB 9001B national military standard quality management system, American Petroleum Institute (API) certification, as well as recognition, certification, and approval from ship classification societies such as CCS, LR, DNV.GL, BV, ABS, KR, among others.

The number of recognitions, certifications, and approvals received by GSR ranks top in the industry. GSR's "Julong" brand wire ropes have been rated as user products for 20 consecutive years. The company is recognized as a AAAA-level "Standardized Good Behavior Enterprise" at the level, a key high-tech enterprise in China's Torch Plan, a demonstration enterprise for China's technological innovation, a Chinese intellectual property advantage enterprise, and a demonstration enterprise for nurturing Chinese industrial brands. The company was awarded the "China Quality Nomination Award" in 2016, and its wire rope products were included in the list of "China Manufacturing Single Item Champion Demonstration Enterprises" in 2017.

## Directory

- Characteristics of steel wire rope-----1
- Sealed wire ropes for venues and ropeways-----6
- Sealed wire rope for other applications-----11
- Wire contact wire rope-----14
- Point contact wire rope-----22
- Compacted strand wire rope-----27
- Coarse diameter wire rope-----29
- Single strand wire rope-----30
- Precautions for the use of wire rope-----33

## Characteristics of steel wire rope

### Construction of steel wire rope

Wire rope is made of several strands and a rope core (metal core, fiber core or other rope core), and the strand is made of several steel rods and a core (central steel wire or fiber core).

### Rope core

Rope core is divided into fiber core and steel core fiber core.

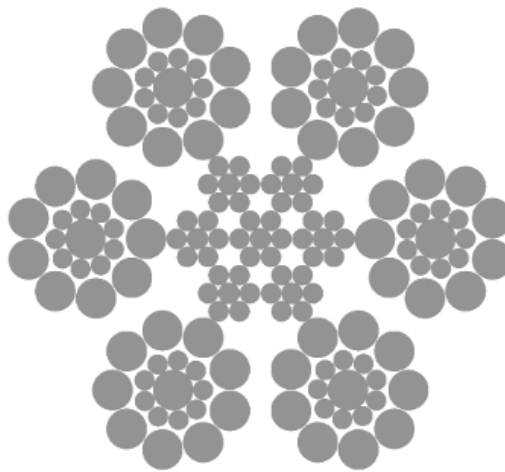
Fiber core steel rope is soft and has good bending performance. When the steel rope is subjected to collision and impact loads during work, the fiber core can play a buffering role. Fiber core is divided into natural fiber core and synthetic fiber core. Natural fiber core has more oil storage, so that the steel rope has enough lubrication internally during work and prevents corrosion of steel wire; synthetic fiber core (such as polypropylene, polyethylene) has good toughness, water absorption, acid resistance, alkali resistance, corrosion resistance, extrusion resistance and wear resistance, etc., and the steel rope is not easy to deform under dynamic load and has a stable diameter.

### Steel core

Steel core is divided into independent steel wire core (IWRC) and steel wire core (WSC). Metal and steel core steel rope has large breaking pull force, extrusion resistance and high temperature resistance, and is not easy to deform under dynamic load and has a stable diameter.

### linear contact lay wire rope

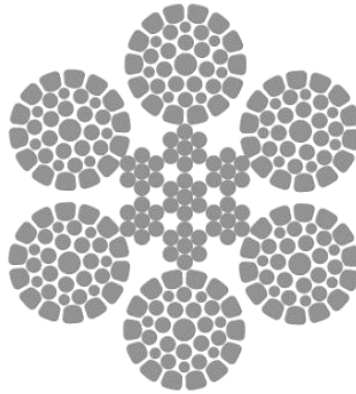
Linear contact lay wire rope the twist length of all steel wires in the rope is the same, and each layer of steel wire is placed on the groove formed between the inner layer of steel wires. The steel wires are in line contact, and the structure of the rope is close. Therefore, the line contact steel wire rope has a large breaking pull force, no secondary bending stress between the layers of steel wires when used, and good fatigue resistance.



6×19S-IWRC

### Compacted steel wire rope

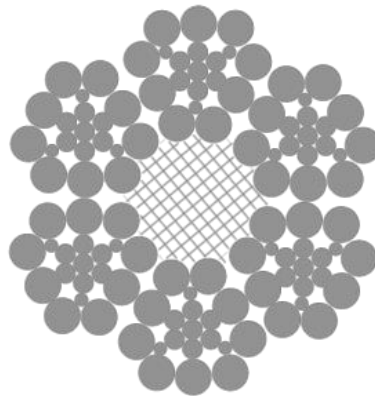
The steel wires in the rope are in surface contact, and the metal filling coefficient of the steel wire rope is large, and the structure of the rope is close. When the steel wire rope is used, the contact stress between the steel wires is small, there is no secondary bending stress, and the contact area between the steel wire rope and the wheel groove is large. Therefore, the compacted steel wire rope has good wear resistance, fatigue resistance and extrusion resistance, and is not easy to deform.



6×K36WS-IWRC

### Special-shaped steel wire rope

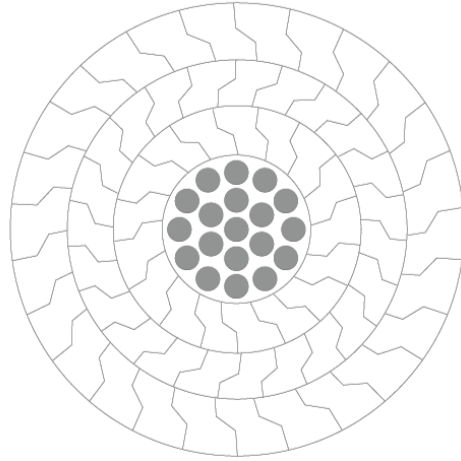
The section of the steel wire rope is not round, which is usually called special-shaped steel wire rope. The main types are triangular and fan-shaped steel wire ropes. The supporting surface of the special-shaped steel wire rope is 3-4 times larger than that of the round steel wire rope, that is, the contact area with the wheel groove is large, the contact stress is small, and the service life is 2-3 times higher than that of the round steel wire rope. The contact points between the rope and the rope of the triangular steel wire rope are increased, and the compression resistance and fatigue resistance are good. The metal effective section area of the special-shaped steel wire rope is large, and the breaking pull force of the whole rope is increased by 25% compared with that of the round steel wire rope at the same diameter and strength.



6×V19-FC

### Locked coil wire rope

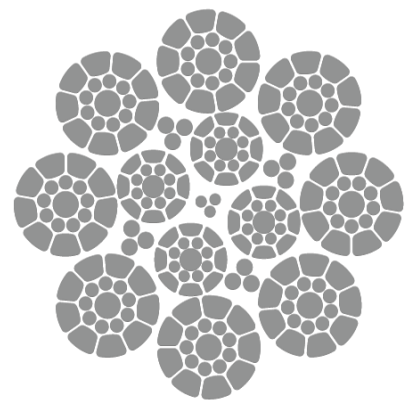
Sealed steel wire rope Sealed steel wire rope layers of special steel wire outside the core are tightly sewn together to form a smooth closed surface, the core and adjacent layers of special steel wire twist to the opposite, so the sealed steel wire rope has the advantages of large metal filling coefficient and breaking pull, good wear resistance, long service life, no rotation, small structural elongation.



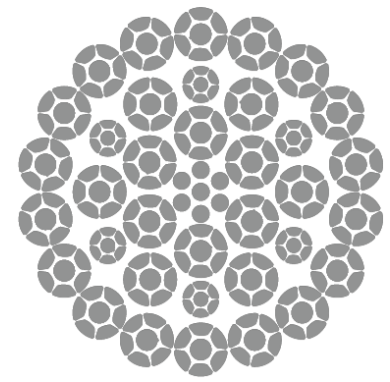
Three layers of Z-wire rope

### Resistance rotation steel wire rope

6 or 8 strands of steel wire rope for rotation of steel wire rope, when the steel wire rope is used for single or high lift lifting steel wire rope twist because of rotation, not only affect the service life of the steel wire rope, but also affect the lifting efficiency and safety of operators. By changing the structure and twist method of the steel wire rope can eliminate the rotation of the steel wire rope. The current use of micro-rotation and resistance rotation steel wire rope is multi-strand, three-strand, four-strand round or fan-shaped strand steel wire rope.



8×K19S-PWRC (Slight spin)



35(W)×K7(Stop rotation)

### Metal core coated steel wire rope

Plastic polymer coated on the surface of the metal core and between the strands of the steel wire rope, reduce the wear between the strands and the inner and outer layers of the rope, thus improving the wear resistance, fatigue resistance, impact resistance and extrusion resistance of the steel wire rope. Prolong the service life of the steel wire rope.

### Galvanized aluminum (zinc) steel wire rope

Galvanized aluminum (zinc) steel wire rope is made of electro galvanized or hot galvanized aluminum (zinc) steel wire twisted. Zinc or zinc aluminum alloy layer in the corrosive environment (such as seawater, marine atmosphere corrosion, hydrogen sulfide, sulfur dioxide atmosphere corrosion, etc.) to protect the steel wire, improve the service life of the wire rope.

### Lubrication of steel wire rope

Lubricating oil can prevent steel wire rust, make the lubrication between the steel wire, steel wire rope and pulley components reduce friction. If the user has no special requirements, we in the production of the rope core and the surface of the steel wire rope are coated with lubricating oil, and for important uses and more serious corrosion places with steel wire rope using the stock spray high drop point lubricating oil; friction improvement with steel wire rope coated with grease.

### Twisting of steel wire rope

Interactive twist: the twisting direction of the steel wire in the outer layers is opposite to the twisting direction of the outer layers in the steel wire rope. As shown in the figure below.



Right interactive twist (sZ)



Left interactive twist (zS)

Concurrent twist: the twisting direction of the steel wire in the outer layers is the same as the twisting direction of the outer layers in the steel wire rope. As shown in the figure below.



right-hand lang-lay (zZ)



left-hand lang-lay (sS)



### **Number of outer steel wires**

For the same diameter of the steel wire rope, the selection of the outer steel wire number of the steel wire rope can improve the wear resistance of the steel wire rope, and the selection of the outer steel wire number of the steel wire rope has the advantages of soft, fatigue resistance.

### **Approximate calculation of the diameter of the outermost layer of the wire rope**

Six-strand steel wire rope:  $d = D / (N + 3.5)$

Eight-strand steel wire rope:  $d = D / (N + 6.5)$

Where:

d: outer steel wire diameter, in mm.

D: nominal diameter of steel wire rope, in mm.

N: number of outer steel wires of steel wire rope.

### **Calculation formula for reference weight of steel wire rope**

Calculation formula for reference weight of steel wire rope:  $M = KD^2$

Where:

M: reference weight of steel wire rope per unit length, in kg/100m.

D: nominal diameter of steel wire rope, in mm.

K: weight coefficient of a certain type of oil-coated steel wire rope per unit length, in kg/100m\*mm<sup>2</sup>, the value of K is shown in the table below.

### **Calculation formula for minimum breaking tension of steel wire rope**

Calculation formula for minimum breaking tension of steel wire rope:

$$F = K * D^2 * R / 1000$$

Where:

F--minimum breaking tension of steel wire rope, in KN.

D--nominal diameter of steel wire rope, in mm.

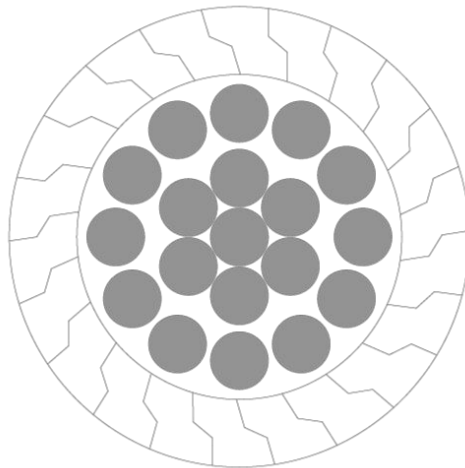
R--nominal tensile strength of steel wire rope, in MPa.

K'--minimum breaking tension coefficient of a certain type of steel wire rope, the value of K' is shown in the table below.

### **Structural elongation of wire rope**

The elongation of wire rope consists of elastic elongation and structural elongation, structural elongation is permanent elongation. Some applications (such as permanent suspension load-bearing structures, reciprocating load-bearing ropes, and other lengths of lifting ropes, etc.) require that the wire rope must be eliminated from the structure of the elongation of the pre-tensioning is to eliminate the effective means of the elongation of the Construction of wire rope. Our company can provide users with this service.

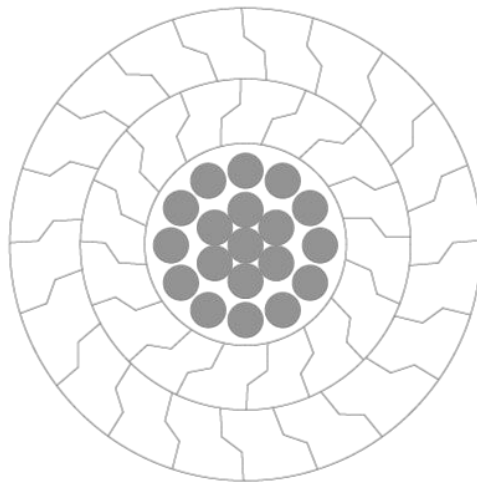
### Sealed wire ropes for venues and ropeways



One layer of Z-wire sealing rope

Nominal diameter of wire rope mm	Approximate nominal length weight kg/100m	Nominal metal cross-sectional area mm <sup>2</sup>	Minimum breaking tension kN		
			1570 level	1670 level	1770 level
20	226	254	367	391	414
22	273	307	445	473	501
24	325	366	529	563	596
26	382	429	621	660	700
28	443	498	720	766	812
30	509	572	827	879	932
32	579	650	940	1000	1060
34	653	734	1060	1130	1200
36	732	823	1190	1270	1340
38	816	917	1330	1410	1500
40	904	1020	1470	1560	1660

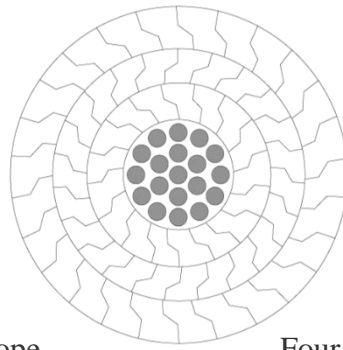
### Sealed wire ropes for venues and ropeways



Two-ply Z-wire sealing rope

Nominal diameter of wire rope mm	Approximate nominal length weight kg/100m	Nominal metal cross-sectional area mm <sup>2</sup>	Minimum breaking tension kN		
			1570 level	1670 level	1770 level
25	359	409	597	635	673
26	389	443	645	686	727
28	451	514	748	796	844
30	518	590	859	914	969
32	589	671	977	1040	1102
34	665	757	1103	1174	1244
36	745	849	1237	1316	1395
38	830	946	1378	1466	1554
40	920	1048	1527	1625	1722
42	1010	1155	1684	1791	1898
44	1110	1268	1848	1966	2083
46	1220	1386	2020	2149	2277
48	1320	1509	2199	2339	2479
50	1440	1638	2386	2538	2690
52	1550	1771	2581	2746	2910
54	1680	1910	2783	2961	3138
56	1800	2054	2994	3184	3375
58	1930	2203	3211	3416	3620
60	2070	2358	3436	3655	3874

### Sealed wire ropes for venues and ropeways



Triple Z-wire sealing rope

Four-ply Z-wire sealing rope

Nominal diameter of wire rope	Approximate nominal length weight	Nominal metal cross-sectional area	Minimum breaking tension kN		
			1570 level	1670 level	1770 level
mm	kg/100m	mm <sup>2</sup>			
40	976	1096	1583	1683	1784
42	1076	1208	1745	1856	1967
44	1181	1326	1915	2037	2159
46	1291	1449	2093	2226	2360
48	1405	1578	2279	2424	2569
50	1525	1713	2473	2630	2788
52	1649	1852	2675	2845	3015
54	1779	1997	2884	3068	3252
56	1913	2148	3102	3299	3497
58	2052	2304	3327	3539	3751
60	2196	2466	3561	3788	4014
62	2345	2633	3802	4044	4286
64	2499	2806	4051	4309	4567
66	2657	2984	4309	4583	4857
68	2821	3167	4574	4865	5156
70	2989	3357	4847	5155	5464
72	3162	3551	5127	5454	5781
74	3340	3751	5416	5761	6106
76	3523	3957	5713	6077	6441
78	3711	4168	6018	6401	6784
80	3904	4384	6330	6733	7137
82	4102	4606	6651	7074	7498
84	4304	4833	6979	7424	7868
86	4512	5066	7315	7781	8247
88	4724	5305	7660	8147	8635
90	4941	5549	8012	8522	9032

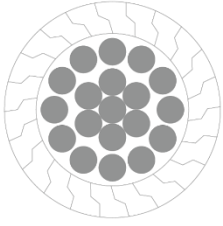
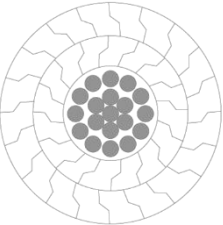
### Sealed wire ropes for venues and ropeways

Nominal diameter of wire rope	Approximate nominal length weight	Nominal metal cross-sectional area	Minimum breaking tension kN		
			1570 level	1670 level	1770 level
mm	kg/100m	mm <sup>2</sup>			
92	5163	5798	8372	8905	9438
94	5390	6053	8740	9296	9853
96	5622	6313	9116	9696	10277
98	5858	6579	9499	10104	10709
100	6100	6850	9891	10521	11151
102	6419	7189	10405	11068	11730
104	6673	7474	10817	11506	12195
106	6933	7764	11237	11953	12668
108	7197	8060	11665	12408	13151
110	7466	8361	12101	12872	13643
112	7740	8668	12545	13344	14143
114	8019	8980	12997	13825	14653
116	8302	9298	13457	14314	15172
118	8591	9621	13925	14812	15699
120	8885	9950	14401	15319	16236
122	9183	10285	14885	15833	--
124	9487	10625	15377	16357	--
126	9795	10970	15877	16889	--
128	10109	11321	16385	17429	--
130	10427	11678	16902	17978	--
132	10751	12040	17426	18535	--
134	11079	12408	17958	19101	--
136	11412	12781	18498	19676	--
138	11750	13159	19046	20259	--
140	12093	13544	19602	20850	--
142	12441	13933	20166	21450	--
144	12794	14329	20738	22059	--
146	13152	14729	21318	22676	--
148	13515	15136	21906	23301	--
150	13883	15548	22502	23935	--
152	14255	15965	23106	24578	--
154	14633	16388	23718	25229	--
156	15015	16816	24338	25888	--
158	15403	17250	24966	26556	--
160	15795	17690	25602	27233	--

### Sealed wire ropes for venues and ropeways

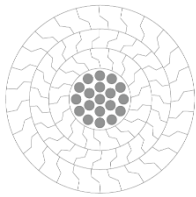
Nominal diameter of wire rope	Approximate nominal length weight	Nominal metal cross-sectional area	Minimum breaking tension kN		
			1570 level	1670 level	1770 level
162	16193	18135	26246	27918	--
164	16595	18585	26898	28612	--
166	17002	19041	27558	29314	--
168	17414	19503	28227	30024	--
170	17831	19970	28903	30744	--
172	18253	20443	29587	31471	--
174	18680	20921	30279	32207	--
176	19112	21404	30979	32952	--
178	19549	21894	31687	33705	--
180	19991	22388	32403	34467	--
182	20438	22889	33127	35237	--
184	20889	23394	33859	36016	--
186	21346	23906	34599	36803	--
188	21807	24423	35347	37599	--
190	22274	24945	36103	38403	--
192	22745	25473	36867	39216	--
194	23221	26006	37639	40037	--
196	23703	26545	38419	40867	--
198	24189	27090	39208	41705	--
200	24680	27640	40004	42552	--

### Sealed wire rope for other applications

	Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope MPa				
			1180	1270	1370	1470	1570
			Minimum wire breaking tension				
 <p>One layer of Z-wire</p>	16	144	175	188	203	218	232
	18	182	221	238	257	275	294
	20	224	273	294	317	340	363
	22	272	330	355	383	411	439
	24	323	393	423	456	489	523
	26	379	461	496	535	574	613
	28	440	535	576	621	666	711
	30	505	614	661	713	765	817
	32	574	698	752	811	870	929
	34	649	788	849	915	982	1049
	36	727	884	951	1026	1101	1176
	38	810	985	1060	1143	1227	1310
	40	898	1091	1174	1267	1359	1452
42	990	1203	1295	1397	1499	1601	
 <p>Two-layer Z-wire</p>	24	328	404	435	470	504	538
	26	385	475	511	551	591	631
	28	447	550	592	639	686	732
	30	513	632	680	734	787	841
	32	584	719	774	835	896	957
	34	659	812	874	942	1011	1080
	36	739	910	979	1056	1134	1211
	38	823	1014	1091	1177	1263	1349
	40	912	1123	1209	1304	1399	1495
	42	1005	1239	1333	1438	1543	1648
	44	1104	1359	1463	1578	1693	1809
	46	1206	1486	1599	1725	1851	1977
	48	1313	1618	1741	1878	2015	2152
50	1425	1755	1889	2038	2187	2335	
52	1541	1898	2043	2204	2365	2526	

Note: The sum of the minimum breaking tension of the wire rope x 0.87.

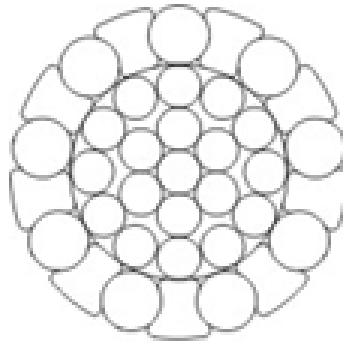
### Sealed wire rope for other applications

	Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope					MPa
			1180	1270	1370	1470	1570	
			Minimum wire breaking tension					kN
 <p>Three or more layers of Z-wire</p>	48	1382	1645	1770	1910	2049	2188	
	50	1500	1785	1921	2072	2223	2375	
	52	1622	1930	2078	2241	2405	2568	
	54	1750	2082	2241	2417	2593	2770	
	56	1882	2239	2410	2599	2789	2979	
	58	2018	2402	2585	2788	2992	3195	
	60	2160	2570	2766	2984	3202	3419	
	62	2306	2744	2954	3186	3419	3651	
	64	2458	2924	3147	3395	3643	3891	
	66	2614	3110	3347	3610	3874	4138	
	68	2774	3301	3553	3833	4112	4392	
	70	2940	3498	3765	4061	4358	4654	
	72	3110	3701	3983	4297	4610	4924	
	74	3286	3909	4207	4539	4870	5201	
	76	3466	4123	4438	4787	5137	5486	
	78	3650	4343	4675	5043	5411	5779	
80	3840	4569	4917	5305	5692	6079		

Note: The sum of the minimum breaking tension of the wire rope x 0.87.



### Sealed wire rope for other applications

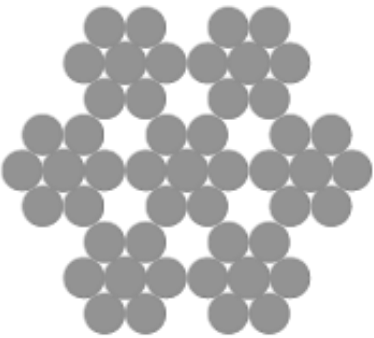


One layer of X-shaped special steel wire and round steel wire

Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope MPa				
		1180	1270	1370	1470	1570
		Minimum wire breaking tension kN				
20	224	283	305	329	353	377
22	272	343	369	398	427	456
24	323	408	439	473	508	543
26	379	479	515	556	596	637
28	440	555	597	644	691	739
30	505	637	686	740	794	848
32	571	725	780	842	903	965
34	645	818	881	950	1020	1089
36	723	918	988	1065	1143	1221
38	806	1022	1100	1187	1274	1360
40	880	1133	1219	1315	1411	1507
42	970	1166	1255	1353	1452	1551
44	1065	1279	1377	1485	1594	1702
46	1164	1398	1505	1623	1742	1860
48	1267	1522	1639	1768	1897	2026
50	1375	1652	1778	1918	2058	2198

Note: The sum of the minimum breaking tension of the wire rope x 0.88.

### Wire contact wire rope

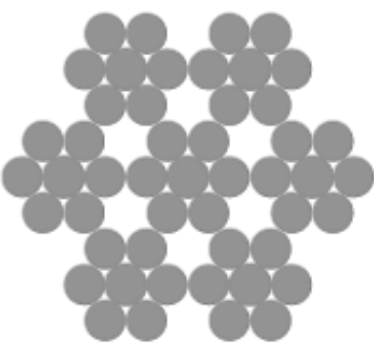
 6x7-WCS Typical structure diagram				Typic structure								Diameter range(mm)	
				Tectonic	Structure of wire rope strand				Outer wire count				
									Total	Per share			
				6x7-FC				36	6	2~48			
				6x7-WCS				36	6	2~48			

Nomin al diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1570		1670		1770		1870		1960	
				Minimum breaking force of wire rope kN									
				Natural fiber core	Synthesiz e fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core
2	1.44	1.42	1.55	2.13	2.32	2.26	2.47	2.40	2.62	2.54	2.77	2.66	2.90
3	3.23	3.19	3.49	4.79	5.23	5.10	5.56	5.40	5.89	5.71	6.23	5.98	6.53
4	5.74	5.66	6.21	8.52	9.29	9.06	9.89	9.60	10.5	10.1	11.1	10.6	11.6
5	8.98	8.85	9.70	13.3	14.5	14.2	15.4	15.0	16.4	15.8	17.3	16.6	18.1
6	12.9	12.7	14.0	19.2	20.9	20.4	22.2	21.6	23.6	22.8	24.9	23.9	26.1
7	17.6	17.3	19.0	26.1	28.5	27.7	30.3	29.4	32.1	31.1	33.9	32.6	35.5
8	23.0	22.7	24.8	34.1	37.2	36.2	39.5	38.4	41.9	40.6	44.3	42.5	46.4
9	29.1	28.7	31.4	43.1	47.1	45.9	50.0	48.6	53.0	51.3	56.0	53.8	58.7
10	35.9	35.4	38.8	53.2	58.1	56.6	61.8	60.0	65.5	63.4	69.2	66.4	72.5
11	43.4	42.8	47.0	64.4	70.3	68.5	74.8	72.6	79.2	76.7	83.7	80.4	87.7
12	51.7	51.0	55.9	76.6	83.6	81.5	89.0	86.4	94.3	91.3	99.6	95.7	104
14	70.4	69.4	76.1	104	114	111	121	118	128	124	136	130	142
16	91.9	90.6	99.4	136	149	145	158	154	168	162	177	170	186
18	116	115	126	172	188	183	200	194	212	205	224	215	235
20	144	142	155	213	232	226	247	240	262	254	277	266	290

Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.134(fiber core) or 1.190(steel core).

### Wire contact wire rope

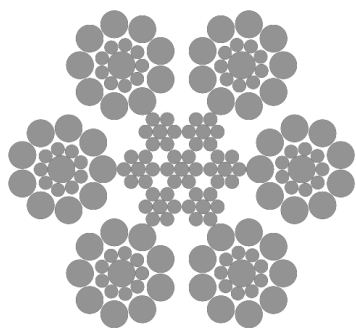
 6x7-WCS Typical structure diagram				Typic structure								Diameter range(mm)	
				Tectonic	Structure of wire rope strand				Outer wire count				
									Total	Per share			
				6x7-FC	1-6				36	6	2~48		
				6x7-WCS	1-6				36	6	2~48		

Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1570		1670		1770		1870		1960	
	Minimum breaking force of wire rope kN												
	Natural fiber core	Synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
22	174	171	188	258	281	274	299	290	317	307	335	322	351
24	207	204	224	307	335	326	356	346	377	365	399	383	418
26	243	239	262	360	393	383	418	406	443	429	468	449	490
28	281	278	304	417	455	444	484	470	513	497	542	521	569
30	323	319	349	479	523	510	556	540	589	571	623	598	653
32	368	362	398	545	595	580	633	614	671	649	709	680	743
34	415	409	449	615	672	654	714	694	757	733	800	768	838
36	465	459	503	690	753	734	801	778	849	822	897	861	940
38	518	511	561	769	839	817	892	866	946	915	999	959	1047
40	574	566	621	852	929	906	989	960	1048	1014	1107	1063	1160
42	633	624	685	939	1025	999	1090	1058	1155	1118	1221	1172	1279
44	695	685	752	1030	1125	1096	1196	1162	1268	1227	1340	1286	1404
46	760	749	821	1126	1229	1198	1307	1270	1386	1341	1464	1406	1535
48	827	816	894	1226	1338	1304	1424	1382	1509	1461	1594	1531	1671

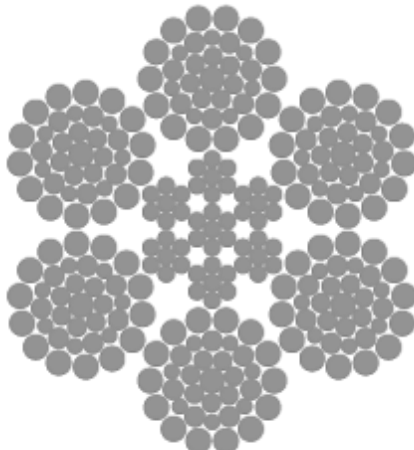
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.134(fiber core) or 1.190(steel core).

### Wire contact wire rope

 6×19S-IWRC Typical structure diagram				Typic structure								Diameter range(mm)	
				Tectonic	Structure of wire rope strand				Outer wire count				
									Total	Per share			
				6×19S-FC	1-9-9				54	9	6~40		
6×19S-IWRC	1-9-9				54	9	6~40						
6×19W-FC	1-6-6+6				72	12							
6×19W-IWRC	1-6-6+6				72	12							
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1570		1670		1770		1870		1960	
	Minimum breaking force of wire rope kN												
	natural fiber core	synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
6	13.5	13.4	15.0	19.0	20.7	20.3	22.1	21.5	23.4	22.7	24.7	23.8	25.9
7	18.4	18.2	20.4	25.9	28.2	27.6	30.0	29.2	31.8	30.9	33.6	32.4	35.2
8	24.0	23.7	26.7	33.9	36.9	36.0	39.2	38.2	41.6	40.3	43.9	42.3	46.0
9	30.4	30.1	33.8	42.9	46.7	45.6	49.6	48.3	52.6	51.0	55.6	53.5	58.3
10	37.5	37.1	41.7	52.9	57.6	56.3	61.3	59.6	65.0	63.0	68.6	66.1	71.9
11	45.4	44.9	50.5	64.0	69.7	68.1	74.2	72.2	78.6	76.3	83.0	79.9	87.0
12	54.0	53.4	60.0	76.2	83.0	81.0	88.3	85.9	93.5	90.7	98.8	95.1	104
13	63.4	62.7	70.5	89.4	97.4	95.1	104	101	110	107	116	112	122
14	73.5	72.7	81.7	104	113	110	120	117	127	124	135	129	141
16	96.0	95.0	107	135	148	144	157	153	166	161	176	169	184
18	122	120	135	171	187	182	199	193	210	204	222	214	233
20	150	148	167	212	230	225	245	239	260	252	275	264	288
22	182	180	202	256	279	272	297	289	314	305	332	320	348
24	216	214	240	305	332	324	353	344	374	363	395	380	414
26	254	251	282	358	390	380	414	403	439	426	464	447	486
28	294	291	327	415	452	441	481	468	509	494	538	518	564
30	338	334	375	476	519	507	552	537	585	567	618	594	647
32	384	380	427	542	590	576	628	611	665	645	703	676	737
34	434	429	482	612	666	651	709	690	751	728	793	764	832
36	486	481	540	686	747	729	794	773	842	817	889	856	932
38	542	536	602	764	832	813	885	861	938	910	991	954	1039
40	600	594	667	847	922	900	981	954	1039	1008	1098	1057	1151

Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.190(fiber core) or 1.270(steel core).

### Wire contact wire rope

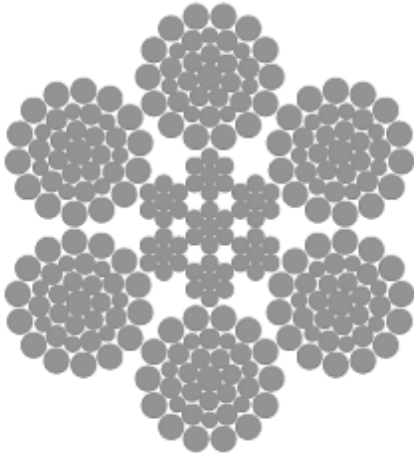
 6×36WS-IWRC Typical structure diagram				Typic structure								Diameter range(mm)	
				Tectonic	Structure of wire rope strand	Outer wire count							
						Total	Per share						
6×25Fi	1-6-6F-12	72	12	8~52									
6×26WS	1-5-5+5-10	60	10	8~52									
6×29Fi	1-7-7F-14	84	14	8~58									
6×31WS	1-6-6+6-12	72	12	8~58									
6×36WS	1-7-7+7-14	84	14	8~60									
6×37S	1-6-15-15	90	15	8~60									
6×41WS	1-8-8+8-16	96	16	36~60									
6×46WS	1-9-9+9-18	108	18	40~60									
6×49SWS	1-8-8-8+8-16	96	16	40~60									
6×55SWS	1-9-9-9+9-18	108	18	44~60									

Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1670		1770		1870		1960		2160	
	natural fiber core	synthetic fiber core	steel core	Minimum breaking force of wire rope kN									
				fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
8	24.9	24.4	27.6	36.0	39.2	38.2	41.6	40.3	43.9	42.3	46.0	46.6	50.7
10	38.9	38.2	43.1	56.3	61.3	59.6	65.0	63.0	68.6	66.1	71.9	72.8	79.3
12	56.0	55.0	62.1	81.0	88.3	85.9	93.5	90.7	98.8	95.1	104	105	114
13	65.7	64.6	72.8	95.1	104	101	110	107	116	112	122	123	134
14	76.2	74.9	84.5	110	120	117	127	124	135	129	141	143	155
16	99.6	97.8	110	144	157	153	166	161	176	169	184	186	203
18	126	124	140	182	199	193	210	204	222	214	233	236	257
20	156	153	172	225	245	239	260	252	275	264	288	291	317
22	188	185	209	272	297	289	314	305	332	320	348	352	384
24	224	220	248	324	353	344	374	363	395	380	414	419	457
26	263	258	291	380	414	403	439	426	464	447	486	492	536
28	305	299	338	441	481	468	509	494	538	518	564	571	621
30	350	344	388	507	552	537	585	567	618	594	647	655	713

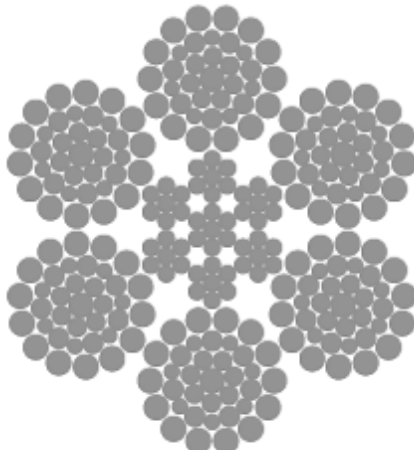
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.283(steel core).

### Wire contact wire rope

 6x36WS-IWRC Typical structure diagram				Typic structure									Diameter range(mm)		
				Tectonic	Structure of wire rope strand				Outer wire count						
									Total	Per share					
				6x25Fi	1-6-6F-12				72	12	8~52				
				6x26WS	1-5-5+5-10				60	10	8~52				
				6x29Fi	1-7-7F-14				84	14	8~58				
				6x31WS	1-6-6+6-12				72	12	8~58				
				6x36WS	1-7-7+7-14				84	14	8~60				
				6x37S	1-6-15-15				90	15	8~60				
				6x41WS	1-8-8+8-16				96	16	36~60				
				6x46WS	1-9-9+9-18				108	18	40~60				
				6x49SWS	1-8-8-8+8-16				96	16	40~60				
				6x55SWS	1-9-9-9+9-18				108	18	44~60				
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope										MPa	
				1670		1770		1870		1960		2160			
	Minimum breaking force of wire rope														kN
	natural fiber core	synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
32	398	391	441	576	628	611	665	645	703	676	737	745	812		
34	450	442	498	651	709	690	751	728	793	764	832	841	916		
36	504	495	559	729	794	773	842	817	889	856	932	943	1027		
38	562	552	622	813	885	861	938	910	991	954	1039	1051	1145		
40	622	611	690	900	981	954	1039	1008	1098	1057	1151	1165	1268		
42	686	674	760	993	1081	1052	1146	1112	1211	1165	1269	1284	1398		
44	753	740	834	1090	1187	1155	1258	1220	1329	1279	1393	1409	1535		
46	823	808	912	1191	1297	1262	1375	1333	1452	1398	1522	1540	1677		
48	896	880	993	1297	1412	1374	1497	1452	1581	1522	1657	1677	1826		
50	973	955	1078	1407	1532	1491	1624	1575	1716	1651	1798	1820	1982		
52	1052	1033	1165	1522	1657	1613	1756	1704	1856	1786	1945	1968	2144		
54	1134	1114	1257	1641	1787	1739	1894	1838	2001	1926	2098	2123	2312		
56	1220	1198	1352	1765	1922	1871	2037	1976	2152	2071	2256	2283	2486		
58	1309	1285	1450	1893	2062	2007	2185	2120	2309	2222	2420	2449	2667		
60	1400	1375	1552	2026	2206	2147	2339	2269	2471	2378	2590	2621	2854		

Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.283(steel core).

### Wire contact wire rope

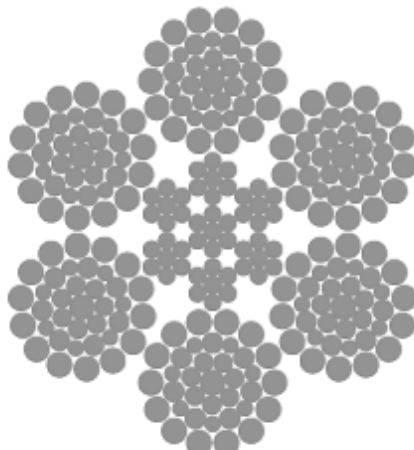
 6x36WS-IWRC Typical structure diagram				Typic structure								Diameter range(mm)	
				Tectonic	Structure of wire rope strand	Outer wire count							
						Total	Per share						
6x25Fi	1-6-6F-12	72	12	8~52									
6x26WS	1-5-5+5-10	60	10	8~52									
6x29Fi	1-7-7F-14	84	14	8~58									
6x31WS	1-6-6+6-12	72	12	8~58									
6x36WS	1-7-7+7-14	84	14	8~60									
6x37S	1-6-15-15	90	15	8~60									
6x41WS	1-8-8+8-16	96	16	36~60									
6x46WS	1-9-9+9-18	108	18	40~60									
6x49SWS	1-8-8-8+8-16	96	16	40~60									
6x55SWS	1-9-9-9+9-18	108	18	44~60									

Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1670		1770		1870		1960		2160	
	natural fiber core	synthetic fiber core	steel core	Minimum breaking force of wire rope kN									
				fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
8	24.9	24.4	27.6	36.0	39.2	38.2	41.6	40.3	43.9	42.3	46.0	46.6	50.7
10	38.9	38.2	43.1	56.3	61.3	59.6	65.0	63.0	68.6	66.1	71.9	72.8	79.3
12	56.0	55.0	62.1	81.0	88.3	85.9	93.5	90.7	98.8	95.1	104	105	114
13	65.7	64.6	72.8	95.1	104	101	110	107	116	112	122	123	134
14	76.2	74.9	84.5	110	120	117	127	124	135	129	141	143	155
16	99.6	97.8	110	144	157	153	166	161	176	169	184	186	203
18	126	124	140	182	199	193	210	204	222	214	233	236	257
20	156	153	172	225	245	239	260	252	275	264	288	291	317
22	188	185	209	272	297	289	314	305	332	320	348	352	384
24	224	220	248	324	353	344	374	363	395	380	414	419	457
26	263	258	291	380	414	403	439	426	464	447	486	492	536
28	305	299	338	441	481	468	509	494	538	518	564	571	621
30	350	344	388	507	552	537	585	567	618	594	647	655	713

Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.283(steel core).

### Wire contact wire rope

 6x36WS-IWRC Typical structure diagram				Typic structure								Diameter range(mm)	
				Tectonic	Structure of wire rope strand	Outer wire count							
						Total	Per share						
6x25Fi	1-6-6F-12	72	12	8~52									
6x26WS	1-5-5+5-10	60	10	8~52									
6x29Fi	1-7-7F-14	84	14	8~58									
6x31WS	1-6-6+6-12	72	12	8~58									
6x36WS	1-7-7+7-14	84	14	8~60									
6x37S	1-6-15-15	90	15	8~60									
6x41WS	1-8-8+8-16	96	16	36~60									
6x46WS	1-9-9+9-18	108	18	40~60									
6x49SWS	1-8-8-8+8-16	96	16	40~60									
6x55SWS	1-9-9-9+9-18	108	18	44~60									

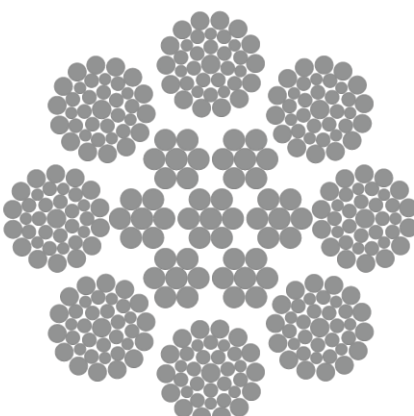
  

Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1670		1770		1870		1960		2160	
	Minimum breaking force of wire rope kN												
	natural fiber core	synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
32	398	391	441	576	628	611	665	645	703	676	737	745	812
34	450	442	498	651	709	690	751	728	793	764	832	841	916
36	504	495	559	729	794	773	842	817	889	856	932	943	1027
38	562	552	622	813	885	861	938	910	991	954	1039	1051	1145
40	622	611	690	900	981	954	1039	1008	1098	1057	1151	1165	1268
42	686	674	760	993	1081	1052	1146	1112	1211	1165	1269	1284	1398
44	753	740	834	1090	1187	1155	1258	1220	1329	1279	1393	1409	1535
46	823	808	912	1191	1297	1262	1375	1333	1452	1398	1522	1540	1677
48	896	880	993	1297	1412	1374	1497	1452	1581	1522	1657	1677	1826
50	973	955	1078	1407	1532	1491	1624	1575	1716	1651	1798	1820	1982
52	1052	1033	1165	1522	1657	1613	1756	1704	1856	1786	1945	1968	2144
54	1134	1114	1257	1641	1787	1739	1894	1838	2001	1926	2098	2123	2312
56	1220	1198	1352	1765	1922	1871	2037	1976	2152	2071	2256	2283	2486
58	1309	1285	1450	1893	2062	2007	2185	2120	2309	2222	2420	2449	2667
60	1400	1375	1552	2026	2206	2147	2339	2269	2471	2378	2590	2621	2854

Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.283(steel core).

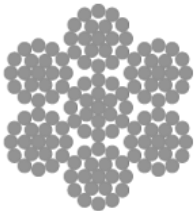


### Wire contact wire rope

 8×36WS-IWRC Typical structure diagram				Typic structure								Diamete r range (mm)				
				Tectonic	Structure of wire rope strand		Outer wire count									
							Total	Per share								
								8×25Fi	1-6-6F-12		72	12	14~52			
Nominal diameter of wire rope (mm)				Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
							1670		1770		1870		1960		2160	
							Minimum breaking force of wire rope kN									
				natural fiber core		synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	steel core
				14	71.5	69.4	87.8	97.9	117	104	124	110	130	115	137	151
				16	90.6	88.1	111	128	152	135	161	143	170	150	179	197
				18	115	111	141	162	193	171	204	181	216	190	226	249
				20	142	138	174	200	238	212	252	224	266	234	279	308
				22	171	166	211	242	288	256	305	271	322	284	338	372
24	204	198	251	288	342	305	363	322	383	338	402	443				
26	239	233	294	338	402	358	426	378	450	396	472	520				
28	278	270	341	391	466	415	494	438	522	459	547	603				
30	319	310	392	449	535	476	567	503	599	527	628	692				
32	362	352	445	511	609	542	645	573	682	600	715	787				
34	409	398	503	577	687	612	728	646	770	677	807	889				
36	459	446	564	647	770	686	817	725	863	760	904	997				
38	511	497	628	721	858	764	910	807	961	846	1008	1110				
40	566	550	696	799	951	847	1008	895	1065	938	1116	1230				
42	624	607	767	881	1049	934	1112	986	1174	1034	1231	1356				
44	685	666	842	967	1151	1025	1220	1082	1289	1135	1351	1489				
46	749	728	920	1057	1258	1120	1333	1183	1409	1240	1476	1627				
48	816	793	1002	1150	1370	1219	1452	1288	1534	1350	1608	1772				
50	885	860	1088	1248	1486	1323	1575	1398	1664	1465	1744	1922				
52	957	930	1176	1350	1608	1431	1704	1512	1800	1585	1887	2079				
54	1032	1003	1268	1456	1734	1543	1837	1630	1941	1709	2035	2242				
56	1110	1079	1364	1566	1864	1660	1976	1753	2088	1838	2188	2411				
58	1191	1157	1463	1680	2000	1780	2120	1881	2239	1971	2347	2587				
60	1274	1238	1566	1798	2140	1905	2268	2013	2397	2110	2512	2768				

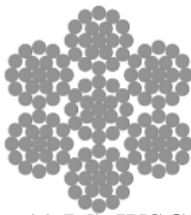
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.330(steel core).

### Point contact wire rope

 6×19(M)-WSC Typical structure diagram		Typic structure											Diameter range(mm)		
		Tectonic	Structure of wire rope strand				Outer wire count								
							Total	Per share							
		6×19(M)-FC	1-6/12				72	12						3~50	
		6×19(M)-WSC	1-6/12				72	12							
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope										MPa	
				1570	1670	1770	1870	1960							
	Minimum breaking force of wire rope										kN				
	Natural fiber core	Synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
3	3.23	3.19	3.71	4.42	4.83	4.70	5.14	4.99	5.45	5.27	5.76	5.52	6.03		
4	5.74	5.66	6.59	7.86	8.59	8.36	9.14	8.86	9.69	9.36	10.23	9.82	10.73		
5	8.98	8.85	10.3	12.3	13.4	13.1	14.3	13.9	15.1	14.6	16.0	15.3	16.8		
6	12.9	12.7	14.8	17.7	19.3	18.8	20.6	19.9	21.8	21.1	23.0	22.1	24.1		
7	17.6	17.3	20.2	24.1	26.3	25.6	28.0	27.1	29.7	28.7	31.3	30.1	32.8		
8	23.0	22.7	26.4	31.5	34.4	33.5	36.6	35.5	38.7	37.5	40.9	39.3	42.9		
9	29.1	28.7	33.4	39.8	43.5	42.3	46.3	44.9	49.0	47.4	51.8	49.7	54.3		
10	35.9	35.4	41.2	49.1	53.7	52.3	57.1	55.4	60.5	58.5	64.0	61.3	67.0		
11	43.4	42.8	49.9	59.5	65.0	63.2	69.1	67.0	73.2	70.8	77.4	74.2	81.1		
12	51.7	51.0	59.3	70.8	77.3	75.3	82.2	79.8	87.2	84.3	92.1	88.3	96.5		
14	70.4	69.4	80.8	96.3	105	102	112	109	119	115	125	120	131		
16	91.9	90.6	105	126	137	134	146	142	155	150	164	157	172		
18	116	115	133	159	174	169	185	179	196	190	207	199	217		
20	144	142	165	197	215	209	228	222	242	234	256	245	268		
22	174	171	199	238	260	253	276	268	293	283	310	297	324		

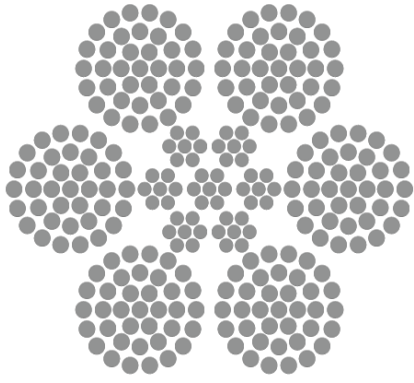
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.283(steel core).

### Point contact wire rope

 6×19(M)-WSC Typical structure diagram		Typic structure											Diameter range(mm)		
		Tectonic		Structure of wire rope strand				Outer wire count							
								Total		Per share					
		6×19(M)-FC		1-6/12				72		12					3~50
6×19(M)-WSC		1-6/12				72		12							
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope										MPa	
				1570		1670		1770		1870		1960			
	Minimum breaking force of wire rope										kN				
	Natural fiber core	Synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core
24	207	204	237	283	309	301	329	319	349	337	368	353	386		
26	243	239	279	332	363	353	386	375	409	396	432	415	453		
28	281	278	323	385	421	410	448	434	475	459	501	481	526		
30	323	319	371	442	483	470	514	499	545	527	576	552	603		
32	368	362	422	503	550	535	585	567	620	599	655	628	686		
34	415	409	476	568	621	604	660	640	700	677	739	709	775		
36	465	459	534	637	696	677	740	718	785	759	829	795	869		
38	518	511	595	710	775	755	825	800	874	845	923	886	968		
40	574	566	659	786	859	836	914	886	969	936	1023	982	1073		
42	633	624	727	867	947	922	1007	977	1068	1032	1128	1082	1182		
44	695	685	798	951	1040	1012	1106	1073	1172	1133	1238	1188	1298		
46	760	749	872	1040	1136	1106	1209	1172	1281	1239	1353	1298	1418		
48	827	816	949	1132	1237	1204	1316	1276	1395	1349	1474	1413	1544		
50	898	885	1030	1229	1342	1307	1428	1385	1513	1463	1599	1534	1676		

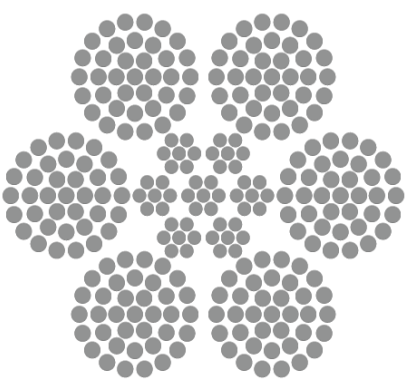
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.200(fiber core) or 1.283(steel core).

### Point contact wire rope

 6×37(M)-IWRC Typical structure diagram				Typic structure								Diameter range (mm)		
				Tectonic	Structure of wire rope strand				Outer wire count					
									Total	Per share				
				6×37(M)-FC				108	18	6~60				
				6×37(M)-IWRC				108	18	6~60				
Nominal diameter (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa										
				1570		1670		1770		1870		1960		
	Minimum breaking force of wire rope kN													
	Natural fiber core	Synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core
6	12.7	12.5	14.8	17.0	18.6	18.1	19.8	19.2	21.0	20.3	22.1	21.2	23.2	
7	17.3	17.0	20.2	23.2	25.3	24.6	26.9	26.1	28.5	27.6	30.1	28.9	31.6	
8	22.7	22.2	26.4	30.2	33.1	32.2	35.2	34.1	37.3	36.0	39.4	37.8	41.3	
9	28.7	28.1	33.4	38.3	41.8	40.7	44.5	43.2	47.2	45.6	49.8	47.8	52.2	
10	35.4	34.7	41.2	47.3	51.7	50.3	54.9	53.3	58.2	56.3	61.5	59.0	64.5	
11	42.8	42.0	49.9	57.2	62.5	60.8	66.5	64.5	70.5	68.1	74.4	71.4	78.0	
12	51.0	50.0	59.3	68.1	74.4	72.4	79.1	76.7	83.9	81.1	88.6	85.0	92.9	
13	59.8	58.6	69.6	79.9	87.3	85.0	92.9	90.0	98.4	95.1	104	99.7	109	
14	69.4	68.0	80.8	92.6	101	99	108	104	114	110	121	116	126	
16	90.6	88.8	105	121	132	129	141	136	149	144	157	151	165	
18	115	112	133	153	167	163	178	173	189	182	199	191	209	
20	142	139	165	189	207	201	220	213	233	225	246	236	258	
22	171	168	199	229	250	243	266	258	282	272	298	286	312	
24	204	200	237	272	298	290	316	307	335	324	354	340	371	
26	239	235	279	319	349	340	371	360	394	381	416	399	436	
28	278	272	323	370	405	394	43	418	457	441	482	463	506	

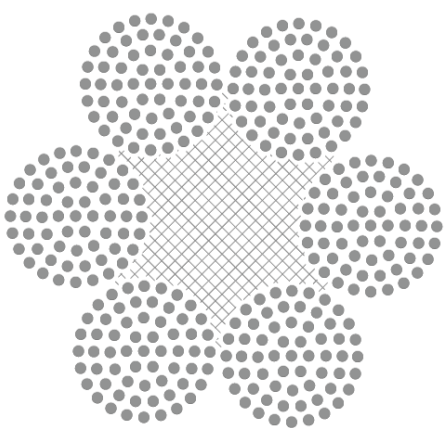
Note: Total wire breaking tension = minimum breaking force of wire rope x 1.224 (fiber core) or 1.297 (steel core).

### Point contact wire rope

 6×37(M)-IWRC Typical structure diagram				Typic structure								Diameter range (mm)	
				Tectonic	Structure of wire rope strand				Outer wire count				
									Total	Per share			
				6×37(M)-FC				108	18	6~60			
				6×37(M)-IWRC				108	18	6~60			
Nominal diameter (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope MPa									
				1570		1670		1770		1870		1960	
				Minimum breaking force of wire rope kN									
				Natural fiber core	Synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core
30	319	312	371	425	465	452	494	479	524	507	554	531	580
32	362	355	422	484	529	515	563	546	596	576	630	604	660
34	409	401	476	546	597	581	635	616	673	651	711	682	745
36	459	450	534	612	669	651	712	690	755	729	797	765	836
38	511	501	595	682	746	726	793	769	841	813	888	852	931
40	566	555	659	756	826	804	879	852	932	901	984	944	1032
42	624	612	727	834	911	887	969	940	1027	993	1085	1041	1137
44	685	672	798	915	1000	973	1064	1031	1127	1090	1191	1142	1248
46	749	734	872	1000	1093	1064	1163	1127	1232	1191	1302	1248	1364
48	816	799	949	1089	1190	1158	1266	1228	1342	1297	1417	1359	1486
50	885	868	1030	1181	1291	1257	1374	1332	1456	1407	1538	1475	1612
52	957	938	1114	1278	1397	1359	1486	1441	1575	1522	1664	1595	1744
54	1032	1012	1201	1378	1506	1466	1602	1554	1698	1641	1794	1720	1880
56	1110	1088	1292	1482	1620	1576	1723	1671	1826	1765	1929	1850	2022
58	1191	1167	1386	1590	1738	1691	1848	1792	1959	1893	2070	1985	2169
60	1274	1249	1483	1701	1860	1810	1978	1918	2096	2026	2215	2124	2321

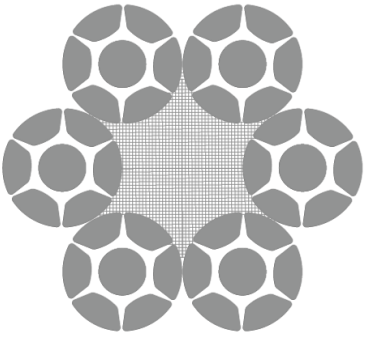
Note: Total wire breaking tension = minimum breaking force of wire rope x 1.224 (fiber core) or 1.297 (steel core).

### Point contact wire rope

 6×61(M)-FC Typical structure diagram		Typic structure										Diameter range(mm)			
		Tectonic	Structure of wire rope strand				Outer wire count								
							Total	Per share							
		6×61(M)-FC		1-6/12/18/24				144		24		28~60			
		6×61(M)-IWRC		1-6/12/18/24				144		24		28~60			
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)			Nominal tensile strength of wire rope										MPa	
				1570		1670		1770		1870		1960			
	Minimum breaking force of wire rope										kN				
	Natural fiber core	Synthesize fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core		
28	289	286	321	356	388	378	412	401	437	424	462	444	484		
30	332	329	369	408	445	434	473	460	502	486	530	510	556		
32	378	374	420	465	506	494	539	524	571	553	603	580	632		
34	427	422	474	525	572	558	608	591	645	625	681	655	714		
36	478	473	531	588	641	625	682	663	723	700	763	734	800		
38	533	527	592	655	714	697	760	739	805	780	851	818	892		
40	590	584	656	726	791	772	842	818	892	865	942	906	988		
42	651	644	723	800	872	851	928	902	984	953	1039	999	1089		
44	714	707	794	878	957	934	1018	990	1079	1046	1140	1097	1195		
46	781	772	868	960	1046	1021	1113	1082	1180	1144	1246	1199	1306		
48	850	841	945	1045	1139	1112	1212	1179	1285	1245	1357	1305	1422		
50	923	913	1025	1134	1236	1207	1315	1279	1394	1351	1473	1416	1544		
52	998	987	1109	1227	1337	1305	1422	1383	1508	1461	1593	1532	1669		
54	1076	1064	1196	1323	1442	1407	1534	1492	1626	1576	1718	1652	1800		
56	1157	1145	1286	1423	1551	1514	1650	1604	1748	1695	1847	1776	1936		
58	1241	1228	1379	1526	1664	1624	1770	1721	1876	1818	1982	1906	2077		
60	1328	1314	1476	1633	1780	1737	1894	1842	2007	1946	2121	2039	2223		

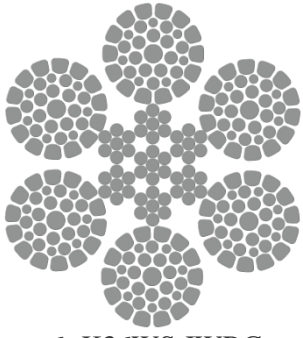
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.275(fiber core) or 1.351(steel core).

### Compacted strand wire rope

 6×K7-FC Typical structure diagram		Typic structure				Diameter range (mm)
		Tectonic	Structure of wire rope strand	Outer wire count		
				Total	Per share	
		6×K7-FC	1-6	36	6	10~40
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope MPa				
		1570	1670	1770	1870	1960
	fiber core	Minimum breaking force of wire rope kN				
		fiber core	fiber core	fiber core	fiber core	fiber core
10	41.0	60.1	64.0	67.8	71.6	75.1
12	59.0	86.6	92.1	97.6	103	108
14	80.4	118	125	133	140	147
16	105	154	164	174	183	192
18	133	195	207	220	232	243
20	164	241	256	271	286	300
22	198	291	310	328	347	363
24	236	346	368	390	413	432
26	277	406	432	458	484	507
28	321	471	501	531	562	589
30	369	541	576	610	645	676
32	420	616	655	694	733	769
34	474	695	739	784	828	868
36	531	779	829	879	928	973
38	592	868	924	979	1034	1084
40	656	962	1023	1085	1146	1201

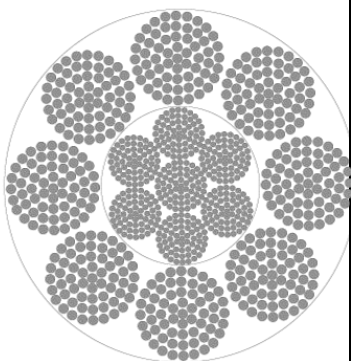
Note: Total wire breaking tension=Minimum breaking force of wire rope×1.134 fiber core.

### Compacted strand wire rope

 6×K36WS-IWRC Typical structure diagram			Typic structure								Diameter range (mm)		
			Tectonic	Structure of wire rope strand				Outer wire count					
								Total	Per share				
			Nominal diameter of wire rope (mm)	Reference weight (kg/100m)		Nominal tensile strength of wire rope MPa							
1670		1770				1870		1960		2160			
Minimum breaking force of wire rope kN													
fiber core	steel core	fiber core		steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	fiber core	steel core	
10	42.5	47.0		63.5	70.5	67.3	74.7	71.1	78.9	74.5	82.7	82.1	91.2
12	61.2	67.7		91.4	101	96.9	108	102	114	107	119	118	131
14	83.3	92.1		124	138	132	146	139	155	146	162	161	179
16	109	120		162	180	172	191	182	202	191	212	210	233
18	138	152	206	228	218	242	230	256	241	268	266	295	
20	170	188	254	282	269	299	284	316	298	331	328	365	
22	206	227	307	341	326	362	344	382	360	400	397	441	
24	245	271	366	406	387	430	409	455	429	476	473	525	
26	287	318	429	476	455	505	480	533	503	559	555	616	
28	333	368	498	553	527	586	557	619	584	648	644	715	
30	383	423	571	634	605	672	640	710	670	744	739	820	
32	435	481	650	722	689	765	728	808	763	847	840	933	
34	491	543	734	815	778	863	821	912	861	956	949	1054	
36	551	609	822	913	872	968	921	1023	965	1072	1064	1181	
38	614	679	916	1018	971	1079	1026	1140	1075	1194	1185	1316	
40	680	752	1015	1128	1076	1195	1137	1263	1192	1323	1313	1458	
42	750	829	1119	1243	1186	1318	1253	1392	1314	1459	1448	1608	
44	823	910	1229	1364	1302	1446	1376	1528	1442	1601	1589	1765	
46	899	995	1343	1491	1423	1581	1504	1670	1576	1750	1737	1929	
48	979	1083	1462	1624	1550	1721	1637	1818	1716	1906	1891	2100	
50	103	1175	1587	1762	1682	1867	1777	1973	1862	2068	2052	2279	
52	1149	1271	1716	1906	1819	2020	1921	2134	2014	2237	2219	2465	
54	1239	1371	1850	2055	1961	2178	2072	2301	2172	2412	2393	2658	
56	1333	1474	1990	2210	2109	2342	2228	2475	2336	2594	2574	2859	
58	1430	1581	2135	2371	2263	2513	2390	2655	2506	2782	2761	3066	
60	1530	1692	2285	2537	2421	2689	2558	2841	2681	2978	2955	3281	

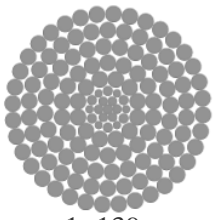


### Coarse diameter wire rope

 8×61M-IWRC Typical structure diagram		Typic structure				Diameter range (mm)	
		Tectonic	Structure of wire rope strand	Outer wire count			
				Total	Per share		
		8×61M	1-6/12/18/24		192	24	64~120
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope					MPa
		1570	1670	1770	1870	1960	
		Minimum breaking force of wire rope					kN
	steel core	steel core	steel core	steel core	steel core	steel core	
64	1749	1968	2093	2218	2344	2457	
68	1974	2221	2363	2504	2646	2773	
72	2214	2490	2649	2808	2966	3109	
76	2466	2775	2952	3128	3305	3464	
80	2733	3075	3271	3466	3662	3838	
84	3013	3390	3606	3822	4038	4232	
88	3307	3720	3957	4194	4431	4645	
92	3614	4066	4325	4584	4843	5076	
96	3935	4428	4710	4992	5274	5527	
100	4270	4804	5110	5416	--	--	
104	4618	5196	5527	5858	--	--	
108	4981	5604	5961	6317	--	--	
112	5356	6026	6410	6794	--	--	
116	5746	6465	6876	7288	--	--	
120	6149	6918	7359	7799	--	--	

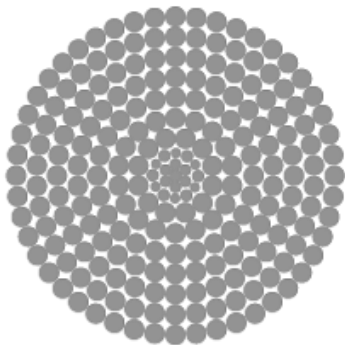
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope×1.321(steel core).

### Single strand wire rope

 1×139 Typical structure diagram		Typic structure				Diameter range (mm)
		tectonic	Structure of wire rope strand	Outer wire count		
				Total	Per share	
		1×103	1×31WS/18/24/30	30	30	
1×139	1×31WS/18/24/30/36	36	36	40.0~56.0		
1×184	1×31WS/18/24/30/36/42	42	42	50.0~60.0		
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope MPa				
		1570	1670	1770	1870	1960
		Minimum breaking force of wire rope kN				
29	417	654	695	737	778	816
30	446	699	744	789	833	873
31	477	747	794	842	890	932
32	508	796	846	897	948	993
33	540	846	900	954	1008	1057
34	573	898	956	1013	1070	1122
35	608	952	1013	1073	1134	1188
36	643	1007	1071	1135	1200	1257
37	679	1064	1132	1199	1267	1328
38	716	1122	1194	1265	1337	1401
39	754	1182	1257	1333	1408	1476
40	794	1243	1323	1402	1481	1552
41	834	1306	1390	1473	1556	1631
42	875	1371	1458	1546	1633	1711
43	917	1437	1528	1620	1712	1794
44	960	1505	1600	1696	1792	1878
45	1004	1574	1674	1774	1874	1965
46	1050	1644	1749	1854	1959	2053
47	1096	1717	1826	1935	2045	2143
48	1143	1791	1905	2019	2133	2235
49	1191	1866	1985	2104	2222	2329
50	1240	1943	2067	2190	2314	2426
51	1290	2021	2150	2279	2408	2523
52	1341	2101	2235	2369	2503	2623
53	1393	2183	2322	2461	2600	2725
54	1446	2266	2411	2555	2699	2829
55	1500	2351	2501	2650	2800	2935
56	1555	2437	2592	2748	2903	3043
57	1612	2525	2686	2847	3007	3152
58	1669	2614	2781	2947	3114	3264
59	1727	2705	2878	3050	3222	3377
60	1786	2798	2976	3154	3332	3493

Note: Minimum wire breaking force sum=Minimum breaking force of wire rope ×1.149.

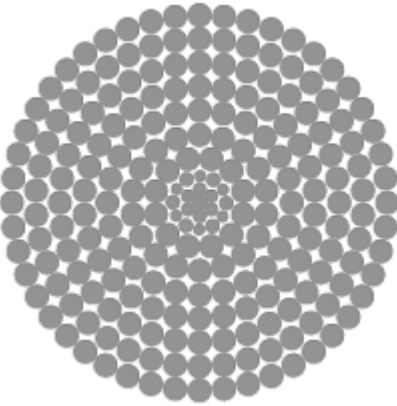
### Single strand wire rope

 1×229 Typical structure diagram		Typic structure				Diameter range (mm)
		Tectonic	Structure of wire rope strand	Outer wire count		
				Total	Per share	
1×229	1×31WS/18/24/30/36/42/48	48	48	55~101		
1×283	1×229/54	54	54	80~110		
1×343	1×229/54/60	60	60	90~120		
1×409	1×229/54/60/66	66	66	100~140		
1×481	1×229/54/60/66/72	72	72	120~160		
1×559	1×229/54/60/66/72/78	78	78	140~180		

Nominal diameter of wire rope(mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope MPa				
		1570	1670	1770	1870	1960
		Minimum breaking force of wire rope kN				
55	1485	2303	2450	2597	2744	2876
56	1540	2388	2540	2692	2844	2981
58	1652	2562	2725	2888	3051	3198
60	1768	2741	2916	3090	3265	3422
62	1887	2927	3113	3300	3486	3654
64	2011	3119	3318	3516	3715	3894
66	2139	3317	3528	3739	3951	4141
68	2270	3521	3745	3969	4194	4396
70	2406	3731	3969	4206	4444	4658
72	2545	3947	4199	4450	4702	4928
74	2689	4170	4435	4701	4966	5205
76	2836	4398	4678	4958	5239	5491
80	3142	4873	5184	5494	5804	6084
84	3464	5373	5715	6057	6399	6707
88	3802	5897	6272	6648	7023	7361
92	4156	6445	6855	7266	7676	8046
96	4525	7018	7464	7911	8358	8761
100	4910	7615	8100	8585	9070	9506
104	5311	8236	8760	9285	9810	-
108	5727	8882	9447	10013	10579	-
112	6159	9552	10160	10768	11377	-
116	6607	10246	10899	11551	12204	-
120	7070	10965	11663	12362	13060	-
124	7550	11708	12454	13200	-	-
128	8045	12476	13270	14065	-	-
132	8555	13268	14113	14958	-	-
136	9082	14084	14981	15878	-	-
140	9624	14924	15875	16826	-	-

### Single strand wire rope

 1×229 Typical structure diagram		Typic structure				Diameter range (mm)
		Tectonic	Structure of wire rope strand	Outer wire count		
				Total	Per share	
1×229	1×31WS/18/24/30/36/42/48	48	48	55~101		
1×283	1×229/54	54	54	80~110		
1×343	1×229/54/60	60	60	90~120		
1×409	1×229/54/60/66	66	66	100~140		
1×481	1×229/54/60/66/72	72	72	120~160		
1×559	1×229/54/60/66/72/78	78	78	140~180		
Nominal diameter of wire rope (mm)	Reference weight (kg/100m)	Nominal tensile strength of wire rope MPa				
		1570	1670	1770	1870	1960
		Minimum breaking force of wire rope kN				
144	10181	15789	16795	-	-	-
148	10755	16679	17741	-	-	-
152	11344	17593	18713	-	-	-
156	11949	18531	19711	-	-	-
160	12570	19493	20735	-	-	-
164	13206	20480	21784	-	-	-
168	13858	21491	22860	-	-	-
172	14526	22527	23962	-	-	-
176	15209	23587	25089	-	-	-
180	15908	24671	26242	-	-	-
Note: Minimum wire breaking force sum=Minimum breaking force of wire rope ×1.149.						

## Precautions for the use of wire rope

### Handling, storage and maintenance of wire rope

When loading and unloading the wire rope disk, it must be loaded and unloaded by crane, so as not to cause damage to the rope disk or the phenomenon of chaotic roll; ground handling, the wire rope disk is not allowed to roll on the uneven ground, resulting in the surface of the wire rope pressure injury; no packaging of the wire rope handling, the surface of the wire rope cannot be stuck with stones, clay and so on, affecting the use of the wire rope.

Steel wire rope should be stored in a dry and ventilated warehouse, to prevent direct sunlight or heat dry baking, the warehouse cannot be multi-layer stacking of steel wire rope. If the wire rope is stored in large quantities for a long time, it should be inspected frequently to prevent rusting, and should be treated in time after rusting is found and re-lubricated, such as serious corrosion, the section of wire rope should be scrapped. When the wire rope is placed outdoors, it should be cushioned with wooden boards, placed on dry ground and covered with rain cover. Wire rope storage time more than one year, should be re-sampling test, qualified before use.

Wire rope has been coated with enough lubricating oil when it is manufactured, but in the process of using, the original lubricating oil will be slowly lost and emitted, so the wire rope should be coated with lubricating oil on a regular basis to ensure rust prevention and lubrication, reduce friction and prolong the service life of the wire rope.

### Inspection of wire rope

Wire rope in the use of the process, should be in accordance with the relevant provisions of the regular inspection, and will check the results of good records. Inspection content should include the following items: the degree of wear and tear of the wire rope, wire breakage, corrosion, lubrication, deformation, rope connection part or end fastening part and other abnormal phenomena. Wire rope in the reel, pulley and over the wire wheel and other components above the sliding, through the friction components are easy to wear out grooves to make the wire rope wear faster, and sometimes the wear of the pulley will also make the wire rope deformation, increase bending fatigue. Therefore, these components must be carefully inspected, if there is unsuitable, must be immediately replaced or amended.

### Wire Rope Unwinding and Reeling Methods

See Fig. 1 for the way of wire rope release and Fig. 2 and Fig. 3 for the way of wire rope reeling.

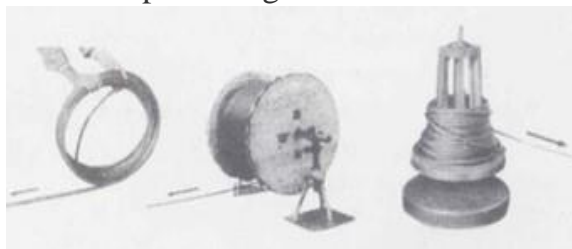


Figure 1: Rope release method Figure

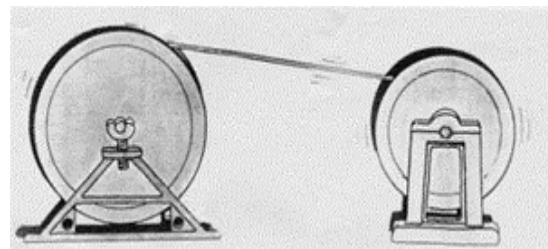


Figure 2: Rope reeling method

When the wire rope is wound in multiple layers of the reel, the tensioning device should be added to the rope release frame to ensure that the wire rope is evenly and tightly wound on the reel, as shown in Figure 3.

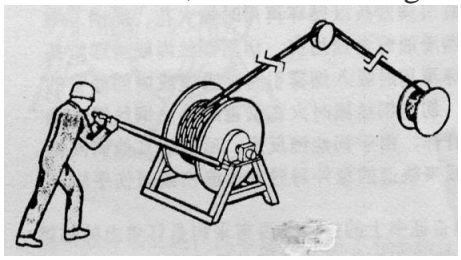


Figure 3

The direction of single-layer winding of wire rope on the reel  
 The direction of single layer winding of wire rope on the reel is shown in Fig. 4 and Fig. 5.

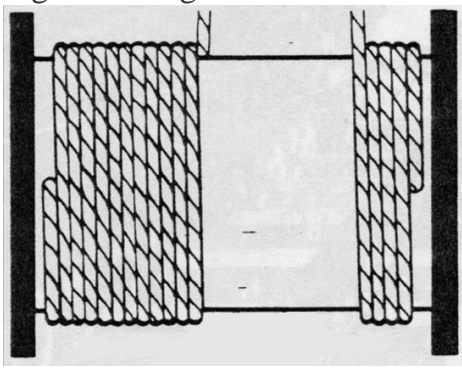


Figure 4: Left twisted wire rope

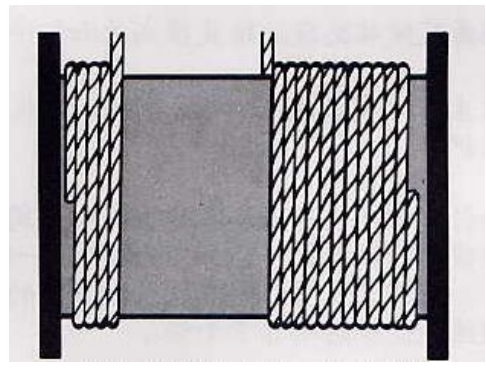


Figure 5: Right twisted wire rope

**Wire rope cutting head bundling method**

When the wire rope needs to be cut off and used, both ends of the cut head should be tied with wire or small rope strands, and the tying length should be at least 2 times the diameter of the wire rope (D), and the tying length of the parallel twisted wire rope, multi-layer stranded wire rope and single stranded wire rope should be at least 6 times the diameter of the wire rope (D), and the tying method should be as shown in Fig. 6.

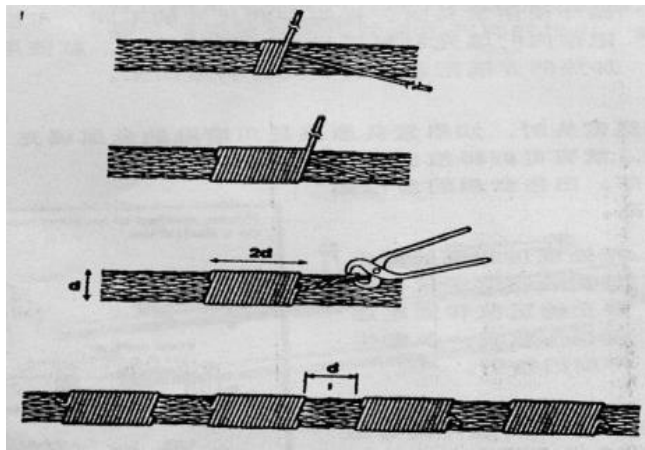


Figure 6

### Installation of wire rope

When the old rope is used as the hauling rope of the new rope, the coupling method of welding the new and old rope ends to each other cannot be used, because this method will seriously damage the structure of the new wire rope. Correct coupling method:

1. As shown in Fig. 7, weld the end of the new wire rope with a ring, pressure head, twisted head processing
2. Use fine steel wire rope or three-strand fiber rope with the same twisting direction as the new wire rope as hauling rope.

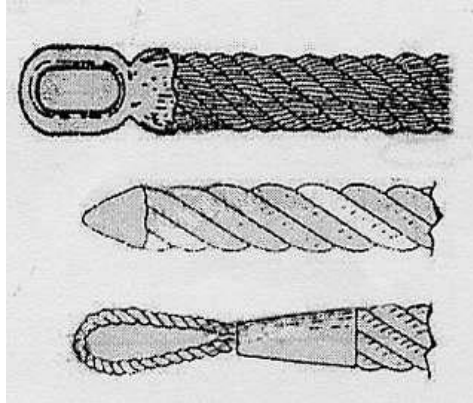


Figure 7

### The relationship between wire rope in use and sheave groove

Suitable wheel groove and wire rope contact should be as shown in Figure 8. Wheel groove is too large as shown in Figure 9 and wheel groove is too small as shown in Figure 10, in use will exacerbate the fatigue of the wire rope breakage.

Wheel groove radius (R) and the nominal diameter of the wire rope (D) ratio:  
 $R/D=0.525\sim 0.550$

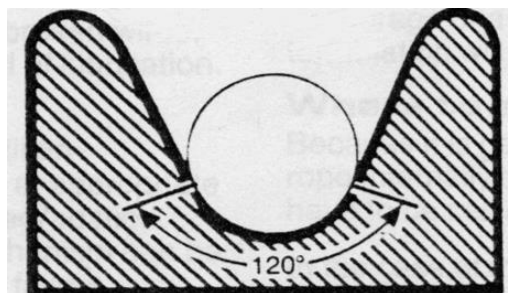


Figure 8 correct

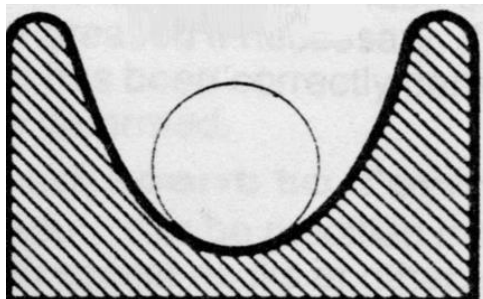


Figure 9 Error

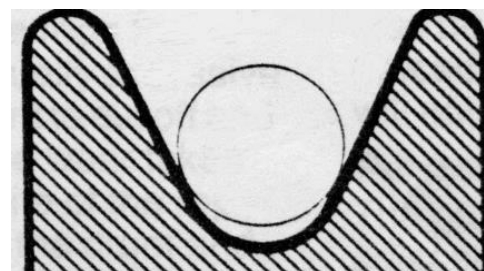


Figure 10 Error

### Rope and drum angle

The angle between the wire rope and the drum is shown in Fig. 11, the angle of the ungrooved drum is  $<1.5^\circ$ , and the angle of the grooved drum is  $<2.5^\circ$ .

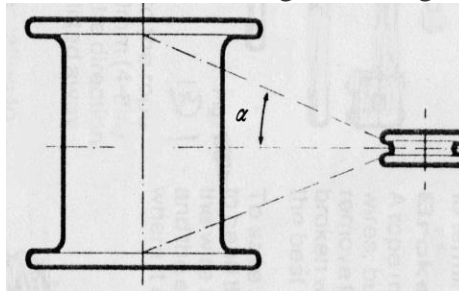


Figure 11

### How to use the wire rope clamp

The method of using the wire rope rope clip is shown in Fig. 12.



Figure 12

### Wire rope breakage treatment

Wire rope in the process of use, broken wire, wire rope can continue to run, it should be as early as possible to remove the broken wire. Although commonly used method of breaking the broken wire directly clamped off with wire cutters, but is by no means the best method, because it will leave a rough break affecting the use, you can use wire cutters to clamp the broken wire before and after bending until it breaks off, with this method so that the wire breaks in the middle of the strands will not cause harm.

### Measurement of wire rope diameter

The diameter of the wire rope is measured as shown in Fig. 14, and Fig. 15 shows the wrong measurement method.

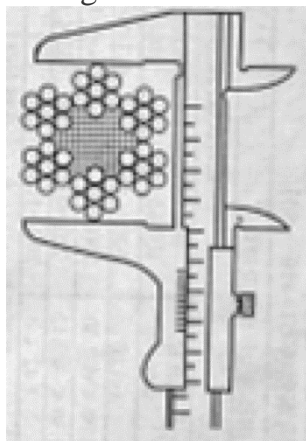


Figure 14

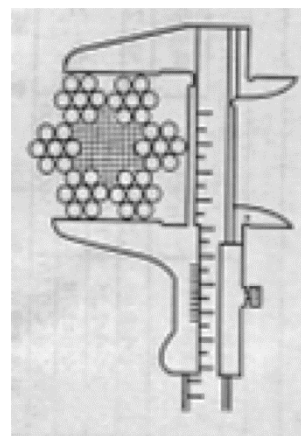


Figure 15



# Warning!

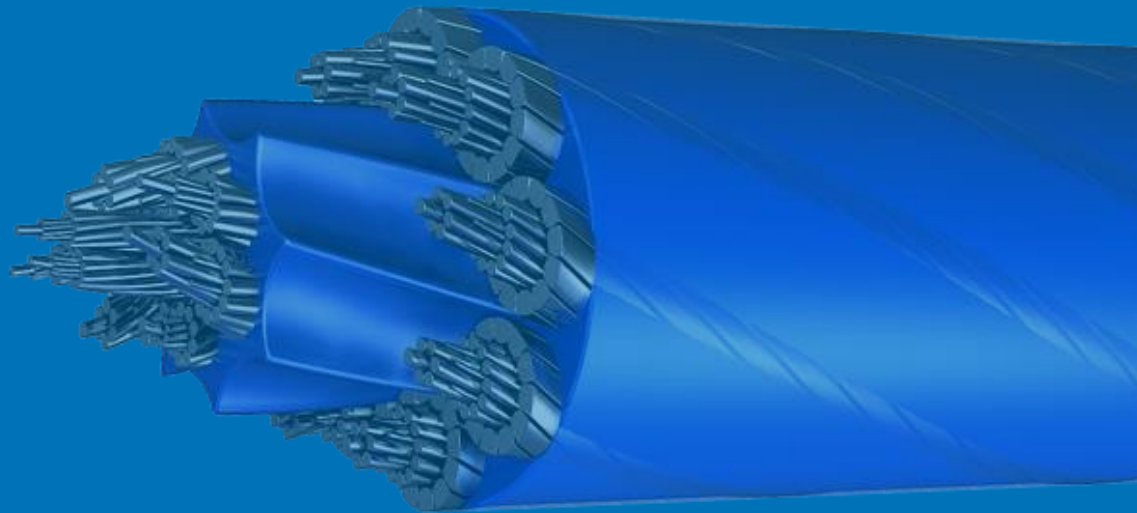
Overweight, wear and tear, misuse, damage and improper maintenance will cause the rope to fail. For your safety and the protection of other equipment.

Attention:



- Check the wire rope for wear and damage before each use.
- Never allow the use of seriously worn, damaged and scrapped wire rope.
- Never allow overloading of wire rope.

Consult the correct method of wire rope use, relevant standards and norms.



Address: No. 190, Zhangzhuang Road, Huayin District,  
Jinan City, Shandong Province, China  
Zip code: 250000  
Website: [www.gsrgroup.cn](http://www.gsrgroup.cn)  
Phone/WhatsApp: +86 18663734929  
Fax: 0531-85605466  
Email: [export@gsrgroup.cn](mailto:export@gsrgroup.cn)