



**ROYALMEX**

**Steel Strand For Prestressed Concrete**

**Unbonded Strand Wire & Wire Ropes**



# INTRODUCTION



ROYALMEX LLC is one of the leading suppliers of metal products from China, Thailand and India. Its range of metal products includes low relaxation high strength PC wires and PC strands, high tension cable, galvanized cables, galvanized wire ropes, carbon cable for optical fiber reinforcement, unbonded strand wires, etc.

Royalmex has supplied PC strands to major leading precast, hollow core and post tension companies. Our PC strands have been tested by the Dubai Municipality testing laboratory & approved by Abu Dhabi Municipality Road & Technical Services Sector Authority and approved by many other consultants; and have been used in some of the prestigious projects such as:

- Highway and utility trestle EMAL Bridge by Khalifa Port and Industrial Zone
- Al Sowa Island Roads and bridges
- Yas Island Car Park
- Al Quoz Jumeirah International Staff Accommodation
- Juffar Tower
- Nestle Dubai Manufacturing
- Nestle Substation & LV room
- REM RAAM Project
- Shopping Center in Sharjah
- 800 villas at Dubai Land
- Directorate General of Civil Defense
- Al Salamah Centre in Um Al Quwain

We are regularly exporting our steel products to other Middle East countries, India and some selected Southeast Asian countries. We partner relationship with few selected manufacturers whom we represent for the Middle East region.

Our mills are in conformity with ISO9001:2000 and have many other quality certifications. Total annual production capacity for PC strands alone is about 200,000 metric tons and approximately 100,000 metric tons for other steel wire products. Royalmex is a tried and tested quality supplier of PC strands and wire & wire products.

*We are always here to serve you.*



# PC WIRE AND PC STRAND



## List of Products

Type		Main Size $\Phi$ mm	Shape
Cold-Drawing and Plain Round Wire		3.00, 4.00, 5.00, 6.00 7.00, 7.80, 8.00, 9.00	
Three Sides Indented Wire		5.00, 6.00, 7.00, 8.00	
PC Spiral Rib Steel Wire		4.00, 5.00, 6.00 7.00, 8.00	
PC Strand	1X2 1X3	10.00, 12.00 10.80, 12.90	
	1X7	9.53, 11.10, 12.70, 15.00, 15.20 15.24, 15.70, 20.00, 22.00	
Unbonded Strand		9.50, 12.70, 15.00, 15.20, 15.70	



PC Spiral Rib Steel Wire



Galvanized wire rope



PC Indented Wire



High strength low relaxation PC strands



PC Wire



A Corner of PC Strand Line



Finished Products Area



Stranding Machine





**Analysis of Carbon and sulphur**

**Physical Performance Test of the Products**

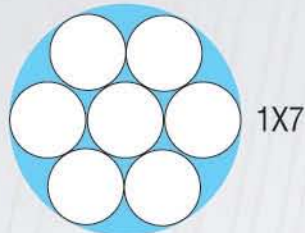


**PC Stranded Wire Relaxation Test**

GB/T5224-2003

ASTMA416/A416M-2002

Steel strand twisted by round steel wire used for prestressed concrete structure, rock or earth anchorage etc.



### Diameter and Tolerance of 1X2 Steel Strand

construction of steel strand	Nominal Diameter		Tolerance of steel strand (mm)	Reference cross - section (Sn/mm <sup>2</sup> )	Theoretical weight of 1m steel strand (g/m)
	Steel strand (Dn/mm)	Steel wire (d/mm)			
1X2	10.00	5.00	+0.25	39.3	309
	12.00	6.00	-0.10	56.5	444

### Diameter and Tolerance of 1X3 Steel Strand

construction of steel strand	Nominal Diameter		Measured dimension of steel strand (A/mm)	Tolerance of steel strand (mm)	Reference cross - section (Sn/mm <sup>2</sup> )	Theoretical weight of 1m steel strand (g/m)
	Steel strand (Dn/mm)	Steel wire (d/mm)				
1X3	10.80	5.00	9.33	+0.20	58.9	462
	12.90	6.00	11.20	-0.10	84.8	666

## ASTM A416-98

Grade	Nominal diameter (mm)	Tolerance (mm)	Nominal steel area (mm <sup>2</sup> )	Nominal weight per 1000 metre (kg)	Minimum breaking load not less than (kN)	Minimum load at 1% extension (kN)	Elongation not less than (%)	Relaxation Value 1000hrs not greater than	
								70%Initial load	80%Initial load
								250	9.53 11.11 12.70 15.24
270	9.53 11.11 12.70 15.24	+0.65 -0.15	54.84 74.19 98.71 140.00	432 582 775 1102	102.3 137.9 183.7 260.7	92.1 124.1 165.3 234.6	3.5	2.5	3.5

## BS 5896-1980

Strand type	Nominal diameter (mm)	Tolerance (mm)	Nominal steel area (mm <sup>2</sup> )	Nominal mass per 1000meter (kg)	Tensile strength (MPa)	Specified characteristic breaking load (kN)	Specified characteristic 0.1%proof load (kN)	load at 1% Elongation Lo≥500mm (kN)	Minimum elongation at MAX load (%)	Constriction at break	Max relaxation after 1000h		
											60% Initial load	70% Initial load	80% Initial load
											II	II	II
standard 7-wire	9.3	+0.3 -0.15	52	408	1770	92	78	81	3.5		1.0	2.5	4.5
	11.0		71	557	1770	125	106	110	3.5		1.0	2.5	4.5
	12.5	+0.4	93	730	1770	164	139	144	3.5		1.0	2.5	4.5
	15.2	-0.2	139	1090	1670	232	197	204	3.5		1.0	2.5	4.5
super 7-wire	9.6	+0.3 -0.15	55	432	1860	102	87	90	3.5	For all strands ductile wire breaks visible to the naked eye	1.0	2.5	4.5
	11.3		75	590	1860	139	118	122	3.5		1.0	2.5	4.5
	12.9	+0.4	100	785	1860	186	158	163	3.5		1.0	2.5	4.5
	15.7	-0.2	150	1180	1770	265	225	233	3.5		1.0	2.5	4.5

## GB/T5224-2003

### PC Strand GB/t5224-2003

Composition	Nominal diameter (mm)	Nominal cross-section (mm <sup>2</sup> )	Tolerance (mm)	Tensile strength grade (MPa)	Breaking strength of the finish strand (kN)	Yielding load (kN)	Elongation Lo=600MM (%)	Theoretocal weight per 1000 meter (kg)	Relaxation value 1000 hours not greater than	
									II	
									Initial loads is 70%of maximum nominal load	
1x2	10.00	39.3	+0.25	1720	67.6	60.8	3.5	309	2.5	
	12.00	56.5	-0.10		97.2	87.5		444		
1x3	10.80	58.9	+0.20	1720	101	90.9	3.5	462	2.5	
	12.90	84.8	-0.10		146	131		666		
1x7	Stand-ard	9.5	54.8	+0.30	1860	102	91.8	3.5	430	2.5
		11.10	74.2	-0.15	1860	138	124		582	
		12.70	98.7		1860	184	166		775	
		15.20	140	+0.40 -0.25	1720 1860	241 260	217 234		1101	

## PC Plain Round Wire GB/T5223-2002

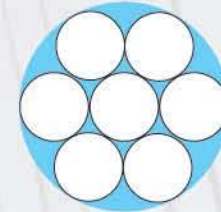
Nominal diameter (mm)	Tolerance (mm)	Tensile strength $\delta_b$ not less than (MPa)	Off-proportion extension in stress $\delta_p$ not less than (MPa)		Elongation $l_0=200$ mm not less than (%)	Bending test		Relaxation		
			WLR	WNR		Times/180° not less than	Radius (mm)	Initial stress of % tensile strength	stress Looses after 1000 hours not greater than %	
									I	II
4.00	$\pm 0.04$	1470	1290	1250	3.5	3	10	70	8	2.0
		1570	1380	1330						
5.00	$\pm 0.05$	1670	1470	1410	3.5	4	15	70	8	2.0
		1770	1560	1500						
6.00	$\pm 0.05$	1570	1380	1330	3.5	4	15	70	8	2.0
		1670	1470	1410						
7.00	$\pm 0.05$	1470	1290	1250	3.5	4	20	70	8	2.0
9.00	$\pm 0.06$	1570	1380	1330	3.5	4	25	70	8	2.0

## PC Spiral Rib Steel Wire GB/T5223-2002

Nominal diameter (mm)	Quantity Piece	Spiral rib wire nominal size				
		Base diameter (D) mm	Outside diameter (D) mm	Rib size		Lead (c) mm/360°
				Width mm		
4.00	4	3.85 $\pm$ 0.05	4.25 $\pm$ 0.05	0.90~1.30		24.00~30.00
5.00	4	4.80 $\pm$ 0.05	5.30 $\pm$ 0.05	1.30~1.70		28.00~36.00
6.00	4	5.80 $\pm$ 0.05	6.30 $\pm$ 0.05	1.60~2.00		30.00~38.00
7.00	4	6.73 $\pm$ 0.05	7.46 $\pm$ 0.10	1.80~2.20		35.00~45.00
8.00	4	7.75 $\pm$ 0.05	8.45 $\pm$ 0.10	2.00~2.40		40.00~50.00

## ASTM A 648-1995 Hard Drawn Steel Wire for PCCP

Decimal size in (mm)	Class II			Class III			Class II and Class III min turns per 8 in. (230mm)
	Ksi (MPa)	Breaking strength (kN)		Ksi (MPa)	Breaking strength (kN)		
		Mix	Max		Min	Max	
0.192 (4.88)	222 (1530)	6430 (28.6)	7300 (32.5)	252 (1740)	7300 (32.5)	8170 (36.3)	8
0.250 (6.35)	211 (1450)	10360 (46.1)	11830 (52.6)	240 (1650)	11780 (52.4)	13250 (58.9)	6
0.312 (7.92)	201 (1390)	15370 (58.4)	17660 (78.6)	221 (1520)	16900 (75.2)	19190 (85.4)	5



1X7

- Note:** (1) Mechanical performance should conform to the specification.  
 (2) of PC stranded wire.  
 According to the different use, we can supply PC stranded wire with the other tensile strength and diameter through negotiation by both parties.



JG3006-93

### Technical Specifications of Unbonded Strand Wire

Standard	Diameter MM	Tensile Strength Mpa	Yield Strength	Modulus	Grease weight	Thickness of Plastic	1000h stress relaxation (70%) not more than	
JG3006-93	12.0	1570	119.17*	1.8*10 <sup>5</sup>	43	0.8-1.2	8	2.5
	15.0	1470	174.93*		50	0.8-1.2	8	2.5

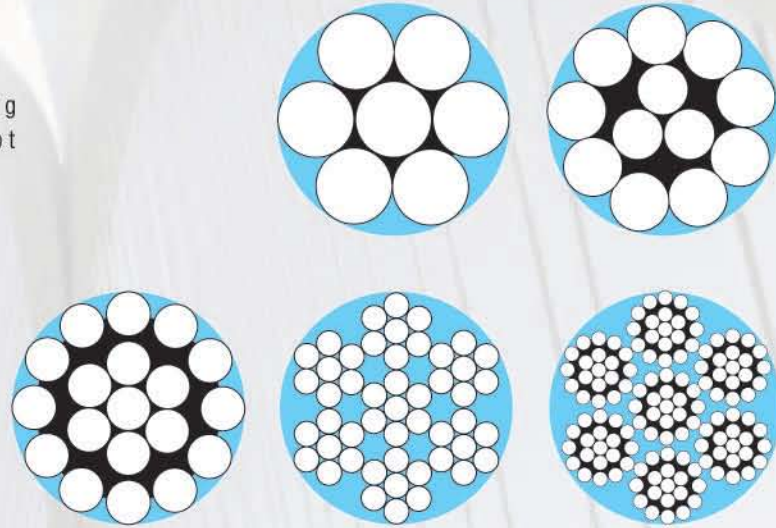
- Note:** (1) indicating Yielding Load takes 85% of the breaking load of the whole strand wire  
 (2) As agreed by the both Parties, supply prestressing steel of other strength and dimension upon its purpose.

# GALVANIZED WIRE ROPES



■ GB/T14451-1993

Galvanized wire rope for operating various mechanical devices (except aviation device).



Comstruction	Nominal diameter (mm)	Min breaking load (kN)	Approximate weight (kg/100m)
1X12 (3+9)	1.0	1.05	0.49
	1.2	1.50	0.70
	1.4	2.00	0.95
	1.5	2.30	1.09
	1.6	2.50	1.24
	1.8	3.10	1.56
1X7	0.9	0.90	0.41
	1.0	1.03	0.50
	1.2	1.52	0.74
	1.4	2.08	1.01
	1.5	2.25	1.15
	1.6	2.77	1.42
	1.8	3.19	1.63
	2.0	4.02	2.05
	1.0	1.06	0.50
1X19	1.2	1.52	0.74
	1.4	2.08	0.96
	1.5	2.39	1.14
	1.6	2.59	1.28
	1.8	3.29	1.60
	2.0	4.06	1.96
	2.5	6.01	3.07
	2.8	7.53	3.90
	3.0	8.63	4.46
	3.5	11.74	6.07

Comstruction	Nominal diameter (mm)	Min breaking load (kN)	Approximate weight (kg/100m)
6X7+1 WS	1.4	1.76	0.87
	1.5	1.99	0.98
	1.6	2.29	1.13
	1.8	2.81	1.39
	2.0	3.38	1.67
	2.5	5.45	2.70
	2.08	6.45	3.32
	3.0	7.28	3.77
	3.5	10.37	5.30
	4.0	12.92	6.62
	4.5	15.89	8.60
	4.8	17.79	9.60
	5.0	19.79	10.50
	5.5	23.19	12.60
	6X19+IWS	6.0	28.11
2.5		5.15	2.63
2.8		6.56	3.35
3.0		7.25	3.70
3.5		9.53	4.87
4.0		12.13	6.35
4.5		16.13	8.33
4.8		16.58	9.00
5.0		18.74	10.10
5.5		23.23	12.40
6.0	27.66	14.70	



### PACKING:

Prestressed strands & wires usually are packed with the Grade 1 or Grade 2. Packing materials: PP cloth+VPI paper, or PP cloth, etc. According to customers' needs, the packing without moistureproof is also available.



### LOADING:

Prestressed Strands must be hoisted and laid in proper order, and space them out. The coiled strand must be lifted with fork-lift trucks, C shape hook, or other specialized lifting tools. The coiled wires and unbonded prestressed strands must be lifted with specialized lifting tools. Carefully handling. Dragging and throwing the coils are not allowed.



### STORAGE & HANDLING:

- \* Strands should be unloaded under shed or cover as far as possible.
- \* For short term storage outdoors, coils should be stacked on timber support covered with water proof sheet. Care should be taken to ensure air circulation to avoid condensation. For long term storage outside, in addition to above precautions, it is advisable to keep small bag of vapour phase inhibitor.
- \* Steel cutting should be effected with abrasive disc cutters or shears. Using flame cutters or exposing steel to sources of heat can alter the micro structure and change properties / characteristics of steel.



### Pull Direction

Place strand pack in strand cage so that arrow pull direction faces opening.



### CAUTION

PC Strand Wire is coiled under high tension. Ensure adequate safety measures while uncoiling



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Al Ain Centre, Office No. 102,  
P. O. Box 28629, Dubai - U.A.E.

Tel: +971 4 3552920 / 3595092

Fax: +971 4 3552926 / 3595094

E-mail: [info@royaltechenterprise.com](mailto:info@royaltechenterprise.com)

Website: [www.royaltechenterprise.com](http://www.royaltechenterprise.com)