



**ESSEN**  
STEEL







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**COMMITTED TO  
QUALITY WITH  
GREEN  
TECHNOLOGY**

# ESSEN STEEL INDUSTRY LLC

Essen Steel Industry LLC, located in Abu Dhabi, United Arab Emirates is a leading regional producer of steel wire and strands. We manufacture high carbon and low carbon steel wire and strands conforming to International Standards: Hot Dip Galvanized Wires, Spring Wire, Mild Steel Wire, Binding Wire, PC Strands, as well as ACSR and ACS wire and strands. Key supply segments : Construction, Power, Telecom, Agriculture and Engineering.

Our vision is to lead globally in Steel Wire and Steel Wire Products manufacturing by keeping customers as the focus of every strategy and achieve exceptional, sustainable and profitable growth through product development support with latest trends and technology. Our Manufacturing facilities are accredited with ISO 9001 / 14001/ 45001 by TUV SUD and DCL (Dubai Central Laboratories) (Dubai Municipality) certification for LRPC product to both ASTM and BS standards. Further to strengthen the market presence ESSEN STEEL is accredited with UK CARES certification. We have invested 35 Million USD for latest state-of-the-art manufacturing facility at KIZAD, Abu Dhabi, UAE. The plant capacity is 72,000 MTPA of steel wires and strands. The group intends to move ahead and reach 90,000 MTPA levels of manufacturing by 2025. Our team is inspired, by our Directors, who are focused on durable quality product with engineering background and are always leading the way with their thrust on World class manufacturing practices. Our world class in-house product testing facilities support us as one of the best Wire & Strand producers in the region with all process validation systems in place and SPC is practiced throughout the organization for touching each minor need of improvement and defect elimination.



We enjoy a good reputation and buyer confidence regarding quality and timely supply. We are a professionally managed Company backed by a competent qualified Team of Experts to ensure quality products delivered at customer end with continuous emphasis on quality improvement through stringent checks at every stage of production process.

Our Technical Team is in constant touch with latest technology keeping abreast of all developments and incorporating the same in our operations and practices. There is also complete interaction with our customers regularly to develop the products as per their requirements.







ESSEN STEEL INDUSTRY LLC is contributing to regional industrial development by manufacturing steel wire & strands that are catering to various segments like Infra-structure, construction, fencing, spring etc. Our process controls/checks are meeting world's most stringent norms and are being evaluated by some of the best technical experts in the world, with guidance at every stage right from steel cleaning & coating process, wire drawing, galvanizing, fine drawing, stranding, makes the product most durable and high quality meeting all requirements of customers.

We are testing the steel at all stages with process validation and control plans, design controls and 24x7 process data monitoring through data acquisition system. Further, we emphasize on green culture in production/process thus have spent significantly on facilities to keep minimum or lowest impact on environment.





The facility has maximum emphasis on quality product and thus has invested in online data acquisition systems on its manufacturing lines and monitoring of process parameters twice in a shift. The Quality Lab is well equipped with testing machines from Testometric, UK for checking the product quality parameters. All Engineers are well trained on systems and practices by best available industry professionals from world leaders. SPC techniques are followed in general practice for controlling and monitoring process parameters. ESSEN STEEL is a green manufacturing setup, where latest green technology is used to produce world class products with optimum energy conservation and clean green process.

ESSEN STEEL stands tall on its technology for manufacturing PC Strand and Hot Dip Galvanized products without using any strong acids. The facility operates without pickling process, which normally involves strong acids like Hydrochloric Acid (HCl) & Sulfuric Acid (H<sub>2</sub>SO<sub>4</sub>). Thus keeping the high commitment levels towards environmental protection and sustainability. Essen Steel consumes minimum energy for its hot dip galvanized products using green technology with high speed production line.

ESSEN STEEL operates one of the highest speed hot dip galvanized green process plants in the world operating at 350+ dV.

## CERTIFICATE OF QUALITY MANAGEMENT



## CERTIFICATE OF IN-COUNTRY VALUE



## CERTIFICATE OF PRODUCT CONFORMITY



## CERTIFICATE OF ROADS & TRANSPORT AUTHORITY



## CERTIFICATE OF PRODUCT CONFORMITY FROM DUBAI LABORATORY



For delivering the best and consistent quality to customers, emphasis is given on good rod suppliers and for all premium segment products, the main input i.e. wire rods are procured from only approved sources and 100% incoming inspection makes our system strong and consistent

We validate our process for each product with excellent world-class laboratory with testing facilities from world best testing machine makers for metallurgical, mechanical(physical) and chemical testing of steel. All products are supported with test certificates in accordance with relevant international codes & standards.

A steel member is prestressed and embedded in concrete, loses the initially applied stress exponentially with the passage of time. The important factor attributing to this loss is stress relaxation property of steel. By treating the steel through a thermo-mechanical stabilizing process the stress relaxation property is controlled to a great extent, resulting in following advantages:

1. Up to 10% reduction in steel requirements
2. Reduction in project cost for reduction in number of labor/ducts/sheathings/wedges
3. Reduction in concrete requirement due to reduced size of structural members



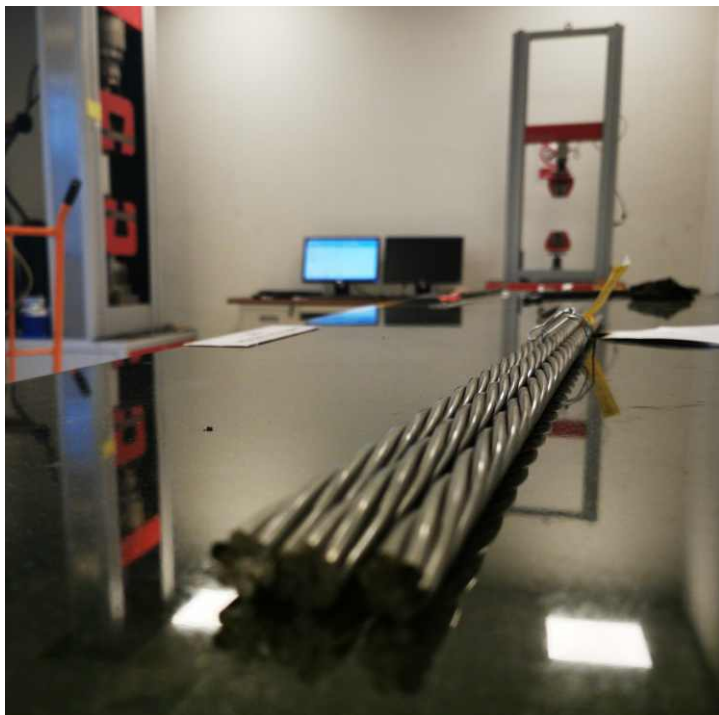
PC Strand



Technical Meeting Session



## QUALITY ASSURANCE



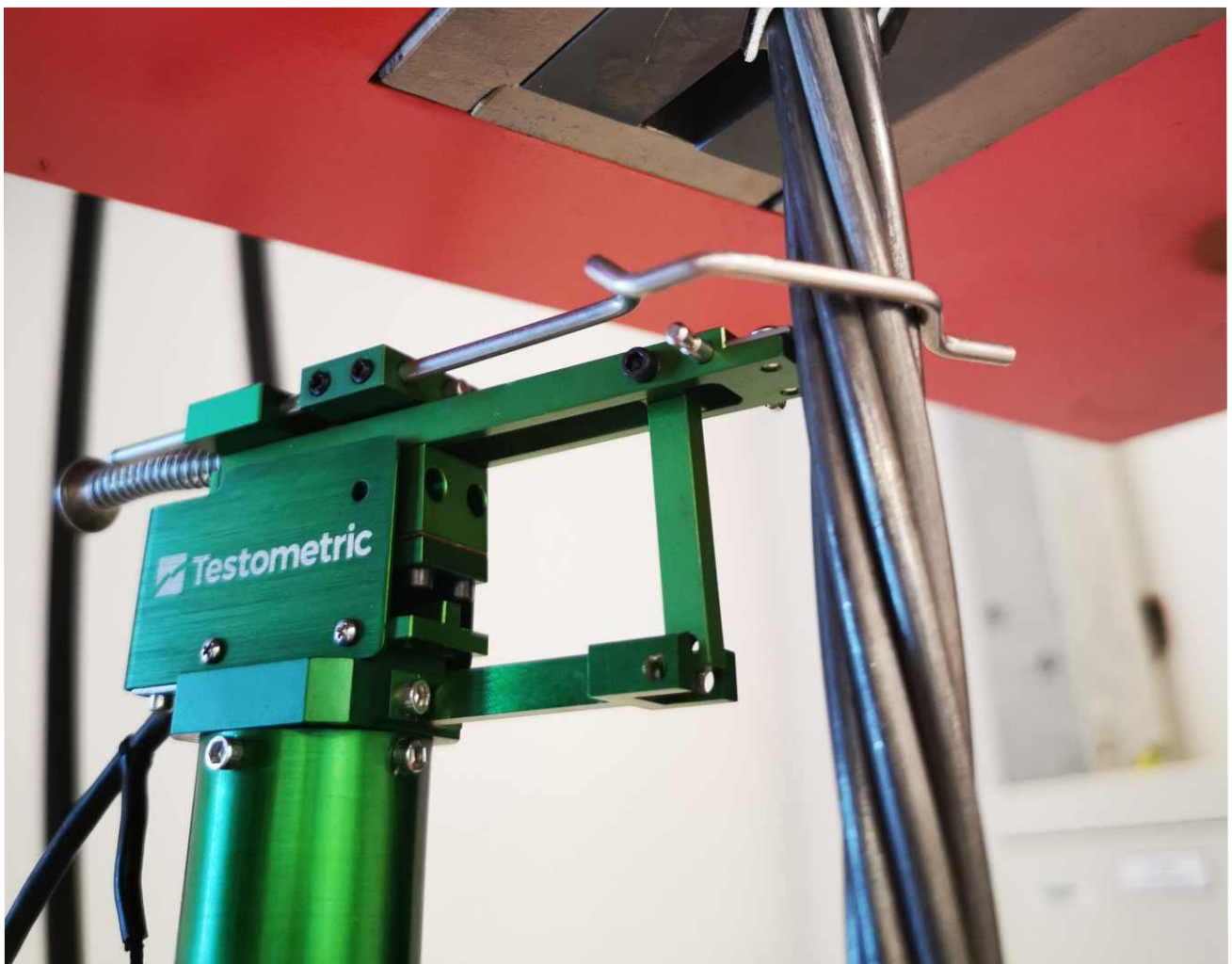
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We have a fully equipped laboratory to monitor and maintain a well-defined quality assurance system, which tracks and tests steel at every stage right from rod stage tests like physical testing, metallurgical testing and chemical testing. The Lab is well equipped with testing machines & manned by professionally qualified highly experienced technical team comprising of engineering graduates.

Quality Assurance engineers are always guided by some of the world's best technical experts and developments/ process are accordingly validated with all test records. Besides this, equipment is selected from world's best makers like:

1. Tensile testing machines from Testometric, UK
2. Relaxation testing machine, Taiwan
3. Wire bend test machine from in house design

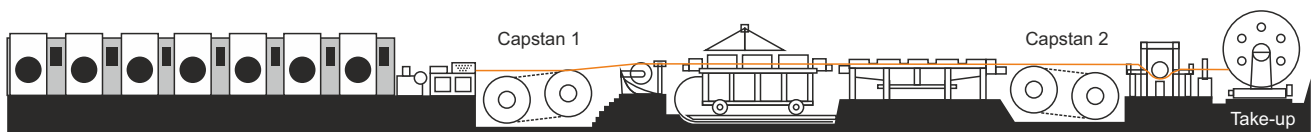
Our product is well designed with design software, experience of best Steel wire & Strands manufacturers technical heads and our own team, which is highly experienced in field of steel wire & Strands. Thus, design parameters are tested with comprehensive testing in quality laboratory, which supports the ultimate performance parameters like breaking force, relaxation, MOE etc. This makes our PC Strands world class product with guaranteed performance. Thus, by using ESSEN STEEL Products, you are assured of excellent Quality and commitment for service!!! We foresee a great relation with you and are committed to serve you better !! first time and every time.





Thus, best suppliers are selected for supply RM and process chemicals and tools achieve and maintain consistent quality, enough spares are maintained to adhere the stringent delivery norms of customers, even on short notice. ESSEN steel is focused on maintaining 100% delivery adherence in order to assist customers on timely completion projects.

The manufacturing process starts from Wire rod preparation for wire drawing which involves cleaning of scales / rust / dust / oil / grease from the wire rod surface, this is normally done with chemical process involving harmful acids and lot of environmental hazards but ESSEN has chosen green technology to have minimize the environmental Impact !! We are cleaning the surface with shot blasting, which is well contained and ENVIRONMENT FRIENDLY & SAFE activity, this is followed by inline Electro-phosphating technology which is another green technology implemented by ESSEN STEEL in order to maintain the focus on Green manufacturing!! Thus, wire rod is cleaned and coated with phosphate, as it enters for wire drawing operation. We are handling the wire rod only one time right from payoff station to finished wire for stranding & relaxation process!! This enhance the product quality as there is no chance of physical damage to rod surface by multi-handling, this is another advantage in the process technology selection.



**The Manufacturing Process : The manufacturing is done on green technology process line with higher SAFETY & ENVIRONMENT friendly approach.**

The manufacturing process starts from wire rod preparation for wire drawing, which includes Mechanical descaling / surface cleaning with state-of the art green technology and surface is coated with phosphate with in-line electro-phosphating technology which covers 100% surface (not possible in conventional pickling process) and green technology thus, offers better wire rod surface for drawing. The wire drawers are from best in class with high speed drawing capabilities offering excellent wire quality with proven mechanical properties. Wire is collected in spools and send for next process of thermo-Mechanical stabilization, which induces the Low-Relaxation property in product. All machines/lines are PLC controlled with load/extension monitoring during operation, thus consistent high quality output is guaranteed. The wire rods are handled only single time in order to prevent any mechanical surface damage and the output of 27 MT master spool is layer wound to 3.40 MT coils as final pack. These coils are wrap packed with PE strap with ESSEN logo and VCI shrink wrap as per customer requirement. The packed coils are stacked in eye-to-sky position in FG stock area on FIFO basis.

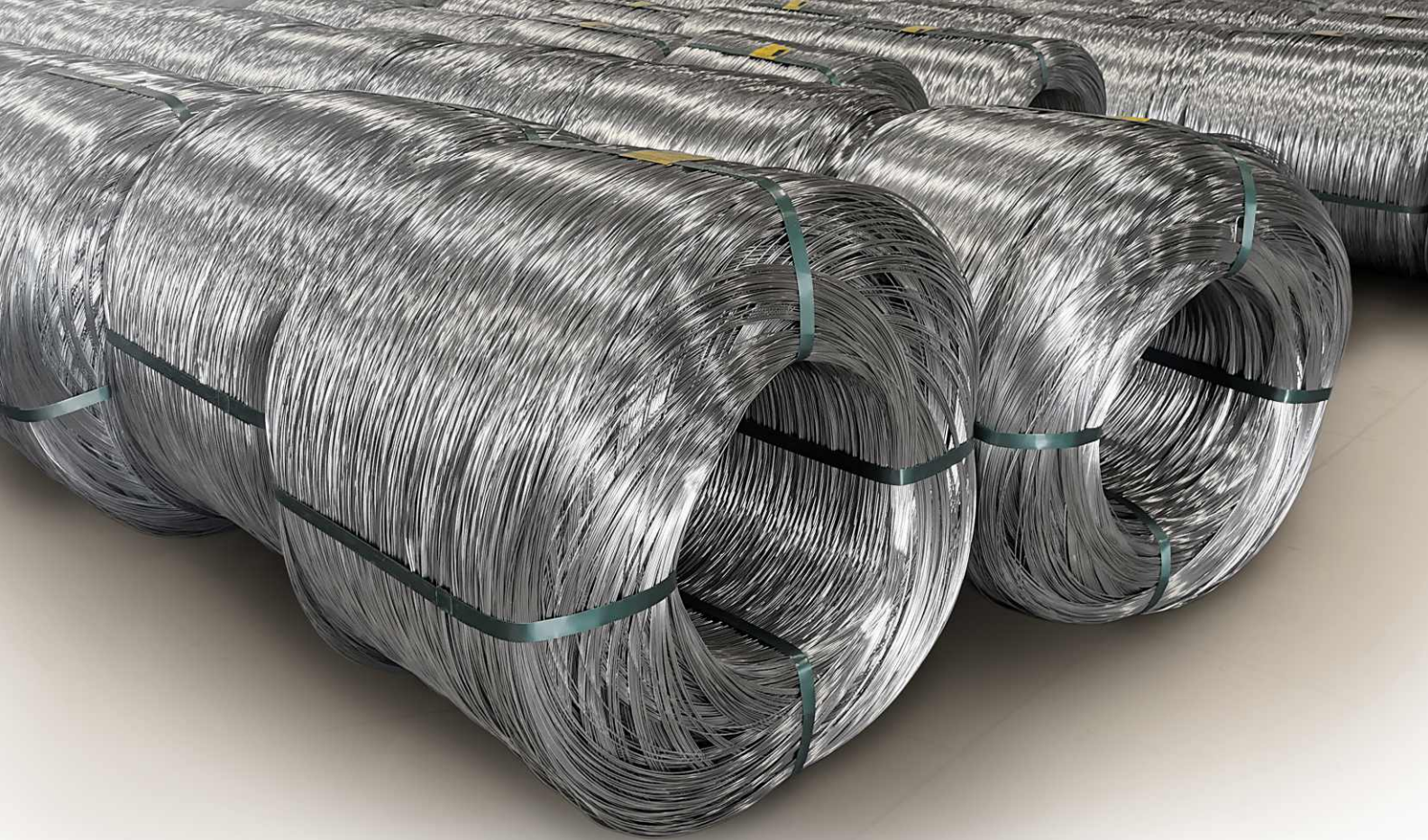


# HOT DIPPED GALVANIZED **STEEL WIRE**

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## DIAMETER

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Ø0.80 mm (0.031") - Ø6.00 mm (0.39")  
Tolerance : **T1 and T2 acc to EN10218-2**

## COATING

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HEAVILY GALVANIZED  
**(EN10244-2 CLASS A, AB AND B)**  
COMMERCIAL GALVANIZED  
**(EN10244-2 CLASS C AND D)**

## TENSILE STRENGTH

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SOFT(S) = 350 - 550 N/mm<sup>2</sup>  
HARD (H) = 550 - 950 N/mm<sup>2</sup>  
HIGH TENSILE (HT) = 950 - 1860 N/mm<sup>2</sup>

## RAW MATERIALS

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WIRE RODS  
**(SAE 1006, 1008, 1010, 1018, 1045, 1076, 1082)**  
ZINC  
**(%99,995 ZINC INGOTS ACC TO EN 1179 Z1)**

## QUALITY

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TS - En10244 - 2, ASTM A641A and  
other international norms

## TENSILE

TENSILE CLASS	DIAMETER	TENSILE STRENGTH
SOFT(S)	Ø0.80 mm - Ø6.00 mm	400 - 550 N/mm <sup>2</sup>
HARD(H)	Ø0.80 mm - Ø6.00 mm	550 - 950 N/mm <sup>2</sup>
HIGH TENSILE(HT)	Ø0.80 mm - Ø6.00 mm	950 - 1860 N/mm <sup>2</sup>

## STANDARD COATING WEIGHT ACC. TO EN10244-2

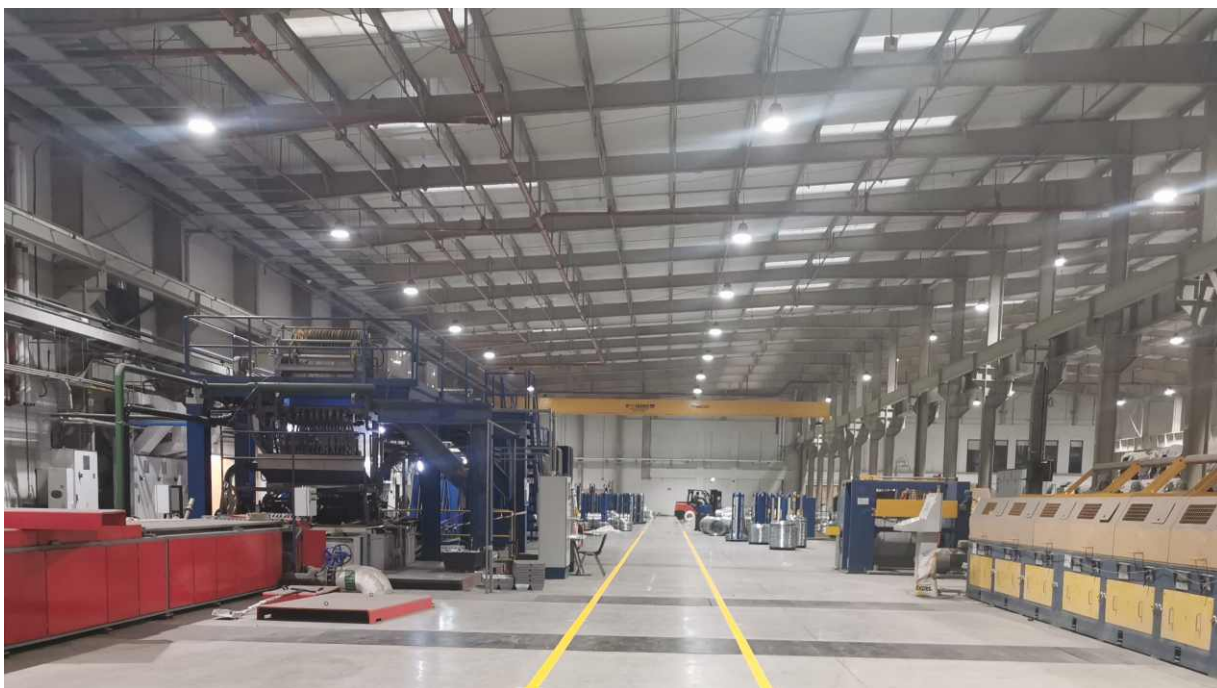
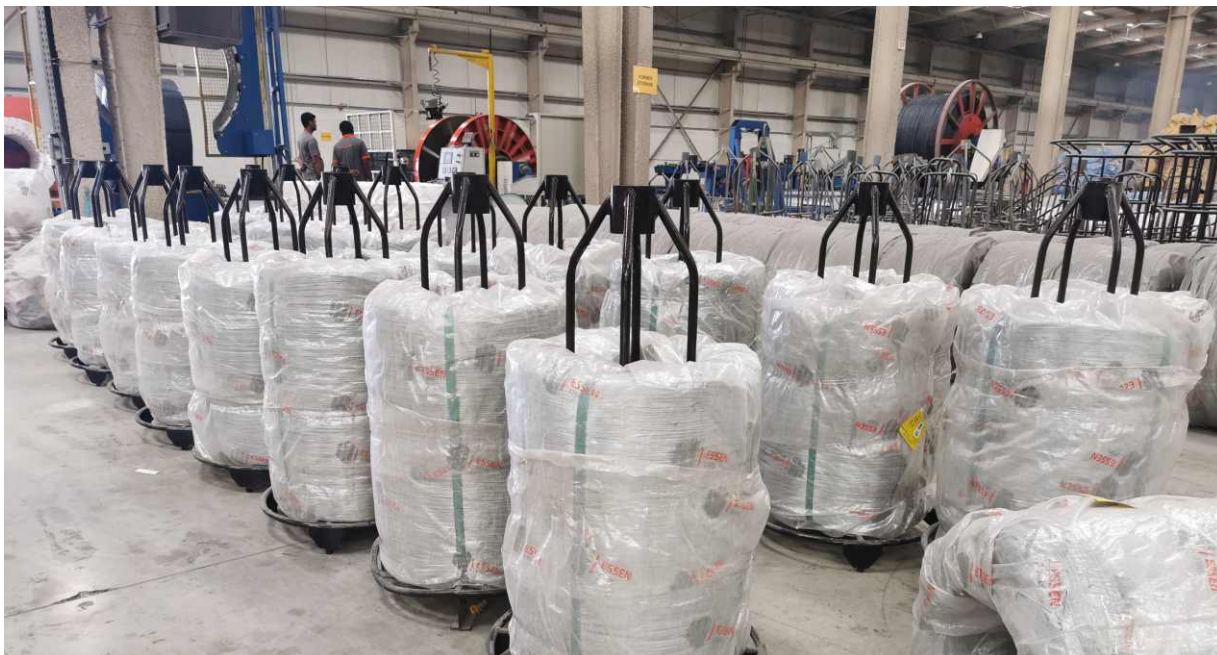
DIAMETER (mm)		CLASS A	CLASS AB	CLASS B	CLASS C	CLASS D
Min.	Max.					
0.90	1.00	155	110	70	55	25
1.00	1.20	165	115	80	60	25
1.20	1.40	180	125	90	65	25
1.40	1.65	195	135	100	70	30
1.65	1.85	205	145	100	75	30
1.85	2.15	215	155	115	80	40
2.15	2.50	230	170	125	85	45
2.50	2.80	245	185	125	95	45
2.80	3.20	255	195	135	100	50
3.20	3.80	265	210	135	105	60
3.80	4.40	275	220	135	110	60
4.40	5.20	280	220	150	110	70
5.20	8.20	290	---	---	110	80





## PACKAGING SIZE & TYPE

WIRE DIAMETER	Ø0.80 mm - Ø1.50 mm (MIDI COIL)		Ø1.60 mm - Ø5.00 mm (STANDARD COIL)		Ø3.00 mm - Ø6.00 mm (JAMBO COIL)
ID (inner dia.)	330 - 350 mm	430 - 470 mm	430 - 470 mm	480 - 520 mm	530 - 570 mm
OD (outer dia.)	540 - 570 mm	740 - 780 mm	740 - 780 mm	880 - 920 mm	1020 1070 mm
Weight	250 - 400 kgs	250 - 500 kgs	600 - 900 kgs	600 - 900 kgs	950 - 1500 kgs



## GALVANIZED WIRE-NAIL



SIZE (mm)	TOLERANCE (mm)	TENSILE (Mpa)	Coating (GSM)	Elongation
2.28	-0.05/+0.00	650-850	50	7-9%
2.28	-0.05/+0.00	650-850	180	7-9%
2.28	-0.05/+0.00	650-850	330	7-9%
2.51	-0.05/+0.00	650-850	305	7-9%
2.82	-0.05/+0.00	650-850	50	7-9%
2.82	-0.05/+0.00	650-850	180	7-9%
2.82	-0.05/+0.00	650-850	330	7-9%
2.87	-0.05/+0.00	650-850	305	7-9%
2.95	-0.05/+0.00	650-850	50	7-9%
2.95	-0.05/+0.00	650-850	180	7-9%
2.95	-0.05/+0.00	650-850	330	7-9%
3.02	-0.05/+0.00	650-850	50	7-9%
3.02	-0.05/+0.00	650-850	180	7-9%
3.02	-0.05/+0.00	650-850	330	7-9%
3.05	-0.05/+0.00	650-850	305	7-9%
3.12	-0.05/+0.00	650-850	50	7-9%
3.12	-0.05/+0.00	650-850	180	7-9%
3.12	-0.05/+0.00	650-850	330	7-9%
3.27	-0.05/+0.00	650-850	50	7-9%
3.27	-0.05/+0.00	650-850	180	7-9%
3.27	-0.05/+0.00	650-850	330	7-9%
3.33	-0.05/+0.00	650-850	305	7-9%
3.72	-0.05/+0.00	650-850	50	7-9%
3.72	-0.05/+0.00	650-850	180	7-9%
3.72	-0.05/+0.00	650-850	330	7-9%
4.00	-0.06/+0.00	650-850	330	7-9%
4.08	-0.06/+0.00	650-850	330	7-9%



# APPLICATIONS

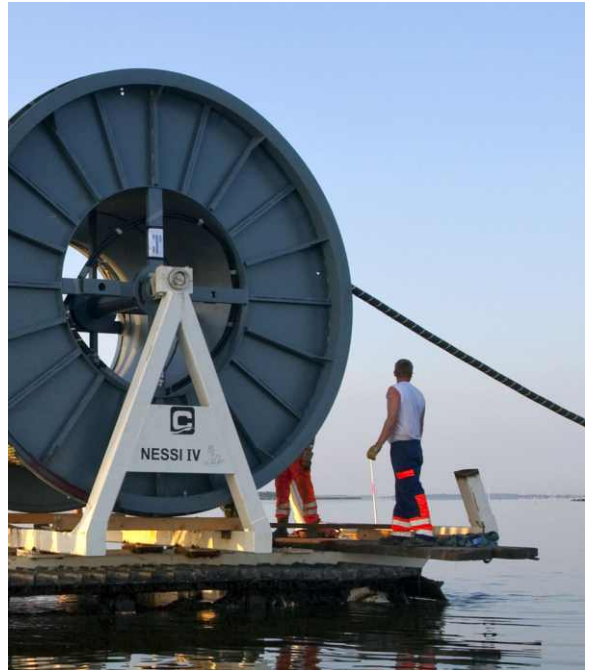
As far as galvanized wires are concerned, Essen Wire is a known global trademark. Hot-dipped coating production method is available within various zinc layer thicknesses as commercial galvanized ( $>25\text{gr/m}^2$ ) or heavily galvanized wire ( $<600\text{gr/m}^2$ ). Our brand name is characterized by its clean, smooth and shiny surface. Wire rods, both low carbon and high carbon alloy, processed by cold drawing and our advanced heat treatment technology provide a wide tensile strength range to our customers.

Our advanced technological machinery investments with experienced know-how gives a small variation gap on tensile strength fluctuations at each part of the wire. From soft binding wire to hard spring wire and everything in between: Essen Wire will be your reliable solution partner at your business sector. We can supply our wires in all sort of packaging formats such as coils on carriers, rosettes or orbits wrapped with PE stretch.



# SUBMARINE CABLES

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Essen Steel offers the specialized product with heavy coating hot dip galvanized wires for submarine applications with steel RM base from SAE 1006 to 1082 depending on strength requirements. We also offer tailor made product developed as per customer norms/requirements. Armouring Wires offers mechanical properties as per EN 10257-1&2 and galvanized coating as per EN 10244-2 class A. Testing of wires >> As per EN 10002-1/EN 10218-1. Technical Delivery conditions: EN 10021

## **PRODUCT PROFILE**

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HEAVY COATING ARMOURING WIRE  
2.12 mm to 6,00 mm



# TECHNICAL SPECIFICATIONS

TENSILE GRADES AND CLASS					
TERRAIN CABLE	SUBMARINE CABLES				
	Class 34	Class 65	Class 85	Class 105	Class 125
340>Rm≤540 N/mm <sup>2</sup>	340>Rm≤540 N/mm <sup>2</sup>	650>Rm≤850 N/mm <sup>2</sup>	850>Rm≤1050 N/mm <sup>2</sup>	1050>Rm≤1250 N/mm <sup>2</sup>	1250>Rm≤1450 N/mm <sup>2</sup>

WIRE SIZE AND PACKAGING				
Wire Diameter	Ø 0,90	Ø 1,25 - 3,00 mm	Ø 1,60 - 3,00 mm	Ø 3.50 - 6.00 mm
Inner diameter	330 - 350 mm	420 - 450 mm	420 - 450 mm	470 - 500 mm
Outer Diameter	540 - 570 mm	800 - 850 mm	750 - 800 mm	850 - 940 mm
Package Weight	250 - 400 Kg	250 - 600 Kg	500 - 1000 Kg	500 - 1000 Kg

TENSILE GRADES AND CLASS					
TERRAIN CABLE	SUBMARINE CABLES				
	Class 34	Class 65	Class 85	Class 105	Class 125
0,90 mm	3.35 mm	2,65 mm	2,12 mm	2,12 mm	2,12 mm
1.25 mm	4.00 mm	3.35 mm	2,24 mm	2,24 mm	2,24 mm
1.60 mm	4.25 mm	4.25 mm	2,36 mm	2,36 mm	2,36 mm
2,00 mm	4.50 mm	5,00 mm	2.50 mm	2.50 mm	2.50 mm
2.50 mm	4.75 mm		2,65 mm	2,65 mm	2,65 mm
3.15 mm	5,00 mm		2,80 mm	2,80 mm	2,80 mm
4.00 mm	5,30 mm		3.15 mm	3.15 mm	3.15 mm
	5,60 mm		3.35 mm	3.35 mm	3.35 mm
	6,00 mm		3.55 mm	3.55 mm	3.55 mm
			4.00 mm	4.00 mm	4.00 mm
			5,00 mm	5,00 mm	5,00 mm
			5,30 mm	5,30 mm	5,30 mm
			6,00 mm	6,00 mm	6,00 mm

\* Apart from these standard sized, the min.0.87 mm with max. Other diameters between 4.00 mm are produced upon request.

# CABLE ARMoured GALVANIZED WIRE

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Galvanized steel armour wire shall be as per BS EN 10257 unless agreed otherwise. Wire shall be made from low carbon steel by hot-dipped galvanization. The wire shall be well cleaned drawn and galvanized to the diameter specified. These shall be free from splits, surface flaws and other harmful defects and the coating shall adhere to the steel below the coating.



When tested as per BS EN 10257 and BS EN 10244, the zinc coated steel wires shall meet the requirement of table below -

Wire diameter & tolerance mm	Max dc resistance @20°C, Ω/km	Min turns to fracture/gauge length, nos./mm	Min mass of zinc coating, g/m <sup>2</sup>	Dipping test (no. of dips)		Tensile strength, N/mm2	Minimum elongation at break, %
				1 min dip	1/2 min dip		
0.90 ± 0.035	216.92	33/175	155	1	1	350 - 450	7.5
1.25 ± 0.040	112.45	24/75	180	1	1	350 - 450	10
1.60 ± 0.045	68.64	37/150	195	2	–	350 - 450	10
2.00 ± 0.050	43.93	30/150	215	2	–	350 - 450	10
2.50 ± 0.060	28.11	24/150	245	2	1	350 - 450	10
3.15 ± 0.070	17.71	19/150	255	3	--	350 - 450	10

## PACKAGING AND MARKING

Galvanized steel wires shall be supplied coil and each coil shall be suitable bound and fastened compactly. Coil shall be protected with a plastic wrapper. Supplier shall maintain the dimensions and weight of coil mentioned in below table -

Wire mm	Coil Weight kg	Coil dimensions (before strapping the coil)		
		Inner diameter (mm)	Outer diameter (mm)	Height (mm)
0.90 - 1.60	300 to 500	380 to 450	800 max	900 max
2.00 - 3.15	500 to 800	380 to 500	800 max	900 max





# AS WIRE ALUMINIUM CLAD STEEL WIRE

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**APPLICATIONS, PRODUCTS AND MANUFACTURING PROCESS** Using the technology, ESSEN Steel Industry LLC manufactures and supplies high quality Aluminium-clad steel wire and cable products for electrical utilities, cable manufacturers, and accessory manufacturers. Essen Steel manufactures Ground wire, guy wire, AS wire for optical ground wire (OPGW) applications and Aluminium- clad steel (AS) core wire for various overhead conductors. Our AS wire is manufactured by continuous extrusion process which bonds high purity aluminium to high strength steel wire. The thick aluminium cladding provides AS wire with superior corrosion resistance as well as high conductivity. AS wire incorporates the capability to vary the aluminium thickness as required for higher conductivity described in the latest ASTM and IEC standards.

**Cross-sectional View of AS Wire**



- Thick aluminum cladding - standard ratio of aluminum area in cross section: 25%
- High corrosion resistance
- High electrical conductivity
- High strength
- Excellent thermal stability for high temperature operation
- Lighter weight

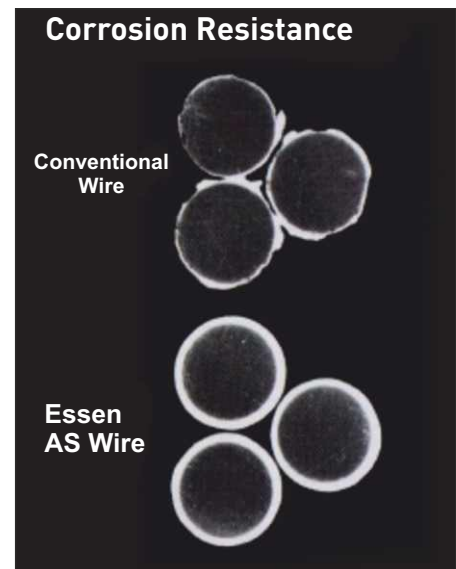
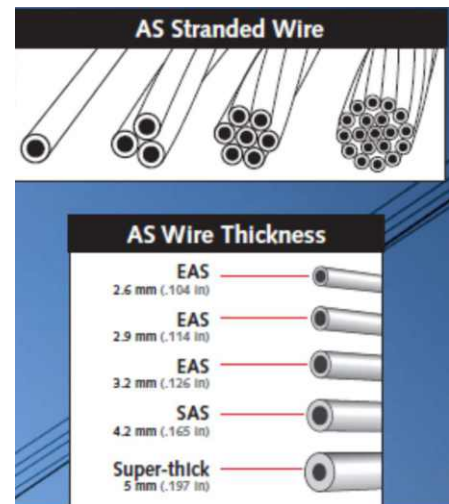
## Characteristics of AS Wire

- Wider variety of properties and size of steel wire, thickness of aluminum cladding and quality of aluminum. (Cross sectional area ratio of the aluminum is AS wire covers approximately 13% to 85%, while that designated in ASTM B415 is fixed at 25%.)
- Wider range of combinations of tensile strength and conductivity.
- High corrosion resistance due to thick EC-grade aluminum covering.
- Sufficiently strong bonding strength at the boundary between aluminum layer and steel core.
- Lighter in weight than galvanized and aluminized steel wire.
- Excellent thermal stability for continuous operation in high temperature.
- Availability of wider variety of products as follows:
  - AS Wire of complex cross section.
  - AS wire of approximately 2.05mm to 8mm in diameter.

## Corrosion Resistance

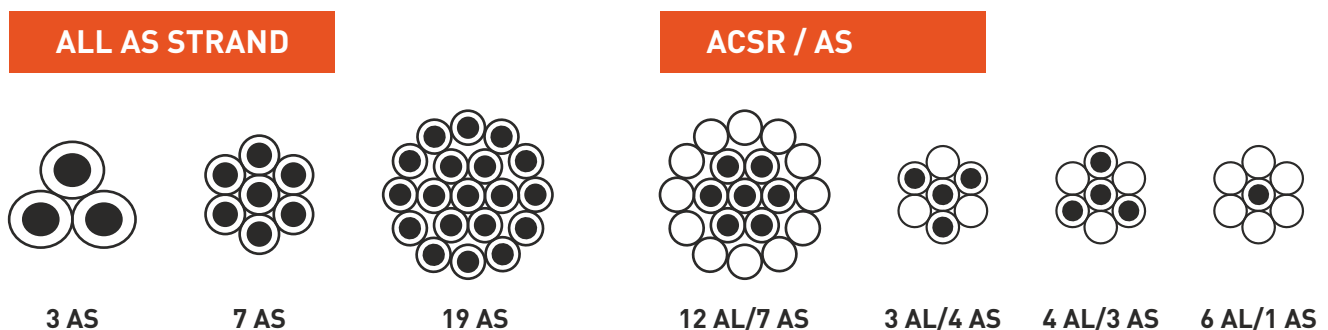
The corrosion resistance to bare aluminum conductors for overhead transmission and distribution line is very important when installed in high risk areas such as near the sea, industrial areas, deserts, etc.

The thick, high corrosion resistant EC-grade aluminum covering of AS wire will protect the steel core by its advantageous galvanic action, even if the steel core is partially exposed.



## Types of Wire

AS wire has been used in a great variety of applications such as conductors, ground wires and guy wires in overhead transmissions and distribution line, messenger wires, guard rope, mooring rope, trellis, barbed wire and net fencing. Various applications and cross-sectional views of AS wire are shown below.





## OVERHEAD SHIELD WIRE (GROUND WIRE)

Single Wire ASTM B415													
Size/ AWG	Diameter		Ultimate Tensile strength		Minimum Breaking Strength		Weight		Resistane at 20°		Cross Section		
	Inches	mm	ksi	kg/mm <sup>2</sup>	lbs	kg	lbs/1,000 ft.	kg/km	Ω/1,000 ft.	Ω/km	C mils	inches <sup>2</sup>	mm <sup>2</sup>
4	.2043	5.189	155	109.0	5,081	2,304.6	93.63	139.34	1.222	4.010	41,740	0.033	21.150
	.1880	4.775	160	112.5	4,441	2,014.6	79.29	118.00	1.443	4.735	35,340	0.028	17.910
5	.1819	4.620	165	116.0	4,290	1,945.9	74.25	110.50	1.541	5.056	33,090	0.026	16.770
	.1729	4.392	170	119.5	3,991	1,810.4	67.09	99.84	1.706	5.598	29,900	0.023	15.150
6	.1620	4.114	175	123.0	3,608	1,636.6	58.88	87.62	1.943	6.375	26,240	0.021	13.300
	.1549	3.934	180	126.6	3,392	1,538.8	53.84	80.13	2.126	6.974	24,000	0.019	12.160
7	.1443	3.665	185	130.1	3,025	1,372.1	46.69	69.48	2.450	8.038	20,820	0.016	10.550
	.1369	3.477	190	133.6	2,796	1,268.5	42.04	62.57	2.722	8.931	18,740	0.015	9.495
8	.1285	3.264	195	137.1	2,529	1,147.1	37.03	55.11	3.089	10.135	16,510	0.013	8.367
9	.1144	2.906	195	137.1	2,005	909.4	29.37	43.71	3.896	12.783	13,090	0.010	6.632
10	.1019	2.588	195	137.1	1,590	721.2	23.29	34.66	4.912	16.116	10,380	0.008	5.261
11	.0907	2.304	195	137.1	1,269	571.9	18.47	27.49	6.194	20.322	8,230	0.006	4.168
12	.0808	2.052	195	137.1	1,000	453.6	14.65	21.80	7.811	25.627	6,530	0.005	3.310

Coefficient of linear expansion : 0.000 0007 2/deg F (12.96 x 10<sup>-6</sup>/deg C)  
 Temperature Coefficient of resistance :0.0020/deg F(0.0036/deg C)  
 Modules of elasticity : 23,500 ksi (16,520 kg/mm<sup>2</sup>)  
 Min. aluminum thickness : 10% of nominal wire radius

Stranded Wire ASTM B416													
Size/ AWG	Individual Wire Diameter		Stranded Diameter		Minimum Breaking Strength		Weight		Resistane at 20°		Cross Section		
	Inches	mm	Inches	mm	lbs	kg	lbs/1,000 ft.	kg/km	Ω/1,000 ft.	Ω/km	C mils	inches <sup>2</sup>	mm <sup>2</sup>
19/6	.1620	4.114	.810	20.570	61,700	27,980	1,134.00	1688.0	0.1037	0.3403	498,800	0.3917	252.70
19/7	.1443	3.665	.721	18.310	51,730	23,460	889.50	1339.0	0.1308	0.4292	395,500	0.3107	200.40
19/8	.1285	3.264	.642	16.310	43,240	19,610	713.50	1062.0	0.1649	0.5411	313,700	0.2464	159.00
19/9	.1144	2.906	.572	14.530	34,290	15,550	565.80	842.0	0.2079	0.6821	248,800	0.1954	126.10
19/10	.1019	2.588	.509	12.130	27,190	12,330	448.70	667.8	0.2622	0.8603	197,300	0.1549	99.93
7/5	.1819	4.620	.546	13.870	27,030	12,260	524.90	781.2	0.2264	0.7428	231,700	0.1820	117.40
7/6	.1620	4.115	.486	12.340	22,730	10,310	416.30	619.5	0.2803	0.9197	183,800	0.1443	93.09
7/7	.1443	3.665	.433	11.000	19,060	8,645	330.00	491.1	0.3535	1.1595	145,700	0.1145	73.87
7/8	.1285	3.264	.385	9.779	15,930	7,225	261.80	389.6	0.4458	1.4627	115,600	0.0908	58.56
7/9	.1144	2.906	.343	8.712	12,630	5,728	207.60	308.9	0.5621	1.8442	91,650	0.0720	46.44
7/10	.1019	2.588	.306	7.772	10,020	4,544	164.70	245.1	0.7088	2.3255	72,680	0.0571	36.82
7/11	.0907	2.304	.272	6.909	7,945	3,603	130.60	194.4	0.8938	2.9325	57,590	0.0452	29.18
7/12	.0808	2.052	.242	6.147	6,301	2,858	103.60	154.2	1.1270	3.6976	45,710	0.0359	23.16
3/5	.1819	4.620	.392	9.957	12,230	5,547	224.50	334.1	0.5177	1.6985	99,310	0.0780	50.32
3/6	.1620	4.115	.349	8.864	10,280	4,662	178.10	265.0	0.6528	2.1418	78,750	0.0619	39.90
3/7	.1443	3.665	.311	7.899	8,621	3,910	141.20	210.7	0.8232	2.1009	62,450	0.0491	31.64
3/8	.1285	3.264	.277	7.036	7,206	3,268	112.00	166.7	1.0380	3.4057	49,530	0.0389	25.10
3/9	.1144	2.907	.247	6.274	5,715	2,592	88.81	132.2	1.3090	4.2947	39,280	0.0309	29.90
3/10	.1019	2.588	.220	5.588	4,532	2,055	70.43	104.8	1.6510	5.4168	31,150	0.0245	15.78

Coefficient of linear expansion : 0.000 0007 2/deg F (12.96 x 10<sup>-6</sup>/deg C)  
 Temperature coefficient of resistance :0.0020/deg F(0.0036/deg C)  
 Modules of elasticity : 23,500 ksi (16,520 kg/mm<sup>2</sup>)

All weight, measurement, and values are nominal.  
 All ASTM specifications are per the latest addition

## GUY WIRE & MESSENGER WIRE

Single Wire for STRANDS ASTM B415												
Nominal Diameter		AWG (equiva- lent)	Cross Section		Ultimate Tensile Strength		Minimum Breaking Strength		Weight		Minimum Aluminum Thickness	
Inches	mm		Inches <sup>2</sup>	mm <sup>2</sup>	ksi	kg/mm <sup>2</sup>	lbs	kg	lbs/1,000 ft.	kg/km	C mils	inches <sup>2</sup>
.081	2.06	12	.0052	3.33	195	137	1,005	457	14.72	22.0	.0041	0.103
.083	2.11		.0054	3.50	195	137	1,055	479	15.46	23.0	.0042	0.106
.091	2.31	11	.0065	4.19	195	137	1,268	574	18.58	27.6	.0046	0.116
.102	2.59	10	.0082	5.27	195	137	1,593	722	23.35	34.7	.0051	0.130
.104	2.64		.0085	5.47	195	137	1,657	750	24.27	36.1	.0052	0.132
.110	2.79		.0095	6.11	195	137	1,853	838	27.15	40.3	.0055	0.140
.114	2.90	9	.0102	6.61	195	137	1,990	905	29.16	43.5	.0057	0.145
.120	3.05		.0113	7.31	195	137	2,205	1,000	32.31	48.2	.0060	0.153
.121	3.07		.0115	7.40	195	137	2,242	1,010	32.85	48.8	.0061	0.154
.128	3.25	8	.0129	8.30	195	137	2,509	1,130	36.77	54.7	.0064	0.163
.139	3.53		.0152	9.79	185	130	2,807	1,270	43.36	64.5	.0070	0.177
.145	3.68	7	.0165	10.60	180	127	2,972	1,350	47.18	70.1	.0073	0.184
.148	3.75		.0172	11.00	180	127	3,097	1,400	49.15	72.8	.0074	0.188
.165	4.19		.0214	13.80	170	120	3,635	1,650	61.10	90.9	.0083	0.210
.173	4.39		.0235	15.10	165	120	3,878	1,810	67.16	99.8	.0087	0.220

Density: 0.2381 lb/in<sup>3</sup>

STRANDS for Guy & Messenger Wire ASTM B416											
Designation	Construction Nos.		AWG (equiva- lent)	Standard Diameter		Cross Section		Minimum Breaking Strength		Weight	
	Inches	mm		Inches	mm	Inches <sup>2</sup>	mm <sup>2</sup>	lbs	kg	lbs/1,000 ft.	kg/km
4MG 3	3/0.102	2.59	3/10	1.220	5.59	0.0245	15.8	4,500	2,060	70.60	105
5 MG3	3/0.114	2.90	3/9	0.247	6.27	0.0306	19.8	5,600	2,580	88.80	132
6 MG	7/0.081	2.06	7/12	0.242	6.15	0.0361	23.3	6,300	2,880	104.10	155
6.6 MG	7/0.083	2.11	–	0.249	6.32	0.0379	24.5	6,600	3,020	109.30	163
7 MG3	3/0.128	3.25	3/8	0.277	7.04	0.0386	24.9	7,100	3,240	111.20	165
8 MG	7/0.091	2.31	7/11	0.272	6.91	0.0455	29.3	8,000	3,620	131.40	195
5/16 in.MG	3/0.141	3.68	3/7	5/16	7.94	0.0495	31.9	8,400	3,850	142.70	212
10 MG	7/0.102	2.59	7/10	0.306	7.77	0.0572	36.9	10,000	4,550	165.10	245
5/16 in.MG	7/0.104	2.64	–	5/16	7.94	0.0595	38.3	10,400	4,720	171.60	255
11.5 MG	7/0.110	2.79	–	0.330	8.38	0.0665	42.8	11,600	5,280	192.00	285
12.5 MG	7/0.114	2.90	7/9	0.343	8.71	0.0714	46.3	12,500	5,700	206.20	308
3/8 in.MG	7/0.121	3.05	–	–	9.52	0.0792	51.2	13,800	6,310	228.40	340
14 MG	7/0.121	3.07	–	0.363	9.22	0.0805	51.8	14,100	6,390	232.20	345
16 MG	7/0.128	3.25	7/8	0.386	9.80	0.0901	58.1	16,000	7,160	260.00	387
18 MG	7/0.139	3.53	–	0.417	10.60	0.1062	68.5	18,000	8,020	306.60	456
7/16 in.MG	7/0.145	3.68	7/7	7/16	11.10	0.1156	74.5	18,700	8,510	333.60	496
20 MG	7/0.148	3.75	–	0.444	11.30	0.1204	77.3	20,000	8,840	347.50	515
1/2 in.MG	7/0.165	4.19	–	1/2	12.70	0.1497	96.5	22,900	10,400	432.00	642
25 MG	7/0.173	4.39	–	0.519	13.20	0.1645	106.0	25,000	11,400	474.80	705

Package : Standard packaging for guy wire will be in 500 ft. coils or on 5000 ft. reels

All weight, measurement, and values are nominal.  
All ASTM specifications are per the latest addition



## AS SOLID WIRE

Diameter		Stress at 1.0% Extension		Ultimate Tensile Strength		Resistivity at 68°F	Density lb/in <sup>3</sup>
Inches	mm	ksi	kg/mm <sup>2</sup>	ksi	kg/mm <sup>2</sup>	51.01 ohm-cmil/ft	.2381 (6.590g/cm <sup>3</sup> )
0.0770-0.1289	1.956-3.274	175	123	195	137		
0.1290-0.1369	3.275-3.477	170	120	190	134		
0.1370-0.1443	3.478-3.665	165	116	185	130		
0.1444-0.1549	3.666-3.934	160	112	180	127		
0.1550-0.1620	3.935-4.115	160	112	175	123		
0.1621-0.1729	4.116-4.392	155	109	170	120		
0.1730-0.1819	4.393-4.620	150	105	165	116		
0.1820-0.1880	4.621-4.775	145	102	160	112		

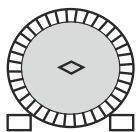
Resistivity: 51.0 ohm-cmil/ft at 68°F=0.08480 ohm-mm/m at 20°C = Conductivity 20.3% IACS at 20°C

Min. aluminum thickness : 10% of nominal wire radius

## PERFORMANCE OF AS WIRE

PERFORMANCE OF AS WIRE						
Standard	Abbreviation	Minimum Tensile Strength kgf/mm <sup>2</sup>	Minimum Conductivity at 20°C (%IACS)	Modulus of Elasticity kgf/mm <sup>2</sup>	Coefficient of Linear Expansion kgf/x10 <sup>2</sup> /°C	
IEC 61232	AS / IEC	1,070~1,340 Mpa	20.3	162 GPa	13.0 x 10 <sup>-6</sup> K <sup>-1</sup>	
ASTM B-415 ASTM B -502	AS / ASTM	109 - 137	20.3	162 GPa	12.6	
DIN 48200-Teil 8	AD / DIN	1,080~1,370N/mm <sup>2</sup>	20.3	162 Gpa	12.6	
ONORM E4031	AS / ONORM	1,080~1,370N/mm <sup>2</sup>	20.3	162 Gpa	12.6	
NORMA ESPANOLA UNE 21-059 / 21-060	AS / UNE	1,080~1,370N/mm <sup>2</sup>	20.3	162 Gpa	12.6	
Australian Standard 1220-part 3 / 1222 part 2	AS / ASTM	1.19~1.34GPa	20.3	162 Gpa	12.6	
Japan Federation of Electric Power Co. A241, A220	AS / JFEPC	130~135	20.3~23.0	14,600 ~ 14,700	12.9	
JCS 1389-2014	14% Conductivity	14 AS	160	14	17,300	12
	20% Conductivity	20 AS	135	20.3	15,800	12.6
	23% Conductivity	23 AS / 130	130	23	15,200	12.9
		23 AS / 125	125		15,200	12.9
	27% Conductivity	27 AS	110	27	14,300	13.4
	30% Conductivity	30 AS	90	30	13,500	13.8
	35% Conductivity	35 AS	70	35	12,400	14.5
	40% Conductivity	40 AS	70	40	11,100	15.5

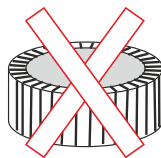
JCS : Japanese Cable Makers Association Standard



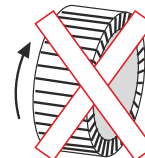
Use blocks  
on both sides



Use crane  
or forklift



Do not lay flat



Do not roll in  
opposite direction



Do not drop

# ACSR WIRE STEEL CORE WIRES FOR ALUMINIUM CONDUCTORS

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## TECHNICAL SPECIFICATIONS

Essen Steel offers the product as single wire, seven wire strand & 19 wire strands.

ACSR Wires as per IEM-60888; BS EN-50189; ASTM B 498 / 498M; BS EN-50182; BS EN 50189 ST1A, ST2B, ST3D, ST4A, ST5E, ST6C

ASTM B 957; ASTM A 475 -98  
Testing of wires >> As per EN 10002-1/  
EN 10218-1

### PRODUCT PROFILE

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#### ACSR WIRES AS PER ASTM & BS Electrical Guywire Stay Wire

1,57 mm	3,35 mm
1,80 mm	3,40 mm
2,16 mm	3,45 mm
2,25 mm	3,53 mm
2,59 mm	3,66 mm
2,65 mm	3,99 mm
2,79 mm	4,09 mm
3,00 mm	4,57 mm
3,05 mm	





# TECHNICAL SPECIFICATIONS

DIAMETER (mm)	ST1A (N/mm <sup>2</sup> )	ST4A (N/mm <sup>2</sup> )
1,24 ≤ 1,50	1170 - 1400	1275 - 1670
1,50 ≤ 1,75	1170 - 1400	1275 - 1670
1,75 ≤ 2,25	1170 - 1400	1275 - 1670
2,25 ≤ 2,75	1150 - 1350	1275 - 1670
2,75 ≤ 3,00	1140 - 1350	1275 - 1670
3,00 ≤ 3,50	1100 - 1300	1225 - 1620
3,50 ≤ 4,25	1100 - 1300	1225 - 1620
4,25 ≤ 4,75	1100 - 1300	1225 - 1620
4,75 ≤ 5,50	1100 - 1300	1225 - 1620

## RAW MATERIAL

WIRE RODS (SAE 1045, 1065, 1070)

ZINC (%99, 995 ZINC INGOTS ACC TO EN 1179 Z1)

## COATING

HEAVILY GALVANIZED (EN10244-2 CLASS A - CLASS C)

## QUALITY

EN50189 - ASTM B498 and other international norms



# QUALITY & PACKING

Essen Steel Offers the ACSR wire/strands for all types of zinc coating and tensile norms from UHS/EHS grades and normal coating to heavy coating as per EN-10244-2.



## PACKAGING

We offer the product based on the requirement of customer and different lengths can be offered accordingly. The product can be offered in

- A.** Coil form (ID: 500 / OD: 700: Height as per length) the coils will be strapped at 4 points with Plastic strip.
- B.** Wooden reel size ranging from flange: 630/Belly: 285 width 474 for single wire (material weight can be up to 700 Kgs)
- C.** Wooden reel up to Flange:1600/ Belly:800 width 900 with weight capacity up to 3.5 MT.



## GALVANIZED STEEL WIRE STRANDS

Class A Galvanized and ESSEN-ZIAL Wire (95% Zinc /5% Aluminum + Mischmetel)										
Galvanized Steel Strands				Manimum Breaking Strength (lbs)					Minimum Weigth of Coating OZ / Sq.ft	
Strand Diameter (Inches)	Coated Wire Diameter (Inches)	Wires Per Strand	Strand Weight lbs/1,000ft	Utilities Grade	Common Grade	Siemens-Martin Grade	High Strength Grade	Extra-high strength Grade	Class A	Conzinal
1/4	.120	3	117	3,150	1,860	3,040	4,730	6,740	.85	.85
1/4	.120	3	117	4,500					.85	.85
5/16	.145	3	171	6,500	2,490	4,090	6,350	9,100	.90	.90
3/8	.165	3	220	8,500	3,330	5,560	8,360	11,800	.90	.90
1/4	.080	7	121		1,900	3,150	4,750	6,650	.60	.60
9/32	.093	7	164	4,600	2,570	4,250	6,400	8,950	.70	.70
5/16	.104	7	205		3,200	5,350	8,000	11,200	.80	.80
5/16	.109	7	225	6,000					.80	.80
3/8	.120	7	273	11,500	4,250	6,950	10,800	15,400	.85	.85
7/16	.145	7	399	18,500	5,700	9,350	14,500	20,800	.90	.90
1/2	.165	7	517	25,000	7,400	12,100	18,800	26,900	.90	.90
9/16	.188	7	671		9,600	15,700	24,500	35,000	1.00	1.00
5/8	.207	7	813		11,600	19,100	29,600	42,400	1.00	1.00
1/2	.100	19	504		7,620	12,700	19,100	26,700	.70	.70
9/16	.113	19	637		9,640	16,100	24,100	33,700	.80	.80
5/8	.125	19	796		11,000	18,100	28,100	40,200	.85	.85
3/4	.150	19	1,155		16,000	26,200	40,800	58,300	.90	.90
7/8	.177	19	1,581		21,900	35,900	55,800	79,700	.90	.90
1	.200	19	2,073		28,700	47,000	73,200	104,500	1.00	1.00

All weight, measurement, and values are nominal.  
All ASTM specifications are per the latest addition

### ESSEN-ZIAL (Essen Zinc Aluminum) 95% Zinc / 5% Aluminum plus Mischmetal specifications:

A855 / A855M (Guy, Messengers)

A925 (Overhead Ground Wire)

B802/B802M, B803/B803M, B958/B958M (Core Wire in ACSR Conductors)

### Essen CLASS A Galvanized Steel specifications:

A363 (Zinc Coated Steel Overhead Ground / Shield Wire)

A475 (Zinc Coated Steel Wire Strand for Guys, Messengers)

B498 (Zinc Coated Steel Core Wire in ACSR Conductors)

Galvanized Steel is used for the following applications: Guy and messenger wires, overhead ground/shield wires on electrical transmission and distribution lines, and as a core wire for ACSR conductors.

ESSEN-ZIAL : 95% Zinc + 5% Aluminum - Mischmetal Alloy is available per ASTM Standard : A855 / A855M for use as guys and messenger, A925 for use as overhead ground / shield wire, and B802/B802M, B803/ B803M, B958/B958M for use as core wires in ACSR conductors.

GALVANIZED STEEL STRAND - CLASS A is available per ASTM Standards:

A363 (Zinc Coated Steel Overhead Ground Wire) for use as overhead ground / shield wire, A475 (Zinc Coated Steel Wire Strand) for use as guys and messenger, or B498 (Zinc Coated Steel Core Wire) for use in ACSR Conductors.

We manufacturer and stock a large variety of sizes and strengths, from utility grade to extra-high strength for quick delivery. We offer our coated steel wires in 3-wire, 7-wire and 19-wire constructions.

Packaging is available in 250' or 500' hand coils and reels up to 20,000' lengths.

Colored end-wrapping is used for grade identification.





# COLD DRAWN STEEL WIRES

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## DIAMETER

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Ø 3,80 mm - Ø 7,00 mm  
Plain, Zinc Coated or Deformed

## TENSILE STRENGTH

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Min. 550 N/mm<sup>2</sup>

## YEILD STRENGTH

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Min. 500 N/mm<sup>2</sup>

## RAW MATERIAL

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WIRE RODS (SAE 1006, 1008, 1010)

## QUALITY

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DIN 488, BS 4483 or ASTM or Other  
International Standard

## TECHNICAL SPECIFICATIONS

STANDARD	EN 10218
RAW MATERIAL	SAE 1006, SAE 1008, SAE 1010, SAE 1018
DIAMETER	1,40 - 15,00 mm
TENSILE STRENGTH	500 - 1,050 N/mm <sup>2</sup>
COIL WEIGHT	50 - 1,000 kg
PACKAING	-
FIELD OF USE	Industrial Product Manufacture

# SPRING WIRE

## TECHNICAL SPECIFICATIONS

STANDARD	EN 10270-1
RAW MATERIAL	SAE 1045, SAE 1070, SAE 1075
DIAMETER	1,20 - 4,00 mm
TENSILE STRENGTH	SL (Class A), SM (Class B)
COIL WEIGHT	100 - 1,000 kg
PACKAGING	-
FIELD OF USE	Sitting group and Industrial Area



## PACKAGING

COILS	Inner Ø mm	Outer Ø mm	H mm	Weight kg	Wire Ø mm
	220	400		20 / 25	0.30 ÷ 0.60
	300	500		50	0.60 ÷ 1.10
	400	650		100 / 200	1.20 ÷ 2.00
	550	900		200 / 300	2.10 ÷ 3.10
	600	950		300	3.20 ÷ 4.70
	700	1100		600	4.80 ÷ 8.40
	800	1400		600 / 900	8.50 ÷ 12.00

FORMERS	Inner Ø mm	Outer Ø mm	H mm	Weight kg	Wire Ø mm
	500	970	1200 max	1500 max	1.80 ÷ 3.10
	560	1000	1200 max	1500 max	3.20 ÷ 4.70
	660	1200	1400 max	1500 max	4.80 ÷ 9.00

CHEESE TYPE Z2	Inner Ø mm	Outer Ø mm	H mm	Weight kg	Wire Ø mm
	355	750	280	400 / 450	1.80 ÷ 2.50

CHEESE TYPE Z3	Inner Ø mm	Outer Ø mm	H mm	Weight kg	Wire Ø mm
	500	900	500	700 / 120	0.50 ÷ 3.70



**ESSEN**  
STEEL

WIRE & STRAND



**PC STRAND**



# PC STRAND

## Pre-stressed concrete Reinforcement Steel Strand

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### PLAIN or GALVANIZED

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EN 10244 - 2 CLASS A

### DIAMETER

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Ø 7,94 mm (5/16") - Ø 17,78 mm (7/10")

### TYPE

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LOW RELAXATION

### TENSILE STRENGTH

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GRADE 270K (1860 MPA)

### RAW MATERIALS

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SPECIAL WIRE ROD (SAE 1082)

### COIL SIZE

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ID 800 mm, 31,5"

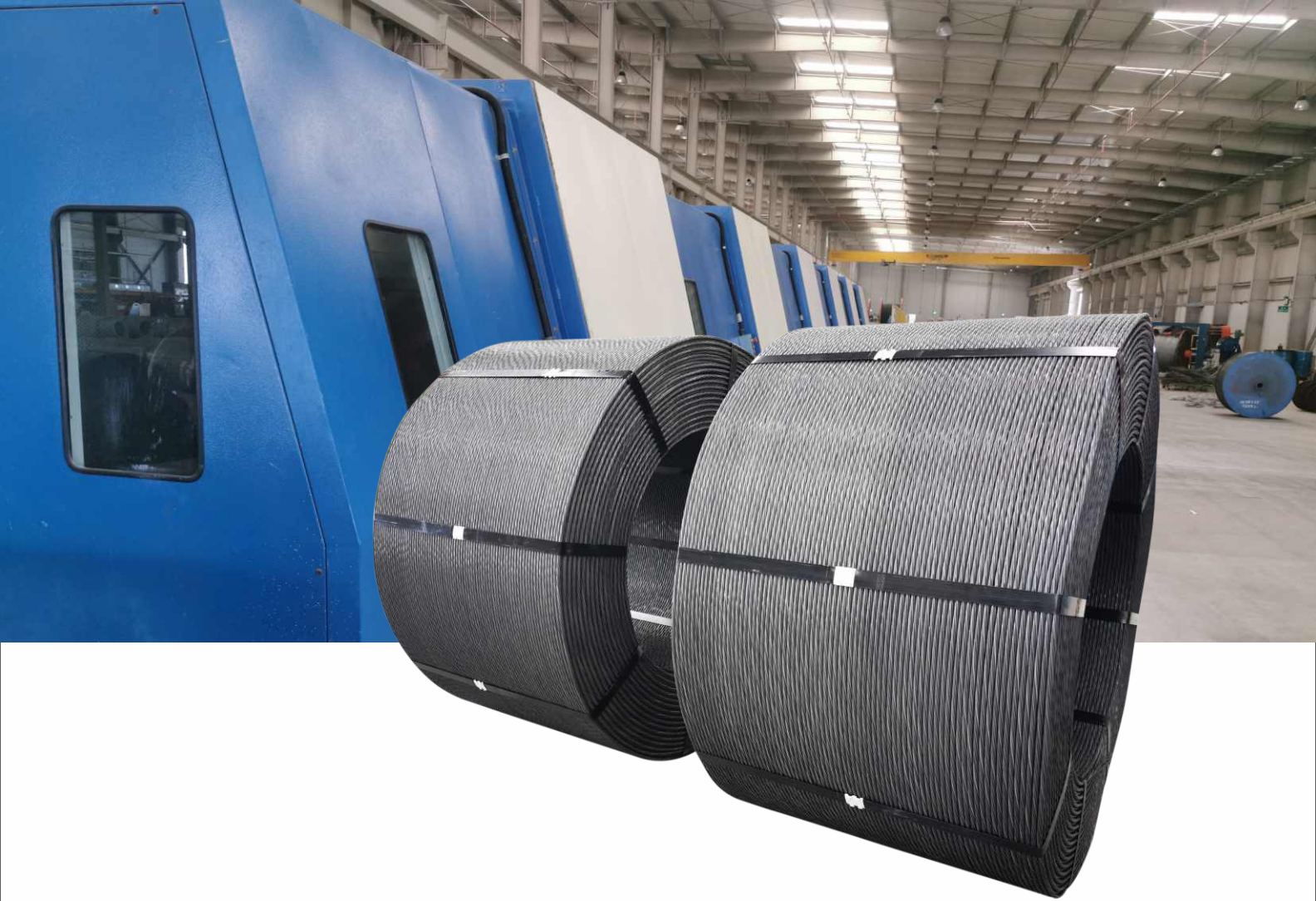
TRAVERSE : 750 mm, 29,5"

WEIGHT : 2500 - 4000 kgs (5,500 - 8,800 lbs)

### QUALITY

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EN 10138 -3, ASTM A416/A 416M - 10,  
BS 5896, TS 5680



### Dimensions of Reeless Coil (Product Packing)

Essen Steel Low Relaxation PC strand can be supplied in dry or oiled condition as per customers's requirement. Oil used can be easily washed with plain water at site before stressing and grouting operations.

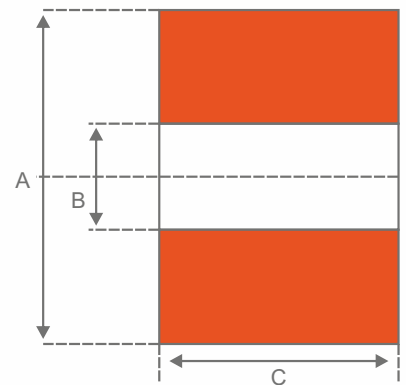
PC strands are supplied in cheese coil from 2.5 MT to 3.5 MT as per customer's requirement. These coils are suitable strapped for compactness and depending on customer's requirement are packed or palletized.

The starting end of the strand is separately identified and can be easily located in the coil.

Eye to Side



Eye to Sky



Position of Coil as per customer specification

Nominal Diameter of Strand	kg / mtr	Outside Diameter (mm)	Inside Diameter (mm)	Width/Height (mm)	Approximate Length per pack (mtr) (Correspond to coil weight of 2.5 to 3.5 MT)
9.30	0.406	1300 to 1500	B=750	C=800	7750
9.53	0.432				7500
12.7	0.775				4250
15.2	1.10				3000
15.7	1.17				2850

## PRODUCTS ARE OFFERED AS THE FOLLOWING SPECIFICATIONS AND INTERNATIONAL STANDARDS:

### ASTM A416-17a

#### Low Relaxation

GRADE	NOMINAL DIAMETER		TOLERANCE ON DIAMETER	STEEL AREA OF STRAND		WEIGHT OF STRAND		TENSILE STRENGTH	MINIMUM BREAKING LOAD	MINIMUM LOAD @1% EXTENSION	MIN. ELONG.	LAY LENGTH
	mm	in	mm	mm <sup>2</sup>	in <sup>2</sup>	kg/1000m	lb/1000ft	N/mm <sup>2</sup>	KN	KN	%	mm
250 (1725)	7,9	5/16	+/-0,40	37	0,058	294	197	1725	64,50	58,10	3,5	(12-16) x d
	9,5	3/8	+/-0,40	52	0,08	405	272	1725	89,00	80,10	3,5	
	11,1	7/16	+/-0,40	69,7	0,108	548	367	1725	120	108,10	3,5	
	12,7	1/2	+/-0,40	92,9	0,144	730	490	1725	160	144,10	3,5	
	15,2	6/10	+/-0,40	139	0,216	1090	737	1725	240	216,20	3,5	
270 (1860)	9,53	3/8	+0,65/-0,15	55	0,085	430	290	1860	102	92,1	3,5	
	11,1	7/16	+0,65/-0,15	74,2	0,115	580	390	1860	138	124,1	3,5	
	12,7	1/2	+0,65/-0,15	98,7	0,153	780	520	1860	184	165,3	3,5	
	15,2	6/10	+0,65/-0,15	140	0,217	1100	740	1860	261	234,60	3,5	
	15,7	0,62	+0,65/-0,15	150	0,231	1200	780	1860	279	251,4	3,5	
	17,8	7/10	+0,65/-0,15	190	0,294	1500	1000	1860	353	318,00	3,5	

Max. relaxation loss after 1000 Hrs < 2,5% when initial load at 70% of specified breaking load.

### BS 5896 : 2012

#### Relaxation Class 2

STEEL NAME	DIAMETER	TENSILE STRENGTH	CROSS SECTIONAL AREA	MASS PER METER	DEVIATION ON MASS PER METER	CHARACTERISTIC VALUE OF MAX. FORCE FM	MAXIMUM VALUE OF MAXIMUM FORCE FM	Fp 0.1%	Rt 0.1%	MIN. ELONG. Lo.= 500 MM	CURVATIVE OF STRAND	LAY LENGTH
	mm	N/mm <sup>2</sup>	mm <sup>2</sup>	g/m	%	kN	kN	kN	kN	%		mm
Y1670S7	15,20	1670	139	1086	± 2	232	267	204	NA	3,5	MAX BOW HEIGHT = 25 MM / 1 METER	(14-18) X D
Y1700S7G*	18,00	1700	223	1742	± 2	379	436	334	NA	3,5		
Y1770S7	9,30	1770	52	406,1	± 2	92	106	81	NA	3,5		
Y1770S7	11,00	1770	70	546,7	± 2	124	143	109	NA	3,5		
Y1170S7	12,50	1770	93	726,3	± 2	165	190	145	NA	3,5		
Y1770S7	15,70	1770	150	1172	± 2	266	306	234	NA	3,5		
Y1820S7G*	15,20	1820	165	1289	± 2	300	345	264	NA	3,5		
Y1860S7	8,00	1860	38	296,8	± 2	70,7	81,3	62,2	NA	3,5		
Y1860S7	9,30	1860	52	406,1	± 2	96,7	111	85,1	NA	3,5		
Y1860S7	9,60	1860	55	429,6	± 2	102	117	89,8	NA	3,5		
Y1860S7	11,30	1860	75	585,8	± 2	140	161	123,0	NA	3,5		
Y1860S7	12,50	1860	93	726,3	± 2	173	199	152,0	NA	3,5		
Y1860S7	12,90	1860	100	781	± 2	186	214	164,0	NA	3,5		
Y1860S7	15,20	1860	139	1086	± 2	259	298	228,0	NA	3,5		
Y1860S7	15,70	1860	150	1172	± 2	279	321	246,0	NA	3,5		
Y1860S7G*	12,70	1860	112	874,7	± 2	208	239	183,0	NA	3,5		

Max. relaxation loss after 1000 Hrs < 2,5% when initial load at 70% of specified breaking load.

The diameter of the central wire shall be at least 3,0% greater than the diameter of the outer helical wires.

\* Compacted strand



## EN 10138 - 3 : 2011

### Uncoated Strand 7 - steel wire for prestressed concrete

STEEL NAME	STEEL NUMBER	DIAMETER	TENSILE STRENGTH	CROSS SECTIONAL AREA	MASS PER METER	DEVIATION ON MASS PER METER	CHARACTERISTIC VALUE OF MAX. FORCE FM	MAXIMUM VALUE OF MAXIMUM FORCE FM	Fp 0.1%	Rt 0.1%	MIN. ELONG. Lo. = 500 MM	CURVATIVE OF STRAND	LAY LENGTH
		mm	N/mm <sup>2</sup>	mm <sup>2</sup>	g/m	%	kN	kN	kN	kN	%		mm
Y1770S7	1.1365	9,30	1770	52	406,1	± 2	92	106	81	NA	3,5	MAX.BOW HEIGHT = 25 MM / 1 METER	(14-18) XD
Y1170S7	1.1365	12,50	1170	93	726,3	± 2	165	190	145	NA	3,5		
Y1860S7	1.1366	9,30	1860	52	406,1	± 2	96,7	111	85,1	NA	3,5		
Y1860S7	1.1366	12,50	1860	93	726,3	± 2	173	199	152,0	NA	3,5		
Y1860S7	1.1366	15,20	1860	139	1086	± 2	259	298	228,0	NA	3,5		
Y1860S7	1.1366	15,70	1860	150	1172	± 2	279	321	246,0	NA	3,5		
Y1960S7	1.1367	9,30	1960	52	406,1	± 2	102	117	91	NA	3,5		
Y1960S7	1.1367	12,50	1960	93	726,3	± 2	182	209	162	NA	3,5		
Y2060S7	1.1368	12,50	2060	93	726,3	± 2	192	221	171	NA	3,5		
Y2060S7	1.1368	12,90	2060	100	781	± 2	206	237	183,0	NA	3,5		
Y1860S7G*	1.1372	12,70	1860	112	874,7	± 2	208	239	183,0	NA	3,5		
Y1860S7G*	1.1372	15,20	1860	165	1289	± 2	307	353	270	NA	3,5		
Y1700S7G*	1.1370	18,00	1700	223	1742	± 2	379	436	334	NA	3,5		

Max. relaxation loss after 1000 Hrs < 2,5% when initial load at 70% of specified breaking load.

The diameter of the central wire shall be at least 3,0% greater than the diameter of the outer helical wires.

\* Compacted strand

## AUSTRALIAN STANDARDS : AS 1311

STANDARD	NOMINAL DIAMETER	DIAMETER TOLERANCE	NOMINAL AREA OF STAND	NOMINAL MASS	MINIMUM BREAKING STRENGTH OF STAND		MINIMUM YIELD STRAND		MINIMUM ELONGATION	INITIAL LOAD	
	mm	Imm	mm <sup>2</sup>	kg/1000m	kgf	kN	kgf	kN	%	70%	80%
Regular	9.30	+/- 0.4	52.00	410	9,528	94.00	8,145	79.90	3.5	2.5 (B)	3.5 (B)
	10.90	+/- 0.4	71.00	555	12,742	125.00	10,836	106.30	3.5	2.5 (B)	3.5 (B)
	12.70	+/- 0.4	94.00	740	16,820	165.00	14,297	140.30	3.5	2.5 (B)	3.5 (B)
	15.20	+/- 0.4	139.00	1,090	23,140	227.00	19,669	193.00	3.5	2.5 (B)	3.5 (B)
Super	9.30	+/- 0.4	55.00	430	10,398	102.00	8,838	86.70	3.5	2.5 (B)	3.5 (B)
	10.90	+/- 0.4	75.00	590	14,067	138.00	11,957	117.30	3.5	2.5 (B)	3.5 (B)
	12.70	+/- 0.4	100.00	785	18,756	184.00	15,943	156.40	3.5	2.5 (B)	3.5 (B)
	15.20	+/- 0.4	143.00	1,125	25,484	150.00	21,662	212.50	3.5	2.5 (B)	3.5 (B)
Extra High Tensile	15.20	+/- 0.4	143.00	1,125	26,606	261.00	22,615	221.90	3.5	2.5 (B)	3.5 (B)

## JAPANESE STANDARDS : JIS G 3536

Grade	Nominal Diameter		Minimum Yield Strand			Minimum Elongation*	1000 hr Relaxation Loss
	mm	Inch	kgf	lbf	kN	%	
SWPR7AL	9.30	3/8	7633	16973	75.50	3.5	2.5% max with initial load equal to 70% of minimum specified breaking load
	10.80	7/16	10312	22930	102.00		
	12.40	1/2	13750	30573	136.00		
	15.20	6/10	20624	45860	204.00		
SWPR7BL	9.50	3/8	8776	19513	86.80	3.5	
	11.10	7/16	11930	26527	118.00		
	12.70	1/2	15772	35069	156.00		
	15.20	6/10	22444	49906	222.00		

\*GL (Gauge Length) = 600mm

## JAPANESE SPECIFICATIONS : JIS G 3536


GRADE	NOMINAL DIAMETER		DIAMETER TOLERANCE		NOMINAL AREA		NOMINAL WEIGHT		MIN. BREAKING STRENGTH		
	mm	Inch	± mm	± inch	mm <sup>2</sup>	Inch <sup>2</sup>	kg/1000m	lb/1000ft	kgf	lbf	kN
SWPR7AL	9.30	3/8			51.61	0.080	405	272	8978	19963	88.80
	10.80	7/16	+0.40	+0.016	69.68	0.108	546	367	12132	26976	120.00
	12.40	1/2	-0.20	-0.008	92.90	0.144	729	490	16176	35968	160.00
	15.20	6/10			138.70	0.215	1101	740	24264	53952	240.00
SWPR7BL	9.50	3/8			54.84	0.085	432	290	10312	22930	102.00
	11.10	7/16	+0.40	+0.016	74.19	0.115	580	390	13952	31023	138.00
	12.70	1/2	-0.20	-0.008	98.71	0.153	774	520	18500	41139	183.00
	15.20	6/10			138.70	0.215	1101	740	26390	58673	261.00

## INDIAN SPECIFICATION : IS-14268/1992

CLASS	NOMINAL DIAMETER OF STRAND	TOLERANCE	NOMINAL AREA OF STRAND	MINIMUM BREAKING STRENGTH OF STRAND		0.2 PROOF LOAD (90%) OF BREAKING STRENGTH		MINIMUM % ELONGATION GL=600mm	NOMINAL WEIGHT OF STRAND (APPROX)	RELAXATION LOSS	CHEMICAL COMPOSITION
	mm	± mm	mm <sup>2</sup>	kN	kg	kN	kg		kg/kM	%	%
11	9.5	+0.66 -0.15	54.8	102.3	10434	92.1	9394	3.5	432	2.5 Max. at 70% of specified min breaking load after 1000 hours OR 1.8 max. at 70% of specified min. breaking load after 100 hours	S = .04 max. P = .04 max.
	11.1	+0.66 -0.15	74.2	137.9	14065	124.1	12658		582		
	12.7	+0.66 -0.15	98.7	183.7	18737	165.3	16860		775		
	15.2	+0.66 -0.15	140.0	260.7	26592	234.6	23929		1102		

## BS 5896:1980 Amd 1

TYPE OF STRAND	NOMINAL DIAMETER	TOLERANCE		NOMINAL AREA OF STRAND	NOMINAL TENSILE STRENGTH	SPECIFIED CHARACTERISTIC BREAKING STRENGTH	LOAD AT 1% ELONGATION	RELAXATION			Minimum Elongation at max load	Nominal Mass
		DIA	Cross sectional areas and Mass					INITIAL LOAD (% OF ACTUAL BREAKING LOAD)	Maximum after 1000hrs			
	mm	± mm		mm²	N/mm²	kN	kN		Class 1	Class 2		kg/1000m
7-wire Standard	9.3	+0,30	+4%	52	1860	97	85	For all strands	For all strands	For all strands	For all strands	408
	11	-0.15		71	1770	125	110					557
	12.5	+0,40	-2%	93	1860	173	152	60%	4.50%	1%	730	
	15.2	-0,20		139	1860	259	228	70%	8.00%	2.50%	1090	
7-Wire Super	9.6	+0,30	+4%	55	1860	102	90	80%	12%	4.50%	3.50%	432
	11.3	-0.15		75	1860	139	122					590
	12.9	+0,40	-2%	100	1860	186	163					785
	15.7	-0,20		150	1860	279	246					1180



# PC WIRE

## Pre-stressed concrete Reinforcement Steel Strand

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### **PLAIN or GALVANIZED AND INTENDED**

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EN 10244 - 2 CLASS A

### **RAW MATERIALS**

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SAE 1082

### **TYPE**

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LOW RELAXATION (Maximum relaxation at 1000h is 2.5% when loaded 70% of  $F_{ma}$ )

### **TENSILE STRENGTH**

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GRADE 270K (1860 MPA)

### **QUALITY**

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EN 10138 -3, ASTM A421/A 421M - 10,  
BS 5896

### **PACKAGING DIMENSIONS**

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ID : 1500 - 1800 mm

OD : 1900 - 2200 mm

WEIGHT : 1200 - 1500 kg



## TECHNICAL SPECIFICATIONS

STEEL NAME	DIAMETER mm	CROSS SECTIONAL AREA mm <sup>2</sup>	TENSILE STRENGTH Mpa	MASS g/m	DEVIATION ON MASS %	CHARACTERISTIC VALUE OF MAXIMUM FORCE kN	MAXIMUM VALUE OF MAXIMUM FORCE kN	CHARACTERISTIC VALUE OF 0,1% PROOF FORCE kN
Y1860C	3,0	7,07	1860	55,2	+-2	13,1	15,0	13,1
	4,0	12,57		98,1		23,4	26,7	23,4
	5,0	19,63		153,0		36,5	41,8	36,5
Y1770C	3,2	8,04	1770	62,5	+-2	14,2	16,2	14,2
	5,0	19,63		153,0		34,8	39,5	34,8
	6,0	28,27		221,0		50,0	56,9	50,0
Y1670C	6,9	37,39	1670	292,0	+-2	62,4	71,0	62,4
	7,0	38,48		301,0		64,3	73,0	64,3
	7,5	44,18		345,0		73,8	83,8	73,8
	8,0	50,27		393,0		83,9	95,4	83,9





## GLOBAL PRESENCE OF ESSEN STEEL





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WIRE & STRAND

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