WIRE

www.dsrcorp.com

D|S|R DSR CORP
DSR WIRE CORP

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D|S|R

In the bed giving you cozy sleep.

With fisherman s dream of full net,

In the beautiful piano melody,

Together with calm rest of shi ps mooring at harbor,

As cranes lift up cargos,

At the busy elevators you are using everyday,

Inside of a car taking you wherever you want to go,

DSR is always with you anytime and anywhere.

D|S|R

DSR in association with customers

Company Working with Customers

DSR is committed to our customers needs, and we will always place our customers considerations before our own. Our customer care and manufacturing divisions have been structured to honor this commitment, bringing together best systems and quality products for customer satisfaction. Our goal is to keep our customers satisfied products and services.

Quality Assurance System

DSR is striving to reach the perfection of the quality. To achieve this goal, we have in place quality assurance system, under which we reach the requirements of ISO 9001:2008, TS 16949:2009, CE, KS, JIS, Lloyd s, ABS, DNV, NK, CCS, API and BV certificates and more.

Total Solutions! - DSR

We produce and sales in whole categories of rope and wire industry(steel, stainless, fiber). With us, you don t have to waste your time to find what you want. Also we are providing the fastest business services and after services to meet the satisfaction of your convenience.

Maintaining perfect product quality system.

DSR products quality is still on improving, by running individual R&D facilities. We have got certification of ISO 9001: 2008, TS 16949:2009, permission of marking JIS and CE mark, admission of factory from classifications, such as KR, LLOYD S, ABS, DNV, BV, CCS, API, GL.

Pursuing endless innovation.

DSR has founded technical laboratory individually, to develop our unique Fiber, High carbon steel wire & wire rope, and also for Stainless wire & wire rope. Through this innovative mind, we create and guarantee our technology of wire rope and stainless steel wire.(KR, KS, ISO 9001:2008, TS 16949:2009 Certificated)

Leading the industry

With 40years long carrier, DSR posses high quality certification in fiber, wire and wire rope industry, such as TS 16949:2009, ISO 9001:2008, KS, KR, API, LLOYD S, ABS, BV, DNV, CCS, GL. By developing special items, we always considerate to meet customer s satisfaction, and drawing DSR into world wide and into your mind.

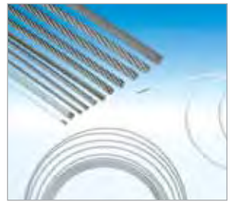
You can meet DSR over the world.

Items from DSR have been widely recognized so that you can meet DSR in hundreds of country through the five oceans and the six continents as we encourage our brand power.

Combining the world s best wire, rope and sling manufacture with a happy and prosperous customer base will create a bright future for us all.
All at DSR look forward to working with you, and trust that we can serve you well.

DSR Wire Total WIRE Info








Stainless Steel Wire for Spring

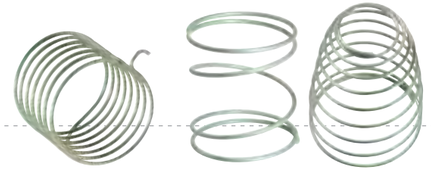
DSR is supplying Stainless Steel Wire for Spring with excellent mechanical properties(advanced surface, cast & helix control) for a uniformity of spring forming, our spring wire is manufactured under the strict quality control from wire rod to final products with suitable coating treatment classified by the usages.

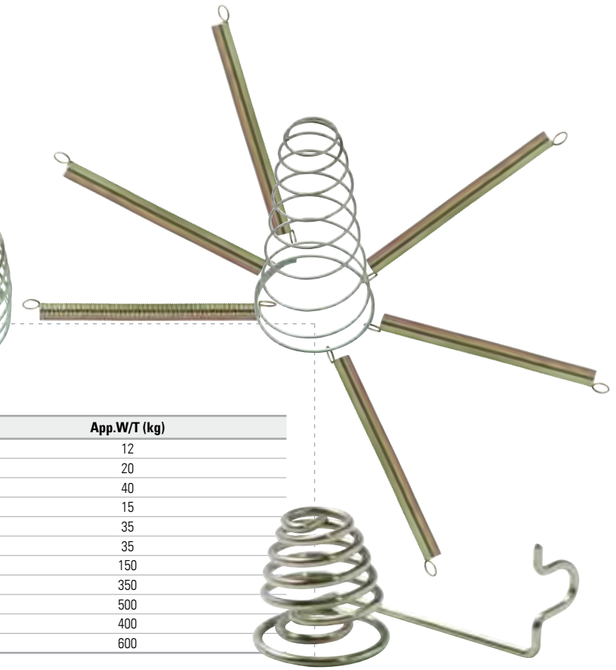
Surface Finish & Applications

Type	Symbol	Grade	Dia. (mm)	Applications
S-Co	WPA	AISI 302, 304, 304N1, 316	0.20 ~ 15.00	General Spring
	WPB	AISI 302, 304, 304N1	0.20 ~ 15.00	
	WPC	AISI 631J1	0.20 ~ 5.00	
Bright	WPA	AISI 302, 304, 304N1, 316	0.15 ~ 6.00	Precision Spring good bright surface & forming processing work
	WPB	AISI 302, 304, 304N1	0.15 ~ 6.00	
Ni-Co	WPA	AISI 302, 304, 304N1, 316	0.20 ~ 2.30	Precision coiling at high Speed
	WPB	AISI 302, 304, 304N1		
	WPC	AISI 631J1		
Ni-Co Bright	WPA	AISI 302, 304, 304N1, 316		
	WPB	AISI 302, 304, 304N1		

Mechanical Properties

Dia. (mm)	Tolerance (mm)	Tensile Strength (N/mm²)		
		CLASS A AISI 302-WPA AISI 304-WPA, AISI 304N1-WPA AISI 316-WPA	CLASS B AISI 302-WPB AISI 304-WPB AISI 304N1-WPB	CLASS C AISI 631J1-WPC
0.16	± 0.005	1650 - 1900	2150 - 2400	1950 - 2200
0.18				
0.20				
0.23	± 0.008	1600 - 1850	2050 - 2300	1930 - 2180
0.26				
0.29				
0.32				
0.35				
0.40				
0.45	± 0.010		1950 - 2200	1850 - 2100
0.50				
0.55				
0.60				
0.65		1530 - 1780	1850 - 2100	1800 - 2050
0.70				
0.80				
0.90	± 0.015			
1.00				
1.20		1450 - 1700	1750 - 2000	1700 - 1950
1.40				
1.60		1400 - 1650	1650 - 1900	1600 - 1850
1.80	± 0.020			
2.00				
2.30		1320 - 1570	1550 - 1800	1500 - 1750
2.60				
2.90		1230 - 1480	1450 - 1700	1400 - 1650
3.20				
3.50	± 0.025			
4.00				
4.50		1100 - 1350	1350 - 1600	1300 - 1550
5.00				
5.50				
6.00				
6.50	± 0.035	1000 - 1250	1270 - 1520	
8.00				
9.00			1130 - 1380	
10.00			980 - 1230	
12.00	± 0.050		880 - 1130	





Packing

SPOOL

Dia. (mm)	Packing (F × B × W : A)	App.W/T (kg)
0.16 ~ 0.44	DIN200	12
	DIN250	20
	DIN355	40
	SH390	15
	SH460	35
0.45 ~ 0.80	SH460	35
	560 Steel Reel	150
0.65 ~ 1.90	760 Steel Reel	350
1.91 ~ 4.20	700 x 380 x 480 (Wooden Reel)	500
	760 x 430 x 360 (Wooden Reel)	400
	750 x 380 x 480 (Wooden Reel)	600

COIL

Dia. (mm)	Coil I.D (inch)	App.W/T (kg)
0.20 ~ 0.30	8	10
0.30 over ~ 0.40	8	10
0.40 over ~ 0.50	8 ~ 10	10
0.50 ~ 0.80	12	20 ~ 25
0.80 ~ 0.90	16	25 ~ 35
0.90 over ~ 1.00	16	25 ~ 50
1.0 over ~ 1.80	16	25 ~ 50
1.80 over ~ 2.30	24	100
2.30 over ~ 3.20	24	100 ~ 200
3.20 over ~ 6.00	30	200 ~ 500
6.00 over ~ 15.00	40	200 ~ 500

CARRIER

Dia. (mm)	Coil I.D (inch)	App.W/T (kg)
1.91 ~ 3.20	24	910
3.21 ~ 6.00	30	1000
6.01 ~ 15.00	40	1000 ~ 1500

Cast & Helix

The most important thing to make high quality spring wire is how to control cast & helix. As our specifications are based on lots of customers demands, we have ever made control of it as follows.

Dia. (mm)	Coil I.D (inch)	Cast (mm)	Helix (mm)
0.20 ~ 0.40	8	200 ~ 300	30 under
0.40 over ~ 0.50	8	200 ~ 300	
	10	250 ~ 370	
0.50 ~ 0.80	12	300 ~ 450	
0.80 ~ 0.90	16	400 ~ 600	
0.90 over ~ 1.00			50 under
1.0 over ~ 1.80			
1.80 over ~ 2.30	24	600 ~ 900	60 under
2.30 over ~ 3.20			
3.20 over ~ 6.00	30	760 ~ 1150	100 under
6.00 over ~ 15.00	40	1000 ~ 1500	130 under

Stainless Steel Wire for Cold Heading

Stainless Steel Wire for Cold Heading is made by high quality wire rod and special heat treatment process. This enables customers to obtain products of excellent surface and metal structure necessary for superior products in spite of severe pressure condition.

Classification

Type	Grade	Symbol	Dia. (mm)	Surface Finish
Austenite	AISI 304	WSA	0.8 ~ 10.0	Bright & S-Co Z-Co
	AISI 302HQ (XM-7)			
	AISI 316			
	AISI 305			
	AISI 304J3			
	AISI 302HQ (XM-7)	WSB	0.8 ~ 20.0	
	AISI 304J3			
Ferrite	AISI 430	WSB	0.8 ~ 20.0	
Martensite	AISI 410	WSB	0.8 ~ 20.0	

Tolerance & Ovality of Diamater & Allowance Range of Pit Depth

Dia. (mm)	Tolerance (mm)	Ovality (mm)	Allowance of Pit depth
0.80 ~ 3.00	+ 0	0.013	0.03 under
	- 0.025		
3.01 ~ 6.00	+ 0	0.015	0.04 under
	- 0.03		
6.01 ~ 10.00	+ 0	0.020	0.05 under
	- 0.04		
10.01 ~ 20.00	+ 0	0.025	0.06 under
	- 0.05		

Mechanical Properties

Symbol	Grade	Dia. (mm)	Tensile Strength (N/mm²)	Elongation (%)	Reduction of Area rate (%)
WSA	AISI 302HQ (XM-7)	2.00 under	480 ~ 630	30 over	70 over
		2.00 over	440 ~ 590	40 over	
	AISI 304J3 AISI 304	2.00 under	560 ~ 710	30 over	70 over
		2.00 over	510 ~ 660	40 over	
	AISI 316	2.00 under	560 ~ 710	20 over	70 over
		2.00 over	510 ~ 660	30 over	
	AISI 305	2.00 under	530 ~ 680	30 over	70 over
		2.00 over	490 ~ 640	40 over	
WSB	AISI 302HQ (XM-7)	2.00 under	500 ~ 680	20 over	65 over
		2.00 over	450 ~ 630	25 over	
	AISI 304J3 AISI 304	2.00 under	580 ~ 760	20 over	65 over
		2.00 over	530 ~ 710	25 over	
	AISI 316	2.00 under	580 ~ 760	10 over	65 over
		2.00 over	530 ~ 710	20 over	
	AISI 305	2.00 under	560 ~ 740	20 over	65 over
		2.00 over	510 ~ 690	25 over	
	AISI 430	2.00 under	500 ~ 700	-	65 over
		2.00 over	450 ~ 600	10 over	
	AISI 410	2.00 under	540 ~ 740	-	65 over
		2.00 over	460 ~ 640	10 over	

Headability & Corrosion Resistance

Packing

Dia. (mm)	Coil I.D (inch)	WSA Unit Weight (kg)			Coil I.D (inch)	WSB Unit Weight (kg)	
		Coil	Carrier	Pay-off Drum		Coil	Carrier
0.80 ~ 1.80	16	60	200	200	16	50	250
1.81 ~ 2.90	24	80	300	-	24	100	300
2.91 ~ 6.00	24	100	600	-	24	250	600
4.50 ~ 8.00	-	-	-	-	28	500	900
6.01 ~ 10.00	28 ~ 30	600	1000	-	-	-	-
8.00 ~ 20.00	-	-	-	-	30 ~ 40	600	1500

Welding Wire

Application: Welding of stainless steel

Chemical Compositions

(Wt./%)

Spec	C	Si	Mn	P	S	Ni	Cr	Mo
AISI Y308/ER308	Max 0.08	0.30 ~ 0.65	1.0 ~ 2.5	Max 0.03	Max 0.03	9.0 ~ 11.0	19.5 ~ 22.0	Max 0.75
AISI Y308L/ER308L	Max 0.03	0.30 ~ 0.65	1.0 ~ 2.5	Max 0.03	Max 0.03	9.0 ~ 11.0	19.5 ~ 22.0	Max 0.75
AISI Y309/ER309	Max 0.12	0.30 ~ 0.65	1.0 ~ 2.5	Max 0.03	Max 0.03	12.0 ~ 14.0	23.0 ~ 25.0	Max 0.75
AISI Y316/ER316	Max 0.08	0.30 ~ 0.65	1.0 ~ 2.5	Max 0.03	Max 0.03	11.0 ~ 14.0	18.0 ~ 20.0	2.0 ~ 3.0
AISI Y316L/ER316L	Max 0.03	0.30 ~ 0.65	1.0 ~ 2.5	Max 0.03	Max 0.03	11.0 ~ 14.0	18.0 ~ 20.0	2.0 ~ 3.0

Mechanical Properties and Packing Type

Dia. (mm)	Tolerance (mm)	T/S (mm)	Length (N/mm²)	Packing Type
1.6	± 0.05	740 ~ 1080	1000 (- 0, +10)	5kg / Plastic Tube
2.0				
2.4				
2.6				
3.2				
4.0				

Lead Pin Wire

The Lead Pin Wire is produced with excellent surface conditions to get perfect Glass to Metal Seal.
It is suitable for the material of hermetic terminal pin.
Hermetic compressors are commonly used for refrigerator and air conditioner.

Chemical Composition

(Wt./%)

C	Si	Mn	P	S	Ni	Cr	N
Max 0.2	Max 0.1	Max 1.5	Max 0.04	Max 0.03	Max 0.25	23.0 ~ 27.0	Max 0.25

Mechanical Properties and Packing Type

Dia. (mm)	Tolerance (mm)	T/S (N/mm²)	Finish	Packing Type
1.0 ~ 4.0	± 0.015	Max 1000	Dull or Bright	Coil or Carrier

Stainless Steel Special Wire

Covar Wire

Covar Wire made of Fe-Ni-Co has very low thermal expansion. It is mainly used for sealing Glass or Ceramic in electronic industry.

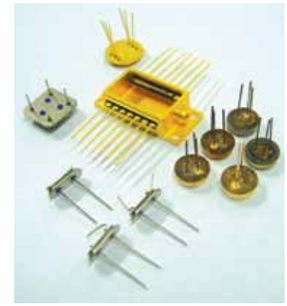
Chemical Composition

(Wt./%)

C	Si	Mn	P	S	Ni	Cr	Cu	Co
0.04	0.2	0.5	0.03	0.03	28.0 ~ 30.0	0.2	0.75	17.0 ~ 18.0

Mechanical Properties and Packing Type

Dia. (mm)	Dia Tolerance (mm)	T/S (N/mm²)	Elongation (%)	Finish	Packing Type
0.45	± 0.002	650 ~ 800	Min. 14	Bright	20kg / Drum, Spool



NF Wire

NF(Nickel Free) Wire is suitable for the material of accessories contacting on human body.
Magnetism: Strong

Chemical Composition

(Wt./%)

C	Si	Mn	P	S	Ni	Cr
Max 0.04	Max 0.6	0.5 ~ 1.0	Max 0.01	Max 0.01	Max 0.05	16.0 ~ 17.0

Physical Characteristics

Specific Gravity (g/cm³)	Specific Heat (cal/g. °c)	Thermal Conduction (I/cal.sec. °c)	Thermal Expansion Factor
7.72	0.11	0.0626	10.4

Machanical Properties and Packing Type

Dia. (mm)	Dia Tolerance (mm)	T/S (N/mm²)	Finish	Packing Type
0.20 ~ 0.90	+ 0, - 0.01	800 ~ 1200	S-Co / Bright	20kg / Spool & Coil
1.00 ~ 4.50	+ 0, - 0.02	540 ~ 780		30 ~ 100kg / Coil

Stainless Steel Wire for Roping

Stainless Steel Wire for Roping has the most suitable mechanical properties for control cable, and wire ropes with a various types of packing.

Properties

Type	Grade	Main chemical composition(%)	Properties
Austenite	302	Cr : 17 Ni : 7	AISI 302 is placed above AISI 304 in tensile Strength.
	304	Cr : 18 Ni : 8	AISI 304 is placed a little bit above AISI 302 in resistance to corrosion.
	305	Cr : 17 Ni : 12	AISI305 is non-magnetic. AISI 305 is similar to AISI 302 & 304 in resistance to corrosion. AISI 305 is same level with AISI 316 in tensile strength.
	316	Cr : 17 Ni : 10 Mo : 2	AISI 316 has excellent resistance to corrosion and find resistance to sea water. It is placed under AISI 304 in tensile strength and characterized by non-magnetic.

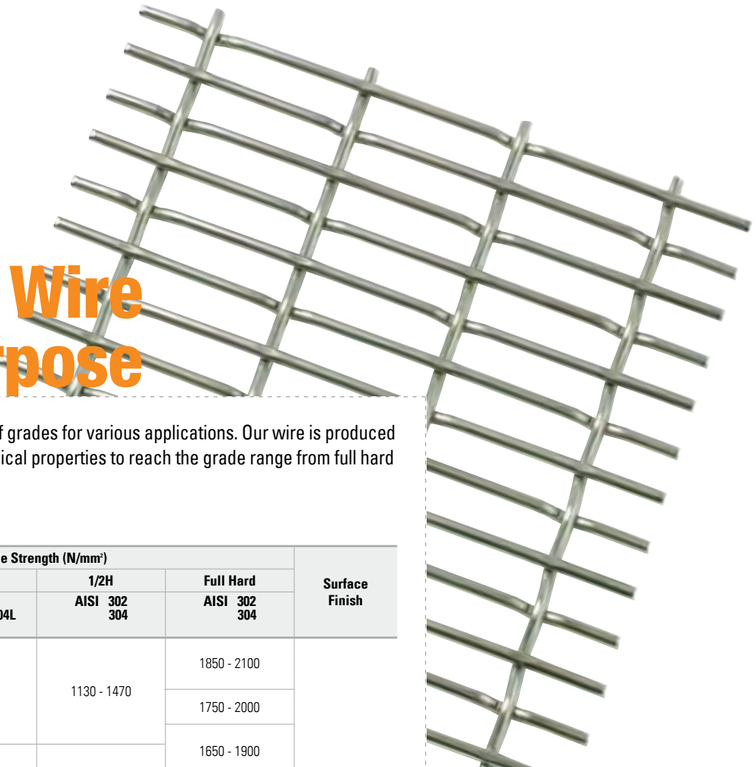
Mechanical Properties(Tensile Strength : ASTM A492)

Dia. (mm)	AISI 302, 304		AISI 305, 316	
	× 1000 PSI	N/mm²	× 1000 PSI(Min)	N/mm²(Min)
~ 0.18	320 - 355	2210 - 2450	245	1690
0.19 - 0.25	312 - 350	2150 - 2410	245	1690
0.26 - 0.38	310 - 345	2140 - 2380	240	1650
0.39 - 0.48	305 - 340	2100 - 2340	240	1650
0.49 - 0.64	295 - 330	2030 - 2280	235	1620
0.65 - 0.76	285 - 315	1960 - 2170	235	1620
0.77 - 0.89	275 - 310	1900 - 2140	235	1620
0.90 - 1.02	260 - 300	1790 - 2070	235	1620
1.03 - 1.27	255 - 285	1760 - 1970	230	1590
1.28 - 1.52	250 - 280	1720 - 1930	225	1550
1.53 - 1.78	245 - 275	1690 - 1900	220	1520
1.79 - 2.03	240 - 270	1650 - 1860	210	1450
2.04 - 2.29	240 - 270	1650 - 1860	210	1450
2.30 - 2.54	235 - 265	1620 - 1830	205	1410

Packing

Spool	Material	Dia. (mm)	Winding Weight(Kg)
DIN 100	Plastic	0.08 ~ 0.25	1.5
DIN 125	Plastic	0.10 ~ 0.25	3
DIN 160	Plastic	0.16 ~ 1.00	6
DIN 200	Plastic	0.16 ~ 1.00	12
DIN 250	Plastic	0.21 ~ 1.00	20
DIN 355	Plastic	0.51 ~ 1.00	40
B 10	Plastic	0.08 ~ 0.25	5
B 40 (60)	Steel	0.21 ~ 1.00	25

● Packing on wooden real is also available from 0.50mm and bigger size.



Stainless Steel Wire for General Purpose

Stainless Steel Wire for General Purpose has all kinds of grades for various applications. Our wire is produced with excellent surface conditions matched with mechanical properties to reach the grade range from full hard to soft according to our customer's demands.

Mechanical Properties

Dia. (mm)	Tolerance (mm)	Tensile Strength (N/mm²) SOFT (W1) AISI 302, 304L 304, 316L 316, 310S	1/4H AISI 302 304, 304L 316	1/2H AISI 302 304	Full Hard AISI 302 304	Surface Finish
0.80	± 0.015	570 - 820	780 - 1130	1130 - 1470	1850 - 2100	Dull or Bright
0.90						
1.00						
1.20	± 0.020				1750 - 2000	
1.40						
1.60					1650 - 1900	
1.80	± 0.030					
2.00						
2.60		520 - 770	740 - 1080	1080 - 1420	1550 - 1800	
2.80						
3.00	± 0.040				1450 - 1700	
4.00						
5.00					1350 - 1600	
6.00	± 0.050	500 - 750	740 - 1030	1030 - 1320		
9.00					1270 - 1520	
10.00	± 0.060					
12.00						
14.00	± 0.070					
20.00						

● 1/8H, 3/4H wire is available on request.

Packing

Dia. (mm)	SOFT (W1) Coil Dia (inch)	Unit Weight (kg) Coil	Spool	Drum	Carrier	1/4H Coil Dia. (inch)	Unit Weight (kg) Coil	Spool	Drum	Carrier	1/2H – F.H Coil Dia. (inch)	Unit Weight (kg) Coil	Spool	Carrier
0.80	12 (16)	25	20	200 (16)	-	12	25	40	-	-	12	25	20 ~ 40	-
0.90	12 (16)	25	-	200 (16)	-	12	25	40	-	-	12	25	20 ~ 40	-
1.00	12 (16)	30	-	200 (16)	-	16	50	-	-	-	16	40	350	-
1.20	16	40	-	200	-	16	50	-	-	-	16	50	350	-
1.40	16	60	-	200	-	16	60	-	-	-	16	50	350	-
1.60	16	60	-	200	-	16	60	-	-	-	18	60	350	-
1.80	16	60	-	200	-	16	60	-	-	-	18	60	350	-
2.00	24	100	-	-	600	24	500	-	-	910	24	500	-	-
2.60	24	250	-	-	600	24	500	-	-	910	24	500	-	-
3.00	24	250	-	-	600	24	500	-	-	910	24	500	-	-
4.00	24	250	-	-	600	24	500	-	-	910	24	500	-	-
5.00	24	250	-	-	600	24	600	-	-	1500	24	500	-	-
6.00	30	250	-	-	600	28	600	-	-	1500	24	500	-	900
8.00	30	700	-	-	700	28	600	-	-	1500	-	-	-	-
10.00	36	700	-	-	700	30 ~ 40	600 ~ 700	-	-	1500	-	-	-	-
12.00	40	-	-	-	-	30 ~ 40	600 ~ 700	-	-	1500	-	-	-	-
14.00	40	-	-	-	-	30 ~ 40	600 ~ 700	-	-	1500	-	-	-	-
20.00	40	-	-	-	-	30 ~ 40	600 ~ 700	-	-	1500	-	-	-	-

● W1 : Drum packing is available on request.(Diameter 0.80~1.00mm)

Shaped Wire

Contents

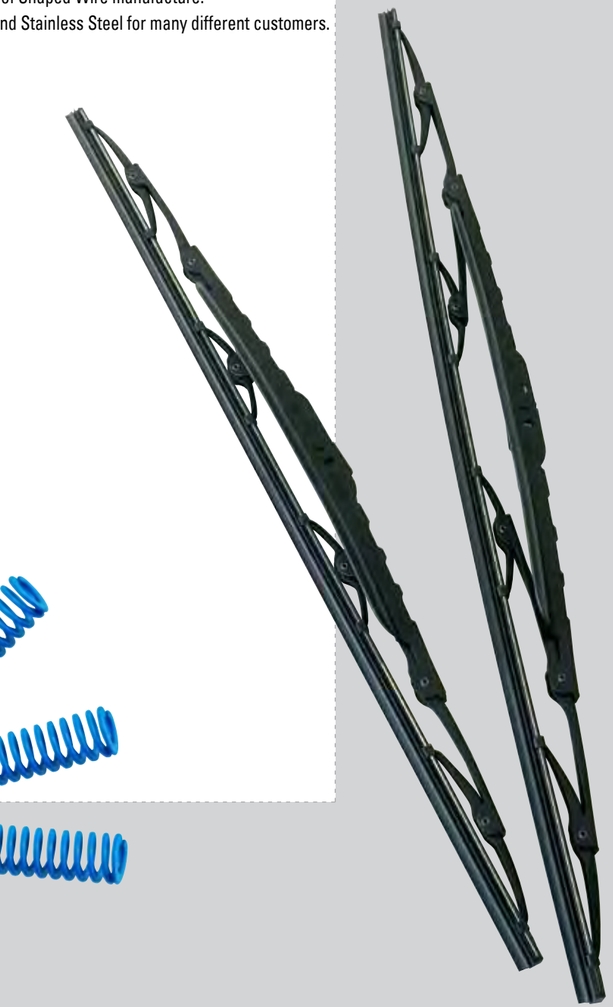
DSR has high quality experience of Shaped Wire manufacture.
We produce High Carbon Steel and Stainless Steel for many different customers.

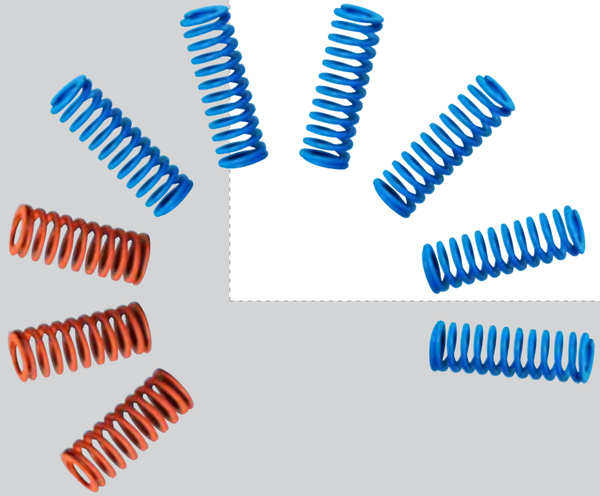
Material

High Carbon Steel
Stainless Steel

Types

Rolled Music Wire
Square Wire (=Flat Wire)
Zinc-Galvanized Flat Wire





Zinc-Coated Steel Wire

Zinc Steel Wire is excellent in corrosion resistance and zinc adhesion. Classified tensile strength and adhesion rate of wire meet all applications with standards.

Mechanical Properties

(KS D 7063)

Dia. (mm)	Tensile Strength (N/mm²)				Elongation (%)	Torsion (Turn)	
	SWGF-4,5	SWGD-1	SWGD-2	SWGD-3	SWGF-4,5,6	SWGF-4,5,6,	SWGD-1,2,3
0.50 ~ 0.60	-	1570 ~ 1860	1860 ~ 2160	2160 ~ 2450	-	-	20 over
0.60 ~ 0.80	-	1520 ~ 1770	1770 ~ 2060	2060 ~ 2350	-	-	20 over
0.80 ~ 1.00	-	1520 ~ 1770	1770 ~ 2010	2010 ~ 2260	-	-	20 over
1.00 ~ 1.20	-	1470 ~ 1720	1720 ~ 1960	1960 ~ 2210	-	-	20 over
1.20 ~ 1.40	-	1420 ~ 1670	1670 ~ 1910	1910 ~ 2160	-	-	20 over
1.40 ~ 1.60	-	1370 ~ 1620	1620 ~ 1860	1860 ~ 2110	-	-	20 over
1.60 ~ 1.80	-	1320 ~ 1570	1570 ~1810	1810 ~ 2060	-	-	20 over
1.80 ~ 2.00	-	1270 ~ 1520	1520 ~ 1770	1770 ~ 2010	-	-	20 over
2.00 ~ 2.30	1230 over	1270 ~ 1470	1470 ~ 1720	1720 ~ 1960	3.0 over	14 over	15 over
2.30 ~ 2.60	1230 over	1230 ~ 1420	1420 ~ 1670	1670 ~ 1910	3.0 over	14 over	15 over
2.60 ~ 2.90	1230 over	1230 ~ 1420	1420 ~ 1670	1670 ~ 1910	3.0 over	14 over	15 over
2.90 ~ 3.20	1230 over	1180 ~ 1370	1370 ~ 1620	1620 ~ 1860	3.0 over	14 over	15 over
3.20 ~ 3.50	1230 over	1180 ~ 1370	1370 ~ 1570	1570 ~ 1810	3.0 over	14 over	15 over
3.50 ~ 4.00	1230 over	-	-	-	-	10 over	10 over
4.00 ~ 4.50	1230 over	-	-	-	-	10 over	10 over
4.50 ~ 5.00	1230 over	-	-	-	-	10 over	10 over

Minimum Weight of Zinc Coating

(Unit : g/m²)

Dia. (mm)	SWGF-4	SWGF-5	SWGD-1,2,3
0.50 ~ 0.60	-	-	50 over
0.60 ~ 0.80	-	-	60 over
0.80 ~ 1.00	-	-	70 over
1.00 ~ 1.20	-	-	80 over
1.20 ~ 1.50	-	-	90 over
1.50 ~ 1.90	-	-	100 over
2.00 ~ 2.50	205 over	155 over	110 over
2.50 ~ 3.20	230 over	185 over	125 over
3.20 ~ 3.60	250 over	230 over	135 over
3.60 ~ 4.00	250 over	230 over	-
4.00 ~ 4.40	260 over	245 over	-
4.40 ~ 5.00	270 over	245 over	-

● **Note** : SWGF-Final Gavanized
SWGD-Drawn Galvanized

Oil-Tempered Wire

OT Wire containing C, Si is selectively added by the predetermined amounts of V, Cr, and Cu. Through DSR's own high quality control system, our OT Wire shows excellent performance which is not available in high carbon spring wire and music wire.
OT Wire has superior strength and toughness. It will implement excellent elasticity, ductility, better resistance against fatigue and deformation in various spring applications.
OT Wire is recommended to make the springs for repeated dynamic loads, including clutch springs.

Chemical Composition

Classification		Chemical Composition (%)							
		C	Si	Mn	P	S	Cu	Cr	V
Oil-Tempered Carbon Wire	KS, JIS	0.53 ~ 0.88	0.10 ~ 0.35	0.30 ~ 1.20	max. 0.030	max. 0.030	-	-	-
	ASTM	0.55 ~ 0.85	0.15 ~ 0.35	0.30 ~ 1.20	max. 0.040	max. 0.050	-	-	-
	EN(FD)	0.60 ~ 0.75	0.10 ~ 0.35	0.50 ~ 1.20	max. 0.030	max. 0.025	max. 0.12	-	-
Oil-Tempered Cr-Si Alloyed Wire	KS, JIS	0.51 ~ 0.59	1.20 ~ 1.60	0.50 ~ 0.90	max. 0.035	max. 0.035	-	0.55 ~ 0.90	-
	ASTM	0.51 ~ 0.59	1.20 ~ 1.60	0.60 ~ 0.80	max. 0.035	max. 0.040	-	0.60 ~ 0.80	-
	EN(FD)	0.50 ~ 0.60	1.20 ~ 1.60	0.50 ~ 0.90	max. 0.030	max. 0.025	max. 0.12	0.50 ~ 0.80	-
Oil-Tempered Carbon Wire for Valve Spring	KS, JIS	0.60 ~ 0.75	0.12 ~ 0.32	0.60 ~ 0.90	max. 0.025	max. 0.025	max. 0.20	-	-
	ASTM	0.60 ~ 0.75	0.15 ~ 0.35	0.60 ~ 0.90	max. 0.025	max. 0.030	-	-	-
	EN(VD)	0.60 ~ 0.75	0.15 ~ 0.30	0.50 ~ 1.00	max. 0.020	max. 0.020	max. 0.06	-	-
Oil-Tempered Cr-Si Alloyed Wire for Valve Spring	KS, JIS	0.51 ~ 0.59	1.20 ~ 1.60	0.50 ~ 0.80	max. 0.025	max. 0.025	max. 0.20	0.50 ~ 0.80	-
	ASTM	0.51 ~ 0.59	1.20 ~ 1.60	0.50 ~ 0.80	max. 0.025	max. 0.025	-	0.60 ~ 0.80	-
	EN(VD)	0.50 ~ 0.60	1.20 ~ 1.60	0.50 ~ 0.90	max. 0.025	max. 0.020	max. 0.06	0.50 ~ 0.80	-
Oil-Tempered Cr-Si Alloyed Wire for High Strength Valve Spring		0.62 ~ 0.68	1.20 ~ 1.60	0.50 ~ 0.80	max. 0.020	max. 0.015	max. 0.02	0.5 ~ 0.80	0.1 ~ 0.25

Packing

Dia. (mm)	Block Dia. (inch)	Carrier / Coil (kg)
1.50 ~ 1.99	24	300
1.70 ~ 2.29	30	500
2.00 ~ 2.99	36	200 ~ 1,000
3.00 ~ 4.99	48	500 ~ 1,000
5.00 ~ 8.00	60	500 ~ 1,000
8.00 ~ 16.00	70	1,000 ~ 2,000

Reference Specification

Classification		Specification			
		KS	JIS	ASTM	EN
Oil-Tempered Carbon Wire	SPEC	KS D 3579	JIS G 3560	ASTM A 229	EN 10270-2
	GRADE	SWO-A, B	SWO-A, B	Class 1, 2	FDC
Oil-Tempered Cr-Si Alloyed Wire	SPEC	KS D 3579	JIS G 3560	ASTM A 401	EN 10270-2
	GRADE	SWOSC-B	SWOSC-B	-	FDSiCr
Oil-Tempered Carbon Wire for Clutch spring	SPEC	-	-	-	EN 10270-2
	GRADE	-	-	-	TDC
Oil-Tempered Cr-Si Alloyed Wire for Clutch spring	SPEC	-	-	-	EN 10270-2
	GRADE	-	-	-	TDSiCr
Oil-Tempered Carbon Wire for Valve Spring	SPEC	KS D 3580	JIS G 3561	ASTM A 230	EN 10270-2
	GRADE	SWO-V	SWO-V	OT Carbon Valve	VDC
Oil-Tempered Cr-Si Alloyed Wire for Valve Spring	SPEC	KS D 3580	JIS G 3561	ASTM A 877	EN 10270-2
	GRADE	SWOSC-V	SWOSC-V	OT CrSi Valve	VDSiCr

Oil-Tempered Carbon Wire

Mechanical Properties (KS D 3579 / JIS G 3560)

Dia. (mm)	Tolerance (mm)	Depth of Scratch (mm)	Tensile Strength (N/mm²) SWO-A min	SWO-A max	SWO-B min	SWO-B max	ROA (%)
1.50	±0.035	0.02	-	-	-	-	45
1.60	±0.035		-	-	-	-	45
1.80	±0.035		-	-	-	-	45
2.00	±0.035	1% of Wire Dia.	1570	1720	1720	1860	45
2.30	±0.035		1570	1720	1720	1860	45
2.60	±0.035		1570	1720	1720	1860	45
2.90	±0.035		1520	1670	1670	1810	45
3.00	±0.035		1470	1620	1620	1770	45
3.20	±0.035		1470	1620	1620	1770	40
3.50	±0.045		1470	1620	1620	1770	40
4.00	±0.045		1420	1570	1570	1720	40
4.50	±0.045		1370	1520	1520	1670	40
5.00	±0.045		1370	1520	1520	1670	40
5.50	±0.045		1320	1470	1470	1620	35
5.60	±0.045		1320	1470	1470	1620	35
6.00	±0.060		1320	1470	1470	1620	35
6.50	±0.060	1.4% of Wire Dia.	1320	1470	1470	1620	35
7.00	±0.060		1230	1370	1370	1520	35
7.50	±0.060		1230	1370	1370	1520	35
8.00	±0.060		1230	1370	1370	1520	35
8.50	±0.060		1230	1370	1370	1520	30
9.00	±0.070		1230	1370	1370	1520	30
9.50	±0.070		1180	1320	1320	1470	30
10.00	±0.070		1180	1320	1320	1470	30
10.50	±0.090		1180	1320	1320	1470	30
11.00	±0.090		1180	1320	1320	1470	30
11.50	±0.090		1180	1320	1320	1470	30
12.00	±0.090		1180	1320	1320	1470	30
13.00	±0.090		-	-	-	-	30
14.00	±0.090		-	-	-	-	30
15.00	±0.090		-	-	-	-	-
16.00	±0.090	-	-	-	-	-	-

Mechanical Properties (ASTM A 229)

Dia. inch	Dia. mm	Tolerance (mm)	Tensile Strength (ksi) Class 1 min	Class 1 max	Class 2 min	Class 2 max
0.063	1.60	±0.001	239	268	276	305
0.071	1.80	±0.001	235	264	270	299
0.079	2.00	±0.001	232	261	264	293
0.087	2.20	±0.002	229	258	260	289
0.098	2.50	±0.002	225	254	254	283
0.110	2.80	±0.002	220	249	248	276
0.118	3.00	±0.002	218	247	245	273
0.138	3.50	±0.002	210	235	238	265
0.157	4.00	±0.002	203	229	232	258
0.177	4.50	±0.002	200	226	226	252
0.197	5.00	±0.002	196	235	220	247
0.217	5.50	±0.002	191	218	218	244
0.236	6.00	±0.002	189	215	215	244
0.276	7.00	±0.002	186	210	210	236
0.315	8.00	±0.002	181	207	207	234
0.354	9.00	±0.002	177	203	205	231
0.394	10.00	±0.002	174	200	203	229
0.433	11.00	±0.002	171	196	200	226
0.472	12.00	±0.003	167	191	197	223
0.551	14.00	±0.003	162	189	194	220
0.630	16.00	±0.003	162	189	191	218

Mechanical Properties (EN 10270-2 (FDC))

Dia. (mm) Over	Dia. (mm) Up to	Tolerance (mm)	Tensile Strength (MPa) FD/FDC min	FD/FDC max	ROA (%)
1.50	1.60	±0.02	1760	1940	45
1.60	2.00	±0.025	1720	1890	45
2.00	2.50	±0.025	1670	1820	45
2.50	2.70	±0.025	1640	1790	45
2.70	3.00	±0.030	1620	1770	45
3.00	3.20	±0.030	1600	1750	45
3.20	3.50	±0.030	1580	1730	42
3.50	4.00	±0.030	1550	1700	42
4.00	4.20	±0.035	1540	1690	40
4.20	4.50	±0.035	1520	1670	40
4.50	4.70	±0.035	1510	1660	40
4.70	5.00	±0.035	1500	1650	40
5.00	5.60	±0.035	1470	1620	38
5.60	6.00	±0.040	1460	1610	38
6.00	6.50	±0.040	1440	1590	35
6.50	7.00	±0.040	1430	1580	35
7.00	8.00	±0.045	1400	1550	35
8.00	8.50	±0.045	1380	1530	32
8.50	10.00	±0.05	1360	1510	32
10.00	12.00	±0.07	1320	1470	30
12.00	14.00	±0.08	1280	1430	30
14.00	15.00	±0.08	1270	1420	-
15.00	16.00	±0.09	1250	1400	-

Oil-Tempered Cr-Si Alloyed Wire

Mechanical Properties (KS D 3579 / JIS G 3560)

Dia. (mm)	Tolerance (mm)	Depth of Scratch (mm)	Tensile Strength (N/mm²) SWOSC-B min	SWOSC-B max	ROA (%)
1.50	±0.035	0.02	1960	2110	45
1.60	±0.035		1960	2110	45
1.80	±0.035		1960	2110	45
2.00	±0.035	1% of Wire Dia.	1910	2060	45
2.30	±0.035		1910	2060	45
2.60	±0.035		1910	2060	45
2.90	±0.035		1910	2060	45
3.00	±0.035		1860	2010	45
3.20	±0.035		1860	2010	40
3.50	±0.045		1860	2010	40
4.00	±0.045		1810	1960	40
4.50	±0.045		1810	1960	40
5.00	±0.045		1760	1910	40
5.50	±0.045		1760	1910	35
5.60	±0.045		1710	1860	35
6.00	±0.060		1710	1860	35
6.50	±0.060	1.4% of Wire Dia.	1710	1860	35
7.00	±0.060		1660	1810	35
7.50	±0.060		1660	1810	35
8.00	±0.060		1660	1810	35
8.50	±0.060		1660	1810	30
9.00	±0.070		1660	1810	30
9.50	±0.070		1660	1810	30
10.00	±0.070		1660	1810	30
10.50	±0.090		1660	1810	30
11.00	±0.090		1660	1810	30
11.50	±0.090		1660	1810	30
12.00	±0.090		1610	1760	30
13.00	±0.090		1610	1760	30
14.00	±0.090		1610	1760	30
15.00	±0.090		1610	1760	-
16.00	±0.090	-	1610	1760	-

Mechanical Properties (ASTM A 401)

Dia. inch	Dia. mm	Tolerance (mm)	Tensile Strength (ksi) min	Tensile Strength (ksi) max	ROA (%)
0.063	1.60	±0.001	284	313	-
0.071	1.80	±0.001	284	310	-
0.079	2.00	±0.001	281	307	-
0.087	2.20	±0.002	278	305	-
0.098	2.50	±0.002	276	302	45
0.110	2.80	±0.002	273	299	45
0.118	3.00	±0.002	270	296	45
0.138	3.50	±0.002	267	293	40
0.157	4.00	±0.002	264	290	40
0.177	4.50	±0.002	261	287	40
0.197	5.00	±0.002	258	284	40
0.217	5.50	±0.002	255	281	40
0.236	6.00	±0.002	249	278	40
0.276	7.00	±0.002	247	273	40
0.315	8.00	±0.002	244	270	4
0.354	9.00	±0.002	241	267	40
0.394	10.00	±0.002	238	264	40
0.433	11.00	±0.002	235	261	35
0.472	12.00	±0.003	232	254	35
0.551	14.00	±0.003	228	249	30
0.630	16.00	±0.003	225	248	30

Mechanical Properties (EN 10270-2 (FDSiCr))

Dia. (mm) Over	Dia. (mm) Up to	Tolerance (mm)	Tensile Strength (MPa) FDSiCr min	FDSiCr max	ROA (%)
1.50	1.60	±0.02	2040	2220	45
1.60	2.00	±0.025	2000	2180	45
2.00	2.50	±0.025	1970	2140	45
2.50	2.70	±0.025	1950	2120	45
2.70	3.00	±0.030	1930	2100	45
3.00	3.20	±0.030	1910	2080	45
3.20	3.50	±0.030	1900	2060	42
3.50	4.00	±0.030	1870	2030	42
4.00	4.20	±0.035	1860	2020	40
4.20	4.50	±0.035	1850	2000	40
4.50	4.70	±0.035	1840	1990	40
4.70	5.00	±0.035	1830	1980	40
5.00	5.60	±0.035	1800	1950	38
5.60	6.00	±0.040	1780	1930	38
6.00	6.50	±0.040	1760	1910	35
6.50	7.00	±0.040	1740	1890	35
7.00	8.00	±0.045	1710	1860	35
8.00	8.50	±0.045	1700	1850	32
8.50	10.00	±0.05	1660	1810	32
10.00	12.00	±0.07	1620	1770	30
12.00	14.00	±0.08	1580	1730	30
14.00	15.00	±0.08	1570	1720	-
15.00	16.00	±0.09	1550	1700	-

Oil-Tempered Carbon Wire for Valve Spring

Mechanical Properties (KS D 3580 / JIS G 3561)

Dia. (mm)	Tolerance (mm)	Tensile Strength (N/mm²) SWO-V		ROA (%)
		min	max	
1.50	±0.020	-	-	45
1.60	±0.020	-	-	45
1.80	±0.020	-	-	45
2.00	±0.020	1620	1770	45
2.30	±0.020	1620	1770	45
2.60	±0.020	1620	1770	45
2.90	±0.020	1620	1770	45
3.00	±0.020	1570	1720	45
3.20	±0.020	1570	1720	45
3.50	±0.030	1570	1720	45
4.00	±0.030	1570	1720	40
4.50	±0.030	1520	1670	40
5.00	±0.030	1520	1670	40
5.50	±0.030	1470	1620	40
5.60	±0.030	1470	1620	40
6.00	±0.040	1470	1620	40
6.50	±0.040	-	-	40
7.00	±0.040	-	-	40
8.00	±0.040	-	-	40

Mechanical Properties (ASTM A 230)

Dia.		Tensile Strength (ksi)		ROA (%)
inch	mm	min	max	
0.061	1.55	245	265	-
0.062	1.57	240	260	-
0.072	1.83	240	260	-
0.075	1.91	240	260	-
0.080	2.03	240	260	-
0.092	2.34	240	260	-
0.106	2.69	235	255	40
0.128	3.25	235	255	40
0.135	3.43	230	250	40
0.148	3.76	230	250	40
0.162	4.11	230	250	40
0.177	4.50	225	245	40
0.192	4.88	225	245	40
0.207	5.26	220	240	40
0.225	5.72	220	240	40
0.244	6.20	215	235	40
0.250	6.35	215	235	40

Mechanical Properties (EN 10270-2 (TD, VDC))

Dia. (mm)		Tolerance (mm)	Tensile Strength (MPa) TD, VDC		ROA (%)
Over	Up to		min	max	
1.50	1.60	±0.020	1700	1800	50
1.60	2.00	±0.025	1670	1770	50
2.00	2.50	±0.025	1630	1730	50
2.50	2.70	±0.025	1600	1800	50
2.70	3.00	±0.030	1600	1700	50
3.00	3.20	±0.030	1570	1670	45
3.20	3.50	±0.030	1570	1670	45
3.50	4.00	±0.030	1550	1650	45
4.00	4.20	±0.035	1550	1650	45
4.20	4.50	±0.035	1550	1650	45
4.50	4.70	±0.035	1540	1640	45
4.70	5.00	±0.035	1540	1640	40
5.00	5.60	±0.040	1520	1820	40
5.60	6.00	±0.040	1470	1570	40
6.00	6.50	±0.040	1470	1570	40
6.50	7.00	±0.045	1420	1520	40
7.00	8.00	±0.045	1390	1490	35

Oil-Tempered Cr-Si Alloyed Wire for Valve Spring

Mechanical Properties (KS D 3580 / JIS G 3561)

Dia. (mm)	Tolerance (mm)	Tensile Strength (N/mm²) SWOSC-V		ROA (%)
		min	max	
1.50	±0.020	1960	2110	45
1.60	±0.020	1960	2110	45
1.80	±0.020	1960	2110	45
2.00	±0.020	1910	2060	45
2.30	±0.020	1910	2060	45
2.60	±0.020	1910	2060	45
2.90	±0.020	1910	2060	45
3.00	±0.020	1860	2010	45
3.20	±0.020	1860	2010	45
3.50	±0.030	1860	2010	45
4.00	±0.030	1810	1960	40
4.50	±0.030	1810	1960	40
5.00	±0.030	1760	1910	40
5.50	±0.030	1760	1910	40
5.60	±0.030	1710	1860	40
6.00	±0.040	1710	1860	40
6.50	±0.040	1710	1860	40
7.00	±0.040	1660	1810	40
7.50	±0.040	1660	1810	40
8.00	±0.040	1660	1810	40

Mechanical Properties (ASTM A 877)

Dia.		Tensile Strength (ksi)		ROA (%)
inch	mm	min	max	
0.059	1.50	294	321	-
0.079	2.00	290	310	45
0.118	3.00	280	300	45
0.148	3.75	276	294	40
0.177	4.50	265	286	40
0.197	5.00	263	283	40
0.224	5.70	261	280	40
0.248	6.30	255	280	40
0.311	7.90	251	270	40

Mechanical Properties (EN 10270-2 (TDSiCr, VDSiCr))

Dia. (mm)		Tolerance (mm)	Tensile Strength (MPa) TDSiCr, VDSiCr		ROA (%)
Over	Up to		min	max	
1.50	1.60	±0.020	2080	2210	50
1.60	2.00	±0.025	2010	2160	50
2.00	2.50	±0.025	1960	2100	50
2.50	2.70	±0.025	1910	2010	50
2.70	3.00	±0.030	1910	2010	50
3.00	3.20	±0.030	1910	2010	45
3.20	3.50	±0.030	1910	2010	45
3.50	4.00	±0.030	1860	1960	45
4.00	4.20	±0.035	1860	1960	45
4.20	4.50	±0.035	1860	1960	45
4.50	4.70	±0.035	1810	1910	45
4.70	5.00	±0.035	1810	1910	40
5.00	5.60	±0.040	1810	1910	40
5.60	6.00	±0.040	1760	1860	40
6.00	6.50	±0.040	1760	1880	40
6.50	7.00	±0.045	1710	1810	40
7.00	8.00	±0.045	1710	1810	35

Hard Drawn Steel Wire

Hard Drawn Steel Wire is the most excellent wire which is variously classified by carbon contents, sizes, mechanical properties and applications. Its excellence in flexibility and casting with strict DSR's quality control system satisfy customers demands.

Chemical Composition (JIS G 3506)

Classification	Chemical Composition (%)				
	C	Si	Mn	P	S
SWRH 27	0.24 ~ 0.31	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 32	0.29 ~ 0.36	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 37	0.34 ~ 0.41	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 42A	0.39 ~ 0.46	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 42B	0.39 ~ 0.46	0.15 ~ 0.35	0.60 ~ 0.90	0.040 under	0.040 under
SWRH 47A	0.44 ~ 0.51	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 47B	0.44 ~ 0.51	0.15 ~ 0.35	0.60 ~ 0.90	0.040 under	0.040 under
SWRH 52A	0.49 ~ 0.56	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 52B	0.49 ~ 0.56	0.15 ~ 0.35	0.60 ~ 0.90	0.040 under	0.040 under
SWRH 57A	0.54 ~ 0.61	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 57B	0.54 ~ 0.61	0.15 ~ 0.35	0.60 ~ 0.90	0.040 under	0.040 under
SWRH 62A	0.59 ~ 0.66	0.15 ~ 0.35	0.30 ~ 0.60	0.040 under	0.040 under
SWRH 62B	0.59 ~ 0.66	0.15 ~ 0.35	0.60 ~ 0.90	0.040 under	0.040 under
SWRH 67A	0.64 ~ 0.71	0.15 ~ 0.35	0.30 ~ 0.60	0.030 under	0.040 under
SWRH 67B	0.64 ~ 0.71	0.15 ~ 0.35	0.60 ~ 0.90	0.030 under	0.030 under
SWRH 72A	0.69 ~ 0.76	0.15 ~ 0.35	0.30 ~ 0.60	0.030 under	0.030 under
SWRH 72B	0.69 ~ 0.76	0.15 ~ 0.35	0.60 ~ 0.90	0.030 under	0.030 under
SWRH 77A	0.74 ~ 0.81	0.15 ~ 0.35	0.30 ~ 0.60	0.030 under	0.030 under
SWRH 77B	0.74 ~ 0.81	0.15 ~ 0.35	0.60 ~ 0.90	0.030 under	0.030 under
SWRH 82A	0.79 ~ 0.86	0.15 ~ 0.35	0.30 ~ 0.60	0.030 under	0.030 under
SWRH 82B	0.79 ~ 0.86	0.15 ~ 0.35	0.60 ~ 0.90	0.030 under	0.030 under

Packing

Inner Dia. Of Coil		Dia. (mm)	Packing Unit (kg)						
inch	mm		Coil	Carrier	Steel Reel	Din 355	MEG Bobbin	Z-2 Coil	Z-3 Coil
8	220	0.20 ~ 0.29	10	-	-	40	15	-	-
10	250	0.30 ~ 0.49	20	-	-	40	15	-	-
12	300	0.50 ~ 0.69	50	-	400	40	15	250	-
14	350	0.70 ~ 0.89	70	-	400	-	-	250	-
16	400	0.90 ~ 1.59	100	400	400	-	-	400	-
20	500	1.60 ~ 1.99	100	600	400	-	-	400	-
24	600	2.00 ~ 2.99	200	800	400	-	-	400	-
28	700	3.00 ~ 6.00	300	1,000	-	-	-	-	1,000
30	760	3.00 ~ 6.00	300	1,000	-	-	-	-	-
32	820	5.50 ~ 12.50	300	2,000	-	-	-	-	-

Mechanical Properties (JIS G 3521, KS D 3510)

Dia. (mm)	Tensile Strength											
	SWA				SWB				SWC			
	N/mm²		Kg/mm²		N/mm²		Kg/mm²		N/mm²		Kg/mm²	
	min	max	min	max	min	max	min	max	min	max	min	max
0.20	1910	2210	195	226	2210	2500	226	255	2500	2790	255	285
0.23	1860	2160	190	220	2160	2450	220	250	2450	2750	250	281
0.26	1810	2110	185	215	2110	2400	215	245	2400	2700	245	276
0.29	1770	2060	181	210	2060	2350	210	240	2350	2650	240	270
0.32	1720	2010	176	205	2010	2300	205	235	2300	2600	235	265
0.35	1720	2010	176	205	2010	2300	205	235	2300	2600	235	265
0.40	1670	1960	170	200	1960	2260	200	231	2260	2550	231	260
0.45	1620	1910	165	195	1910	2210	195	226	2210	2500	226	255
0.50	1620	1910	165	195	1910	2210	195	226	2210	2500	226	255
0.55	1570	1860	160	190	1860	2160	190	220	2160	2450	220	250
0.60	1570	1810	160	185	1810	2110	185	215	2110	2400	215	245
0.65	1570	1810	160	185	1810	2110	185	215	2110	2400	215	245
0.70	1520	1770	155	181	1770	2060	181	210	2060	2350	210	240
0.80	1520	1770	155	181	1770	2010	181	205	2010	2300	205	235
0.90	1520	1770	155	181	1770	2010	181	205	2010	2260	205	231
1.00	1470	1720	150	176	1720	1960	176	200	1960	2210	200	226
1.20	1420	1670	145	170	1670	1910	170	195	1910	2160	195	220
1.40	1370	1620	140	165	1620	1860	165	190	1860	2110	190	215
1.60	1320	1570	135	160	1570	1810	160	185	1810	2060	185	210
1.80	1270	1520	130	155	1520	1770	155	181	1770	2010	181	205
2.00	1270	1470	130	150	1470	1720	150	176	1720	1960	176	200
2.30	1230	1420	126	145	1420	1670	145	170	1670	1910	170	195
2.60	1230	1420	126	145	1420	1670	145	170	1670	1910	170	195
2.90	1180	1370	120	140	1370	1620	140	165	1620	1860	165	190
3.20	1180	1370	120	140	1370	1570	140	160	1570	1810	160	185
3.50	1180	1370	120	140	1370	1570	140	160	1570	1770	160	181
4.00	1180	1370	120	140	1370	1570	140	160	1570	1770	160	181
4.50	1130	1320	115	135	1320	1520	135	155	1520	1720	155	176
5.00	1130	1320	115	135	1320	1520	135	155	1520	1720	155	176
5.50	1080	1270	110	130	1270	1470	130	150	1470	1670	150	170
6.00	1030	1230	105	126	1230	1420	126	145	1420	1620	145	165
6.50	1030	1230	105	126	1230	1420	126	145	1420	1620	145	165
7.00	980	1180	100	120	1180	1370	120	140	1370	1570	140	160
8.00	980	1180	100	120	1180	1370	120	140	1370	1570	140	160
8.50	930	1130	95	115	1130	1320	115	135	1320	1520	135	155
9.00	930	1130	95	115	1130	1320	115	135	1320	1520	135	155
10.00	930	1130	95	115	1130	1320	115	135	1320	1520	135	155
11.00	-	-	-	-	1080	1270	110	130	1270	1470	130	150
12.00	-	-	-	-	1080	1270	110	130	1270	1470	130	150
12.50	-	-	-	-	1030	1230	105	126	1230	1420	126	145

Mechanical Properties (DIN 17223)

Dia. (mm)	Tensile Strength (N/mm²)			
	Class A		Class B	
	min	max	min	max
0.30	-	-	2370	2650
0.32	-	-	2350	2630
0.34	-	-	2330	2600
0.36	-	-	2310	2580
0.38	-	-	2290	2560
0.40	-	-	2270	2550
0.43	-	-	2250	2520
0.45	-	-	2240	2500
0.48	-	-	2220	2480
0.50	-	-	2200	2470
0.53	-	-	2180	2450
0.56	-	-	2170	2430
0.60	-	-	2140	2400
0.63	-	-	2130	2380
0.65	-	-	2120	2370
0.70	-	-	2090	2350
0.75	-	-	2070	2320
0.80	-	-	2050	2300
0.85	-	-	2030	2280
0.90	-	-	2010	2260
0.95	-	-	2000	2240
1.00	1720	1970	1980	2220
1.05	1710	1950	1960	2200
1.10	1690	1940	1950	2190
1.20	1670	1910	1920	2160
1.25	1660	1900	1910	2140
1.30	1640	1890	1900	2130
1.40	1620	1860	1870	2100
1.50	1600	1840	1850	2080
1.60	1590	1820	1830	2050
1.70	1570	1800	1810	2030
1.80	1550	1780	1790	2010
1.90	1540	1760	1770	1990

Dia. (mm)	Tensile Strength (N/mm²)			
	Class A		Class B	
	min	max	min	max
2.00	1520	1750	1760	1970
2.10	1510	1730	1740	1960
2.25	1490	1710	1720	1930
2.40	1470	1690	1700	1910
2.50	1460	1680	1690	1890
2.60	1450	1660	1670	1880
2.80	1420	1640	1650	1850
3.00	1410	1620	1630	1830
3.20	1390	1600	1610	1810
3.40	1370	1580	1590	1780
3.60	1350	1560	1570	1760
3.80	1340	1540	1550	1740
4.00	1320	1520	1530	1730
4.25	1310	1500	1510	1700
4.50	1290	1490	1500	1680
4.75	1270	1470	1480	1670
5.00	1260	1450	1460	1650
5.30	1240	1430	1440	1630
5.60	1230	1420	1430	1610
6.00	1210	1390	1400	1580
6.30	1190	1380	1390	1560
6.50	1180	1370	1380	1550
7.00	1160	1340	1350	1530
7.50	1140	1320	1330	1500
8.00	1120	1300	1310	1480
8.50	1110	1280	1290	1460
9.00	1090	1260	1270	1440
9.50	1070	1250	1260	1420
10.00	1060	1230	1240	1400
10.50	-	-	1220	1380
11.00	-	-	1210	1370
12.00	-	-	1180	1340
12.50	-	-	1170	1320

Mechanical Properties (ASTM A 227)

Dia. (mm)		Tensile Strength (N/mm²)				Tensile Strength (Kg/mm²)			
		Class 1		Class 2		Class 1		Class 2	
inch	mm	min	max	min	max	min	max	min	max
0.020	0.51	1940	2220	2220	2500	283	323	324	364
0.023	0.58	1920	2200	2200	2480	279	319	320	360
0.026	0.66	1870	2140	2140	2410	275	315	316	356
0.028	0.71	1830	2100	2100	2370	271	311	312	352
0.029	0.74	1830	2100	2100	2370	271	311	312	352
0.032	0.81	1800	2070	2070	2340	266	306	307	347
0.035	0.89	1800	2070	2070	2340	261	301	302	342
0.041	1.04	1740	2000	2000	2260	255	293	294	332
0.048	1.22	1670	1930	1930	2180	248	286	287	325
0.054	1.37	1670	1930	1930	2180	243	279	280	316
0.062	1.57	1640	1880	1880	2120	237	272	273	308
0.072	1.83	1580	1810	1810	2040	232	266	267	301
0.075	1.91	1580	1810	1810	2040	227	261	262	296
0.080	2.03	1550	1780	1780	2010	223	261	262	296
0.092	2.34	1510	1730	1730	1960	220	253	254	287

Dia. (mm)		Tensile Strength (N/mm²)				Tensile Strength (Kg/mm²)			
		Class 1		Class 2		Class 1		Class 2	
inch	mm	min	max	min	max	min	max	min	max
0.106	2.69	1480	1700	1700	1920	216	248	249	281
0.120	3.05	1460	1680	1680	1900	210	241	242	273
0.135	3.43	1420	1630	1630	1840	206	237	238	269
0.148	3.76	1380	1590	1590	1700	203	234	235	266
0.162	4.11	1380	1590	1590	1700	200	230	231	261
0.177	4.50	1350	1550	1550	1750	195	225	226	256
0.192	4.88	1320	1510	1510	1700	192	221	222	251
0.207	5.26	1300	1490	1490	1670	190	218	219	247
0.225	5.72	1280	1470	1470	1650	185	214	215	243
0.250	6.35	1250	1440	1440	1630	182	210	211	239
0.312	7.92	1190	1370	1370	1550	174	200	201	227
0.375	9.53	1130	1310	-	-	167	193	194	220
0.438	11.13	1090	1260	-	-	165	190	191	216
0.492	12.50	1050	1210	-	-	156	180	181	205

Mechanical Properties (BS 5216)

Dia. (mm)	Tensile Strength (N/mm²)					
	Grade 1		Grade 2		Grade 3	
	min	max	min	max	min	max
0.20	2040	2340	2340	2640	2640	2940
0.22	2020	2320	2320	2620	2620	2920
0.25	2000	2300	2300	2600	2600	2900
0.28	1970	2270	2270	2570	2570	2870
0.30	1960	2250	2250	2550	2550	2850
0.32	1960	2240	2240	2520	2520	2800
0.34	1950	2230	2230	2510	2510	2790
0.36	1930	2210	2210	2490	2490	2770
0.38	1900	2180	2180	2460	2460	2740
0.40	1870	2150	2150	2430	2430	2710
0.42	1860	2120	2120	2380	2380	2640
0.45	1840	2100	2100	2360	2360	2620
0.48	1820	2080	2080	2340	2340	2600
0.50	1800	2060	2060	2320	2320	2580
0.53	1780	2040	2040	2300	2300	2560
0.56	1760	2020	2020	2280	2280	2540
0.60	1750	1990	1990	2230	2230	2470
0.63	1730	1970	1970	2210	2210	2450
0.67	1720	1960	1960	2200	2200	2440
0.71	1680	1920	1920	2160	2160	2400
0.75	1660	1900	1900	2140	2140	2380
0.80	1650	1880	1880	2110	2110	2340
0.85	1620	1850	1850	2080	2080	2310
0.90	1600	1830	1830	2060	2060	2290
0.95	1580	1810	1810	2040	2040	2270
1.00	1570	1790	1790	2010	2010	2230
1.06	1550	1770	1770	1990	1990	2210
1.12	1530	1750	1750	1970	1970	2190
1.18	1530	1740	1740	1950	1950	2160
1.25	1510	1720	1720	1930	1930	2140
1.32	1500	1700	1700	1910	1910	2120
1.40	1490	1690	1690	1890	1890	2090
1.50	1460	1660	1660	1860	1860	2060
1.60	1440	1640	1640	1840	1840	2040
1.70	1420	1620	1620	1820	1820	2020

Dia. (mm)	Tensile Strength (N/mm²)					
	Grade 1		Grade 2		Grade 3	
	min	max	min	max	min	max
1.80	1400	1600	1600	1800	1800	2000
1.90	1390	1590	1590	1790	1790	1990
2.00	1370	1570	1570	1770	1770	1970
2.12	1350	1550	1550	1750	1750	1950
2.24	1330	1530	1530	1730	1730	1930
2.36	1320	1520	1520	1720	1720	1920
2.50	1300	1500	1500	1700	1700	1900
2.65	1290	1490	1490	1690	1690	1890
2.80	1270	1470	1470	1670	1670	1870
3.00	1250	1450	1450	1650	1650	1850
3.15	1240	1440	1440	1640	1640	1840
3.35	1220	1420	1420	1620	1620	1820
3.55	1200	1400	1400	1600	1600	1800
3.75	1190	1390	1390	1590	1590	1790
4.00	1170	1370	1370	1570	1570	1770
4.25	1150	1350	1350	1550	1550	1750
4.50	1130	1330	1330	1530	1530	1730
4.75	1120	1320	1320	1520	1520	1720
5.00	1110	1310	1310	1510	1510	1710
5.30	1090	1290	1290	1490	1490	1690
5.60	1070	1270	1270	1470	1470	1670
6.00	1050	1250	1250	1450	1450	1650
6.30	1040	1240	1240	1440	1440	1640
6.70	1030	1230	1230	1430	1430	1630
7.10	1010	1210	1210	1410	1410	1610
7.50	1000	1200	1200	1400	1400	1600
8.00	970	1170	1170	1370	1370	1570
8.50	960	1160	1160	1360	1360	1560
9.00	940	1140	1140	1340	1340	1540
9.50	-	-	1130	1330	1330	1530
10.00	-	-	1120	1320	1320	1520
10.60	-	-	1100	1300	1300	1500
11.20	-	-	1090	1290	1290	1490
11.80	-	-	1070	1270	1270	1470
12.50	-	-	1060	1260	1260	1460

Mechanical Properties (AS 1472)

Dia. (mm)	Tensile Strength (N/mm²)			
	Range 1		Range 2	
	min	max	min	max
0.56	1960	2250	2220	2490
0.63	1930	2220	2190	2460
0.69	1900	2190	2160	2430
0.71	1900	2190	2160	2430
0.80	1870	2160	2130	2400
0.90	1840	2130	2100	2370
1.00	1800	2070	2040	2310
1.12	1770	2040	2010	2270
1.25	1730	2000	1970	2230
1.40	1700	1960	1930	2180
1.60	1670	1920	1890	2130
1.80	1630	1880	1850	2080
2.00	1600	1840	1810	2040
2.24	1560	1800	1770	2000

Dia. (mm)	Tensile Strength (N/mm²)			
	Range 1		Range 2	
	min	max	min	max
2.50	1530	1760	1730	1950
2.80	1500	1720	1690	1910
3.15	1460	1680	1650	1870
3.55	1450	1670	1640	1850
4.00	1410	1630	1600	1810
4.50	1370	1590	1560	1760
5.00	1350	1560	1530	1730
5.60	1320	1520	1490	1680
6.30	1290	1490	1460	1650
7.10	1260	1460	1430	1620
8.00	1230	1420	1390	1570
9.00	1190	1380	1350	1530
10.00	1180	1360	1330	1510
11.20	1170	1340	1310	1480

Mechanical Properties (EN 10270-1)

Dia. (mm)	Tensile Strength (MPa)					
	SL		SM		DM	
	min	max	min	max	min	max
0.20	-	-	-	-	-	-
0.22	-	-	-	-	-	-
0.25	-	-	-	-	-	-
0.28	-	-	-	-	-	-
0.30	-	-	2370	2650	2370	2650
0.32	-	-	2350	2630	2350	2630
0.34	-	-	2330	2600	2330	2600
0.36	-	-	2310	2580	2310	2580
0.38	-	-	2290	2560	2290	2560
0.40	-	-	2270	2550	2270	2550
0.43	-	-	2250	2520	2250	2520
0.45	-	-	2240	2500	2240	2500
0.48	-	-	2220	2480	2220	2480
0.50	-	-	2200	2470	2200	2470
0.53	-	-	2180	2450	2180	2450
0.56	-	-	2170	2430	2170	2430
0.60	-	-	2140	2400	2140	2400
0.63	-	-	2130	2380	2130	2380
0.65	-	-	2120	2370	2120	2370
0.70	-	-	2090	2350	2090	2350
0.75	-	-	2070	2320	2070	2320
0.80	-	-	2050	2300	2050	2300
0.85	-	-	2030	2280	2030	2280
0.90	-	-	2010	2260	2010	2260
0.95	-	-	2000	2240	2000	2240
1.00	1720	1970	1980	2220	1980	2220
1.05	1710	1950	1960	2200	1960	2200
1.10	1690	1940	1950	2190	1950	2190
1.20	1670	1910	1920	2160	1920	2160
1.25	1660	1900	1910	2140	1910	2140
1.30	1640	1890	1900	2130	1900	2130
1.40	1620	1860	1870	2100	1870	2100
1.50	1600	1840	1850	2080	1850	2080
1.60	1590	1820	1830	2050	1830	2050
1.70	1570	1800	1810	2030	1810	2030

Dia. (mm)	Tensile Strength (MPa)					
	SL		SM		DM	
	min	max	min	max	min	max
1.80	1550	1780	1790	2010	1790	2010
1.90	1540	1760	1770	1990	1770	1990
2.00	1520	1750	1760	1970	1760	1970
2.10	1510	1730	1740	1960	1740	1960
2.25	1490	1710	1720	1930	1720	1930
2.40	1470	1690	1700	1910	1700	1910
2.50	1460	1680	1690	1890	1690	1890
2.60	1450	1660	1670	1880	1670	1880
2.80	1420	1640	1650	1850	1650	1850
3.00	1410	1620	1630	1830	1630	1830
3.20	1390	1600	1610	1810	1610	1810
3.40	1370	1580	1590	1780	1590	1780
3.60	1350	1560	1570	1760	1570	1760
3.80	1340	1740	1550	1740	1550	1740
4.00	1320	1520	1530	1730	1530	1730
4.25	1310	1500	1510	1700	1510	1700
4.50	1290	1490	1500	1680	1500	1680
4.75	1270	1470	1480	1670	1480	1670
5.00	1260	1450	1460	1650	1460	1650
5.30	1240	1430	1440	1630	1440	1630
5.60	1230	1420	1430	1610	1430	1610
6.00	1210	1390	1400	1580	1400	1580
6.30	1190	1380	1390	1560	1390	1560
6.50	1180	1370	1380	1550	1380	1550
7.00	1160	1340	1350	1530	1350	1530
7.50	1140	1320	1330	1500	1330	1500
8.00	1120	1300	1310	1480	1310	1480
8.50	1110	1280	1290	1460	1290	1460
9.00	1090	1260	1270	1440	1270	1440
9.50	1070	1250	1260	1420	1260	1420
10.00	1050	1230	1240	1400	1240	1400
10.50	-	-	1220	1380	1220	1380
11.00	-	-	1210	1370	1210	1370
12.00	-	-	1180	1340	1180	1340
12.50	-	-	1170	1320	1170	1320




Music Spring Wire

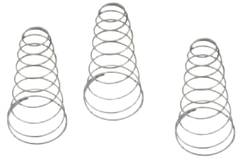
Music Spring Wire is made of high carbon steel.
Its excellence in chemical & physical properties is used in automobile, electronic equipment, precision machines, and other precision spring with the excellent strength, elasticity, creep, and resistance to fatigue.

Chemical Composition (JIS G 3502)

Classification	Chemical Composition (%)					
	C	Si	Mn	P	S	Cu
SWRS 62A	0.60 ~ 0.65	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 62B	0.60 ~ 0.65	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 67A	0.65 ~ 0.70	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 67B	0.65 ~ 0.70	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 72A	0.70 ~ 0.75	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 72B	0.70 ~ 0.75	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 75A	0.73 ~ 0.78	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 75B	0.73 ~ 0.78	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 77A	0.75 ~ 0.80	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 77B	0.75 ~ 0.80	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 80A	0.78 ~ 0.83	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 80B	0.78 ~ 0.83	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 82A	0.80 ~ 0.85	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 82B	0.80 ~ 0.85	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 87A	0.85 ~ 0.90	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 87B	0.85 ~ 0.90	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under
SWRS 92A	0.90 ~ 0.95	0.12 ~ 0.32	0.30 ~ 0.60	0.025 under	0.025 under	0.20 under
SWRS 92B	0.90 ~ 0.95	0.12 ~ 0.32	0.60 ~ 0.90	0.025 under	0.025 under	0.20 under

Packing

Inner Dia. Of Coil		Dia. (mm)	Packing Unit (kg)						
inch	mm		Coil	Carrier	Steel Reel	Din 355	MEG Bobbin	Z-2 Coil	Z-3 Coil
8	220	0.20 ~ 0.29	10	-	-	40	15	-	-
10	250	0.30 ~ 0.49	20	-	-	40	15	-	-
12	300	0.50 ~ 0.69	50	-	400	40	15	250	-
14	350	0.70 ~ 0.89	70	-	400	-	-	250	-
16	400	0.90 ~ 1.59	100	400	400	-	-	400	-
20	500	1.60 ~ 1.99	100	600	400	-	-	400	-
24	600	2.00 ~ 2.99	200	800	400	-	-	400	-
28	700	3.00 ~ 6.00	300	1,000	-	-	-	-	1,000
30	760	3.00 ~ 6.00	300	1,000	-	-	-	-	-
32	820	6.00 ~ 12.50	300	2,000	-	-	-	-	-



Mechanical Properties (KS D 3556)

Dia. (mm)	Tensile Strength (N/mm²)			
	PW-1		PW-2	
	min	max	min	max
0.20	2600	2840	2840	3090
0.23	2550	2790	2790	3040
0.26	2500	2750	2750	2990
0.29	2450	2700	2700	2940
0.32	2400	2650	2650	2890
0.35	2400	2650	2650	2890
0.40	2350	2600	2600	2840
0.45	2300	2550	2550	2790
0.50	2300	2550	2550	2790
0.55	2260	2500	2500	2750
0.60	2210	2450	2450	2700
0.65	2210	2450	2450	2700
0.70	2160	2400	2400	2650
0.80	2110	2350	2350	2600
0.90	2110	2300	2300	2500
1.00	2060	2260	2260	2450
1.20	2010	2210	2210	2400
1.40	1960	2160	2160	2350
1.60	1910	2110	2110	2300

Dia. (mm)	Tensile Strength (N/mm²)			
	PW-1		PW-2	
	min	max	min	max
1.80	1860	2060	2060	2260
2.00	1810	2010	2010	2210
2.30	1770	1960	1960	2160
2.60	1770	1960	1960	2160
2.90	1720	1910	1910	2110
3.00	1670	1860	1860	2060
3.20	1670	1860	1860	2060
3.50	1670	1810	1810	1960
4.00	1670	1810	1810	1960
4.50	1620	1770	1770	1910
5.00	1620	1770	1770	1910
5.50	1570	1710	1710	1860
6.00	1520	1670	1670	1810
6.50	1520	1670	1670	1810
7.00	1470	1620	1620	1770
8.00	1470	1620	-	-
9.00	1420	1570	-	-
10.00	1420	1570	-	-

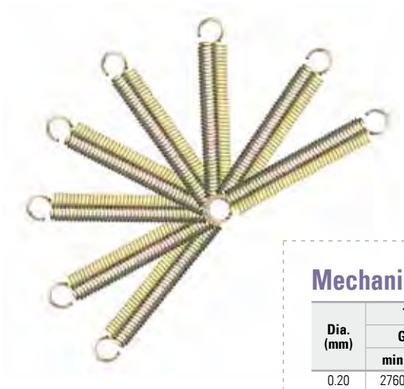
Mechanical Properties (JIS G 3522)

Dia. (mm)	Tensile Strength (N/mm²)			
	SWP-A		SWP-B	
	min	max	min	max
0.20	2600	2840	2840	3090
0.23	2550	2790	2790	3040
0.26	2500	2750	2750	2990
0.29	2450	2700	2700	2940
0.32	2400	2650	2650	2890
0.35	2400	2650	2650	2890
0.40	2350	2600	2600	2840
0.45	2300	2550	2550	2790
0.50	2300	2550	2550	2790
0.55	2260	2500	2500	2750
0.60	2210	2450	2450	2700
0.65	2210	2450	2450	2700
0.70	2160	2400	2400	2650
0.80	2110	2350	2350	2600
0.90	2110	2300	2300	2500
1.00	2060	2260	2260	2450
1.20	2010	2210	2210	2400
1.40	1960	2160	2160	2350
1.60	1910	2110	2110	2300

Dia. (mm)	Tensile Strength (N/mm²)			
	SWP-A		SWP-B	
	min	max	min	max
1.80	1860	2060	2060	2260
2.00	1810	2010	2010	2210
2.30	1770	1960	1960	2160
2.60	1770	1960	1960	2160
2.90	1720	1910	1910	2110
3.00	1670	1860	1860	2060
3.20	1670	1860	1860	2060
3.50	1670	1810	1810	1960
4.00	1670	1810	1810	1960
4.50	1620	1770	1770	1910
5.00	1620	1770	1770	1910
5.50	1570	1710	1710	1860
6.00	1520	1670	1670	1810
6.50	1520	1670	1670	1810
7.00	1470	1620	1620	1770
8.00	1470	1620	-	-
9.00	1420	1570	-	-
10.00	1420	1570	-	-

Calculation of Weight and Length for Music Spring Wire

- Weight for Hard Drawn Steel Wire(kg) = Diameter(mm) × Diameter(mm) × 0.006165 × Length(M)
- Length for Hard Drawn Steel Wire(M) = Weight(kg) ÷ Diameter(mm) ÷ Diameter(mm) ÷ 0.006165



Mechanical Properties (BS 5216)

Dia. (mm)	Tensile Strength (N/mm²)			
	Grade 4		Grade 5	
	min	max	min	max
0.20	2760	3090	3090	3420
0.22	2720	3030	3030	3340
0.25	2680	2980	2980	3280
0.28	2650	2940	2940	3230
0.30	2640	2920	2920	3200
0.32	2620	2890	2890	3160
0.34	2600	2860	2860	3120
0.36	2570	2830	2830	3090
0.38	2550	2800	2800	3050
0.40	2520	2770	2770	3020
0.42	2510	2750	2750	2990
0.45	2480	2720	2720	2960
0.48	2460	2690	2690	2920
0.50	2440	2670	2670	2900
0.53	2430	2650	2650	2870
0.56	2420	2630	2630	2840
0.60	2410	2610	2610	2810
0.63	2400	2590	2590	2780
0.67	2380	2570	2570	2760
0.71	2370	2550	2550	2730
0.75	2350	2530	2530	2710
0.80	2320	2490	2490	2660

Dia. (mm)	Tensile Strength (N/mm²)			
	Grade 4		Grade 5	
	min	max	min	max
0.85	2290	2460	2460	2630
0.90	2280	2440	2440	2600
0.95	2260	2420	2420	2580
1.00	2240	2390	2390	2540
1.06	2210	2360	2360	2510
1.12	2190	2340	2340	2490
1.18	2160	2310	2310	2460
1.25	2140	2290	2290	2440
1.32	2120	2270	2270	2420
1.40	2090	2240	2240	2390
1.50	2060	2210	2210	2360
1.60	2040	2190	2190	2340
1.70	2020	2170	2170	2320
1.80	2000	2150	2150	2300
1.90	1990	2140	2140	2290
2.00	1970	2120	2120	2270
2.12	1950	2100	2100	2250
2.24	1930	2080	2080	2230
2.36	1920	2070	2070	2220
2.50	1900	2050	2050	2200
2.65	1890	2040	2040	2190

Dia. (mm)	Tensile Strength (N/mm²)			
	Grade 4		Grade 5	
	min	max	min	max
2.80	1870	2020	2020	2170
3.00	1850	2000	2000	2150
3.15	1840	1990	-	-
3.35	1820	1970	-	-
3.55	1800	1950	-	-
3.75	1790	1940	-	-
4.00	1770	1920	-	-
4.25	-	-	-	-
4.50	-	-	-	-
4.75	-	-	-	-
5.00	-	-	-	-
5.30	-	-	-	-
5.60	-	-	-	-
6.00	-	-	-	-
6.30	-	-	-	-
6.70	-	-	-	-
7.10	-	-	-	-
7.50	-	-	-	-
8.00	-	-	-	-
8.50	-	-	-	-
9.00	-	-	-	-

Mechanical Properties (ASTM A 228)

Dia. (inch)	Tensile Strength (ksi)	
	min	max
0.008	399	441
0.009	393	434
0.010	387	428
0.011	382	422
0.012	377	417
0.013	373	412
0.014	369	408
0.015	365	404
0.016	362	400
0.018	356	393
0.020	350	387
0.022	345	382
0.024	341	377
0.026	337	373
0.028	333	368

Dia. (inch)	Tensile Strength (ksi)	
	min	max
0.030	330	365
0.032	327	361
0.034	324	358
0.036	321	355
0.038	318	352
0.040	315	349
0.042	313	346
0.045	309	342
0.048	306	339
0.051	303	335
0.052	302	333
0.055	300	331
0.059	296	327
0.063	293	324
0.067	290	321

Dia. (inch)	Tensile Strength (ksi)	
	min	max
0.072	287	317
0.076	284	314
0.079	283	313
0.080	282	312
0.085	279	308
0.090	276	305
0.095	274	303
0.100	271	300
0.102	270	299
0.107	268	296
0.110	267	295
0.112	266	294
0.121	263	290
0.125	261	288
0.130	259	286

Dia. (inch)	Tensile Strength (ksi)	
	min	max
0.135	258	285
0.138	256	283
0.140	256	283
0.145	254	281
0.150	253	279
0.156	251	277
0.162	249	275
0.177	245	270
0.192	241	267
0.207	238	264
0.225	235	260
0.250	230	255

Mechanical Properties (AS 1472)

Dia. (mm)	Tensile Strength (N/mm²)	
	Range 3	
	min	max
0.56	2460	2780
0.63	2430	2750
0.69	2400	2710
0.71	2400	2710
0.80	2370	2680
0.90	2340	2640
1.00	2280	2570

Dia. (mm)	Tensile Strength (N/mm²)	
	Range 3	
	min	max
1.12	2240	2530
1.25	2200	2480
1.40	2150	2430
1.60	2100	2370
1.80	2050	2320
2.00	2010	2270
2.24	1970	2230

Dia. (mm)	Tensile Strength (N/mm²)	
	Range 3	
	min	max
2.50	1920	2170
2.80	1880	2120
3.15	1840	2080
3.55	1820	2060
4.00	1780	2010
4.50	1730	1960
5.00	1700	1920

Dia. (mm)	Tensile Strength (N/mm²)	
	Range 3	
	min	max
5.60	1650	1860
6.30	1620	1830
7.10	1590	1790
8.00	1540	1740
9.00	1500	1700

Mechanical Properties (DIN 17223)

Dia. (mm)	Tensile Strength (N/mm²)			
	Class C		Class D	
	min	max	min	max
0.20	-	-	2800	3100
0.22	-	-	2770	3060
0.25	-	-	2720	3010
0.28	-	-	2680	2970
0.30	-	-	2660	2940
0.32	-	-	2640	2920
0.34	-	-	2610	2890
0.36	-	-	2590	2870
0.38	-	-	2570	2850
0.40	-	-	2560	2830
0.43	-	-	2530	2800
0.45	-	-	2510	2780
0.48	-	-	2490	2760
0.50	-	-	2480	2740
0.53	-	-	2460	2720
0.56	-	-	2440	2700
0.60	-	-	2410	2670
0.63	-	-	2390	2650
0.65	-	-	2380	2640
0.70	-	-	2360	2610
0.75	-	-	2330	2580
0.80	-	-	2310	2560
0.85	-	-	2290	2530

Dia. (mm)	Tensile Strength (N/mm²)			
	Class C		Class D	
	min	max	min	max
0.90	-	-	2270	2510
0.95	-	-	2250	2490
1.00	-	-	2230	2470
1.05	-	-	2210	2450
1.10	-	-	2200	2430
1.20	-	-	2170	2400
1.25	-	-	2150	2380
1.30	-	-	2140	2370
1.40	-	-	2110	2340
1.50	-	-	2090	2310
1.60	-	-	2060	2290
1.70	-	-	2040	2260
1.80	-	-	2020	2240
1.90	-	-	2000	2220
2.00	1980	2200	1980	2200
2.10	1970	2180	1970	2180
2.25	1940	2150	1940	2150
2.40	1920	2130	1920	2130
2.50	1900	2110	1900	2110
2.60	1890	2100	1890	2100
2.80	1860	2070	1860	2070
3.00	1840	2040	1840	2040
3.20	1820	2020	1820	2020

Dia. (mm)	Tensile Strength (N/mm²)			
	Class C		Class D	
	min	max	min	max
3.40	1790	1990	1790	1990
3.60	1770	1970	1770	1970
3.80	1750	1950	1750	1950
4.00	1740	1930	1740	1930
4.25	1710	1900	1710	1900
4.50	1690	1880	1690	1880
4.75	1680	1860	1680	1860
5.00	1660	1840	1660	1840
5.30	1640	1820	1640	1820
5.60	1620	1800	1620	1800
6.00	1590	1770	1590	1770
6.30	1570	1750	1570	1750
6.50	1560	1740	1560	1740
7.00	1540	1710	1540	1710
7.50	1510	1680	1510	1680
8.00	1490	1660	1490	1660
8.50	1470	1630	1470	1630
9.00	1450	1610	1450	1610
9.50	1430	1590	1430	1590
10.00	1410	1570	1410	1570
10.50	1390	1550	1390	1550

Mechanical Properties (EN 10270-1)

Dia. (mm)	Tensile Strength (MPa)			
	SH		DH	
	min	max	min	max
0.20	-	-	2800	3110
0.22	-	-	2770	3080
0.25	-	-	2720	3010
0.28	-	-	2680	2970
0.30	2660	2940	2660	2940
0.32	2640	2920	2640	2920
0.34	2610	2890	2610	2890
0.36	2590	2870	2590	2870
0.38	2570	2850	2570	2850
0.40	2560	2830	2560	2830
0.43	2530	2800	2530	2800
0.45	2510	2780	2510	2780
0.48	2490	2760	2490	2760
0.50	2480	2740	2480	2740
0.53	2460	2720	2460	2720
0.56	2440	2700	2440	2700
0.60	2410	2670	2410	2670
0.63	2390	2650	2390	2650
0.65	2380	2640	2380	2640
0.70	2360	2610	2360	2610
0.75	2330	2580	2330	2580
0.80	2310	2560	2310	2560
0.85	2290	2530	2290	2530

Dia. (mm)	Tensile Strength (MPa)			
	SH		DH	
	min	max	min	max
0.90	2270	2510	2270	2510
0.95	2250	2490	2250	2490
1.00	2230	2470	2230	2470
1.05	2210	2450	2210	2450
1.10	2200	2430	2200	2430
1.20	2170	2400	2170	2400
1.25	2150	2380	2150	2380
8.00	1490	1660	1490	1660
1.30	2140	2370	2140	2370
1.40	2110	2340	2110	2340
1.50	2090	2310	2090	2310
1.60	2060	2290	2060	2290
1.70	2040	2260	2040	2260
1.80	2020	2240	2020	2240
1.90	2000	2220	2000	2220
2.00	1980	2200	1980	2200
2.10	1970	2180	1970	2180
2.25	1940	2150	1940	2150
2.40	1920	2130	1920	2130
2.50	1900	2110	1900	2110
2.60	1890	2100	1890	2100
2.80	1860	2070	1860	2070
3.00	1840	2040	1840	2040

Dia. (mm)	Tensile Strength (MPa)			
	SH		DH	
	min	max	min	max
3.20	1820	2020	1820	2020
3.40	1790	1990	1790	1990
3.60	1770	1970	1770	1970
3.80	1750	1950	1750	1950
4.00	1740	1930	1740	1930
4.25	1710	1900	1710	1900
4.50	1690	1880	1690	1880
4.75	1680	1860	1680	1860
5.00	1660	1840	1660	1840
5.30	1640	1820	1640	1820
5.60	1620	1800	1620	1800
6.00	1590	1770	1590	1770
6.30	1570	1750	1570	1750
6.50	1560	1740	1560	1740
7.00	1540	1710	1540	1710
7.50	1510	1680	1510	1680
8.00	1490	1660	1490	1660
8.50	1470	1630	1470	1630
9.00	1450	1610	1450	1610
9.50	1430	1590	1430	1590
10.00	1410	1570	1410	1570