

LOOSCO

WIRE AND WIRE ROPE DIVISION

WIRE PRODUCTS CATALOG

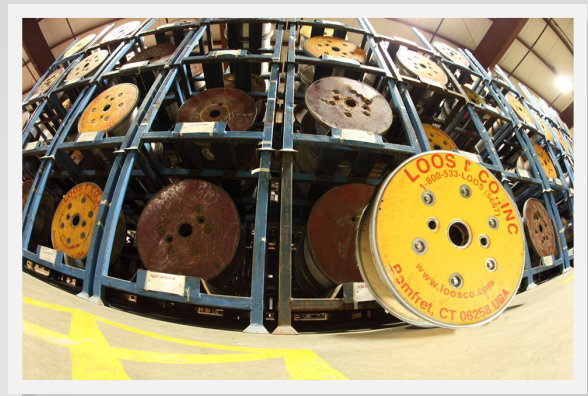
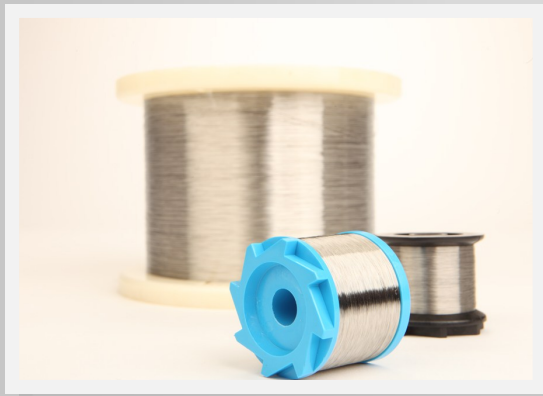


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MISSION STATEMENT

The mission of Loos & Co., Inc. is to manufacture specialty wire and cable products for critical applications that demand the highest standards of performance and quality. Since the beginnings of the company in 1958, Loos & Co., Inc. has been the industry leader in the development of products for critical applications such as aerospace flight controls, elevators, rescue hoists, earthquake bracing, rigging, scaffolding, automotive controls, and exercise equipment. Loos & Co., Inc. actively seeks to manufacture specialty products that are beyond the expertise of our competitors.



"We don't want to be the biggest, we want to be the best - to be able to provide each individual customer, no matter how small, with the best in service and selection."

- A.W. "Gus" Loos

ABOUT US

For over 50 years Loos & Co., Inc. has pioneered and thrived in the highly critical profession of cable and wire rope manufacturing for use in aerospace flight controls, elevators, rigging and scaffolding where human lives are directly at stake. This valuable experience has taught us "the ropes" about what a difference wire makes. We can help make the difference for you too.



Founded in 1958, Loos & Co., Inc. evolved from a three-car garage business, originally situated behind the home of owner A. W. "Gus" Loos and his wife Joan, to a 220,000 square foot facility located in picturesque Pomfret, Connecticut.

Starting out as a manufacturer's representative for hardware concerns, Mr. Loos imported wire rope and cable from Germany and Japan. Soon, he was stocking cable, tools and fittings, as well as re-reeling and packaging cable.



In 1962, Loos & Co. Inc. began to manufacture cable assemblies. Following in his success in previous market expansions, in 1964 Mr. Loos added the production capability to plastic-coat cables. With the acquisition of its own stranding and closing machines in 1971, Loos & Co., Inc. has been able to draw wire and strand it into cable in house.

Today, we can draw wire, strand cable, extrude plastics, manufacture hardware and tools for mechanical cable, and manufacture cable assemblies, as well as test and package all of the above.

Loos & Co., Inc. manufactures a wide variety of wire, aircraft cable, and wire rope. These products are used in aerospace, military, medical, and commercial applications, including aircraft flight controls, elevators, fitness equipment, rigging, and scaffolding operations. We are an OEM producer of cables for companies such as Boeing, Lockheed Martin, General Dynamics, and Bombardier.

QUALITY STATEMENT

Loos & Co., Inc. is a world class manufacturer of specialty wire and cable products. We practice continual improvement to ensure customer satisfaction. Our business plan demonstrates our commitment to meet customer requirements through specific, measurable objectives. Management reviews the effectiveness of our quality policy and quality management system on a regular basis. We communicate the results of these reviews throughout the organization.



Intertek

sales@loosco.com

COMMON ALLOYS & TEMPERS

GALVANIZED

MINIMAL CORROSION RESISTANCE

Zinc coated carbon steel offers some corrosion resistance. Remains ductile over long periods of working—generally higher breaking strength than stainless steels.

302/304 STAINLESS

GOOD CORROSION RESISTANCE

Also known as 18-8 (18% chromium 8% nickel). Most common grade of stainless steel. Provides good corrosion resistance with strength slightly lower than galvanized steel.

316 STAINLESS

VERY GOOD CORROSION RESISTANCE

Used in highly corrosive environments, such as where sea spray is highly potent. Also used in the food and medical industries. Strength is approximately 10% less than 302/304 stainless.

305 STAINLESS

LOW MAGNETISM; GOOD CORROSION RESISTANCE

Slightly more corrosion resistant than 302/304, 305 stainless is mostly non-magnetic, perfectly suited for aerospace and naval applications.

MONEL® AND INCONEL®

EXCELLENT CORROSION RESISTANCE

These two alloys available upon request. They have excellent corrosion resistance, although are generally lower in strength than other stainless alloys.



Tensile Strengths of Common Wire Grades (PSI, in thousands)

Size	Condition	302	304	305	316/317	321	347	INCONEL® 600	MONEL® 400
.005" - .030"	Annealed	100 - 130	100 - 130	100 - 130	95 - 130	105 - 135	94 - 130	100 - 120	70 - 85
	1/4 Hard	140 - 190	140 - 175	130 - 165	130 - 175	160 - 200	130 - 170	120 - 145	90 - 110
	1/2 Hard	190 - 240	180 - 215	165 - 200	175 - 210	200 - 300	170 - 205	145 - 165	110 - 140
	3/4 Hard	240 - 290	220 - 265	200 - 250	210 - 235	230 - 270	205 - 230	165 - 185	140 - 160
	Full Hard	290 - 360	270 - 350	230 - 280	235 - 275	270 - 340	230 - 275	185 - 215	170 - 210
.031" - .125"	Annealed	95 - 115	95 - 115	95 - 115	95 - 115	95 - 115	95 - 115	90 - 110	70 - 80
	1/4 Hard	130 - 160	120 - 155	135 - 160	130 - 170	130 - 160	110 - 160	110 - 130	80 - 100
	1/2 Hard	165 - 230	160 - 20	150 - 210	150 - 210	165 - 205	160 - 200	130 - 150	100 - 130
	3/4 Hard	195 - 260	190 - 255	180 - 230	205 - 235	200 - 230	200 - 230	150 - 180	110 - 150
	Full Hard	230 - 360	225 - 300	210 - 280	230 - 275	235 - 275	230 - 275	175 - 210	140 - 180
.125" - .250"	Annealed	90 - 115	90 - 110	90 - 105	85 - 105	95 - 105	85 - 105	90 - 105	65 - 79
	1/4 Hard	120 - 140	115 - 140	120 - 140	110 - 130	120 - 140	110 - 130	110 - 130	80 - 100
	1/2 Hard	145 - 170	145 - 170	145 - 170	125 - 155	145 - 170	125 - 155	130 - 150	100 - 130
	3/4 Hard	170 - 200	175 - 200	170 - 200	140 - 180	170 - 200	140 - 180	150 - 170	110 - 140
	Full Hard	190 - 230	200 - 240	190 - 230	160 - 190	190 - 230	160 - 190	160 - 190	120 - 150

LASHING WIRE

Stainless steel lashing wire is used to "lash" an overhead or "aerial" cable or wire to a supporting strand. Loos and Company produces the highest quality stainless steel lashing wire available in a variety of materials for the telecommunications, utilities, and cable TV industries.

Lashing wire manufactured by Loos and Company has been accepted and included in the REA (Rural Electrification Administration, U.S. Dept. of Agriculture) list of materials.

Lashing Wire Specifications							
Loos Part #	Type	Wire Dia.	Nominal Coil Size		Avg. Break Strength	# Coils Per Box	Approx. Ship Wt. Per Box
			LBS.	Feet			
038SA302LAC	302 S.S.	.038"	6.29	1,600'	115 lbs.	6	37 lbs.
038SA316LAC	316 S.S.	.038"	6.29	1,600'	115 lbs.	6	37 lbs.
045SA430LAC	430 S.S.	.045"	6.62	1,200'	125 lbs.	6	40 lbs.
045SA302LAC	302 S.S.	.045"	6.62	1,200'	165 lbs.	6	40 lbs.
045SA316LAC	316 S.S.	.045"	6.62	1,200'	165 lbs.	6	40 lbs.
065SA430LAC	430 S.S.	.065"	5.28	450'	245 lbs.	6	32 lbs.
065SA430LA6	430 S.S.	.065"	7.62	650'	245 lbs.	6	46 lbs.
065SA302LAC	302 S.S.	.065"	5.28	450'	300 lbs.	6	32 lbs.

Chemistry - Additional Specifications*								
	Maximum					Range		
	C	MN	P	S	SI	CR	NI	HO
Type 430 (UNS-S43000)	0.12	1.00	0.00	0.00	1.00	16.00 / 18.00		
Type 302 (UNS-S30400)	0.08	2.00	0.00	0.03	1.00	18.00 / 20.00	8.00 / 10.50	
Type 316 (UNS-S31600)	0.08	2.00	0.05	0.03	1.00	16.00 / 18.00	10.00 / 14.00	2.00 / 3.00

*Minimum elongation for lashing wire = 20% in 10". Wires conform to appropriate AISI Type 430, 302, or 316 Chemistry. Additionally, our lashing wire is wax coated per Bell Telephone Laboratories Spec # AT-7153.

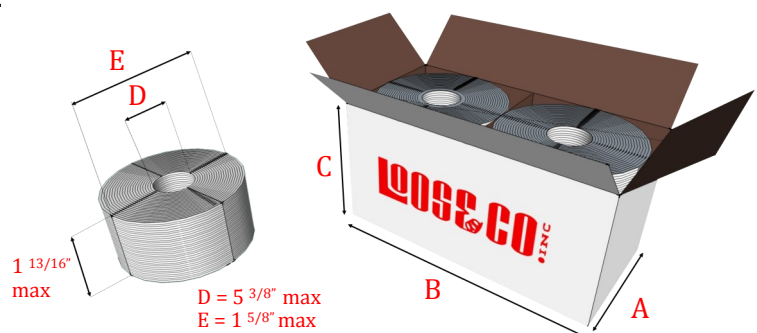
PACKAGING

Standard packaging is intended for use with commercial lashers such as Class C and D. Loos and Company stocks straight hub coils as listed below.

We offer tapered hub coils as well.

All Loos and Company lashing wire is packaged with plastic ties. We believe this offers the most consistent package tension. Plastic ties are also the safest and easiest to use when compared with string or wire ties.

Packaging Specifications			
Product	A	B	C
.065" - 450ft.	5 1/2"	11"	5 1/2"
.065" - 650ft.	6 1/2"	11"	6 1/2"
.045" - 1,200ft.	5 1/2"	11"	5 1/2"
.038" - 1,600ft.	5 1/2"	11"	5 1/2"



WELL MEASURING WIRE

Referred to as well measuring line, wire line, or slickline, this product is a single end wire used for measuring well depths and for lowering measuring devices into a well.

At Loos and Company, we produce weld free stainless steel and exotic high nickel/chrome alloy well measuring wire for use in a wide range of environments. We produce the highest quality Well Measuring Wire to protect against the chemical and physical abuse encountered in Oil and Gas wells. Loos and Company well measuring line is available in lengths of 10,000-15,000-20,000-25,000ft. Additional lengths are available upon request.

Well Measuring Wire Specifications			
Available Alloys	Available Sizes	Tolerance	Lengths Available
302 Stainless	.066 - .125"	±.001"	10,000 ft. 15,000 ft. 20,000 ft. 25,000 ft.
316 Stainless	.066 - .125"	±.001"	
2205 Duplex Alloy	.066 - .125"	±.001"	
XM-19 (Nitronic® 50)	.066 - .125"	±.001"	
Inconel® 625	.066 - .125"	±.001"	
Hastelloy® C-276	.066 - .125"	±.001"	
25-6Mo	.066 - .125"	±.001"	



Chemical Analysis										
Alloy	C	Mn	Cr	Ni	Mo	Cu	N	Nb+Ta	W	PREN*
302	0.06	1.50	18.00	8.00	x	x	x	x	x	19
316	0.05	1.50	17.00	11.00	2.50	0.50	x	x	x	25
2205	0.02	1.50	22.50	5.00	3.25	x	0.16	x	x	31
Alloy 625	0.01	0.02	22.00	64.00	9.00	x	x	4.00	x	55
Hastelloy® C-276	x	x	x	55.00	16.00	x	x	x	4.00	72
XM-19 (Nitronic® 50) (UNS S20910)	0.06	4.0 - 6.0	20.5 - 23.5	11.5 - 13.5	1.50 - 3.00	x	0.20 - 0.40	0.10 - 0.30 Cb + Ta	x	40
25-6Mo	0.02	1.50	20.00	25.00	6.50	1.00	0.20	x	x	36

Physical Properties - Minimum Breaking Strength (lbs.)							
Diameter	302 (UNS 30200)	316 (UNS 31600)	Alloy 2205 (UNS 32205)	Alloy 25.6MO (UNS N08925)	Inconel® 625 (UNS N08925)	Hastelloy® C-276 (UNS N10276)	XM-19 Nitronic 50® (UNS S20910)
.066"	862	736	850	850	875	750	Call us (800.533.5667) for more information
.072"	1018	875	950	950	1000	900	
.082"	1278	1083	1300	1300	1400	1160	
.092"	1582	1363	1600	1600	1700	1450	
.105"	2000	1732	2000	2000	2034	1900	
.108"	2080	1786	2200	2200	2250	2000	
.125"	2724	2270	2700	2700	2800	2600	



SAFETY LOCK WIRE

Loos & Co., Inc. manufactures the highest quality safety lock wire available. Our packages include 1/4 lb & 1 lb canisters, 1 lb., 5 lbs., & 10 lbs. spools, and custom bulk shipments to meet your usage requirements.

Lock Wire Information		
Specification	Alloy	Sizes
NASM20995C		
MS20995	302/304	.015" to .063"
QQW423		
ASTMA580		
AMS5685	305	.015" to .063"
QQW423		
ASTMA580		
NASM20995NC		
MS20995NC	400	.015" to .063"
QQN281		
NASM20995NC		
MS20995NC	600	.015" to .063"
QQW390		
AMS5687		



THE LOOS AND COMPANY ADVANTAGE

Safety lock wire, is a safety product that is often used in high vibration applications where fasteners could shake them loose. Safety lock wire, like many of our products, is a product most people never even realized existed - yet they are around it daily. Planes, trains, and automobiles all use safety lock wire to keep fasteners from shaking loose.

Loos and Company safety lock wire is manufactured from a variety of metals (302/304 Stainless, 305 Stainless, 316 Stainless, Monel®, or Inconel®). We manufacture safety lock wire to numerous specifications including: MS20995, MS20995NC, MS20995N, AMS5685, AMS5687, NASM20995C, NASM20995NC, and NASM20995N. Our safety lock wire is drawn from rod, and annealed it to give it the necessary ductility.

PHYSICAL PROPERTIES

Materials: 300 Series Stainless Steel, Inconel®, Monel®

Diameters: 0.015" to 0.063"

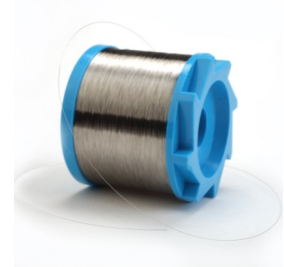
Surface Finish: Bright or Matte

Tensile Strength: 100 to 120 kPSI

PACKAGING OPTIONS

- 1/4 lb. Container (fits in tool box)
- 1 lb. EZ-Pull Containers
- 1 lb., 5 lbs., 10 lbs. Sleeve/Spool Option (often used on government orders)

MEDICAL WIRE



Sizes and Capabilities

Our bulk packaged wire is available from stock in sizes ranging from .001" to .120" and beyond. We offer custom sizes and finishes to meet your requirements. Spool sizes vary depending on your needs, and custom packaging can be provided upon request.

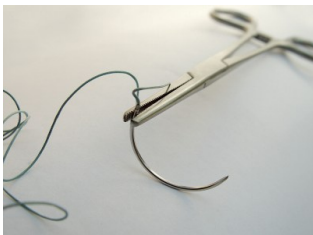
Materials

The materials used in medical equipment are critical to the performance of the product. The effectiveness of the wire in surgical, therapeutic, and other applications depends upon the physical and chemical characteristics of the alloy employed. Loos and Company Medical Technologies Division draws medical grade wire in stainless steel and high nickel alloys, with additional alloys available upon request. We specialize in stainless steel and high nickel exotic alloys, and hold stock to ensure short lead times. Our alloys include:

302	321
304V	347
305	400 Series
316LVM	MP35N

As a manufacturer, we are able to draw custom materials and sizes to meet your exact requirements. Contact our sales department via email (sales@loosco.com) to learn more.

Applications



Loos and Company Medical Technologies Division manufactures round wire for a variety of applications, including:



Guidewires	Sutures
Needles	Orthodontics
Braiding	Coiling
Orthopedics	Endoscopies

BRUSH WIRE



The Loos & Company Jewel Wire Division manufactures custom brush wire products to perform under the harshest situations. With a unique mixture of metallurgical and structural properties, our Brush Wire products offer high performance, customizable solutions. Because Quality and Performance Matter, trust the Jewel Wire Division to provide the service and products you need.

Scratch Brush Wire

Drawn from hard wire, scratch brush wire is used in hand brushes for industrial applications. Sizes for our scratch brush wire often range from .003" to 0.016" and can be manufactured from most metals or alloys. Available in cut lengths or hanks.

Power Brush Wire

To survive the rigors of surface conditioning, power brush wire carries with it a high fatigue life in operation. Often used in manufacturing, power brushes are excellent for removing burrs and sharp edges, greatly increasing safety. With a variety of sizes and materials at our disposal, we can supply brush wire for your surface conditioning needs. Available in cut lengths, hanks, spools, or multistranded on spools.

Crimped Wire

Crimped wire is a must for many applications. crimping the wire increases column strength, thusly improving brush performance. For the toughest jobs, crimped wire is your solution. Available in nearly any metal or alloy, our crimped wire is available in cut lengths, hanks, spools, or multistranded on spools.

Straight & Cut Lengths

Available in a large range of sizes and alloys. We can straighten and cut the wire to your desired length or produce wire hanks.

Stranded Wires

Stranded wires are large sets of wires that are grouped together before being put up on spools. We offer these in sizes from .003 to .020 and arrangements with as little as two and as many as 1,400 wires.

Winding Wire

Used to attach bristles to the handle, winding wire is available in many sizes and materials, and can be purchased on spools or coils.

Retaining Wire

Used to attach brush wire filaments inside of brush channels. Retaining wire is typically from 0.028" to 0.125" in diameter. Available in 304, 304HQ, 316 Stainless, and others upon request.



WIRE CHEMISTRIES

We specialize in stainless steel and high nickel exotic alloys, and hold stock to ensure short lead times. Our quick delivery alloys include 302, 304, 305, 316, 321, 347, 400 Series, 17-7 pH, Monel® and Inconel®. Please review the table below to learn more about the alloys we offer.

Nominal Chemical Composition Stainless Steels										
Type	C Max	Mn Max	P Max	S Max	Si Max	Cr	Ni	Mo Max	Co/Ta Max	Other Elements
201	0.15	5.5 - 7.5	0.06	0.03	1.00	16.0 - 18.0	3.5 - 5.5	-	-	N 0.25 Max
202	0.15	7.5 - 10.0	0.06	0.03	1.00	17.0 - 19.0	4.0 - 6.0	-	-	N 0.25 Max
301	0.15	2.00	0.05	0.03	1.00	16.0 - 18.0	6.0 - 8.0	-	-	-
302	0.15	2.00	0.05	0.03	1.00	17.0 - 19.0	8.0 - 10.0	-	-	-
303	0.15	2.00	0.20	0.15 Min	1.00	17.0 - 19.0	8.0 - 10.0	-	-	-
303SE	0.15	2.00	0.20	0.06	1.00	17.0 - 19.0	8.0 - 10.0	-	-	Se 0.15 Min
304	0.08	2.00	0.05	0.03	1.00	18.0 - 20.0	8.0 - 10.5	-	-	-
304L	0.03	2.00	0.05	0.03	1.00	18.0 - 20.0	8.0 - 12.0	-	-	-
305	0.12	2.00	0.05	0.03	1.00	17.0 - 19.0	10.5 - 13.0	-	-	-
308	0.08	2.00	0.05	0.03	1.00	19.0 - 21.0	10.0 - 12.0	-	-	-
309	0.20	2.00	0.05	0.03	1.00	22.0 - 24.0	12.0 - 15.0	-	-	-
309S	0.08	2.00	0.05	0.03	1.00	22.0 - 24.0	12.0 - 15.0	-	-	-
310	0.25	2.00	0.05	0.03	1.50	22.0 - 24.0	12.0 - 15.0	-	-	-
310S	0.08	2.00	0.05	0.03	1.50	24.0 - 26.0	19.0 - 22.0	-	-	-
314	0.25	2.00	0.05	0.03	1.5 - 3.0	23.0 - 26.0	19.0 - 22.0	-	-	-
316	0.08	2.00	0.05	0.03	1.00	16.0 - 18.0	10.0 - 14.0	2.0 - 3.0	-	-
316L	0.03	2.00	0.05	0.03	1.00	16.0 - 18.0	10.0 - 14.0	2.0 - 3.0	-	-
316F	0.08	2.00	0.2	.10 Min.	1.00	16.0 - 18.0	10.0 - 14.0	1.75 - 3.0	-	-
317	0.08	2.00	0.05	0.03	1.00	18.0 - 20.0	11.0 - 15.0	3.0 - 4.0	-	-
317L	0.03	2.00	0.05	0.03	1.00	18.0 - 20.0	11.0 - 15.0	3.0 - 4.0	-	-
321	0.08	2.00	0.05	0.03	1.00	17.0 - 19.0	9.0 - 12.0	-	-	Ti 5x C Min.
330	0.2	2.00	0.03	0.03	0.75 - 1.50	17.0 - 20.0	34.0 - 37.0	-	-	-
347	0.02	2.00	0.05	0.03	1.00	17.0 - 19.0	9.0 - 13.0	-	-	Cb-Ta 10 x C Min
348	0.08	2.00	0.05	0.03	1.00	17.0 - 19.0	9.0 - 13.0	-	Co 0.2 Ta 0.1	Cb-Ta 10 x C Min
384	0.08	2.00	0.05	0.03	1.00	15.0 - 17.0	17.0 - 19.0	-	-	Cb-Ta 8 x C Min
18-9 LW	0.1	2.00	0.05	0.03	1.00	17.0 - 19.0	8.0 - 10.0	-	-	Cu 3.0 - 4.0
Nitronic 32	0.15	11.0 - 14.0	0.06	0.03	1.00	16.5 - 19.0	0.5 - 2.5	-	-	N 0.20 - 0.45
Nitronic 33	0.08	11.5 - 14.5	0.06	0.03	1.00	17.0 - 19.0	2.25 - 3.75	-	-	N 0.20 - 0.40
Nitronic 40	0.08	8.0 - 10.0	0.06	0.03	1.00	19.0 - 21.0	5.5 - 7.5	-	-	N 0.15 - 0.40
Nitronic 50	0.03 - 0.06	4.0 - 6.0	0.04	0.03	1.00	20.5 - 23.5	11.5 - 13.5	1.5 - 3.0	Co 0.10 - 0.30	N 0.20 - 0.40 V 0.08 - 0.18
Nitronic 60	0.1	7.0 - 9.0			3.5 - 4.5	16.0 - 18.0	8.0 - 9.0			N 0.08 - 0.18
Hardenable (by heat treatment) Types										
410	0.15	1	0.04	0.03	1	11.5 - 13.5	-	-	-	-
416	0.15	1.25	0.06	0.15 Min	1	12.0 - 14.0	-	-	-	-
420	0.15 Min	1	0.04	0.03	1	12.0 - 14.0	-	-	-	-

Nominal Chemical Composition Nickel Alloys													
Type	Ni	C	Mn	Fe	S	Si	Cu	Cr	Al	Ti	Mg	Cb	Mo
200	99.50	0.08	0.18	0.2	0.01	0.18	0.13	-	-	-	-	-	-
201	99.50	0.01	0.18	0.2	0.01	0.13	0.13	-	-	-	-	-	-
205	99.50	0.08	0.18	0.10	0.00	0.08	0.08	-	-	0.03	0.05	-	-
211	95.00	0.10	4.75	0.38	0.01	0.08	0.13	-	-	-	-	-	-
212	97.00	0.20	2.00	0.75	0.02	0.15	0.2	-	-	-	-	-	-
220	99.50	0.04	0.10	0.05	0.00	0.03	0.05	-	-	0.03	0.05	-	-
230	99.50	0.05	0.08	0.08	0.00	0.02	0.05	-	-	0.00	0.06	-	-
Monel® (Nickel-Copper Alloys)													
400	66.50	0.15	1.00	1.25	0.01	0.25	31.50	-	-	-	-	-	-
Inconel® (Nickel-Chromium) Alloys													
600	76.00	0.08	0.50	8.00	0.01	0.25	0.25	15.50	-	-	-	-	-
601	60.50	0.05	0.50	14.10	0.01	0.25	0.50	23.00	1.35	-	-	-	-
625	61.00	0.05	0.25	2.50	0.01	0.25		21.50	0.20	0.20	-	+ Ta 3.65	9.00
X-750	73.00	0.04	0.50	7.00	0.01	0.25	0.25	15.50	0.70	2.50	-	+ Ta 0.95	-
751	72.50	0.05	0.50	7.00	0.01	0.25	0.25	15.50	1.20	2.30	-	+ Ta 0.95	-
Incoloy® (Nickel-Iron-Chromium) Alloys													
800	32.50	0.05	0.75	46.00	0.01	0.50	0.38	21.00	0.38	0.38	-	-	-
801	32.00	0.05	0.75	44.50	0.01	0.50	0.25	20.50	-	1.13	-	-	-
802	32.50	0.35	0.75	46.00	0.01	0.38	-	21	0.58	0.75	-	-	-
804	41.00	0.05	0.75	25.40	0.01	0.38	0.25	29.50	0.30	0.60	-	-	-
805	36.00	0.12	0.75	Bal.	0.02	0.50	0.50	7.50	-	-	-	-	0.50

WIRE GAUGES

Gauges				Diameter		Sectional Area		Length	Gauges				Diameter		Sectional Area		Length
Steel Wire	American Wire (B&S)	Birmingham or Stubbs	British Imperial	Inches	MM	Square Inches	Circ. Mils	Feet Per Pound	Steel Wire	American Wire (B&S)	Birmingham or Stubbs	British Imperial	Inches	MM	Square Inches	Circ. Mils	Feet Per Pound
				Decimally	Decimally								Decimally	Decimally			
1	1	1	1	0.3000	7.620	0.070686	90,000	4.118	18	18	19	19	0.0403	1.0236	0.001276	1,624	228.2
				0.296875	7.541	0.069221	88,135	4.205					20	20	0.0400	1.0160	0.001257
1	2	2	2	0.2893	7.348	0.065733	83,694	4.428	19	20	20	20	0.0360	0.9144	0.001018	1,296	286.0
				0.2840	7.214	0.063347	80,656	4.595					21	21	0.0359	0.9119	0.001012
2	2	3	3	0.2830	7.188	0.062902	80,089	4.628	20	21	21	21	0.0350	0.8890	0.000962	1,225	302.5
				0.28125	7.144	0.062126	79,102	4.685					22	22	0.0348	0.8839	0.000951
2	3	3	3	0.2760	7.010	0.059828	76,176	4.865	21	20	21	21	0.0320	0.8128	0.000804	1,024	361.9
				0.265625	6.747	0.055415	70,557	5.253					22	22	0.0317	0.8052	0.000789
3	4	4	4	0.2625	6.668	0.054119	68,906	5.379	22	21	22	22	0.03125	0.7938	0.000767	976.6	379.5
				0.2590	6.579	0.052685	67,081	5.525					23	23	0.0286	0.7264	0.000642
3	5	5	5	0.2576	6.543	0.052117	66,358	5.585	23	22	22	22	0.0285	0.7239	0.000638	812.3	456.3
				0.2520	6.401	0.049876	63,504	5.836					24	24	0.0280	0.7112	0.000616
4	5	6	6	0.2500	6.350	0.049087	62,500	5.930	24	23	23	23	0.0258	0.6553	0.000523	665.6	556.8
				0.2437	6.190	0.046645	59,390	6.240					25	25	0.0253	0.6426	0.000503
4	6	6	6	0.2380	6.045	0.044488	56,644	6.543	25	24	24	24	0.0250	0.6350	0.000491	625.0	593.0
				0.234375	5.953	0.043143	54,932	6.747					26	26	0.0240	0.6096	0.000452
5	7	7	7	0.2320	5.893	0.042273	53,824	6.886	26	25	25	25	0.0230	0.5842	0.000415	529.0	700.6
				0.2294	5.827	0.041331	52,624	7.043					27	27	0.0226	0.5740	0.000401
5	8	8	8	0.2253	5.723	0.039867	50,760	7.301	27	26	26	26	0.0220	0.5588	0.000380	484.0	765.7
				0.2200	5.588	0.038013	48,400	7.657					28	28	0.0204	0.5182	0.000327
5	9	9	9	0.21875	5.556	0.037583	47,852	7.745	28	27	27	27	0.0201	0.5105	0.000317	404.0	917.4
				0.2120	5.385	0.035299	44,944	8.246					29	29	0.0200	0.5080	0.000314
6	10	10	10	0.2070	5.258	0.033654	42,849	8.649	29	28	28	28	0.0181	0.4597	0.000257	327.6	1,131
				0.2043	5.189	0.032781	41,738	8.880					30	30	0.0180	0.4572	0.000254
6	11	11	11	0.203125	5.159	0.032405	41,260	8.983	30	29	29	29	0.0179	0.4547	0.000252	320.4	1,157
				0.2030	5.156	0.032365	41,209	8.994					31	31	0.0173	0.4394	0.000235
7	12	12	12	0.1920	4.877	0.028953	36,864	10.05	31	30	30	30	0.0164	0.4166	0.000211	269.0	1,378
				0.1875	4.763	0.027612	35,156	10.54					32	32	0.0162	0.4115	0.000206
7	13	13	13	0.1819	4.620	0.025987	33,088	11.20	32	31	31	31	0.0160	0.4064	0.000201	256.0	1,448
				0.1800	4.572	0.025447	32,400	11.44					33	33	0.0159	0.4039	0.000199
8	14	14	14	0.1770	4.496	0.024606	31,329	11.83	33	32	32	32	0.015625	0.3969	0.000192	244.1	1,518
				0.1760	4.470	0.024328	30,976	11.96					34	34	0.0150	0.3810	0.000177
8	15	15	15	0.171875	4.366	0.023201	29,541	12.55	34	33	33	33	0.0148	0.3759	0.000172	219.0	1,692
				0.1650	4.191	0.021382	27,225	13.61					35	35	0.0142	0.3607	0.000158
9	16	16	16	0.1620	4.115	0.020612	26,244	14.12	35	34	34	34	0.0140	0.3556	0.000154	196.0	1,891
				0.1600	4.064	0.020106	25,600	14.48					36	36	0.0136	0.3454	0.000145
9	17	17	17	0.15625	3.969	0.019175	24,414	15.18	36	35	35	35	0.0132	0.3353	0.000137	174.2	2,127
				0.1483	3.767	0.017273	21,993	16.85					37	37	0.0130	0.3302	0.000133
10	18	18	18	0.1480	3.759	0.017203	21,904	16.92	37	36	36	36	0.0128	0.3251	0.000129	163.8	2,262
				0.1443	3.665	0.016354	20,822	17.80					38	38	0.0126	0.3200	0.000125
10	19	19	19	0.1440	3.658	0.016286	20,736	17.87	38	37	37	37	0.0124	0.3150	0.000121	153.8	2,410
				0.140625	3.572	0.015532	19,775	18.74					39	39	0.0120	0.3048	0.000113
11	20	20	20	0.1350	3.429	0.014314	18,225	20.34	39	38	38	38	0.0118	0.2997	0.000109	139.2	2,662
				0.1340	3.404	0.014103	17,956	20.64					40	40	0.0116	0.2946	0.000106
11	21	21	21	0.1285	3.264	0.012969	16,512	22.45	40	39	39	39	0.0113	0.2870	0.000100	127.7	2,902
				0.1280	3.251	0.012868	16,384	22.62					41	41	0.0108	0.2743	0.00009161
12	22	22	22	0.1250	3.175	0.012272	15,625	23.72	41	40	40	40	0.0104	0.2642	0.00008495	108.2	3,427
				0.1205	3.061	0.011404	14,520	25.52					42	42	0.0100	0.2540	0.00007854
12	23	23	23	0.1200	3.048	0.011310	14,400	25.74	42	41	41	41	0.0095	0.2413	0.00007088	90.25	4,107
				0.1160	2.946	0.010568	13,456	27.54					43	43	0.0092	0.2337	0.00006648
13	24	24	24	0.1144	2.906	0.010279	13,087	28.32	43	42	42	42	0.0092	0.2337	0.00006648	84.64	4,379
				0.109375	2.778	0.009396	11,963	30.98					44	44	0.00893	0.2268	0.00006263
13	25	25	25	0.1090	2.769	0.009331	11,881	31.19	44	43	43	43	0.0085	0.2159	0.00005675	72.25	5,130
				0.1055	2.68	0.008742	11,130	33.30					45	45	0.0084	0.2134	0.00005542
14	26	26	26	0.1040	2.642	0.008495	10,816	34.27	45	44	44	44	0.0080	0.2032	0.00005027	64.00	5,791
				0.1019	2.588	0.008155	10,384	35.69					46	46	0.00795	0.2019	0.00004964
14	27	27	27	0.0950	2.413	0.007088	9,025.0	41.07	46	45	45	45	0.0076	0.1930	0.00004536	57.76	6,417
				0.09375	2.381	0.006903	8,789.1	42.17					47	47	0.0075	0.1905	0.00004418
15	28	28	28	0.0920	2.337	0.006648	8,464.0	43.79	47	46	46	46	0.0071	0.1798	0.00003937	50.13	7,394
				0.0915	2.324	0.006576	8,372.3	44.27					48	48	0.0070	0.1778	0.00003848
15	29	29	29	0.0907	2.304	0.006461	8,226.5	45.05	48	47	47	47	0.0068	0.1727	0.00003632	46.24	8,015
				0.0830	2.108	0.005411	6,889.0	53.80					49	49	0.0066	0.1676	0.00003421
16	30	30	30	0.0808	2.052	0.005128	6,528.6	56.77	49	48	48	48	0.0063	0.1600	0.00003117	39.69	9,338
				0.0800	2.032	0.005027	6,400.0	57.91					50	50	0.0062	0.1575	0.00003019
16	31	31	31	0.078125	1.984	0.004794	6,103.5	60.72	50	49	49	49	0.0060	0.1524	0.00002827	36.00	10,295
				0.0720	1.829	0.004072	5,184.0	71.49					51	51	0.00581	0.1476	0.00002651
16	32	32	32	0.0650	1.651	0.003318	4,225.0	87.72	51	50	50	50	0.0058	0.1473	0.00002642	33.64	11,017
				0.0641	1.626	0.003227	4,108.8	90.20					52	52	0.0055	0.1397	0.00002376
16	33	33	33	0.0640	1.626	0.003217	4,096.0	90.48	52	51	51	51	0.0052	0.1321	0.00002124	27.00	13,706
				0.0625	1.588	0.003068	3,906.3	94.88					53	53	0.0050	0.1270	0.00001963
16	34	34	34	0.0580	1.473	0.002642	3,364.0	110.2	53	52	52	52	0.0048	0.1219	0.00001810	23.04	16,086
				0.0571	1.450	0.002561	3,260.4	113.7					54	54	0.0046	0.1168	0.00001662
16	35	35	35	0.0560	1.422	0.002463	3,136.0	118.2	54	53	53	53	0.00445	0.1130	0.00001555	19.80	1

LOOSCO U.S.A.
WIRE AND WIRE ROPE DIVISION

Loos & Co., Inc.
www.loosco.com

P.O. Box 98
Pomfret, CT 06258

Phone: 860-928-7981
Fax: 860-928-6167
E-mail: sales@loosco.com