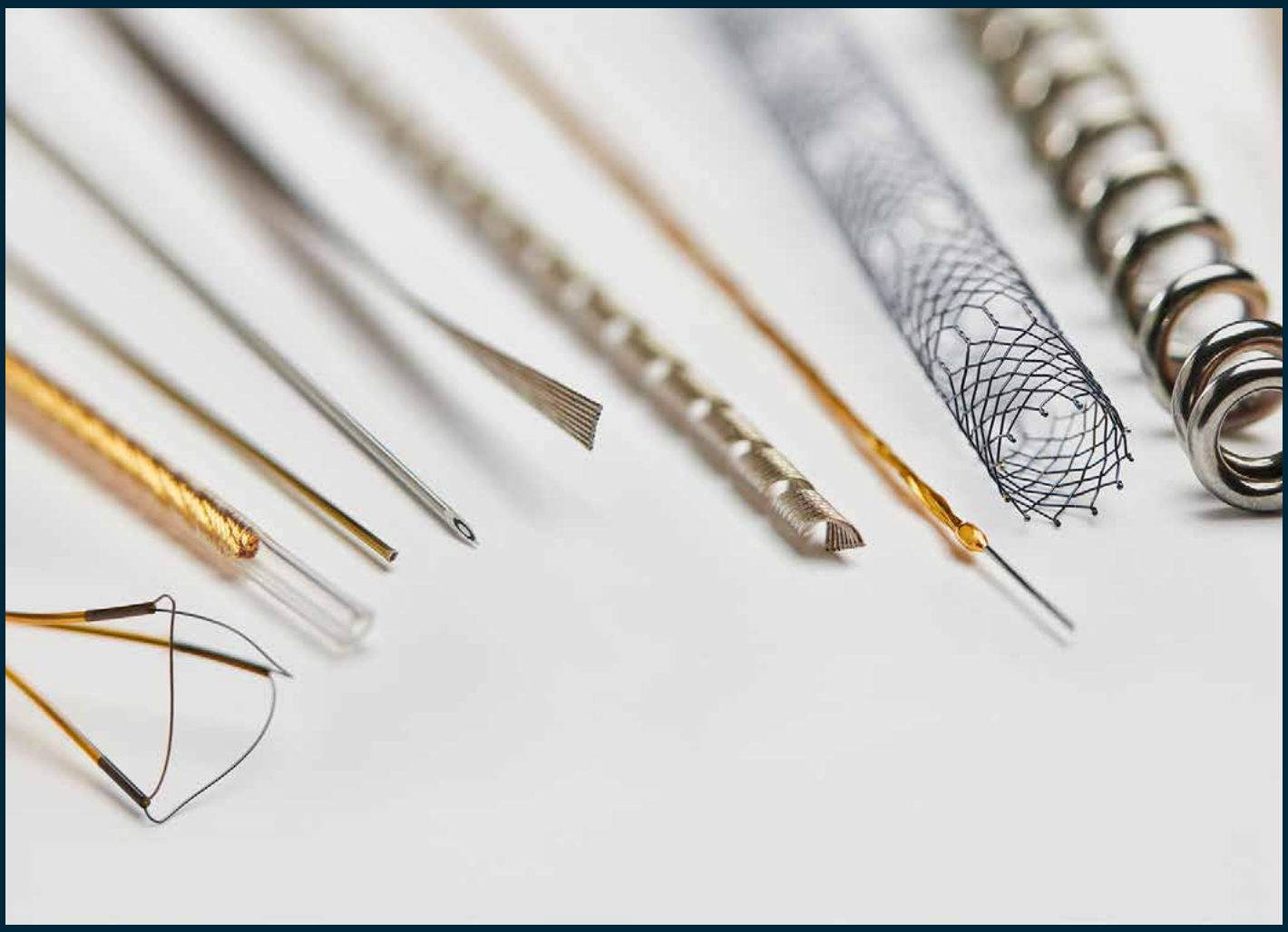


Alleima

Fine medical wire, nitinol solutions,
wire-based components and
micro-tubes for medical applications

Your partner for life-changing medical solutions

Innovation and inspiration to advance your designs

Ready to make a life-changing difference? Choose fine medical wire, nitinol solutions, wire-based components or micro-tubes for your application and let decades of expertise and innovation take your design to the next level.

Alleima develops, manufactures and refines fine medical wire specifically for medical devices. Alleima is also an expert in processing nitinol. You can be sure of ultra-high quality across the entire value chain.

From idea to implementation

Creativity is key to your design. As an integral part of your research and development journey, we can help you imagine and implement innovative solutions to solve tomorrow's medical needs.

Agility matters, too. Our deliberately lean initiatives increase quality and decrease variability throughout the design process. And through a responsive, comprehensive design partnership with you, together we can conceive – and expertly create – utterly unique processes and products.

Meltshop to medical

Advances. Adaptations. At Alleima they happen fast. And as we have strict control over our entire supply chain, that agility comes hand-in-hand with quality.

Diamond precision

What makes fine medical wire products ultra-high quality? The answer starts with the diamond dies. Each one crafted with painstaking attention to detail.

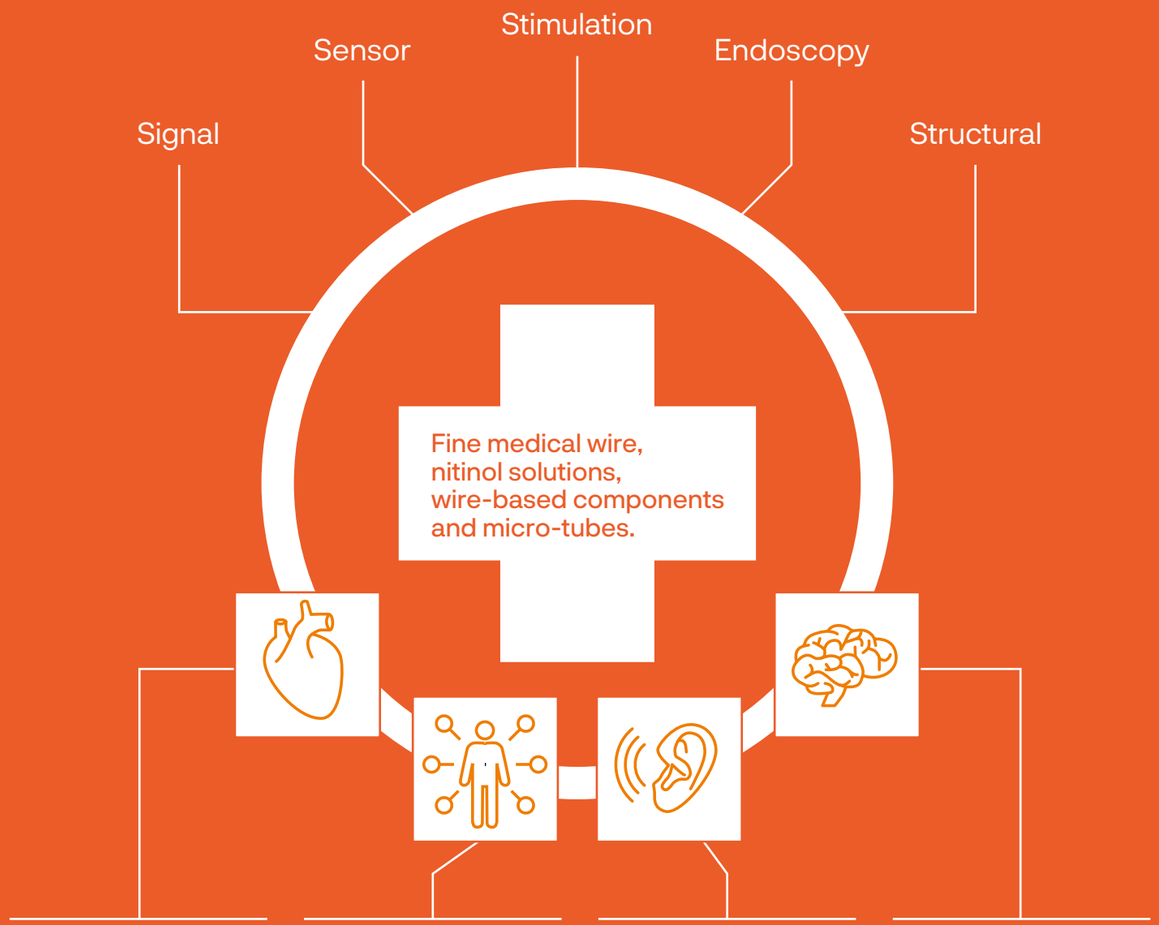
Value at every step

You will notice the same ultra-high standards in our products as in our support. At every step of your design and manufacturing process, we add value. From precision tolerance coating to multi-filar micro cables, our impact doesn't stop with supply. That's just the start.

Examine the medical solutions of the future and you will find fine medical wire in many of them. Thanks to its unique properties, we are already in close partnership with OEMs and universities, enhancing tomorrow's product development. Bring your vision to us and let's explore the possibilities together.

Quality of life. Where will you improve it?

Just some of the areas we're already adding value



Cardiology
Wire for heart solutions, including guide wires, catheter applications and pacing leads.

Endoscopy and remote monitoring
Sensing solutions for data gathering and super-elastic nitinol solutions minimal invasive endoscopic therapies.

Cochlear remediation
Solutions for middle ear implants for sensorineural hearing loss.

Neurology
Wire for deep brain, spine, EMG needles and other stimulation applications.

Progressive resources for tomorrow's medical needs

The extensive medical wire range serves even the most demanding medical challenges. Stainless steels. Precious metals. Biocompatible alloys, such as cobalt-chromium (CoCr) alloys and nitinol. Over 200 different alloys as standard, as well as custom-made alloys, created on request.
To discover our entire material portfolio, visit www.alleima.com/wire or talk to your Alleima contact.
For more information about nitinol please go to page 17.

Some of the most commonly used medical application alloys:

Primary Alloys

Medical grade/stainless steels
MP35N™
MP35N™ Composite Wire
304V
316LV
Alleima® 11R51 / 11R51HV (EN 1.4310)
Alleima® 12R10 / 12R10HV (EN 1.4310)
Alleima® 1RK91 (ASTM A693, F899)

Precious metals
Gold
Silver
Platinum
Platinum Iridium
Platinum Tungsten
Gold Plated Copper
Platinum Clad Tantalum

Alloys
Constantan
Copper

Kanthal® Resistance Alloys

Nikrothal® 80	80%Ni/20%Cr
Nikrothal® 60	60%Ni/16%/balance iron
Nikrothal® 40	35%Ni/20%/2% silicone balance iron
Nikrothal® LX	20%Cr/75%Ni

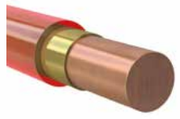
Kanthal® A-1	22%Cr/5,8%Al/balance iron
Kanthal® AE	22%Cr/5,3%Al/balance iron
Kanthal® AF	22%Cr/5,3%Al/balance iron
Kanthal® D	22%Cr/4,8%Al/balance iron
Alkrothal™	15%Cr/4,3%Al/balance iron
Cuprothal® 49	44%Ni balance copper
Cuprothal® 30	23%Ni balance copper
Cuprothal® 15	11%Ni balance copper
Cuprothal® 10	6%Ni balance copper
Cuprothal® 5	2.2%Ni balance copper
Nifethal™ 70	30%Ni/balance iron
Nifethal™ 36	36%Ni/balance iron

Custom wire for unique applications

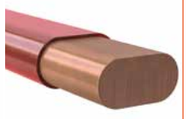
Single Wire Configurations

All alloys can be provided in single strand form, with or without coating, and plated with custom thicknesses of gold or nickel.

Multilayer including Bond Coating



Electroplated and Polymer Finish



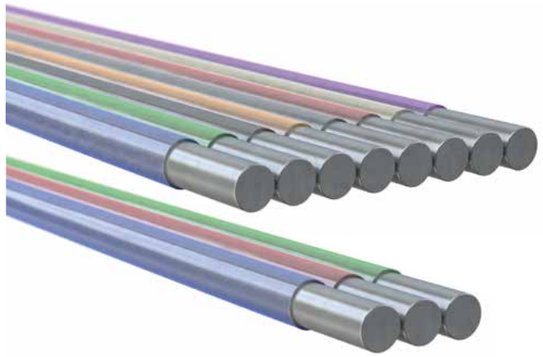
Coated Ribbon Wire

Multilayer including Bond Coating. Round, Flat, Square Wire Configurations.

Pure PTFE Coating

Multi-Filar Arrangements

Single strand wire configurations can also be formed into multi-filar or microcable arrangements.



Multi-Filar Configurations

Cable Configurations

Single strand and multi-filar cables can then be manipulated into different cable configurations. Coatings, such as PTFE or polymer can be applied to any cable arrangement.

Stranded Coated Wire

Stranded Coated Wire With Overcoat Finish

Stranded Bare Wire

Coated Finished Cable

Twisted Multi-Filar Cables

Coils

A vital part of our service is value-added coiling. Take, for example, lead finishing, where wire is both stripped and formed.

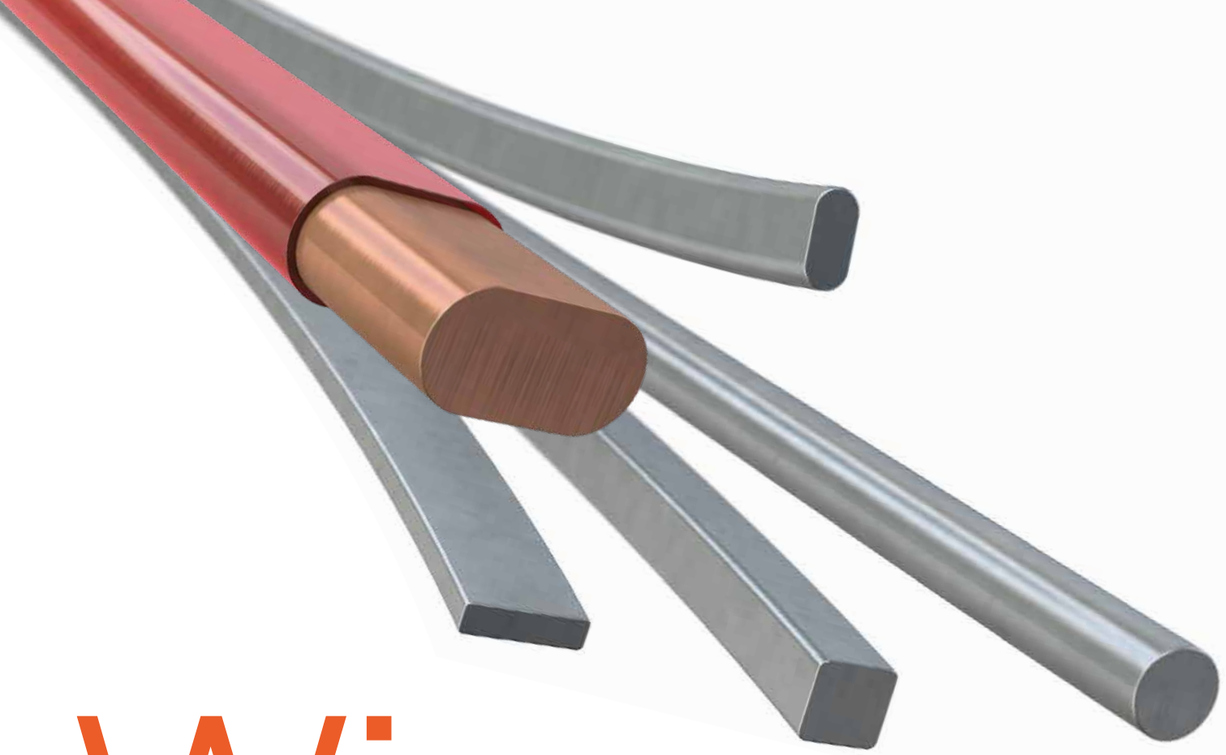
Multi-Filar Coils

Single Strand Coils

PTFE Coils

Free-Standing Coils

These are some of the most popular custom wire solutions. To discover our entire material portfolio, visit www.alleima.com/wire or talk to your Alleima contact.



Wire forms

Round, flat, square and rectangular wire

Round wire		Sizes		Tolerance	
		inch	mm	inch	mm
Bright Coated Plated	Wire	0.0002 to 0.040	0.100 to 1.0	±0.00005	±0.00127
	Fine wire	0.0004 to 0.004	0.010 to 0.100	±0.000025	±0.000635

Flat wire		Thickness		Tolerance	
		inch	mm	inch	mm
Bright Coated Plated	Square and rectangular, brite or coated, supplied on spools	0.00075 to 0.20	0.019 to 0.510	±0.00005	±0.00127
		0.002 to 0.120	0.051 to 3.05	±0.0005	±0.00127

Electroplating or anodizing are other type of surface treatments that allow us to support our customers in making cutting edge medical products.

Electroplating and electro polishing

Our production unit in Sonceboz, Switzerland, has state-of-the-art electroplating capabilities. We can apply one or several metallic coatings to improve characteristics such as electrical properties, acid resistance, or aesthetic appearance. We offer barrel and rack plating for parts and reel-to-reel plating of wire.

Simple in its concept, electroplating allows manufacturers to add a thin layer of metal to a component built from another material.

With our ability to electroplate micro components, we can make state-of-the-art metallic coatings on tiny parts. The typical deposit thickness range is 5 to 50 micro-in (0.13 to 1.3 microns).

For more information please visit our website www.alleima.com/plating

Anodizing

Alleima also offers a reel-to-reel electrolytic passivation process for aluminium alloys to increase the natural oxidation layer for enhanced dielectric behaviour. The anodized layer provides the benefit of hardening the surface for better abrasive wear, when necessary for the application. The typical thickness of the anodized layer is 0.0002 to 0.0004” (0.005 to 0.010 mm). The anodization process can be applied to round wire as well as ribbon wire.

We also offer coloured anodization from titanium oxide, which is homogeneously applied all over the piece. Our finishing allows production of several tones and perfect repeatability. Approximately 30 colours are available.

Electroplating and anodizing

Coating

The key to end-performance success.

The right coating for medical-grade wire can make or break product design. Identifying the best coating is a balancing act of engineering and chemistry, testing even the most experienced design team. And while off-the-shelf solutions exist, they rarely consider downstream impacts, product performance, manufacturability and real costs.

But choose Alleima and you’ll be working with coating experts. Our experts are busy developing, testing and manufacturing coatings and surface modifications specifically for cutting-edge medical products and unique functional devices. Day in. Day out.

PTFE Coating

We offer PTFE coating capabilities. PTFE coating can be applied to any medical grade in the size range 0.001–0.03 in (0.025–0.76 mm). Alleima provides PTFE-coated wire with coating thickness from 0.0001 to 0.0010 in (0.0025–0.025 mm). Clear, Green and Blue finishes are standard. Other colors can be offered on request.

Coating materials

Coatings for use as permanent and temporary implant
Polyurethanes
Polyesterimide
PTFE
FEP
Nylon (top coat)
Polyamide-imide
Polyesters
Polyimide
LARC SI Polyimide

Thermal bondcoats

Thermoplastic coatings for bonding wires together as multi-filar or free standing coils
Thermoplastic Polyvinyl Butyral
Thermoplastic Epoxy
Thermoplastic Polyamide
Thermoplastic Polyamide-imide

Our long experience in the production of wires allows us an upstanding fine tube manufacturing. In addition to various stainless steels, which are principally used in medical applications, for example EMG needles, we can also process other materials, such as tubes of precious metal alloys likes gold and platinum and non-ferrous metals such as brass, nickel, nickel silver, copper, and copper alloys.

Fine Tubes

Fine Tubes sizes

High-quality precision tubes can be seamless or welded. We supply both versions with an accuracy of up to +/-0.001 mm, straightened in defined lengths or in coils. We follow international standards and customer requirements.

Diameter outer	0.00984" – 0.157"	0.25 – 4 mm
Diameter inner	0.00197" – 0.114"	0.05 – 2.9 mm
Wall thickness	0.00157" – 0.04"	0.04 – 1.0 mm

Plastic Insulation

For probes or catheters, it is often important that they are coated with plastics. We can apply different types of insulation or biocompatible materials on the fine tubes. With our multi-layer coating process, a 100% coverage is guaranteed. Pinholes can't emerge with this technology.

Type of Insolation	Temp.	*
Polyurethan V130*	130C°	L
Polyurethan V155*	155C°	L
Polyesterimid W180*	180C°	
Polyesterimid W200	200C°	
Polyimid C300	300C°	
Silicon	200C°	

Adhesive varnish		
Polyvynilbutyral	100C°	L
Polyamid	180C°	L

* available in various colours,
L = solderable

Electroplating

Metals: Gold, Nickel, Platinum, Silver, Tungsten etc
We can apply the same metallic coatings as on the wires. Again, we have the possibility to achieve acid resistance, biocompatibility, or to affect the electrical properties of the tubes. We can electroplate continuous tubes and wires (reel to reel). Our electroplating capabilities are highly efficient and can guarantee coatings to be homogeneous, without porosity (pinholes) or cracks.

Multi-Lumen Tubes

Metals: Gold, Nickel, Platinum, Silver, Tungsten etc
Some applications require that the tube has two or even three different chambers. For this exceptional part, we have developed a special process, that allows us to meet the high requirements of such a product. If desired, the inner conductor can be installed solid or loose in the tube. With the combination of our electroplating and polymeric coating, Alleima has an excellent starting position to realize very complex and sophisticated products. If desired, the inner conductor can be installed solid or loose in the pipe.

Pipe material

Stainless steels
1.4301/AISI304, 1.4306/AISI304L, 1.4404/AISI316L, 1.4435/AISI316LS, 1.4571/AISI316Ti

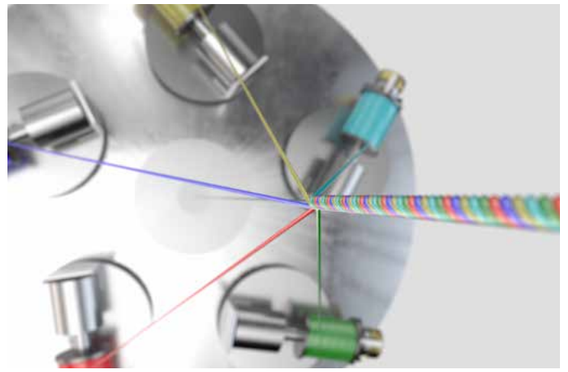
Challenge yourself. Challenge Alleima.

Our manufacturing portfolio is already uniquely diverse. But why stop there? All our partners are invited to collaborate directly with our engineers to modify, manipulate and imagine new capabilities together. Endless opportunities for process, product and possibilities.

Stranding

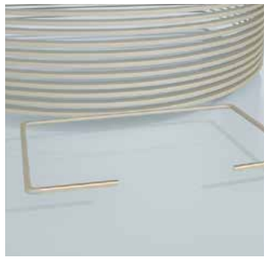
The strands are formed by twisting and wrapping together multiple single ended wires or previously joined multifilar wires or cables to form a stranded instead of multifilar entity. The individual single strands that comprise the multifilar cable can be bare or individually coated prior to cabling. The overall stranded cable can also be overcoated with a polymer or PTFE after the cabling operation.

The range for single ended cable diameter is 0.0007 to 0.010 inches (0.018 mm to 0.25 mm).



Lead finishing

We offer stripping and forming of wire ends.



Mechanical assembly

We support you by assembling single strands and cables according to your requirements. We can also make assemblies in our Class 7 clean room.

Automating processes

Based on your needs, we can develop and automate your manufacturing process. For example, we offer cut to length, straightening, and packaging services, to mention a few.

Realize your ideas faster

Experience and expertise unlock new efficiencies. Like being able to make value-adding suggestions without having to re-start the prototyping stage. Or finding recommendations so innovative they're not even on a customer's radar. Yet. From initial design to refining and validating the final product, your entire Alleima team is committed to optimized development that gets your devices to market. Fast.

An overview of services and value-added operations

Wire and Tube refinement

Reduction
Drawing

Alloy composition
Uniform, cored or multi-lumen

Wire
Round and Rectangular

Tube
Seamless or Welded

Wire
Size: 0.0002"–0.040" / 0.100 mm–1.0 mm
Tolerance up to: 0.00005 in / 0.00127 mm

Tube
Diameter outer: 0.00984"–0.157" / 0.25–4 mm
Diameter inner: 0.00197"–0.114" / 0.05–2.9 mm
Wall thickness: 0.00157"–0.04" / 0.04–1.0 mm

Surface treatment

Coatings
Insultation coatings
Bondable coatings
ETFE coatings

Electroplating
Reel-to-reel, rack and barrel.
Typical metals are; Silver, rhodium... nickel.
For all metal capabilities please see www.alleima.com/plating

Anodizing
Reel to reel
Aluminum and titanium oxide

Electropolishing
Premium Surface Finishes

Value added operations

Special handeling
Clean Room Processing

Cut to length
Single Strand and Cable

Coiling
Freestanding and Helicoil

Packaging
Spools and Bobbins

Mechanical assembly
Single Strand and Cable

Lead finishing
Stripping and Forming

Twisting and stranding
Custom Cable Solutions

Straightening
Mechanical or Thermal Treatment

Operational services

Research and development
Custom Process/
Product Development

Inventory management
Safety Stock Programs

Metallurgy consulting
Materials Selection Assistance

New product development
Custom process development in accordance with customers specifications

Lab testing
Unique Procedural Competance

Lean process optimization
Kanban Applications

Rapid prototyping
Custom wire and wire-component solutions
Micro-tube solutions

Techincal training
3D Design, 3D Visualization and Printing

Samples

Sample package
Round and Rectangular

Developer kit
Round and Rectangular

Nitinol processing

The smart memory metal nitinol is named after its place of discovery, the research facility: Nickel Titanium Naval Ordnance Laboratory. When the material is deformed in a cool state, it returns to its original shape after heating. It makes it ideal to use in the medical applications of the future.

Expertise in processing the memory metal

Nitinol requires material expertise and special processing treatment to maintain its unique temperature-dependent properties for medical applications. When inadequately processed, significant cost, wear or irreversible damages on the device may occur.

With more than 20 years of experience in processing nitinol we target both – cost-effective processing and unleashing the unique mechanical properties of nitinol. Our services span across solving complex design challenges, developing and manufacturing innovative, complex and high-quality products.

We offer grinding for fine finishing with accurate dimensions, braiding for flexibility and strength of your device, shaping of complex, customized geometries, joining nitinol with other materials and final cleanroom assembly.

Extreme flexible and biomechanical

Nitinol is kink-resistant and flexible, making it suitable for use in endoluminal instruments such as retrieval baskets. The baskets are extremely flexible. They allow easy access combined with high kink resistance, high set-up force and 1-to-1 motion transmission.

Nitinol's biomechanical properties are also similar to biological material from a mechanical point of view. This makes it particularly suitable for use in implants. Materials such as stainless steel or titanium are very stiff and hardly elastic, so they do not yield even under pressure from surrounding tissue. Nitinol, on the other hand, with its biomechanical properties like human tissue, allows repeatable alternating stresses.

Endoscopy and soft robotics

"The super elastic properties don't need heat. You constrain, you crimp, you pull through a tube. Then you push it into the body. The system of tubes in the body is very complicated and very long, and we don't want to cut open the body until we get to the point of interest. We want to go endoscopically. That's why endoscopic instruments are getting small in diameter, longer, more flexible, and softer", says Dr Bernd Vogel, Global Technology and Innovation Manager at Alleima and an expert in processing nitinol. "

Crimping is an effective joining technique for nitinol wire, meaning it can be connected to other nitinol components or different materials, such as stainless steel.

For more information please visit our website www.alleima.com/nitinol

NEMA MW 1000: Dimensional standards

Insulated round magnet wire

AWG	Bare wire diameter (inches)			Single build insulation			Heavy build insulation			Triple build insulation		
	Minimum	Nominal	Maximum	Min. Increase in Diameter	Nominal Thickness	Maximum Thickness	Min. Increase in Diameter	Nominal Thickness	Maximum Thickness	Min. Increase in Diameter	Nominal Thickness	Maximum Thickness
21	0.0282	0.0285	0.0288	0.0011	0.0298	0.0303	0.0022	0.0309	0.0314	0.0033	0.0321	0.0326
22	0.0250	0.0253	0.0256	0.0011	0.0266	0.0270	0.0021	0.0276	0.0281	0.0032	0.0288	0.0293
23	0.0224	0.0226	0.0228	0.0010	0.0239	0.0243	0.0020	0.0249	0.0253	0.0030	0.0259	0.0264
24	0.0199	0.0201	0.0203	0.0010	0.0213	0.0217	0.0019	0.0223	0.0227	0.0029	0.0233	0.0238
25	0.0177	0.0179	0.0181	0.0009	0.0190	0.0194	0.0018	0.0199	0.0203	0.0027	0.0209	0.0214
26	0.0157	0.0159	0.0161	0.0009	0.0170	0.0173	0.0017	0.0178	0.0182	0.0026	0.0188	0.0193
27	0.0141	0.0142	0.0143	0.0008	0.0153	0.0156	0.0016	0.0161	0.0164	0.0024	0.0169	0.0173
28	0.0125	0.0126	0.0127	0.0008	0.0137	0.0140	0.0016	0.0144	0.0147	0.0023	0.0152	0.0156
29	0.0112	0.0113	0.0114	0.0007	0.0123	0.0126	0.0015	0.0130	0.0133	0.0022	0.0138	0.0142
30	0.0099	0.0100	0.0101	0.0007	0.0109	0.0112	0.0014	0.0116	0.0119	0.0021	0.0124	0.0128
31	0.0088	0.0089	0.0090	0.0006	0.0097	0.0100	0.0013	0.0105	0.0108	0.0017	0.0110	0.0114
32	0.0079	0.0080	0.0081	0.0006	0.0088	0.0091	0.0012	0.0095	0.0098	0.0016	0.0099	0.0103
33	0.0070	0.0071	0.0072	0.0005	0.0078	0.0081	0.0011	0.0085	0.0088	0.0014	0.0088	0.0092
34	0.0062	0.0063	0.0064	0.0005	0.0070	0.0072	0.0010	0.0075	0.0078	0.0013	0.0079	0.0082
35	0.0055	0.0056	0.0057	0.0004	0.0062	0.0064	0.0009	0.0067	0.0070	0.0012	0.0071	0.0074
36	0.0049	0.0050	0.0051	0.0004	0.0056	0.0058	0.0008	0.0060	0.0063	0.0011	0.0064	0.0067
37	0.0044	0.0045	0.0046	0.0003	0.0050	0.0052	0.0008	0.0055	0.0057	0.0010	0.0057	0.0060
38	0.0039	0.0040	0.0041	0.0003	0.0045	0.0047	0.0007	0.0049	0.0051	0.0009	0.0051	0.0054
39	0.0034	0.0035	0.0036	0.0002	0.0039	0.0041	0.0006	0.0043	0.0045	0.0008	0.0045	0.0048
40	0.0030	0.0031	0.0032	0.0002	0.0035	0.0037	0.0006	0.0038	0.0040	0.0008	0.0041	0.0043
41	0.0027	0.0028	0.0029	0.0002	0.0031	0.0033	0.0005	0.0034	0.0036	0.0007	0.0037	0.0039
42	0.0024	0.0025	0.0026	0.0002	0.0028	0.0030	0.0004	0.0030	0.0032	0.0007	0.0033	0.0035
43	0.0021	0.0022	0.0023	0.0002	0.0025	0.0026	0.0004	0.0027	0.0029	0.0006	0.0030	0.0032
44	0.0019	0.0020	0.0021	0.0001	0.0022	0.0024	0.0004	0.0025	0.0027	0.0006	0.0027	0.0029
45	0.00169	0.00176	0.0018	0.00010	0.0019	0.00205	0.00030	0.00215	0.00230			
46	0.00151	0.00157	0.0016	0.00010	0.0017	0.00185	0.00030	0.00196	0.00210			
47	0.00135	0.00140	0.0015	0.00010	0.0016	0.00170	0.00030	0.00178	0.00190			
48	0.00119	0.00124	0.0013	0.00010	0.0014	0.00150	0.00020	0.00155	0.00170			
49	0.00107	0.00111	0.0012	0.00010	0.0012	0.00130	0.00020	0.00139	0.00150			
50	0.00095	0.00099	0.00103	0.00010	0.0011	0.00120	0.00020	0.00128	0.00140			
51	0.00085	0.00088	0.00092	0.00010	0.0010	0.00110	0.00020	0.00117	0.00129			
52	0.00075	0.00078	0.00081	0.00010	0.0009	0.00100	0.00020	0.00105	0.00115			
53	0.00067	0.00070	0.00073	0.00005	0.0008	0.00085	0.00013	0.00092	0.00103			
54	0.00060	0.00062	0.00065	0.00005	0.0007	0.00075	0.00013	0.00084	0.00095			
55	0.00053	0.00055	0.00057	0.00005	0.0006	0.00070	0.00013	0.00077	0.00087			
56	0.00047	0.00049	0.00051	0.00005	0.0006	0.00065	0.00013	0.00071	0.00081			
57	0.00042	0.00044	0.00046	0.00004	0.0005	0.00056						
58	0.00038	0.00039	0.00041	0.00004	0.0005	0.00051						
59	0,00034	0,00035	0,00036									
60	0,00030	0,00031	0,00032									
61	0,00027	0,00028	0,00029									
62	0,00024	0,00025	0,00026									
63	0,00021	0,00022	0,00023									

Sizes finer than 44 AWG based on the theoretical resistance (10.371 Ohms-Circular Mil/foot) of a copper conductor.

The nominal coated wire thickness is based on the average of the minimum coating thickness increase on a minimum bare wire diameter and the maximum coated wire thickness.

Single build self-bonding wire

AWG	Bare Wire nominal diameter		Maximum increase in diameter insulation		Minimum increase in diameter thermopLastic		Maximum overall diameter	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
21	0.02850	0.7240	0.0011	0.0280	0.00050	0.0130	0.03140	0.7980
22	0.02530	0.6430	0.0011	0.0280	0.00050	0.0130	0.02810	0.7140
23	0.02260	0.5740	0.0010	0.0250	0.00050	0.0130	0.02530	0.6430
24	0.02010	0.5110	0.0010	0.0250	0.00050	0.0130	0.02270	0.5770
25	0.01790	0.4550	0.0009	0.0230	0.00050	0.0130	0.02030	0.5160
26	0.01590	0.4040	0.0009	0.0230	0.00050	0.0130	0.01820	0.4620
27	0.01420	0.3610	0.0008	0.0200	0.00050	0.0130	0.01640	0.4170
28	0.01260	0.3200	0.0008	0.0200	0.00050	0.0130	0.01470	0.3730
29	0.01130	0.2870	0.0007	0.0180	0.00040	0.0100	0.01330	0.3380
30	0.01000	0.2540	0.0007	0.0180	0.00040	0.0100	0.01190	0.3020
31	0.00890	0.2260	0.0006	0.0150	0.00040	0.0100	0.01080	0.2740
32	0.00800	0.2030	0.0006	0.0150	0.00040	0.0100	0.00980	0.2490
33	0.00710	0.1800	0.0005	0.0130	0.00040	0.0100	0.00880	0.2240
34	0.00630	0.1600	0.0005	0.0130	0.00030	0.0080	0.00780	0.1980
35	0.00560	0.1420	0.0004	0.0100	0.00030	0.0080	0.00700	0.1780
36	0.00500	0.1270	0.0004	0.0100	0.00030	0.0080	0.00630	0.1600
37	0.00450	0.1140	0.0003	0.0080	0.00030	0.0080	0.00570	0.1450
38	0.00400	0.1020	0.0003	0.0080	0.00020	0.0050	0.00510	0.1300
39	0.00350	0.0890	0.0002	0.0050	0.00020	0.0050	0.00450	0.1140
40	0.00310	0.0790	0.0002	0.0050	0.00020	0.0050	0.00400	0.1020
41	0.00280	0.0710	0.0002	0.0050	0.00020	0.0050	0.00360	0.0910
42	0.00250	0.0640	0.0002	0.0050	0.00020	0.0050	0.00320	0.0810
43	0.00220	0.0560	0.0002	0.0050	0.00010	0.0025	0.00290	0.0740
44	0.00200	0.0510	0.0001	0.0025	0.00010	0.0025	0.00270	0.0690
45	0.00176	0.0447	0.0001	0.0025	0.00010	0.0025	0.00230	0.0584
46	0.00157	0.0399	0.0001	0.0025	0.00010	0.0025	0.00210	0.0533
47	0.00140	0.0356	0.0001	0.0025	0.00010	0.0025	0.00190	0.0483
48	0.00124	0.0315	0.0001	0.0025	0.00010	0.0025	0.00170	0.0432
49	0.00111	0.0282	0.0001	0.0025	0.00010	0.0025	0.00150	0.0381
50	0.00099	0.0251	0.0001	0.0025	0.00010	0.0025	0.00140	0.0356
51	0.00088	0.0224	0.0001	0.0025	0.00010	0.0025	0.00130	0.0330
52	0.00078	0.0198	0.0001	0.0025	0.00005	0.0013	0.00115	0.0292
53	0.00070	0.0178	0.0001	0.0025	0.00005	0.0013	0.00107	0.0271
54	0.00060	0.0152	0.0001	0.0025	0.00005	0.0013	0.000995	0.0253
55	0.00050	0.0127	0.0001	0.0025	0.00005	0.0013	0.000985	0.0250
56	0.00040	0.0102	0.0001	0.0025	0.00005	0.0013	0.000975	0.0248

Sizes finer than 44 AWG based on the theoretical resistance (10.371 Ohms-Circular Mil/foot) of a copper conductor.

AWG sizes 53 to 56 are not standard NEMA dimensions.

Wire gauges

Wire Gauges (AWG or B&S)

Gauge no	inch	mm
4-0	0.460	11.68
3-0	0.410	10.40
2-0	0.365	9.27
0	0.325	8.25
1	0.289	7.35
2	0.258	6.54
3	0.229	5.83
4	0.204	5.19
5	0.182	4.62
6	0.162	4.11
7	0.144	3.67
8	0.129	3.26
9	0.114	2.91
10	0.102	2.59
11	0.0907	2.30
12	0.0808	2.05
13	0.0720	1.83
14	0.0641	1.63
15	0.0571	1.45
16	0.0508	1.29
17	0.0453	1.15
18	0.0403	1.02
19	0.0359	0.912
20	0.0320	0.812
21	0.0285	0.723
22	0.0254	0.644
23	0.0226	0.573
24	0.0201	0.511
25	0.0179	0.455
26	0.0159	0.405
27	0.0142	0.361
28	0.0126	0.321
29	0.0113	0.286
30	0.0100	0.255
31	0.00893	0.227
32	0.00795	0.202
33	0.00708	0.180
34	0.00631	0.160
35	0.00562	0.143
36	0.00500	0.127
37	0.00445	0.113
38	0.00397	0.101

Standard Wire Gauge (SWG)

inch	mm	Gauge no
0.400	10.16	4-0
0.372	9.45	3-0
0.348	8.84	2-0
0.324	8.23	0
0.300	7.62	1
0.276	7.01	2
0.252	6.40	3
0.232	5.89	4
0.212	5.38	5
0.192	4.88	6
0.176	4.47	7
0.160	4.06	8
0.144	3.66	9
0.128	3.25	10
0.116	2.95	11
0.104	2.64	12
0.0920	2.34	13
0.0800	2.03	14
0.0720	1.83	15
0.0640	1.63	16
0.0560	1.42	17
0.0480	1.22	18
0.0400	1.02	19
0.0360	0.914	20
0.0320	0.813	21
0.0280	0.711	22
0.0240	0.610	23
0.0220	0.559	24
0.0200	0.508	25
0.0180	0.457	26
0.0164	0.417	27
0.0148	0.376	28
0.0136	0.345	29
0.0124	0.315	30
0.0116	0.295	31
0.0108	0.274	32
0.0100	0.254	33
0.00920	0.234	34
0.00840	0.213	35
0.00760	0.193	36
0.00680	0.173	37
0.00600	0.152	38

Wire Gauges (AWG or B&S)

Gauge no	inch	mm
39	0.00353	0.0897
40	0.00315	0.0799
41	0.00280	0.0711
42	0.00249	0.0633
43	0.00222	0.0564
44	0.00198	0.0502
45	0.00176	0.0447
46	0.00157	0.0398
47	0.00140	0.0355
48	0.00124	0.0316
49	0.00111	0.0281
50	0.000986	0.0250
51	0.000800	0.0203
52	0.000600	0.0152
53	0.000500	0.0127
54	0.000400	0.0102
55	0.000300	0.00762
56		
57		
58		
59		
60		

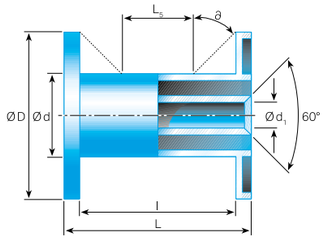
Standard Wire Gauge (SWG)

inch	mm	Gauge no
0.00520	0.132	39
0.00480	0.122	40
0.00440	0.112	41
0.00400	0.102	42
0.00360	0.0914	43
0.00320	0.0813	44
0.00280	0.0711	45
0.00240	0.0610	46
0.00200	0.0508	47
0.00160	0.0406	48
0.00120	0.0305	49
0.00100	0.0254	50
0.000878	0.0223	51
0.000782	0.0199	52
0.000697	0.0177	53
0.000620	0.0157	54
0.000552	0.0140	55
0.000492	0.0125	56
0.000438	0.0111	57
0.000390	0.00991	58
0.000347	0.00881	59
0.000309	0.00785	60

Spools

American standard

Spool Type	D in	d in	d1 in	L in	l in	Wire type
2.125" Flange	2.125	1.375	5/8	1.375	1	0.0005 – 0.002
2.5 " Flange	2.5	1.76	5/8	3.376	3	0.007 – 0.0031
3.15" Flange	3.15	1.97	5/8	3.15	2.52	0.002 – 0.0063
3.5" Flange	3.5	2.125	2.125	2.438	2.125	
5" Flange	5	3	5/8	4.11	3.5	0.0035 – 0.113
6" Flange	6	3.5	5/8	4.11	3.5	0.005 – 0.0253
PT 4 Tapered	5.5 & 4.875	4.375 & 3.875	1	7.875	6.688	0.003 – 0.008
PT10 Tapered	7.087 X 6.300	4.331 X 3.780	1	9	7.875	0.004 – 0.010
12" Reel	11.75	8	2	3.938	3.62	
Anodized Band Spool	2.24	1.98	1.93	1.1	1	Bonding wire



Metric

Spool Type	D mm	d mm	d1 mm	L mm	l mm	Wire size, mm ø	Normal net weight, kg
C 1/4	64	44	16	61	51	<0.030	0.05 – 0.25
C 1/2	64	44	16	86	76	0.030 – 0.099	0.5
B 1	75	40	16	120	100	0.1 – 0.199	1.0
B 2	90	40	16	120	100	0.20 – 0.25	2.0
B 4	120	50	16	120	100	0.26 – 0.50	4.0

Standard din spools

Spool Type	D mm	d mm	d1 mm	L mm	l mm	Wire size, mm ø	Normal net weight, kg
DIN 50	50	32	11	50	38	0.015 – 0.04	0.10
DIN 63	63	40	11	63	49	0.015 – 0.04	0.20
DIN 80	80	50	16	80	64	0.05 – 0.099	0.75
DIN 100	100	63	16	100	80	0.10 – 0.50	1.5
DIN 125	125	80	16	125	100	0.15 – 0.80	3.0
DIN 160	160	100	22	160	128	0.25 – 0.71	5.0
DIN 200	200	125	36	200	160	0.4 – 0.81	10.0
DIN 250	250	160	22	200	160	0.4 – 1.5	20
DIN 355	355	225	36	200	162	1.0 – 3.0	40
SK 460	460	318	305	105	91	0.25 – 1.8	45

Steeger bobbins

Sizes D / d x l
40 / 30 x 26 mm
40 / 16 x 26 mm
43 / 25 x 26 mm

Other spool options available

Forged from the past. Engineered for the future.

One partner for all your needs

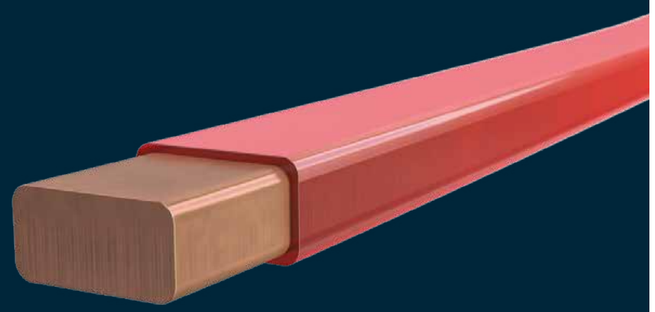
Your sounding board. Your partner. Work with us and take advantage of the finest quality products for medical wire and micro-tubes, nitinol processing, a completely controlled value chain and all the time and cost efficiencies of a single, reliable supplier.

- Partnering with world-class OEMs
- Agile lead times
- Expertly responsive customer service
- Fine medical wire and micro-tubes with highest precision and quality
- Highest quality medical coatings
- Experts in nitinol processing

Certifications

ISO 13485:2016
ISO 9001:2015
ISO 14001:2015
ISO 45001:2018

Our name has changed to Alleima. Yet our long, rich Sandvik history will always burn strong in our hearts. From pioneering malleable steel to perfecting the Bessemer method, ours has always been a story of progress and development. And today, as the world-leader in materials engineering and manipulation, we are committed to advancing industries through materials technology.



Eight ways you'll advance with Alleima

1

A truly innovative partner
Have all our research and development expertise on your side, enhancing your team with innovative thinking and action.

2

Unmatched material science expertise
Give each of your projects the benefit of unrivaled metallurgy and medical wire expertise.

3

New standards in service
Get the service and flexibility you deserve, with a responsive partner ready to adjust to your design and production schedules, however demanding they might be.

4

Financial strength
Achieve long-term sustainable growth by teaming with a financially strong, single-source partner.

5

Quality assurance to trust
Know we have control of the entire value chain, from melt shop to the most precise end-product.

6

Lean processes
Benefit from our continuous journey to increase quality, improve processes, reduce waste and decrease variability.

7

Focus and priority
Know we work closely with every project and order, from development stage to mass production.

8

Value-adding capabilities
Trust that we'll add value at every stage – not only through cut-to-length orders, twisted leads, micro cables, thermocouple sensors, coils and more – but with our service.

The Alleima advantage: a small, agile, custom, precision wire manufacturer, backed by the globally integrated and resource rich Alleima Group.

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