



LSZH Cables



*Flexible Flat Cables for
Low Smoke and
Zero Halogen Requirements*



What are Halogens?

Halogens include the five non-metallic elements Astatine (At), Bromine (Br), Chlorine (Cl), Fluorine (F) and Iodine (I), which form Group 7 in the Periodic Table of Elements. The term Halogen means “salt producing” or “salt forming”. When any of these 5 elements are combined with metals, they produce binary “salts”, such as calcium fluoride, sodium chloride (table salt), silver bromide and potassium iodide.

Why are Halogens Dangerous?

Typically, electrical cables manufactured with PVC, Neoprene, Chlorinated Polyethylene (CPE), FEP and PTFE/Teflon®, utilize the addition of halogens as a flame retardant and to improve high temperature resistance. However, when cables containing halogens are burned they produce toxic fumes and corrosive gases which sear the eyes, nose, mouth and throat to cause severe respiratory damage, disorientation and even death. These gases when exposed to water (e.g., sprinkler systems, humidity, rain) produce dangerous and destructive fluids such as hydrochloric and hydrofluoric acids that can destroy expensive electronic equipment and computer systems.

LSZH Cable Done Right

Standard LSZH cables tend to be stiff due to low smoke, flame retardant and low toxicity additives. Cicoil’s Ultra Flex LSZH cables are the perfect alternative. Our proprietary Flexx-Sil™ engineered elastomer jacketing material naturally exhibits extreme flammability resistance and low smoke attributes without extra additives, and Flexx-Sil™ is halogen-free. Cicoil’s highly flexible LSZH cables have been successfully tested & certified by a UKAS Lab for smoke, toxicity, flammability and halogen content.

Cicoil LSZH Cables are ideal for use in environments that require safety and high- performance reliability. Applications for use include:

- **Highly Populated Facilities:** Indoor Stadiums, Theme Park Attractions, Hotels, Hospitals, Sports Centers, Theaters, Casinos, Malls, Hospitals
- **Data Centers:** Computer Rooms and Switching Centers
- **Mass Transit:** Rail & Subway Cars, Monorails, Buses
- **Aerospace:** Commercial & Military Aircraft, Space Craft, Helicopters
- **Shipboard:** Naval Vessels, Commercial Ships, Ocean Liners, Submarines



The Flexx-Sil™ Advantage

Constructed with its proprietary Flexx-Sil™ jacketing material, Cicoil's high performance flat cables listed in this brochure are Low Smoke Zero Halogen (LSZH). The ultra-pure material by nature is flame retardant and combines the best aspects of silicone rubber, such as flexibility, durability and extreme temperature exposure, but without any contaminating substances.

Due to its unique mixture of materials, Flexx-Sil™ does not ignite easily, and if ignited, will not produce black smoke or toxic gas during combustion. The Crystal-Clear, noncorrosive jacket does not contain color additives, plasticizers, CFC's or halogens, which are typically found in other cable jacketing materials.



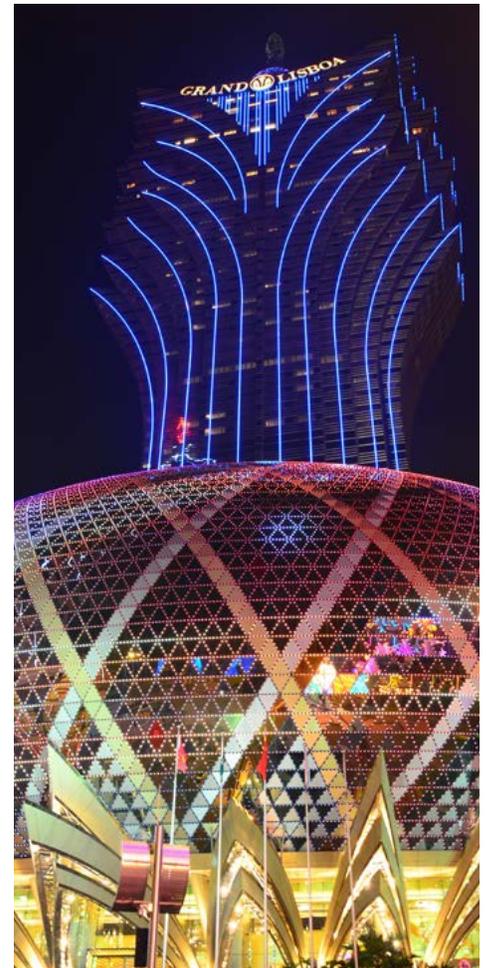
Cicoil's LSZH Cables are extremely durable, perform very well in extreme temperature conditions (−104°C to +165°C), meet the Air Cleanliness Requirements of ISO 146441 and exceed the outgassing requirements of ASTM E595. The non-particulate generating cable is Class 1 Clean Room Rated, RoHS & REACH Compliant, and is cured continuously, with no debris or material contamination in an automated, climate-controlled environment. In addition, the cable jacket passes UL/CSA VW-1, FT 1 & FT 2, UL 94V-0 flammability testing, HL1 & HL2 levels of EN 45545-1 and FAA burn testing.

The ultra-pure Flexx-Sil™ jacket offers 100% transparency, is self-healing from small punctures and will not deform or prematurely age due to prolonged exposure to sunlight, high heat, ozone, UV light, radiation, humidity, fungus, acid, water, sodium chloride, vibration and many chemicals.

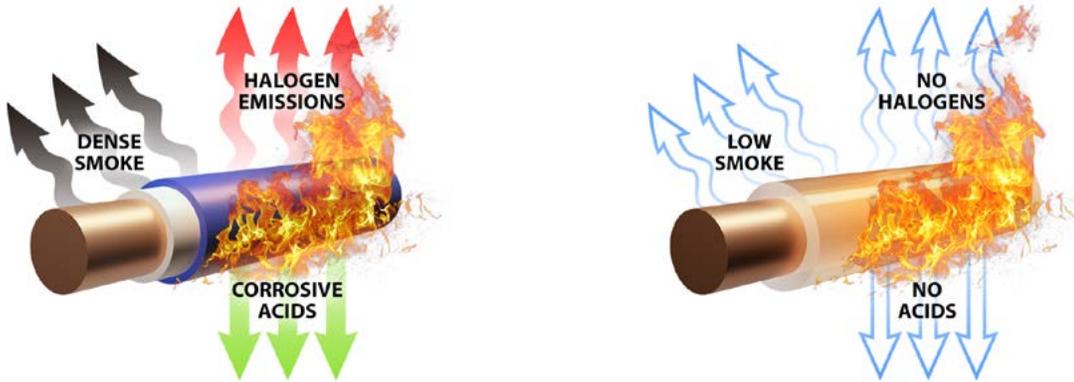
Cicoil has been a leader in designing and manufacturing high performance cable assemblies for over sixty years. The company's Patented Flexx-Sil™ Flat Cable Technology provides high flexibility, extremely long life, and they can withstand temperature extremes from −65 degrees to +260 degrees Celsius. Cicoil's flat cables are used in thousands of demanding applications, including aircraft fuel control cells, semiconductor automation, and the International Space Station. Cicoil designs and manufactures its Flexx-Sil™ jacketed cables and cable assemblies in an automated facility in Valencia, California. Cicoil's quality assurance system is certified to the ISO 9001 (AS9100) standard. Visit www.cicoil.com for more information, or call 661-295-1295 to speak to an application engineer.

What Makes it Halogen-free?

Electrical and electronic cable products are considered Halogen-free if they are manufactured without the use of the five salt forming elements, in the raw materials or the finished cable products. Cicoil Flexx-Sil®-jacketed cables contain no astatine, bromine, iodine, fluorine or chlorine. So, while exhibiting flame- and combustion-resistance, they remain 100% Halogen-free.



Cicoil LSZH Cables VS Non-LSZH Cables



Non-LSZH Cables

Cicoil LSZH Cables

<p>Common jacketing materials like PVC, Neoprene, and PTFE/Teflon™ require the addition of halogens to reduce flammability. In cases, however, where combustion does occur, burning halogens result in dense smoke and corrosive/toxic gases.</p>	VS	<p>Cicoil's Flexx-Sil™ cable jacketing is inherently flame resistant and uses NO HALOGENS. Flexx-Sil™ is our proprietary elastomeric cable encapsulation material that is naturally resistant to combustion, and if ignited under extreme conditions, does not produce black smoke or toxic gas or corrosive substances.</p>
<p>Cables containing halogens present a serious risk to any populated environment. If exposed to water after being burned—as in the case of the use of fire suppression systems or even humidity in the air—halogen-containing cable/wire jacketing will release dangerous or even deadly chemicals such as hydrochloric acid.</p>	VS	<p>A safer choice for all environments, but essential when the safety of human life is a top priority, as in highly populated facilities, mass transit, and crewed vehicles. In the event of a fire, the danger to individuals will not be compounded by toxic, halogen-based airborne chemicals.</p>
<p>The microcircuitry aboard most electronic equipment is particularly susceptible to the acidic moisture produced by materials without LSZH classification.</p>	VS	<p>Mitigates damage done to equipment during a fire. Flexx-Sil™ does not release the corrosive chemicals that eat away at delicate electronics and computer systems.</p>
<p>Flame and combustion retardation additives used on common cable and wire jacketing typically stiffens the material, making the product less flexible and compliant, and susceptible to a shorter functional life in motion applications.</p>	VS	<p>Even with LSZH classification, Flexx-Sil™ jacketing provides <i>extreme</i> flexibility, is 100% transparent, self-heals small punctures, and remains very durable within stressful environmental conditions.</p>
<p>Industry standard cables are infused with color additives that contain contaminants and don't allow for inspection of the cable for possible wire shorts and safety issues.</p>	VS	<p>Crystal-clear jacketed cables offer 100% transparency, which allows for quick, safe inspection of cables in just about any application.</p>

Cicoil LSZH Cables VS Other LSZH Cables

LSZH Cables from Other Manufacturers

Cicoil LSZH Cables

<p>Typically, LSZH cables require filler materials to make them low smoke and zero halogen. This makes the jacket less resistant to chemicals, water, and other environmental stresses as compared to non-LSZH cables, and may even inhibit the cables' mechanical and electrical characteristics.</p>	VS	<p>Cicoil's Flexx-Sil™ jacketing material is flame retardant by nature, completely non-toxic, and requires no additives to achieve zero halogen. It also offers excellent resistance to harsh environments, water, acid and many chemicals.</p>
<p>The materials used to make the cable LSZH limits the flexibility of the cable and impedes its performance in continuous motion and robotics applications.</p>	VS	<p>Cicoil's flat cables are designed to prevent wire breakage, jacket punctures, and operational failure when exposed to tight bending, flexing, mechanical stress, and harsh environments.</p>
<p>The outer jacket of LSZH cables may crack during installation or tight bends, so lubricants are recommended to prevent jacket damage.</p>	VS	<p>Cicoil's unique cable jacket requires minimal maintenance thanks to its self-healing properties and integrity through long term exposure to tight bending, confined spaces, and even vibration.</p>



- Available from Stock
- Available as Bulk Cable or Complete Assemblies

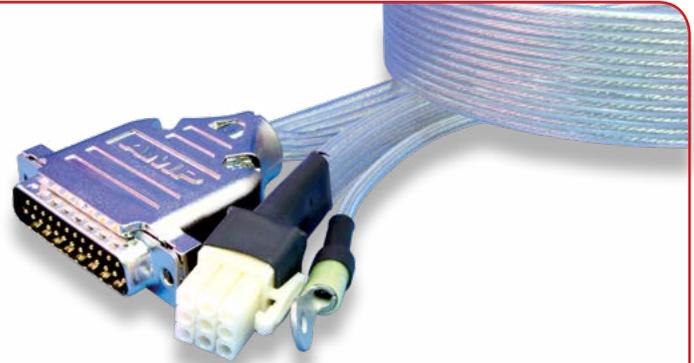
Low Smoke, Zero Halogen Flexible Flat Cables

Hi-Flex Unshielded Multi-Conductor Cable for Power and Control Applications	6
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Hi-Flex, Hi-Temp IDC Ribbon Cable	9
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Hi-Flex Unshielded Cable

- Ideal for High Performance Power & Control Applications
- Ultra Flexible Cable for Confined Area and Continuous Motion
- 4 AWG - 28 AWG Conductors Available in 2 - 12 Conductors
- Low Smoke/Zero Halogen (LSZH)

Cicoil's line of Hi-Flex Unshielded Cables provides the advantages of all Cicoil flexible cables in a standard, low-cost package. Ultra-flexible, finely stranded wire conductors are used for maximum flexibility and long life in dynamic, flexing applications. Cicoil's patented extrusion process encapsulates the wire conductors in a crystal clear, flexible, yet extremely durable Flexx-Sil™ insulation.



Applications
Aerospace, Festoon Systems, Robotics,
Medical, Oil Drilling, Packaging

Cable

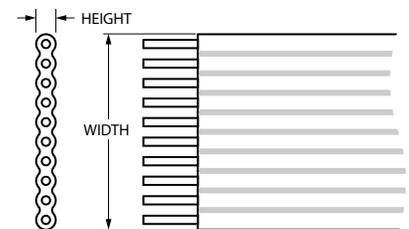
Amp Rating ¹	Volts DC	Conductor Gauge	No. of Conductors	Dimensions [inches]		Part Number
				Width	Height	
5	12K	28 AWG	2	0.13	0.08	969M101-28-2
			3	0.18	0.08	969M101-28-3
			4	0.23	0.08	969M101-28-4
			6	0.33	0.08	969M101-28-6
			8	0.43	0.08	969M101-28-8
			10	0.53	0.08	969M101-28-10
6	12K	26 AWG	2	0.14	0.09	969M101-26-2
			3	0.19	0.09	969M101-26-3
			4	0.25	0.09	969M101-26-4
			6	0.35	0.09	969M101-26-6
			8	0.46	0.09	969M101-26-8
			10	0.57	0.09	969M101-26-10
8	12K	24 AWG	2	0.15	0.10	969M101-24-2
			3	0.21	0.10	969M101-24-3
			4	0.27	0.10	969M101-24-4
			6	0.38	0.10	969M101-24-6
			8	0.50	0.10	969M101-24-8
			10	0.62	0.10	969M101-24-10
11	18K	22 AWG	2	0.18	0.11	969M101-22-2
			3	0.25	0.11	969M101-22-3
			4	0.32	0.11	969M101-22-4
			6	0.45	0.11	969M101-22-6
			8	0.59	0.11	969M101-22-8
			10	0.73	0.11	969M101-22-10
			12	0.87	0.11	969M101-22-12

Note

1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.

Dimensions

2-12 Conductors



Cable Assemblies – 22-28 AWG



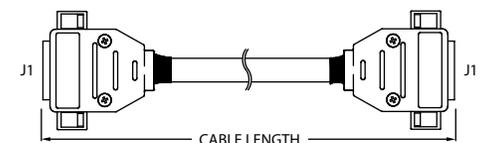
Please contact Cicoil for other connectors and length options.

Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

1. Append onto base cable Part Number for complete assembly. Example: 969M101-28-2-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors for 28 AWG

- Signal (J1): 25-Pos D-SUB - Amphenol, P/N L717-DB25P Metallized Shell - TE, P/N 5748677-3

Connectors for 22-26 AWG

- Signal (J1): Gold Contacts - TE, P/N 745254-2
25-Pos D-SUB Housing - TE, P/N 5205208-1

Cable (continued)

Amp Rating ¹	Volts DC	Conductor Gauge	No. of Conductors	Dimensions [inches]		Part Number
				Width	Height	
13	18K	20 AWG	2	0.20	0.12	969M101-20-2
			3	0.28	0.12	969M101-20-3
			4	0.36	0.12	969M101-20-4
			6	0.51	0.12	969M101-20-6
			8	0.67	0.12	969M101-20-8
			10	0.83	0.12	969M101-20-10
20	20K	18 AWG	12	0.99	0.12	969M101-20-12
			2	0.24	0.14	969M101-18-2
			3	0.33	0.14	969M101-18-3
			4	0.43	0.14	969M101-18-4
			6	0.62	0.14	969M101-18-6
			8	0.81	0.14	969M101-18-8
26	20K	16 AWG	10	1.00	0.14	969M101-18-10
			12	1.19	0.14	969M101-18-12
			2	0.26	0.15	969M101-16-2
			3	0.37	0.15	969M101-16-3
			4	0.48	0.15	969M101-16-4
			6	0.70	0.15	969M101-16-6
27	20K	14 AWG	8	0.92	0.15	969M101-16-8
			10	1.14	0.15	969M101-16-10
			12	1.36	0.15	969M101-16-12
36	20K	12 AWG	3	0.47	0.19	969M101-14-3
			4	0.61	0.19	969M101-14-4
			8	1.16	0.19	969M101-14-8
47	20K	10 AWG	3	0.58	0.24	969M101-12-3
			4	0.75	0.24	969M101-12-4
65	20K	8 AWG	4	0.92	0.29	969M101-10-4
95	20K	6 AWG	4	1.17	0.35	969M101-8-4
125	20K	4 AWG	4	1.47	0.40	969M101-6-4
			4	1.64	0.47	969M101-4-4

Note

1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.

Cable Assemblies – 4-20 AWG



Please contact Cicoil for other connectors and length options.



Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

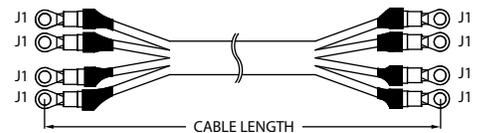
- Append onto base cable Part Number for complete assembly.
Example: 969M101-20-2-CA003
- Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors for 14-20 AWG

- Signal (J1): Gold Contacts - MOLEX, P/N 02-09-6110
- 15-Pos Housing - MOLEX, P/N 19-09-2159



Connectors for 4-12 AWG

- Signal (J1): Ring Lugs - Typical

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper Minimum Bend Radius: - 6x cable height for intermediate flex - 10x cable height for continuous flex Outer Jacket Durometer Rating: 65 (Shore A)	Temperature Rating: -104°C to +165°C Moisture Rating: Submersible, Salt Water Resistant Cleanroom Rating: Class 1, Zero Particulates Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant Low Smoke/Zero Halogen (LSZH): Has passed testing for smoke, toxicity, flammability and halogen content, by UKAS certified lab
	Electrical
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm) See Electrical Rating Chart on Page 14

More

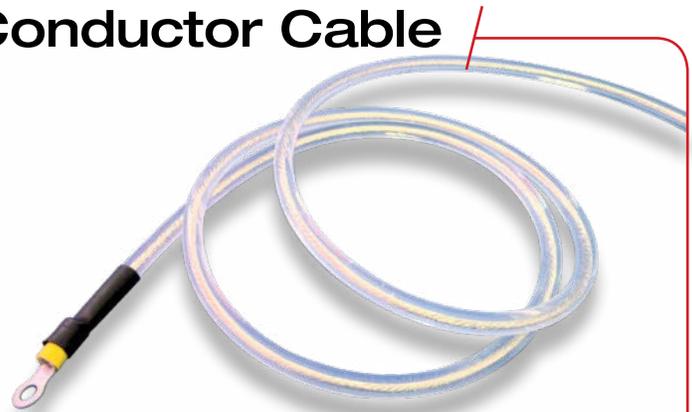
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Hi-Flex Unshielded Single Conductor Cable

- Ideal for Power Applications Requiring Voltages up to 42,000 Volts DC
- Excellent Alternative to PVC & Teflon Wire in Confined Area and Motion Applications
- Available from 4 AWG to 30 AWG
- Low Smoke/Zero Halogen (LSZH)

Cicoil's Hi-Flex Unshielded Single Conductor Cable is ideal for high voltage and extreme temperature applications. Ultra-flexible, finely stranded wire conductors are used for maximum flexibility and long life in dynamic, flexing applications. Cicoil's patented extrusion process encapsulates the wire conductor in a crystal clear, flexible, yet very durable Flexx-Sil™ insulation.

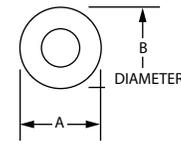


Applications
Aerospace, Solar Panel, Robotics, Medical, Oil Drilling, Wind Turbine, Welding

Cable

Amp Rating ¹	Volts DC	Conductor Gauge	Diameter [inches]	Part Number ²
3	10K	30 AWG	0.21	969M101-30-1
5	12K	28 AWG	0.21	969M101-28-1
6	12K	26 AWG	0.22	969M101-26-1
7	12K	24 AWG	0.22	969M101-24-1
8	31K	22 AWG	0.23	969M101-22-1
10	31K	20 AWG	0.24	969M101-20-1
15	42K	18 AWG	0.25	969M101-18-1
19	42K	16 AWG	0.26	969M101-16-1
27	42K	14 AWG	0.28	969M101-14-1
36	42K	12 AWG	0.30	969M101-12-1
47	42K	10 AWG	0.33	969M101-10-1
65	42K	8 AWG	0.39	969M101-8-1
95	42K	6 AWG	0.44	969M101-6-1
125	42K	4 AWG	0.50	969M101-4-1

Dimensions



Note

1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.
2. High tensile, bare copper and silver plated conductors, insulated wires with specific color codes are available by request. Minimums may apply.

Cable Assemblies



Please contact Cicoil for other connectors and length options.

Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

1. Append onto base cable Part Number for complete assembly.
Example: 969M101-30-1-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- Signal (J1): Ring Lug

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -104°C to +165°C
Minimum Bend Radius: - 6x cable height for intermediate flex - 10x cable height for continuous flex	Moisture Rating: Submersible, Salt Water Resistant
Outer Jacket Durometer Rating: 65 (Shore A)	Cleanroom Rating: Class 1, Zero Particulates
	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
	Low Smoke/Zero Halogen (LSZH): Has passed testing for smoke, toxicity, flammability and halogen content, by UKAS certified lab
	Electrical
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
	See Electrical Rating Chart on Page 14

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Hi-Flex, Hi-Temp IDC Ribbon Cable

- Ultra Flexible Ribbon Cable for standard IDC Connectors
- Available with up to 64 Conductors in .050" or 1mm Pitch
- -104°C to +260°C Rating – Ideal for the Harshest Environments
- Low Smoke/Zero Halogen (LSZH)

Cicoil's high performance line of flat ribbon cable is ideal for electronic applications that require better flexibility, broader temperature and harsh environment capabilities than those offered by PVC or other ribbon cables. Cicoil's patented Flexx-Sil™ jacket provides the highest flex, highest performance ribbon cable available.



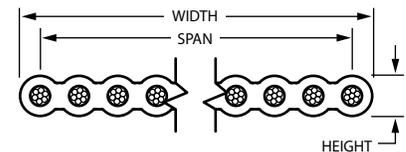
Applications
Aerospace, Robotics, Medical, Semiconductor, Packaging, Surgical Systems

Cable

Gauge Pitch	Amp Rating ¹	No. of Conductors	Dimensions			Part Number
			Width	Span	Height	
28 AWG .050"	5	10	0.50"	0.45"	0.04" max.	310J101-10
		14	0.70"	0.65"	0.04" max.	310J101-14
		16	0.80"	0.75"	0.04" max.	310J101-16
		20	1.00"	0.95"	0.04" max.	310J101-20
		26	1.30"	1.25"	0.04" max.	310J101-26
		28	1.40"	1.35"	0.04" max.	310J101-28
		30	1.50"	1.45"	0.04" max.	310J101-30
		34	1.70"	1.65"	0.04" max.	310J101-34
		40	2.00"	1.95"	0.04" max.	310J101-40
		44	2.20"	2.15"	0.04" max.	310J101-44
		50	2.50"	2.45"	0.04" max.	310J101-50
		60	3.00"	2.95"	0.04" max.	310J101-60
		64	3.20"	3.15"	0.04" max.	310J101-64
28 AWG 1mm	5	10	10 mm	9 mm	0.94 mm	666K101-10
		16	16 mm	15 mm	0.94 mm	666K101-16
		20	20 mm	19 mm	0.94 mm	666K101-20
		26	26 mm	25 mm	0.94 mm	666K101-26
		30	30 mm	29 mm	0.94 mm	666K101-30
		34	34 mm	33 mm	0.94 mm	666K101-34
		40	40 mm	39 mm	0.94 mm	666K101-40
		44	44 mm	43 mm	0.94 mm	666K101-44
50	50 mm	49 mm	0.94 mm	666K101-50		

Note
1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.

Dimensions



Cable Assemblies



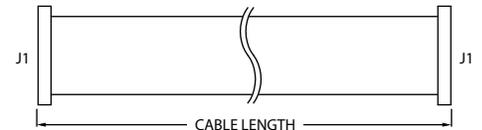
Please contact Cicoil for other connectors and length options.

Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

1. Append onto base cable Part Number for complete assembly. Example: 310J101-10-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- Signal (J1): Berg or equivalent (XX = Position Quantity)
.050" Pitch: P/N 71602-00XX
1mm Pitch: P/N 89361-1XX

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded copper	Temperature Rating: -104°C to +260°C
Minimum Bend Radius: - 6x cable height for intermediate flex	Moisture Rating: Submersible, Salt Water Resistant
Outer Jacket Durometer Rating: 65 (Shore A)	Cleanroom Rating: Class 1, Zero Particulates
	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
	Low Smoke/Zero Halogen (LSZH): Has passed testing for smoke, toxicity, flammability and halogen content, by UKAS certified lab
	Electrical
	Operating Voltage: 300
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 14

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Ultra Flexible Micro IDC Ribbon Cable

- Light, flexible design routes easily in tight spaces
- .025" Pitch works with any Micro IDC connector
- Standard sizes available with up to 34 conductors
- Rated for Temperatures from -104°C to +260°C
- Low Smoke/Zero Halogen (LSZH)

Cicoil's .025" Micro IDC Cable is excellent for tight spacing applications that require dependable signal density. The Ultra Flexible cable performs exceptionally well in harsh environments, including high/low temperatures, and under exposure to moisture and most chemicals.



Applications
Aerospace, Robotics, Medical, Semiconductor, Surgical Systems, Printer Head, Satellites, Board-to-Board

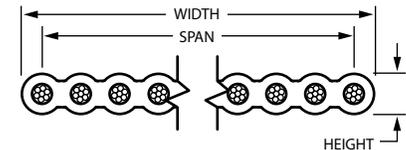
Cable

Gauge Pitch	Amp Rating ¹	Volts DC	No. of Conductors	Dimensions			Part Number
				Width	Span	Height	
30 AWG .025"	0.2	3K	10	0.250"	0.225"	0.026"	482W101-10
			14	0.350"	0.325"	0.026"	482W101-14
			16	0.400"	0.375"	0.026"	482W101-16
			20	0.500"	0.475"	0.026"	482W101-20
			26	0.650"	0.625"	0.026"	482W101-26
			28	0.700"	0.675"	0.026"	482W101-28
			30	0.750"	0.725"	0.026"	482W101-30
			34	0.850"	0.825"	0.026"	482W101-34

Note

1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.

Dimensions



Cable Assemblies



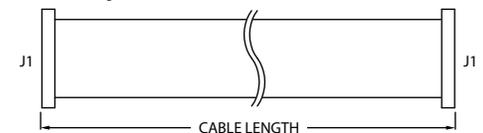
Please contact Cicoil for other connectors and length options.

Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

1. Append onto base cable Part Number for complete assembly. Example: 482W101-10-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- Signal (J1): CnC Tech or equivalent (XX = Position Quantity)
.025" Pitch: P/N 3230-XX-0103-00

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, bare copper	Temperature Rating: -104°C to +260°C
Minimum Bend Radius: - 6x cable height for intermediate flex	Moisture Rating: Submersible, Salt Water Resistant
Outer Jacket Durometer Rating: 65 (Shore A)	Cleanroom Rating: Class 1, Zero Particulates
	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
	Low Smoke/Zero Halogen (LSZH): Has passed testing for smoke, toxicity, flammability and halogen content, by UKAS certified lab
	Electrical
	Operating Voltage: 300
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 14

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Flexx-Sil™ Hi-Temp Festoon Cable

- Rated from -104°C to +165°C
- Ultra Flexible Alternative to PVC & Neoprene Festoon Cables
- Available in 18 AWG to 4 AWG Configurations
- Low Smoke/Zero Halogen (LSZH)

Cicoil's line of Flexx-Sil™ Festoon Cables are designed for continuous flexing, extreme temperature and higher voltage requirement applications. These UV-radiation resistant cables are an excellent alternative to PVC and Neoprene jacketed flat cables that do not provide reliability in severe environments. The clear Flexx-Sil™ jacket makes the cables highly flexible and ideal for extreme temperatures and harsh environments.



Applications
Festoon Systems, Gantries, Telescoping Jetways, Conveyors, Car Washes

Cable

Amp Rating ¹	Volts DC	Conductor Gauge	No. of Conductors	Dimensions [inches]		Part Number ²
				Width	Height	
15	20K	18 AWG	4	0.43	0.14	CFC-18-4
			4	0.48	0.15	CFC-16-4
			8	0.92	0.15	CFC-16-8
19	20K	16 AWG	12	1.36	0.15	CFC-16-12
			4	0.61	0.19	CFC-14-4
			8	1.16	0.19	CFC-14-8
36	20K	12 AWG	4	0.75	0.24	CFC-12-4
47	20K	10 AWG	4	0.92	0.29	CFC-10-4
65	20K	8 AWG	4	1.17	0.35	CFC-8-4
95	20K	6 AWG	4	1.47	0.40	CFC-6-4
125	20K	4 AWG	4	1.64	0.47	CFC-4-4

Note

1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.
2. High tensile, bare copper, silver plated conductors and insulated wires with specific color codes are available by request. Minimums may apply.

Cable Assemblies



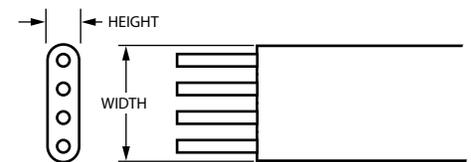
Please contact Cicoil for other connectors and length options.

Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

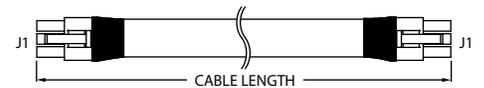
Notes

1. Append onto base cable Part Number for complete assembly.
Example: CFC-18-4-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Dimensions



Assembly Dimensions



Connectors

Wire Gauge	Signal (J1)
18	Gold Contacts - MOLEX, P/N 02-09-6110 9-Pos Housing - MOLEX, P/N 3092092
14-16	Gold Contacts - MOLEX, P/N 02-09-6110 15-Pos Housing - MOLEX, P/N 19-09-2159
4-12	Ring Lugs - Typical

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -104°C to +165°C (higher temperatures available)
Minimum Bend Radius: - 6x cable height for intermediate flex - 10x cable height for continuous flex	Moisture Rating: Submersible, Salt Water Resistant
Outer Jacket Durometer Rating: 65 (Shore A)	Cleanroom Rating: Class 1, Zero Particulates
	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
	Low Smoke/Zero Halogen (LSZH): Has passed testing for smoke, toxicity, flammability and halogen content, by UKAS certified lab
	Electrical
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
	See Electrical Rating Chart on Page 14

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Flexx-Sil™ Cable Jacketing – Simply Superior

Cicoil invented the ribbon cable in 1956, and we have continually perfected and improved our technology to make high performance flat cables. After years of extensive R&D, Cicoil achieved a breakthrough in the method and materials used in making our flexible flat cables. In combination with our patented extrusion process, Cicoil developed an exclusive material which is ideally suited to high flex, high performance flat cable applications. This unique material is called Flexx-Sil™, and it combines the best aspects of the silicone rubber polymer with our exclusive extrusion process, to make the most advanced cable jacketing material available in the marketplace.

Flexx-Sil™ cable jacketing provides the following high performance features:

- **Temperature Extremes** – Operates at temperatures from -104°C to +260°C. Also stays flexible in temps as low as -100°C.
- **Flexibility** – Has the natural flexibility of silicone rubber, which is more than twice as flexible as PVC or PTFE insulation.
- **Crystal Clear** – Flexx-Sil™ is crystal clear, and virtually translucent, clearly showing the purity and the cleanliness of the material
- **Low Outgassing** – The purity of Flexx-Sil™ means that it has very low outgassing characteristics, as the molecular bond is extremely strong, and the extrusion process results in virtually zero impurities.
- **Durable** – Flexx-Sil™ has a Durometer of 65 (Shore A), and can be provided in a SuperTuff™ version with a Durometer of 85 (Shore A).
- **Zero Particulates** – The purity of Flexx-Sil™ results in a Class 1 Cleanroom rating, as the insulation material has zero particulates
- **Halogen Free** – Flexx-Sil™ jacketing is 100% Halogen Free
- **Water/Chemical/UV Resistant** – Flexx-Sil™ jacketing is water proof (including immersion), is resistant to most chemicals, and can operate for years in intense UV and sunlight conditions.

Flexx-Sil™ Composition

The description and composition of Cicoil Flexx-Sil™ jacket is as follows:

Generic Description: Ultra pure, zero additives and no contaminants.

Physical Form: Flexible yet durable

Color: Translucent clear

Odor: None

NFPA Profile: Health 0 Flammability 1 Instability/Reactivity

Physical and Chemical Properties – physical and mechanical, per ZZ-R-765E

Property	Unit	Test Method	Value
Temperature range	°C	ASTM D2137 & UL 94HB	-104 to 260
Hardness	Shore A	ASTM D2240	65-70
Water Absorption	% vol. change	ASTM D471	<+5
Tensile Strength	PSI	ASTM D412	>800
Elongation at Break	%	ASTM D412	>400
Tear Strength	lb/in Die B	ASTM D624	280
Brittle Point	°C	ASTM D2137	-70
Flame Retardant Temp.	°C	UL94HB & IEC332	260 min
Decomposition Temp.	°C	PTL 13057	446.2
Combustion Temp.	°C	PTL 13057	710.3

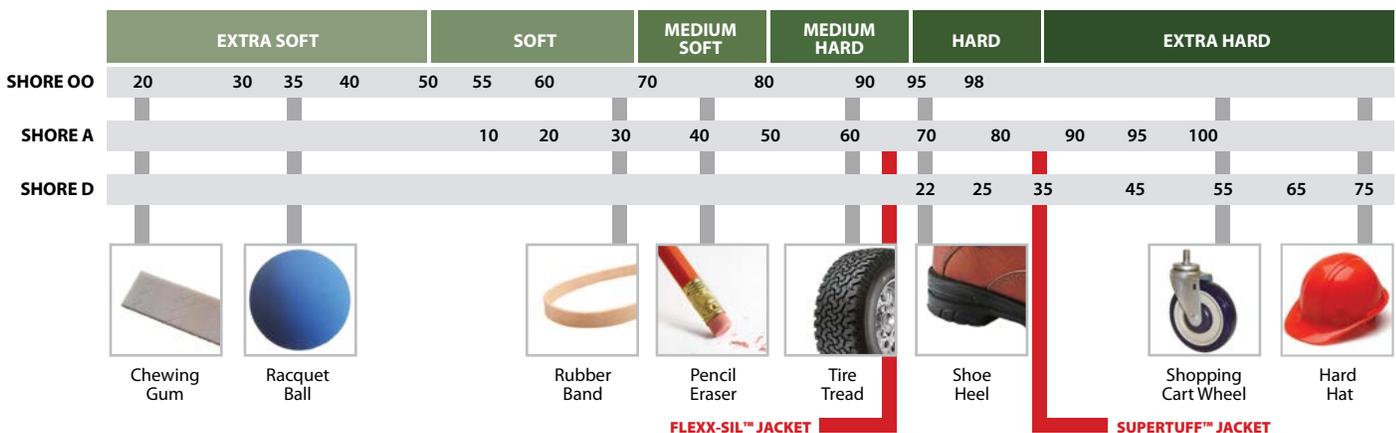
Chemical Resistance

For more information visit: <https://www.cicoil.com/chemical-compatibility-search>

Durometer of Cicoil Flexx-Sil™ Cables

Cicoil's Flexx-Sil™ Cable Jacket has a rating of Shore A65. This rating offers a tough yet flexible jacket that can resist impacts and other physical abuse. See the chart below for a simple way to relate shore ratings to common objects.

Rubber Hardness — The Shore Scale



Cicoil Cleanroom Cables

Cicoil cables are suitable for use in class 1 to 100,000 cleanroom environments. No particulates are generated from Cicoil cables during use in static or dynamic applications.

Product Type: Cicoil Ultraflex cables

Product Family: Flat and round cables using Flexx-Sil™ jacket

Effectivity: Cicoil flat and round cables

Applicable Standard: ISO 14644-1 (ISO 3 - 8)

Applicable Standard: FED STD 209E

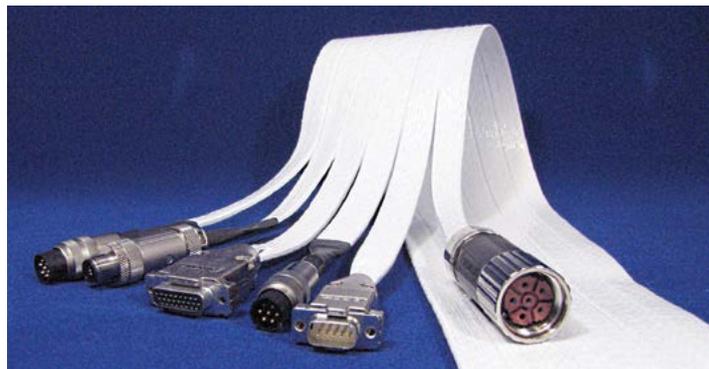
Verification Detail:

- Optical Particle counter and logging
- Time duration testing = 120 minutes
- Static and dynamic* specimen testing

*Dynamic speed testing velocities varied from 0.2 to 10 ft./min.

Air Flow Verification:

- Airflow volume control baseline verified
- Air velocity control baseline verified
- Unidirectional flow area baseline verified
- Room air exchange rates baseline verified
- HEPA filter integrity verified
- Temperature / relative humidity baseline verified



DATA

Static/Dynamic	Particle	
	SIZE µm	COUNT Particles/cu-ft.
Static	5.0	0
Dynamic (0.2-10ft/min)	5.0	0
Static	1.0	0
Dynamic (0.2-10ft/min)	1.0	0
Static	0.5	0
Dynamic (0.2-10ft/min)	0.5	0
Static	0.3	0
Dynamic (0.2-10ft/min)	0.3	0
Static	0.2	0
Dynamic (0.2-10ft/min)	0.2	0
Static	0.1	0
Dynamic (0.2-10ft/min)	0.1	0

Cicoil Cables Outgassing Performance

Cicoil outgassed cables meet the following outgassing requirements:

Details

Certified to Total Mass Loss (TML): <1.00%

CVCM (Collected Volatile Condensable Materials): <0.10%

Vacuum Bake (PSI): 10⁻⁶ torr

Vacuum Bake (Temp): +160°C

Vacuum Duration (h): 48 hours

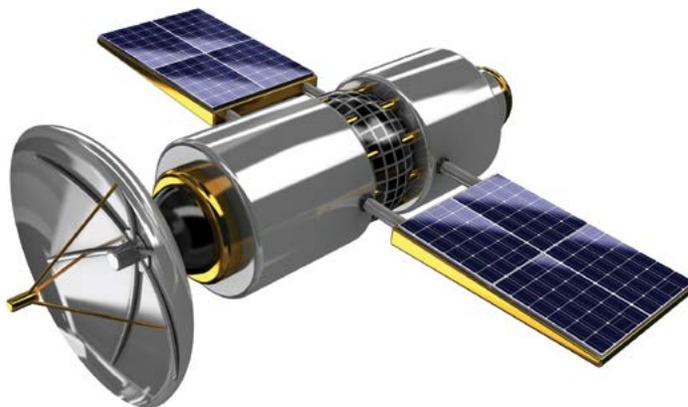
Other Ratings:

NASA Outgassing Specification: Spec 1124

Standard Test Method for TML and CVCM: ASTM E595-93

Notes:

1. Outgassing certificates available upon request.
2. Additional outgassing fee may apply, contact Cicoil for details.



Current Rating Guide for Wire

Please see the current rating guide below. You may use this guide to obtain estimated current ratings for wire. The table provided in this brochure only includes gauges available for standard orders of LSZH cables. For gauges available to the entire Cicoil standard product line and custom orders, see the unabridged table in the full product catalog, or online at cicoil.com/current-rating-guide.

This guide is for reference only. Current ratings will vary depending on each individual application. Careful calculations must be taken to assure proper current loads on wire. Always implement circuit interruption for the protection of wire and cable.

Wire Gauge (AWG)	Diameter Inches	Diameter mm	Ohms/ 1000 ft	Ohms/ km	Maximum amps for chassis wiring
4	0.2043	5.18922	0.2485	0.81508	135
6	0.162	4.1148	0.3951	1.295928	101
8	0.1285	3.2639	0.6282	2.060496	73
10	0.1019	2.58826	0.9989	3.276392	55
12	0.0808	2.05232	1.588	5.20864	41
14	0.0641	1.62814	2.525	8.282	32
16	0.0508	1.29032	4.016	13.17248	22
18	0.0403	1.02362	6.385	20.9428	16
20	0.032	0.8128	10.15	33.292	11
22	0.0254	0.64516	16.14	52.9392	7
24	0.0201	0.51054	25.67	84.1976	3.5
26	0.0159	0.40386	40.81	133.8568	2.2
28	0.0126	0.32004	64.9	212.872	1.4
30	0.01	0.254	103.2	338.496	0.86

Cicoil Flammability Testing Approvals

UL 94V-0 — Cicoil cable has been tested at UL Laboratories and shown to:

- A.** Not have any specimens that burn with flaming combustion for more than 10 seconds after either application of the test flame.
- B.** Not have a total flaming combustion time exceeding 50 seconds for the 10 flame applications for each set of five specimens.
- C.** Not have any specimens that burn with flaming or glowing combustion up to the holding clamp.
- D.** Not have any specimens that drip flaming particles that ignite the dry absorbent surgical cotton located 12 inches below the test specimen.
- E.** Not have any specimens with glowing combustion that persists for more than 30 seconds after the second removal of the test flame.

FAA — FAA Flammability Testing

Cicoil cable has been tested and complies with FAA Title 14 CFR, PART 25—Subpart D, § 25.853 (a) compartment interiors, [Amdt. 25-116, 69 FR 62788, Oct. 27, 2004] Appendix F to Part 25, Part I (a) (1)(ii).

Cicoil cable is confirmed to be self-extinguishing. The average after-flame time must not exceed 15 seconds; and flaming drippings must not continue to burn for more than 5 seconds after falling to the cabinet floor. This test was conducted in accordance with the standards established by The Federal Aviation Administration, as described above.

Reach Declaration of Conformance

Cicoil products do not discharge (during normal use and disposal) any dangerous substances defined in REACH and for human health nor the environment. Cicoil complies with the conditions of Article 7 paragraph 1, Chapter 1 / Title 11.

Cicoil declares that our products meet or exceed the requirements set out by Regulation (CE) No. 1907/2006, called REACH.

Cicoil Flexx-Sil™ and Compliance to European Directives RoHS

Cicoil Flexx-Sil™ jacket is compliant to the RoHS directive.

This declaration is made regarding the following directives of the European Parliament:

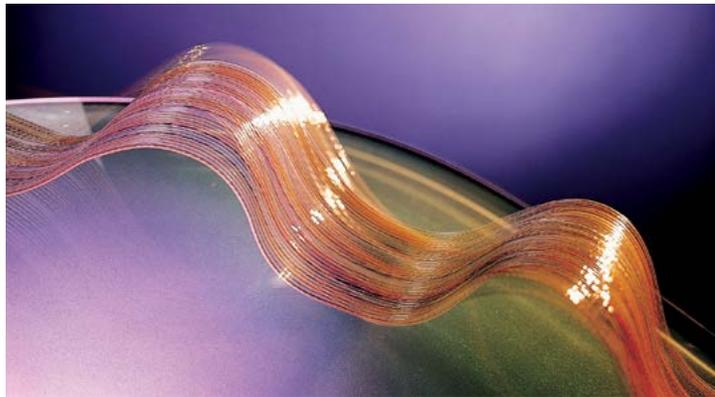
- European Commission Directive 2002/96/EC relating to Waste Electrical & Electronic Equipment (WEEE Directive)
- European Commission Directive 2002/95/EC relating to the Restriction of the use of certain Hazardous Substances in electrical & electronic equipment (RoHS Directive)
- European Commission Directive 2003/11/EC relating to restrictions on the marketing and use of certain dangerous substances and preparations (pentabromodiphenyl ether, octabromodiphenyl ether)

Furthermore, Cicoil Flexx-Sil™ jacket does not utilize ozone-depleting substances (low molecular weight CFCs, HCFCs, HFCs or HCs) as additives or within the manufacturing process.

The prohibited substances are not normally present in the product(s) mentioned above at or above the specified guide concentrations* 0.1% (by weight) lead, mercury, hexavalent chromium, PBB, PBDE, PentaBDE or OctaBDE; and 0.01% (by weight) cadmium.

Online Cable Configurator – Easy as 1-2-3!

Design Your Own Flat Cable in Just Minutes! Over 10 Million Potential Configurations. Try It Today!



Custom design your own cable in real time at Cicoil.com with our online Cable Configurator. It features drag & drop simplicity to design any flat cable, and get an immediate drawing and quote.

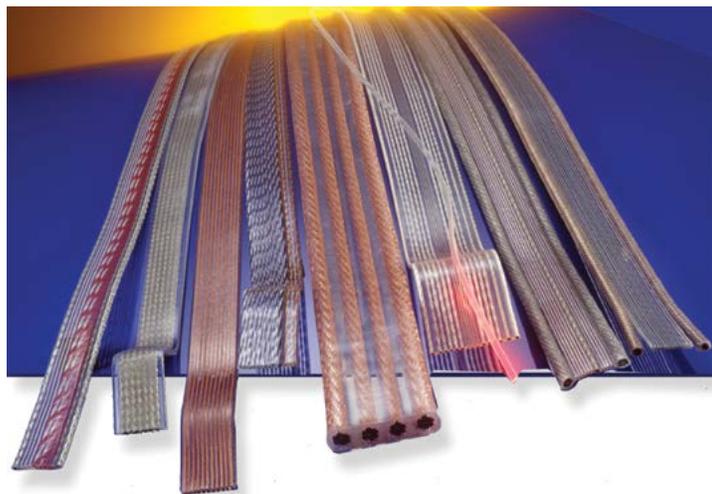
Shipped In Less Than 2 Weeks!

Your custom cable is manufactured and shipped within two weeks of your order.

Cables can be constructed of many elements, including shielded Power conductors, shielded Signal conductors, Video and Coax wires, Tubing for Fluids or Gases, and other design elements like Cicoil's patented StripMount™ fastening strip. Immediately after constructing a flat cable design, you will receive an engineering drawing and a price quotation.

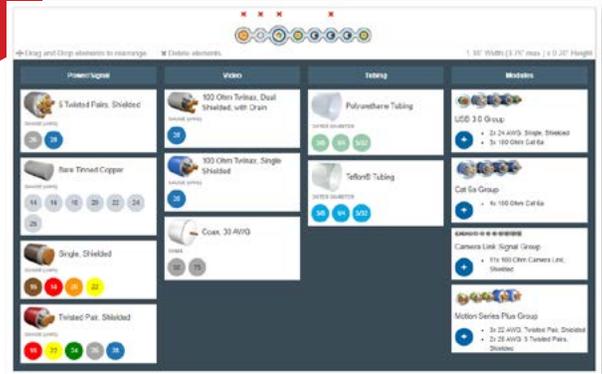
Try out the Cicoil Flat Cable Configurator today. Find it at:

<https://www.cicoil.com/flat-cable/configurator>

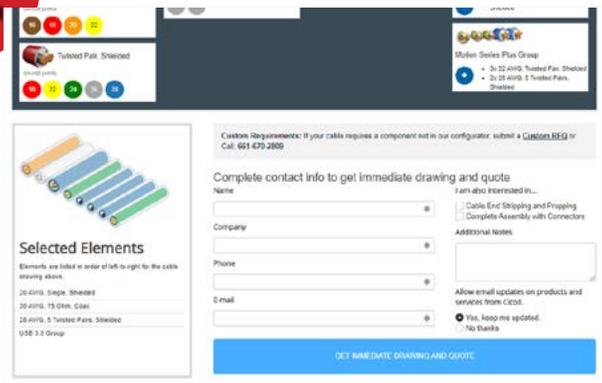


LSZH Flexible Flat Cables

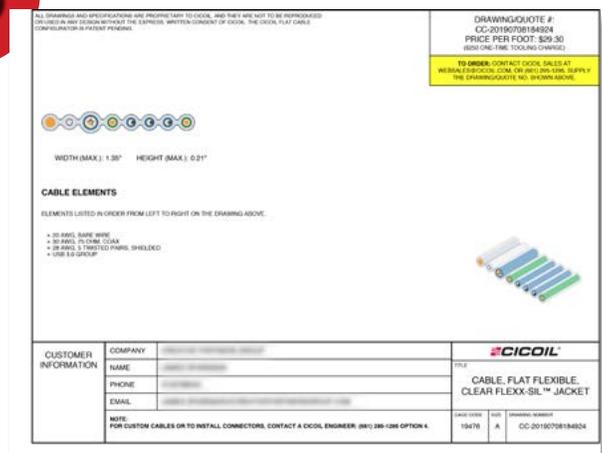
1 Add Conductors & Tubing to Your Cable



2 Remove or Rearrange Parts as Needed and Submit



3 Get a Drawing with Pricing



Cicoil has been the leader in high performance flat cable technology for more than sixty years. Our cables are used in thousands of demanding applications, in a multitude of industries. Whenever high performance flat cables are needed, Cicoil is The Clear Choice.

Military/Aerospace



Cicoil has thousands of cable assemblies operating in the most sophisticated missile, fighter aircraft, commercial aviation, and space applications. Cicoil's Flexx-Sil™ cables are ideal for mission-critical military and aerospace applications.

Semiconductor Equipment



Cicoil Flexx-Sil™ Cables and Cable Assemblies have been used by most major semiconductor equipment manufacturers, in some of the most demanding applications in the industry. Wafer robots, deposition equipment, cleaning robots, and wafer inspection are some of the applications that use Cicoil cables.

Medical



Our cables and cable assemblies are used in a wide variety of medical applications, including automated medical equipment, medical robotics, testing equipment, and also human medical devices like hearing aids.

Industrial Automation/Motion Control



Our high performance cable assemblies are used in a wide variety of extremely demanding motion control and industrial automation applications. Linear motor stages, multi-axis motion systems, robotic equipment, servo axes, and packaging equipment all use Cicoil flexible cables to achieve optimum, reliable performance.



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