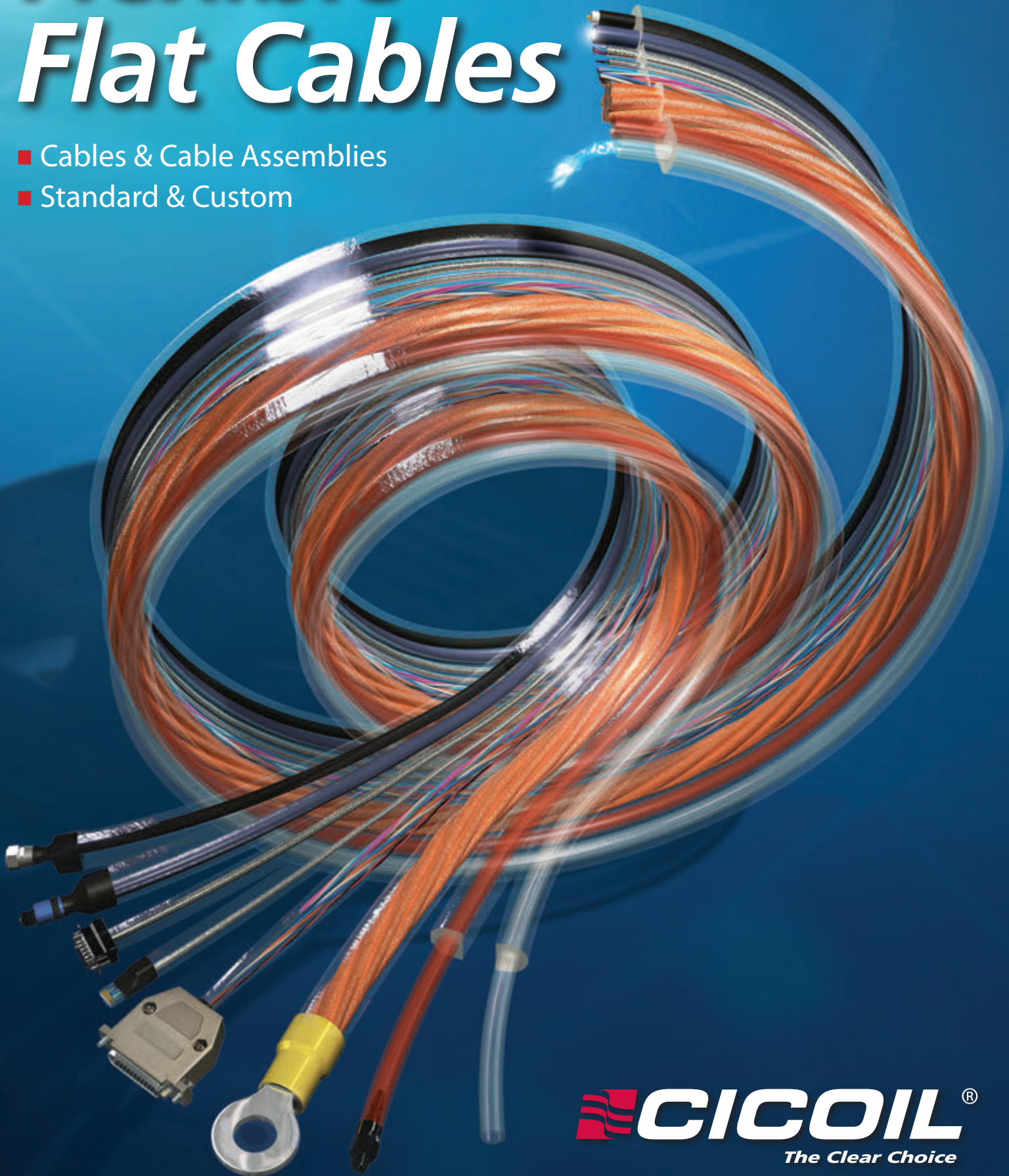


Flexible Flat Cables

- Cables & Cable Assemblies
- Standard & Custom



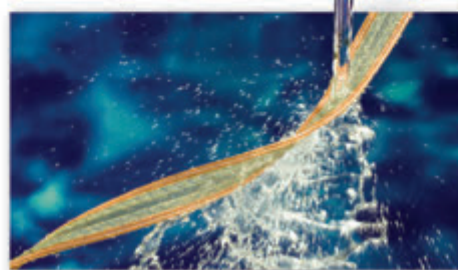
 **CICOIL**®
The Clear Choice

The **Future** of **Cabling** is Here...

Combine power, signal, video, air & liquid in a crystal-clear flat cable.

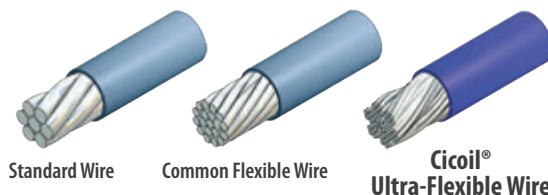
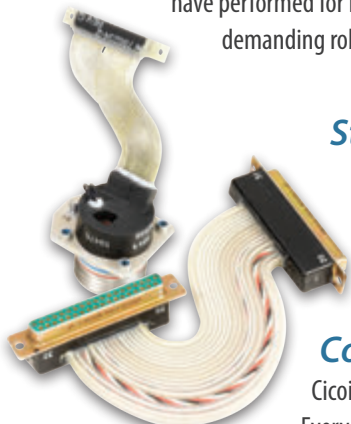
Cicoil high-flex flat cables are the Future of Cabling. Our patented extrusion technology produces the most high performance flat cables available with the superior attributes you're looking for:

- **Ultra flexible:** Tens of millions of flex cycles in the tightest bend radius applications
- **Unlimited variation:** Micro size to 400mm wide cables, wires from 4 to 44 gauge, also including fiber optics, tubing, or coax, so you can get the exact cable you need
- **Extreme Environments:** Our cables perform from -65°C to +260°C, and under exposure to water, steam, chemicals, and oils



Built-In Flexibility

In addition to the strong, flexible cable jacketing, every Cicoil cable incorporates finely stranded, ultra-flexible wire conductors. Conductors and shields are also specially heat-treated and plated to maximize their flexibility, while providing extremely long flex life in the most demanding applications. Cicoil flat cables are rated for over ten million cycles, and our cables have performed for hundreds of millions of flexing cycles in some of the most demanding robotic, continually flexing equipment applications.



Standard Wire Common Flexible Wire Cicoil® Ultra-Flexible Wire

Standard 24 AWG wire has 7 base strands, 'flexible' wire has 19 base strands, while Cicoil High-Flex wire has 66 base strands. All Cicoil wire has base stranding of 40 AWG minimum, versus 36 AWG and larger in other 'flexible' wires.

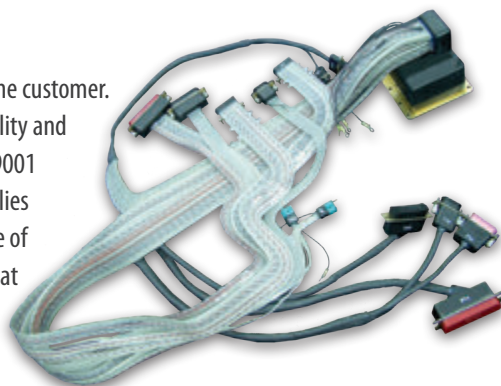
Standard or Custom Cables

Cicoil's patented extrusion process makes custom cables easy, so you can quickly get the exact cable you want. Try our Online Configurator, where you can design your own cable in minutes and get an immediate drawing and quote!

Check out our many standard cables and assemblies, all available from stock for immediate delivery.

Complete Cable Assemblies

Cicoil can provide complete cable assemblies, with any connectors required by the customer. Every cable assembly is 100% tested by our automated test equipment, so reliability and performance is guaranteed. Our award-winning quality system is certified to ISO 9001 standards, including the strict AS9100 aerospace specification. Cicoil cable assemblies are used on the space shuttle, supersonic missiles, and industrial robotics, in some of the most demanding applications possible. So you can rest assured that your cable assembly will receive the same dedication and care, ensuring reliable, high performance operation.



Visit Cicoil.com to learn more, or call (661) 295-1295 to speak directly to an Application Engineer.



AS9100
CERTIFIED



REACH
COMPLIANT
FAA
FLAME-TESTED

CICOIL®
The Clear Choice

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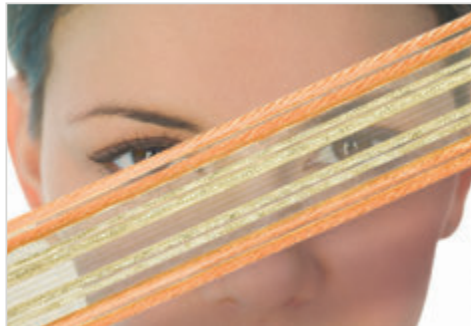
Cicoil – A History of Innovation

Cicoil Invents the Ribbon Cable

Cicoil was founded in 1956 with an innovative new product for the early mainframe computers - the flat ribbon cable. The ribbon cable allowed companies like IBM to replace bulky, stiff round cables with sleek, flexible ribbon cables. Cicoil's innovative engineers figured out how to use a new material, silicone rubber, to 'mold' a flat cable containing multiple conductors of the same size. Named ribbon cables, variations of these flat cables are still used today in most computers, printers, and many electronic devices..



Cicoil's ribbon cables helped America put a man on the moon, as the lightweight cables were integral to the first space walk in 1965, and the Lunar landing in 1969. In the decades that followed, Cicoil flat cables have performed on every US fighter jet, most commercial airplanes, and in many demanding missile and land-based applications



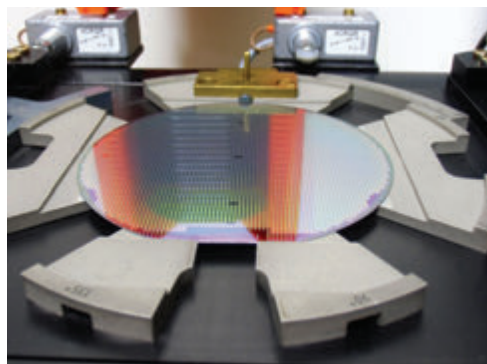
Flexx-Sil™ Material and Patented Extrusion Process

Servo-controlled automation systems need cables that are able to continuously flex for millions of cycles, are lightweight, and that fit in increasingly compact spaces. To meet these new needs, Cicoil developed a new extrusion process, able to make continuous lengths of flat cable with a unique, crystal clear material named Flexx-Sil™. Representing a quantum leap from Cicoil's original molded flat cables, the new Flexx-Sil™ material and extrusion process created a wide variety of high performance, cost-effective flat cable solutions for the semiconductor, motion control and medical automation industries worldwide.

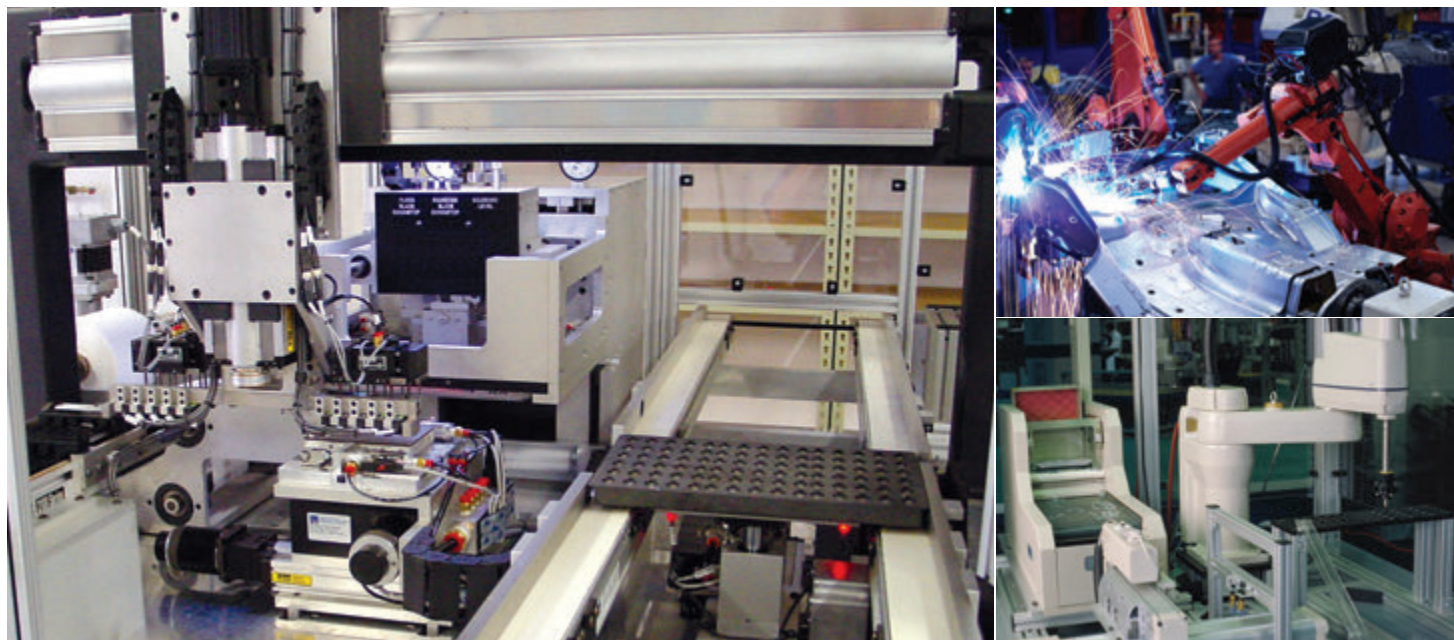


Cicoil Today – Innovating for the Future

Cicoil continues its proud history of innovation, with the company's automated, state-of-the-art facility in Valencia, California. By implementing the latest lean manufacturing production techniques, Cicoil continues to design and manufacture the highest quality products, with fast, responsive lead times for our customers. Our efforts have earned numerous customer and industry awards for quality, delivery, and continuous improvement, and our continued R&D has resulted in multiple US and worldwide patents.



Cicoil cables perform flawlessly in mission-critical applications in the Aerospace, Semiconductor, Medical, and Factory Automation industries. When you need high performance cable solutions, Cicoil is 'The Clear Choice.'



- Available from Stock
- Available as Cable or Complete Assembly

Motion Control Cables

Ideal for high performance motion applications, shielded power and signal conductors are combined into a single, high-flexibility cable. Available in 1, 2 or 3 servo axis versions, in multiple power ratings for all standard rotary and linear servo motors. Due to the flat construction, a cable carrier is often not needed. Cables are available in continuous lengths, or as cable assemblies, complete with connectors.

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Motion Series Cable

- Ideal for Hi-Flex Motion Applications
- Designed for 1KW, 2KW and 3KW Servo Motors
- Shielded Power and Signal Wires for 1, 2 or 3 Servo Axes

Cicoil's Motion Series cable is available in three designs for 1, 2 or 3 axes of servo motion with multiple power ratings. Each Motion Series cable incorporates four shielded power cables and eight signal cables for each axis of motion. The Flexx-Sil™ encapsulation provides a solid, one-piece construction that creates a highly durable, flexible flat cable package.



**NEED
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25

UL MEETS 94V-0 RoHS COMPLIANT REACH COMPLIANT FAA FLAME TESTED

Applications
Linear Motors, Servo and Stepper Motors

Cable

Power Rating	Amp Rating ¹	No. of Axes	Conductor Gauge		Dimensions [inches]		Part Number
			Power	Signal	Width	Height	
1KW	8	1	22 AWG/4c	28 AWG/8c	0.85	0.10	MC-1000-1
		2	22 AWG/8c	28 AWG/16c	1.68	0.10	MC-1000-2
		3	22 AWG/12c	28 AWG/24c	2.52	0.10	MC-1000-3
2KW	15	1	18 AWG/4c	28 AWG/8c	0.95	0.14	MC-2000-1
		2	18 AWG/8c	28 AWG/16c	1.89	0.14	MC-2000-2
		3	18 AWG/12c	28 AWG/24c	2.83	0.14	MC-2000-3
3KW	27	1	14 AWG/4c	28 AWG/8c	1.10	0.20	MC-3000-1
		2	14 AWG/8c	28 AWG/16c	2.19	0.20	MC-3000-2
		3	14 AWG/12c	28 AWG/24c	3.27	0.20	MC-3000-3

Notes

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



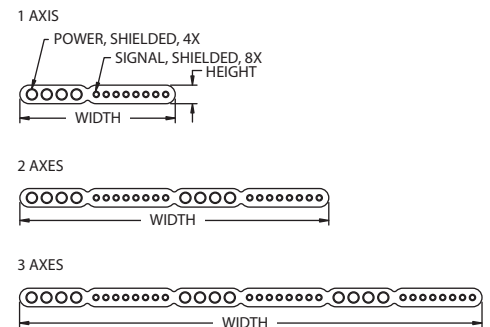
Please contact Cicoil for other connectors and length options.

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

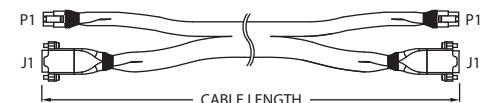
Notes

1. Append onto base cable Part Number for complete assembly.
Example: MC-1000-1-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Dimensions



Assembly Dimensions



Connectors

- Signal (J1): D-Sub 9-Pin, P/N L717-DB25P
Shell P/N 5748677-3

Wire Gauge	Power (P1)
18-22	Tin Contacts - TE, P/N 770904-1 9-Pos Housing - TE, P/N 172169-1
14	Gold Contacts - MOLEX, P/N 02-09-6110 15-Pos Housing - MOLEX, P/N 19-09-2159

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

Options

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Motion Series Plus Cable

- Ideal for Hi-Flex Motion Applications
- Shielded Power and Signal Wires in a Compact Flat Cable
- For 1, 2 or 3 Servo Axes

Cicoil's Motion Series Plus cable is available in a single axis design that may be ganged for 1, 2 or 3 axes servo motion. Each Motion Series Plus cable integrates 6 power conductors and 20 signal wires in a compact flat cable measuring just 0.75" wide by 0.2" thick. The Flexx-Sil™ encapsulation provides a solid, one-piece construction that creates a highly durable, flexible flat cable package.



NEED CUSTOMS?

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Applications
 Linear Motors, Servo and Stepper Motors

Cable

Amp Rating ¹	No. of Axes	Conductor Gauge		Dimensions [inches]		Part Number
		Power	Signal	Width	Height	
8	1	22 AWG/3 pr	28 AWG/10 pr	0.75	0.20	MCP-2000-1
	2	22 AWG/6 pr	28 AWG/20 pr	1.50	0.20	MCP-2000-2
	3	22 AWG/9 pr	28 AWG/30 pr	2.25	0.20	MCP-2000-3

Notes

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

Cable Assemblies



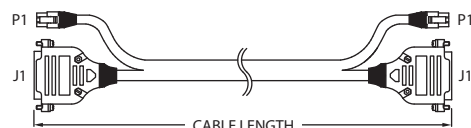
Please contact Cicoil for other connectors and length options.

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

Notes

1. Append onto base cable Part Number for complete assembly. Example: MCP-2000-1-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

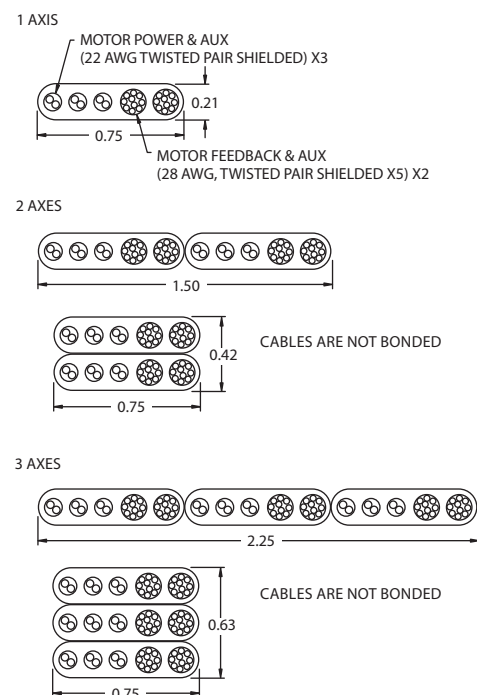
Assembly Dimensions



Connectors

- Power (P1): Tin Contact - TE, P/N 770904-1
 9-Pos Housing - TE, P/N 172169-1
- Signal (J1): 25-Pin - Amphenol, P/N L717-DB25P
 Metallized Shell - TE, P/N 5748677-3

Dimensions



Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

Options

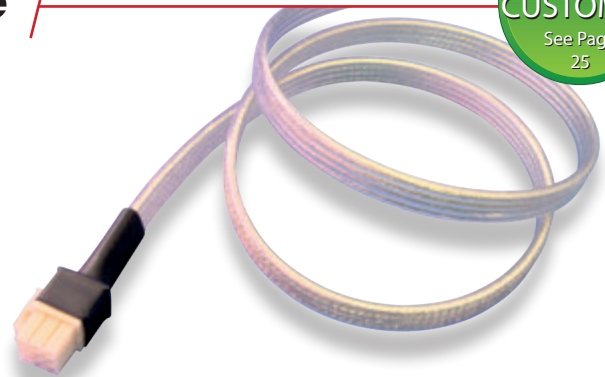
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Hi-Flex Motor Power Cable

- Ideal for Hi-Flex Servo Power Applications
- Rated for More Than 10 Million Flexing Cycles
- 4 Power Conductors in Shielded and Unshielded Versions

Cicoil's line of Hi-Flex Motor Cables provides the advantages of all Cicoil flexible flat 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. Shielded conductors add tinned copper braiding over PFA insulation. Cicoil's patented extrusion process encapsulates the wire conductors in a crystal clear, flexible, yet extremely durable insulation.



**NEED
CUSTOMS?**
See Page
25



Applications
Linear, Servo and Stepper Motors, AC and
Variable Frequency Drives

Cable

	Amp Rating ¹	Volts DC	Conductor Gauge	Dimensions [inches]		Part Number
				Width	Height	
Non-Shielded	7	12,000	24 AWG	0.27	0.09	969M101-24-4-MC
	8	18,000	22 AWG	0.32	0.11	969M101-22-4-MC
	10	18,000	20 AWG	0.36	0.12	969M101-20-4-MC
	15	20,000	18 AWG	0.43	0.14	969M101-18-4-MC
	19	20,000	16 AWG	0.48	0.15	969M101-16-4-MC
	27	20,000	14 AWG	0.61	0.19	969M101-14-4-MC
	36	20,000	12 AWG	0.75	0.24	969M101-12-4-MC
	47	20,000	10 AWG	0.92	0.29	969M101-10-4-MC
	65	20,000	8 AWG	1.26	0.35	969M101-8-4-MC
	95	20,000	6 AWG	1.47	0.40	969M101-6-4-MC
Shielded	125	20,000	4 AWG	1.77	0.47	969M101-4-4-MC
	7	12,000	24 AWG	0.36	0.12	969M101-24-4-SMC
	8	18,000	22 AWG	0.41	0.13	969M101-22-4-SMC
	10	18,000	20 AWG	0.45	0.14	969M101-20-4-SMC
	15	20,000	18 AWG	0.52	0.16	969M101-18-4-SMC
	19	20,000	16 AWG	0.57	0.17	969M101-16-4-SMC
	27	20,000	14 AWG	0.70	0.21	969M101-14-4-SMC
	36	20,000	12 AWG	0.84	0.26	969M101-12-4-SMC
	47	20,000	10 AWG	1.01	0.31	969M101-10-4-SMC

Notes

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

Wire Gauge	Power Connector (P1)
22-24	Tin Contacts - TE, P/N 770902-1; 9-Pos Housing - TE, P/N 172169-1
16-20	Tin Contacts - TE, P/N 171639-1; 9-Pos Housing - TE, P/N 172169-1
14	Gold Contacts - MOLEX, P/N 02-09-6110; 9-Pos Housing - MOLEX, P/N 3092092
4-10	Ring Lugs - Typical

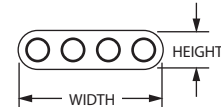
Cable Specifications

All engineering values are nominal and subject to change.

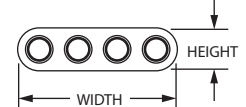
Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

Dimensions

Non-Shielded



Shielded



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: 969M101-24-4-MC-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- See Table to the left

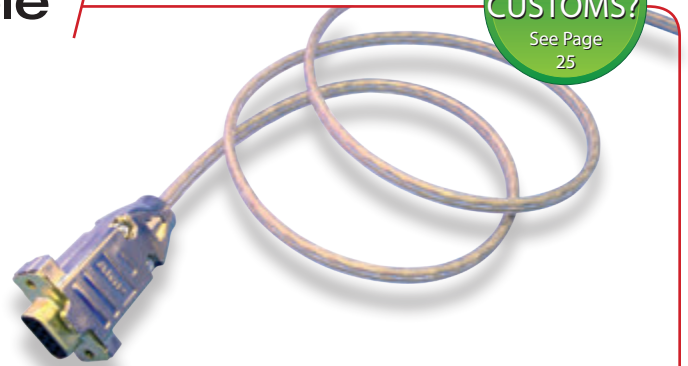
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Hi-Flex Shielded Signal Cable

- Ideal for High Performance Data Transmission Applications
- Ultra Flexible for Confined Area and Continuous Motion
- Twisted Shielded Signal Pairs for Excellent EMI/RFI Protection

Cicoil's Hi-Flex Shielded Signal cables are ideal for the most demanding data transmission applications. Cicoil's patented extrusion process allows individually shielded pairs to be placed in a highly flexible flat profile, while exceeding electrical and signal requirements. These flat cable designs are an excellent alternative to bulky round and stiffer PVC or Teflon flat cable designs.



NEED CUSTOMS?
See Page 25



Applications
Sensors, Encoders, Actuators, Resolvers

Cable

Conductor Gauge	Amp Rating ¹	No. of Pairs	Dimensions [inches]		Part Number
			Width	Height	
28 AWG	5	1	0.12	0.12	969M101-28-1TPS
		2	0.21	0.12	969M101-28-2TPS
		3	0.31	0.12	969M101-28-3TPS
		5	Ø0.21	Ø0.21	969M101-28-5TPS
26 AWG	6	1	0.13	0.13	969M101-26-1TPS
		2	0.23	0.13	969M101-26-2TPS
		3	0.32	0.13	969M101-26-3TPS
24 AWG	7	1	0.14	0.14	969M101-24-1TPS
		2	0.25	0.14	969M101-24-2TPS
		3	0.36	0.14	969M101-24-3TPS
22 AWG	8	1	0.15	0.15	969M101-22-1TPS
		2	0.27	0.15	969M101-22-2TPS
		3	0.40	0.15	969M101-22-3TPS
18 AWG	15	1	0.21	0.21	969M101-18-1TPS
		2	0.38	0.21	969M101-18-2TPS
		3	0.56	0.21	969M101-18-3TPS

Notes

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



Please contact Cicoil for other connectors and length options.

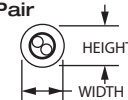
Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

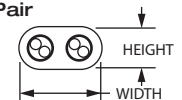
1. Append onto base cable Part Number for complete assembly.
Example: 969M101-28-1TPS-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Dimensions

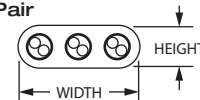
1 Discreet Twisted Pair



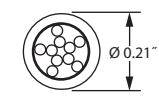
2 Discreet Twisted Pair



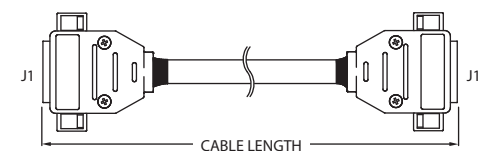
3 Discreet Twisted Pair



5X TWISTED PAIR



Assembly Dimensions



Connectors

Wire Gauge	Signal (J1)
28	25-Pin - Amphenol, P/N L717-DB25P Metallized Shell - TE, P/N 5748677-3
22-26	Gold Contacts - TE, P/N 745254-2 25-Pos D-SUB Housing - TE, P/N 5205208-1
18	Gold Contacts - MOLEX, P/N 02-09-6110 9-Pos Housing - MOLEX, P/N 3092092

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

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Save Space with Custom Flat Cables



Cicoil custom cables solve many critical space, weight, and assembly issues. Packaging many conductors using flat cables provides solutions in high performance, tight-fitting military and aerospace applications. And Cicoil's unique cable forming capability means cables can take virtually any shape, eliminating costly flex circuits or wiring costs.

UAVs Soar with Flat Cables



Cicoil flat cables can include power, signal, data and video conductors in one compact, lightweight package, saving valuable space and weight on UAVs. And the Flexx-Sil™ jacket operates in extreme conditions, including temperatures from -65°C to +260°C, and it also cushions the conductors against vibration and turbulence.

Withstand 10,000 Gs of Shock



This projectile's guidance system sustains 10,000 Gs of shock force when fired. That's why Cicoil high performance flat cables have been specified to form the Control Systems Actuator Harness. Cicoil's unique StripMount™ feature saves space while providing a strong, anti-vibration mounting.

Bring on the Heat...and Cold!



Cicoil delivers exceptional reliability under a broad range of temperatures. Our cables retain their electrical properties and flexibility in temperatures from -65°C to +260°C. They also withstand exposure to high levels of ultraviolet, radiation and ozone with no adverse effects.

Every Launch Counts - Rely on Cicoil



Cicoil flat cables are used extensively within a variety of modern guided missiles and their delivery systems. Their flat profile saves space and weight, while a seamless Flexx-Sil™ encapsulation provides incredible shock absorption. When one launch can make the difference rely on Cicoil.

Certified for Space Travel



Approved by NASA for space flight, Cicoil flat cables exceed outgassing specifications for vacuum and space use. They provide very broad temperature capability, ranging from -65°C to +260°C, and also deliver exceptional resistance to radiation and ozone.

Sophisticated, Versatile, Mission Ready... And that's just the Cicoil Cables! The fighter is pretty cool too.



Cicoil® High Flex Flat Cables

- Perform in temperatures from -65°C to +260°C
- Enables compact, lightweight assemblies
- Flexible flat cables fit in tight spaces
- Complete assemblies, including any connectors, made in-house
- AS9100 certified quality

Cicoil cable assemblies are used in thousands of mission-critical aircraft, missile and space applications. Our AS9100 certified quality system ensures that each cable assembly is rigorously tested to perform in the toughest places. Our in-house cable production and assembly capabilities allow us to respond quickly to prototype or production needs. Visit our website or call today to speak to an engineer.

www.Cicoil.com

CICOIL®
The Clear Choice
661.295.1295 • www.cicoil.com



- Available from Stock
- Available as Cable or Complete Assembly

Data & Video Cables

Video/data communications cables using standard industry protocols in a flat, flexible package. Due to Cicoil's patented Flexx-Sil™ jacketing, these cables feature superior durability in harsh environments and long cycle life in dynamic, flexing applications. Cables are available in continuous lengths, or as cable assemblies, complete with connectors.

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Ethernet Cable

NEED
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Cat 5e

- Ideal for Motion and Harsh Environment Applications
- Exceeds ANSI/TIA/EIA-568-A and TIA/EIA-568-B Cat 5e Specs
- Supporting Data Rates to 1 Gb/second

Cat 6

- Meets or Exceeds Cat 6 - EIA/TIA-568-C/ 11801
- Provide Stringent Crosstalk/Noise Suppression
- Flat Cable Delivers Highest Data Speeds

Cicoil's ethernet cables meet the increased demand of professionals who need a rugged, reliable, portable, flexible and harsh environment ready network cable solution. Cicoil's patented extrusion process allows individually shielded wires to be placed in a highly flexible flat profile for clear, high speed data transmission.



Applications
PLC and DCS Automation Networks, Field
Level Networking and Ethernet Networks

Cable

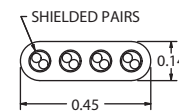
Type	Amp Rating ¹	Conductor Gauge	No. of Pairs	Dimensions [inches]		Part Number
				Width	Height	
Cat 5e	3	30 AWG	4	0.45	0.14	DC-500
Cat 6	7	24 AWG	4	0.71	0.20	DC-600

Note

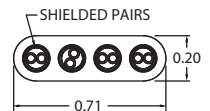
1. Amp rating is the maximum value for each conductor at room temperature of 70°F (21°C). Amp rating decreases as temperature increases.

Dimensions

Cat 5e



Cat 6



Cable Assemblies



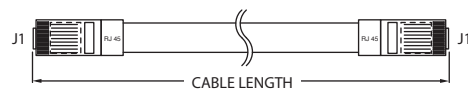
Please contact Cicoil for other connectors and length options.

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

Notes

1. Append onto base cable Part Number for complete assembly.
Example: DC-500-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- Signal (J1): RJ45

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

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Camera Link® Cable

- Ideal for Motion Video, Vision and Frame Grabber Applications
- Exceeds Camera Link® Standards
- Separately-Shielded Conductors in Flat Package Provides Fastest Data Speeds

Cicoil Camera Link® cable is ideal for motion video and frame grabber applications that require an extremely durable and harsh environment resistant design. This design features a 10 million flex cycle life and high flexibility through the use of ultra-flex copper stranded wire in the 11 twinax, dual-shielded cables that comprise the Cicoil Camera Link® cable. Also, individually-shielded conductors in a flat cable create a constant, clear signal path for the highest data speeds available.



NEED CUSTOMS?
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Applications
Aerospace, Robotics, Medical, Semiconductor, Automation

Cable

Amp Rating ¹	Conductor Gauge	No. of Pairs	Dimensions [inches]		Part Number
			Width	Height	
5	28 AWG	11	1.50	0.17	CL-1000

Note

1. Amp rating is the maximum value for each conductor at room temperature of 86°F (30°C). Amp rating decreases as temperature increases.

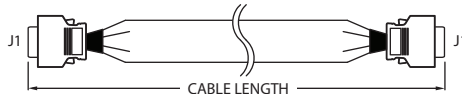
Cable Assemblies



Please contact Cicoil for other connectors and length options.

Connector Type	Temperature Rating	Cable Length (feet)	Part Number Addition
Metal	-55°C to +105°C	3	-M-CA003
		6	-M-CA006
		12	-M-CA012
Plastic	-20°C to +85°C	3	-P-CA003
		6	-P-CA006
		12	-P-CA012

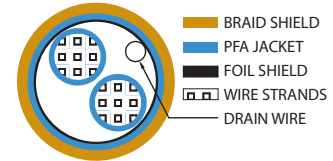
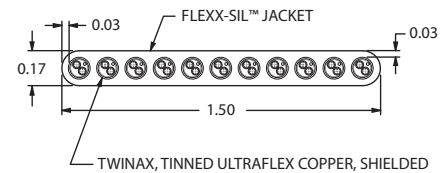
Assembly Dimensions



Connectors

- Signal (J1): Camera Link

Dimensions



Notes

1. Append onto base cable Part Number for complete assembly.
Example: CL-1000-M-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

Options

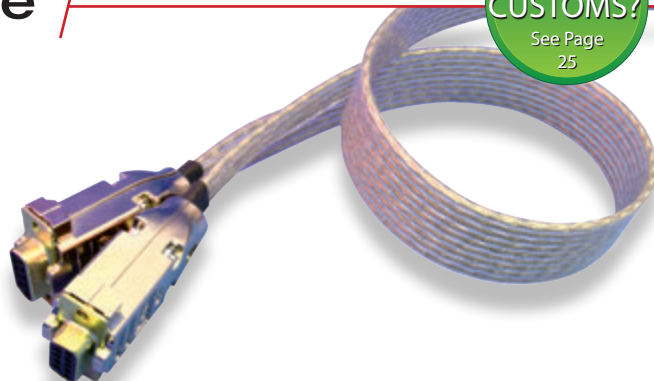
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Controlled Impedance Cable

- Individually Controlled Impedance Signals with Frequencies Up to 1 GHz
- Excellent Alternative to Coaxial Cables in Many Applications
- Choice of 1 - 8 Individually Shielded 100 Ohm Twinax Conductors

Cicoil's Controlled Impedance Cable is a highly flexible cable with individually controlled impedance signals. This 30 AWG/1 twisted shielded pair cable can be used as a more durable and flexible alternative to standard twisted pair and coaxial cables. Unlike bulky round and non-flexible woven cables, the Cicoil design can be used in applications requiring submersion in water, exposure to harsh weather and rugged environments. And the flat cable construction guarantees clear, high speed data transmission.



NEED
CUSTOMS?
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25

UL MEETS 94V-0 SF CE RoHS COMPLIANT REACH COMPLIANT FAA FLAME TESTED

Applications
Sensors, Encoders, Actuators, Resolvers

Cable

Amp Rating ¹	Conductor Gauge	No. of Pairs	No. of Conductors	Dimensions [inches]		Part Number
				Width	Height	
3	30 AWG	1	2	0.15	0.15	CIM-100-01
		2	4	0.28	0.15	CIM-100-02
		4	8	0.54	0.15	CIM-100-04
		6	12	0.81	0.15	CIM-100-06
		8	16	1.07	0.15	CIM-100-08

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



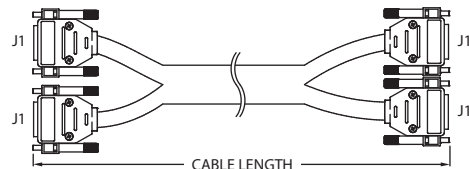
Please contact Cicoil for other connectors and length options.

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

Notes

1. Append onto base cable Part Number for complete assembly.
Example: CIM-100-01-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- Signal (J1): D-SUB, P/N 205203-8

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

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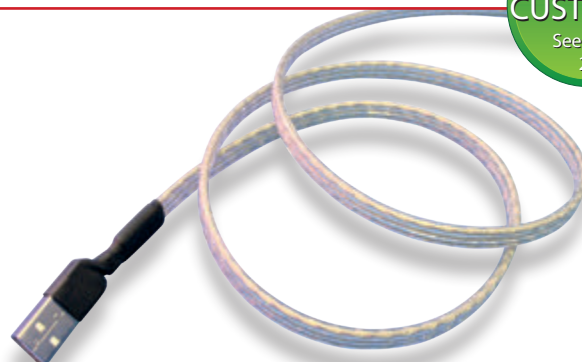
USB Cable

NEED CUSTOMS?

See Page 25

- USB 2.0 and 3.0 Available
- Ideal for High Performance Data Transmission Applications
- Ultra Flexible Cable for Confined Area and Continuous Motion

Comprised of 2 individually shielded power wires and 1 twisted shielded pair of 100 ohm twinaxial configuration, Cicoil's Flexx-Sil™ jacketed USB cables are designed for highly demanding applications. Unlike typical USB cables, the Cicoil cable has been designed for high flexibility, mechanical stress, temperature extremes and harsh environments. And the flat cable construction guarantees clear, high speed data transmission, even in the toughest of environments.



 **UL** MEETS 94V-0
  **SP**
  **CE**
  **RoHS** COMPLIANT
  **REACH** COMPLIANT
  **FAA** FLAME TESTED

Applications
Indoor and outdoor USB applications

Cable

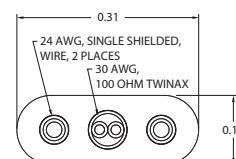
Type	Amp Rating ¹		Conductor Gauge		Dimensions [inches]		Part Number
	Power	Signal	Power	Signal	Width	Height	
USB 2.0	7	3	24 AWG/2c	30 AWG/1 pr	0.31	0.15	USB-2000
USB 3.0	10	5	20 AWG/2c	28 AWG/1 pr	0.37	0.13	USB-3000

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

USB 2.0



Cable Assemblies



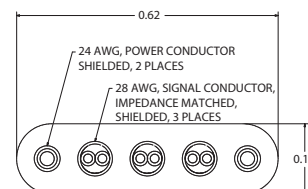
Please contact Cicoil for other connectors and length options.

Cable Length (feet)	Part Number Addition	
	H-H	H-P
3	-CAH003	-CAP003
6	-CAH006	-CAP006
12	-CAH012	-CAP012

Notes

1. Append onto base cable Part Number for complete assembly. Example: USB-2000-CAH003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

USB 3.0



Assembly Dimensions

Host to Host – H-H



Host to Peripheral – H-P



Connectors

- Signal (J1): USB Type A, P/N A-USBPA-3-R
- Signal (J2): USB Type B, P/N B-USBPB-3-R

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical

Conductors: Ultra flexible, finely stranded, tinned copper
Shielding: Ultra flexible, braided shields, with 90% nominal coverage
Minimum Bend Radius:
 - 6x cable height for intermediate flex
 - 10x cable height for continuous flex
Flex Life: 10,000,000 cycles nominal
Outer Jacket Durometer Rating: 65 (Shore A)

Environmental

Temperature Rating: -65°C to +165°C
Moisture Rating: Submersible, Salt Water Resistant
Clean Room Rating: Class 1, Zero Particulates
Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant

Electrical

Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 47

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Complete Assembly	31

Flexible Coaxial Cables

- Ideal for High Performance Video Transmission Applications
- Ultra Flexible Cable for Confined Area and Continuous Motion
- 1 - 8 Individual 50 or 75 Ohm Coax Conductors

Cicoil Flexible Coaxial Cables are ideal for high speed data and video applications that require flexibility, high & low temperature resistance and protection from very rugged environments. These 50 ohm and 75 ohm low capacitance cables feature low line to line skew, maximum signal integrity, low EMI and suppress crosstalk. And the flat cable construction guarantees clear, high speed data transmission, even in the toughest of environments.



NEED CUSTOMS?
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UL MEETS 94V-0 RoHS COMPLIANT REACH COMPLIANT FAA FLAME TESTED

Applications
Aerospace Surveillance, Surgical Robotis, Medical Diagnostics, Automated Test Systems

Cable

Ohms	Amp Rating ¹	Conductor Gauge	No. of Conductors	Dimensions [inches]		Part Number
				Width	Height	
50	3	30 AWG	1	0.12	0.12	FC50-01
			2	0.25	0.12	FC50-02
			4	0.50	0.12	FC50-04
			8	1.01	0.12	FC50-08
75	3	30 AWG	1	0.18	0.18	FC75-01
			2	0.36	0.18	FC75-02
			4	0.73	0.18	FC75-04
			8	1.47	0.18	FC75-08

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



Please contact Cicoil for other connectors and length options.

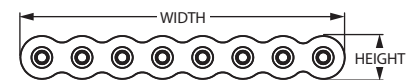
Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

1. Append onto base cable Part Number for complete assembly.
Example: FC50-01-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Dimensions

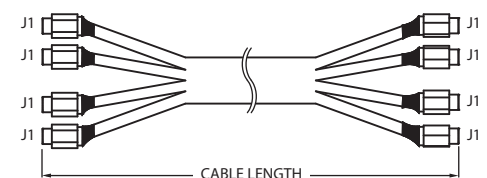
50 Ohm



75 Ohm



Assembly Dimensions



Connectors

- Signal (J1): SMA Male

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

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FireWire Cable

- Ideal for High Performance Data Transmission
- Ultra Flexible Cable for Confined Area and Continuous Motion
- Exceed FireWire Specs in a Flat, Compact Package

Comprised of 2 individually shielded 22 AWG power wires and 1 twisted shielded pair of 28 AWG 100 ohm twinaxial configuration, Cicoil's Flexx-Sil™ jacketed FireWire cables are designed for highly demanding applications. Unlike typical FireWire cables, the Cicoil cable has been designed for high flexibility, mechanical stress, temperature extremes and harsh environments. And the flat cable construction guarantees clear, high speed data transmission, even in the toughest of environments.



NEED CUSTOMS?

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  **CE**
  **RoHS** COMPLIANT
  **REACH** COMPLIANT
  **FAA** FLAME TESTED

Applications
Indoor and Outdoor FireWire Applications

Cable

Amp Rating ¹		Conductor Gauge		Dimensions [inches]		Part Number
Power	Signal	Power	Signal	Width	Height	
8	5	22 AWG/2c	28 AWG/1 pr	0.48	0.18	FW-1000

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



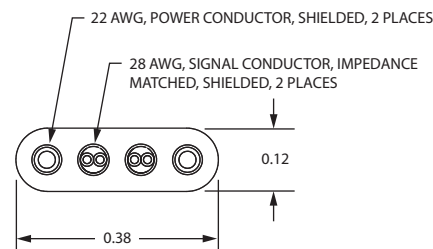
Please contact Cicoil for other connectors and length options.

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

Notes

1. Append onto base cable Part Number for complete assembly.
Example: FW-1000-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Dimensions



Assembly Dimensions



Connectors

- Signal (J1): FireWire, P/N 154-FWW15-E

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded, tinned copper	Temperature Rating: -65°C to +165°C
Shielding: Ultra flexible, braided shields, with 90% nominal coverage	Moisture Rating: Submersible, Salt Water Resistant
Minimum Bend Radius:	Clean Room Rating: Class 1, Zero Particulates
- 6x cable height for intermediate flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
- 10x cable height for continuous flex	Electrical
Flex Life: 10,000,000 cycles nominal	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)
Outer Jacket Durometer Rating: 65 (Shore A)	See Electrical Rating Chart on Page 47

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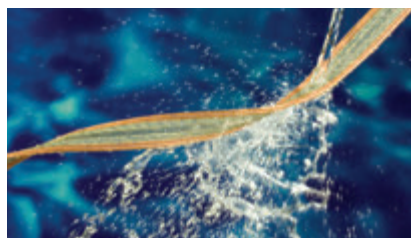
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Complete Assembly	31

One Cable to Rule Them All!



Deliver Signal, Power, Liquid and Gas in a single, unified, highly flexible flat cable. PTFE tubing available for Motion Series Plus cables adds fluid dispensing or pneumatic control capabilities. Applications include medical diagnostic equipment, wafer-handling robots, painting robots, and automated pick-and-place equipment, etc.

Wet and Wild



The water-repellent characteristics of patented Flexx-Sil™ jacketing make our cables immune to immersion, high humidity, fungus, and damp operating environments. Ideal for washdown, autoclave, and other wet applications.

Any Wire. Any Shape. Any Size



Our patented extrusion process allows wire gauges from 4 to 44 AWG, in virtually any configuration required. Power, Signal, Video, Coax, Cat 5e, plus Fiber Optics and tubing for liquids and gases. Multiple wires and conduits are placed in the flat cable, with precise control of the wire spacing, the insulation thickness, and the overall cable shape. Designers can create exactly the cable needed.

Touch It! We'll Send You a Sample



Pictures and words can't fully describe Cicoil Flexible Flat Cable. We want you to have a sample in your hands to discover the flexibility and suppleness! Your cable sample will arrive neatly wrapped in our latest full color information kit. Use the request form at Cicoil.com to receive your Info Kit and Sample.

Online Configurator – Design Your Cable



Go to Cicoil.com and see how easy it is to design the specific cable you need. Combine signal, power, tubing, video into a single high-flex flat cable, then get an instant engineering drawing and price for your own cable! Plus Cicoil will deliver your custom flat cable in two weeks or less. Check out this great design tool at Cicoil.com.

High Flex Cables for Surgical Robotics



Unsurpassed flexibility, compact size, and custom shapes deliver the precision for medical robotics. Our patented Flexx-Sil™ flat cable jacketing is "self-healing" and halogen-free, so will not delaminate or degrade due to exposure to steam, water, alcohol, UV light, mechanical abuse, autoclave and many chemicals.

Flexx-Sil™ Cables for Medical Devices

Soft, Supple, Inert & Versatile



Cicoil® High Flex Flat Cables

- Water, steam (autoclave) and chemical resistant
- Combine power, signal, video and tubing in a single flat cable
- Conductors as small as 44 AWG support miniature electronics
- 10 million+ flexing cycle life
- Eliminate cable carrier tracks
- Online Configurator delivers instant price quotes

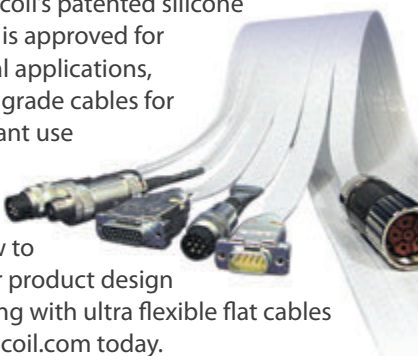
Cicoil Flexx-Sil™ encapsulated cables are used in a wide variety of medical applications, including medical robotics, testing equipment, and also human medical devices like hearing aids.

Flexx-Sil™, Cicoil's patented silicone formulation, is approved for most medical applications, and medical grade cables for human implant use are also available.

Find out how to simplify your product design and packaging with ultra flexible flat cables by visiting Cicoil.com today.

www.Cicoil.com

CICOIL®
The Clear Choice
661.295.1295 • www.cicoil.com





- Available from Stock
- Available as Cable or Complete Assembly

Unshielded Cables: Multi and Single Conductor

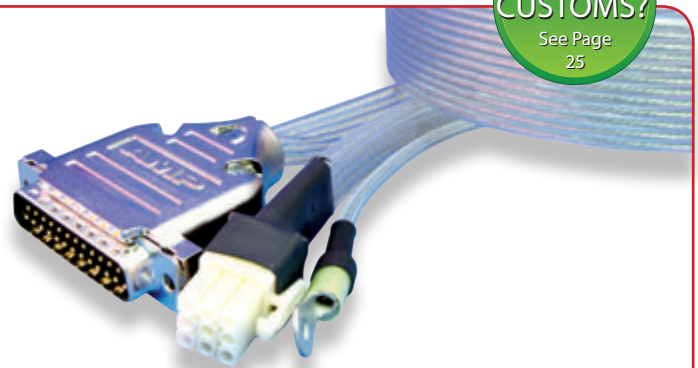
Cicoil has multiple variations of high flex, unshielded cables and assemblies in flat, flexible configurations all available from stock. Ranging from 1 to 64 conductors in flexible flat cables, standard IDC, festoon or thermocouple variations, Cicoil's selection of standard cables provides the highest variety available anywhere. All cables are jacketed in Cicoil's exclusive, clear Flexx-Sil™ material, delivering the highest flexibility in the most extreme environments. Cables are available in continuous lengths, or as cable assemblies, complete with connectors.

Hi-Flex Unshielded Cable	18
Hi-Flex, Hi-Temp IDC Ribbon Cable	20
Flexx-Sil™ Hi-Temp Festoon Cable	21
Hi-Flex Unshielded Single Conductor Cable	22
Thermocouple Cable	23

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

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.



**NEED
CUSTOMS?**
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 **UL** MEETS 94V-0
  **SP**
  **CE**
  **RoHS** COMPLIANT
  **REACH** COMPLIANT
  **FAA** FLAME TESTED

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

Cable

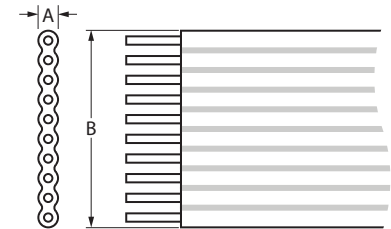
Amp Rating ¹	Volts DC	Conductor Gauge	No. of Conductors	Dimensions [inches]		Part Number
				Width	Height	
5	12K	28 AWG	2	0.13	0.08	969M101-28-2
			3	0.18	0.08	969M101-28-3
			4	0.23	0.08	969M101-28-4
			6	0.33	0.08	969M101-28-6
			8	0.43	0.08	969M101-28-8
			10	0.53	0.08	969M101-28-10
6	12K	26 AWG	2	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	0.5	0.10	969M101-24-8
			10	0.62	0.10	969M101-24-10
11	18K	22 AWG	12	0.74	0.10	969M101-24-12
			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



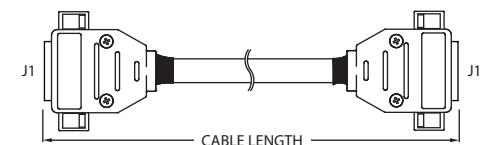
Please contact Cicoil for other connectors and length options.

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	0.2	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
			12	0.99	0.12	969M101-20-12
20	20K	18 AWG	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
			10	1.00	0.14	969M101-18-10
			12	1.19	0.14	969M101-18-12
26	20K	16 AWG	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
			8	0.92	0.15	969M101-16-8
			10	1.14	0.15	969M101-16-10
			12	1.36	0.15	969M101-16-12
27	20K	14 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
36	20K	12 AWG	3	0.58	0.24	969M101-12-3
			4	0.75	0.24	969M101-12-4
47	20K	10 AWG	4	0.92	0.29	969M101-10-4
65	20K	8 AWG	4	1.17	0.35	969M101-8-4
95	20K	6 AWG	4	1.47	0.40	969M101-6-4
125	20K	4 AWG	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.

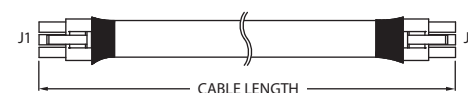


Cable Length (feet)	Part Number Addition
3	-CA003
6	-CA006
12	-CA012

Notes

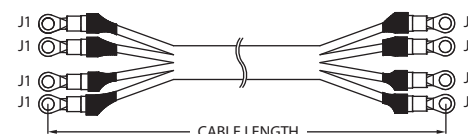
- Append onto base cable Part Number for complete assembly.
Example: 969M101-20-2-CA003
- Connector ratings may differ from cable ratings; refer to manufacturer specifications.

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

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)

Environmental

Temperature Rating: -65°C to +165°C

Moisture Rating: Submersible, Salt Water Resistant

Clean Room Rating: Class 1, Zero Particulates

Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant

Electrical

Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 47

Options

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FlexRail™ Self-Supporting Cable	30
Complete Assembly	31

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
- -65°C to +260°C Rating – Ideal for the Harshest Environments

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.



NEED CUSTOMS?

See Page 25



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
28 AWG 1mm	5	64	3.20"	3.15"	0.04" max.	310J101-64
		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.

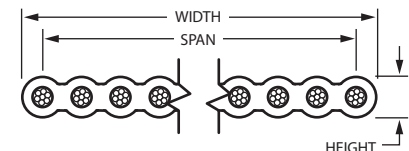
Cable Specifications

All engineering values are nominal and subject to change.

Mechanical	Environmental
Conductors: Ultra flexible, finely stranded copper	Temperature Rating: -65°C to +260°C
Minimum Bend Radius:	Moisture Rating: Submersible, Salt Water Resistant
- 6x cable height for intermediate flex	Clean Room Rating: Class 1, Zero Particulates
- 10x cable height for continuous flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
Outer Jacket Durometer Rating: 65 (Shore A)	Electrical
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 47

Dimensions



Cable Assemblies



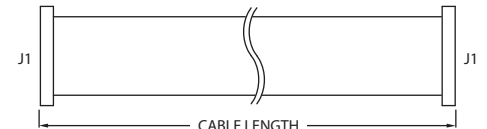
Please contact Cicoil for other connectors and length options.

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

Options

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Flexx-Sil™ Hi-Temp Festoon Cable

**NEED
CUSTOMS?**
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25

- Rated from -65°C to +165°C
- Ultra Flexible Alternative to PVC & Neoprene Festoon Cables
- Available in 18 AWG to 4 AWG Configurations

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.



 **UL** MEETS 94V-0
  **SF**
  **CE**
 RoHS COMPLIANT
 REACH COMPLIANT
 FAA FLAME TESTED

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
27	20K	14 AWG	4	0.75	0.24	CFC-12-4
36	20K	12 AWG	4	0.92	0.29	CFC-10-4
47	20K	10 AWG	4	1.17	0.35	CFC-8-4
65	20K	8 AWG	4	1.47	0.40	CFC-6-4
95	20K	6 AWG	4	1.64	0.47	CFC-4-4
125	20K	4 AWG	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



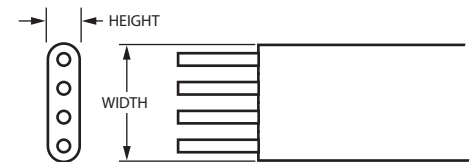
Please contact Cicoil for other connectors and length options.

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

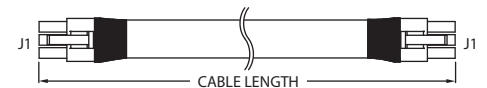
Notes

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

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)

Environmental

Temperature Rating: -65°C to +165°C (higher temperatures available)
Moisture Rating: Submersible, Salt Water Resistant
Clean Room Rating: Class 1, Zero Particulates
Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant

Electrical

Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 47

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Hi-Flex Unshielded Single Conductor Cable

NEED
CUSTOMS?

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25

- 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

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.



UL MEETS 94V-0 SF CE RoHS COMPLIANT REACH COMPLIANT FAA FLAME TESTED

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

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



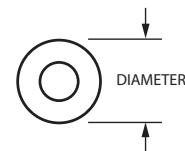
Please contact Cicoil for other connectors and length options.

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.

Dimensions



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: -65°C to +165°C
Minimum Bend Radius:	Moisture Rating: Submersible, Salt Water Resistant
- 6x cable height for intermediate flex	Clean Room Rating: Class 1, Zero Particulates
- 10x cable height for continuous flex	Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant
Outer Jacket Durometer Rating: 65 (Shore A)	Electrical
	Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

See Electrical Rating Chart on Page 47

Options

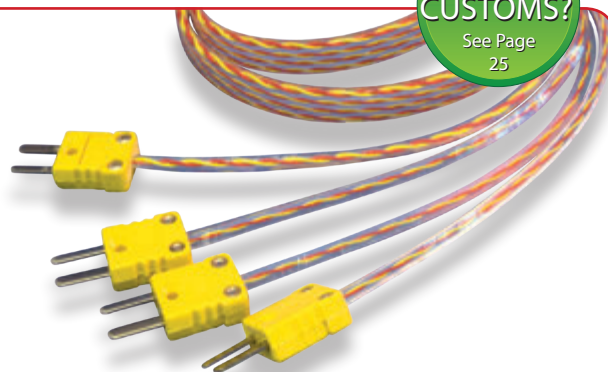
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Thermocouple Cable

- Ideal for Control Instrumentation & Temperature Sensing Applications
- Rated from -65°C to +260°C
- Available in Type J & Type K Versions with 1 - 8 Conductors

Cicoil Thermocouple Cables are ideal for high performance temperature sensing applications, where flexibility and reliability are needed. Available in flat cables, with up to 8 thermocouples, and encased in Cicoil's clear Flexx-Sil™ jacketing, these cables provide high performance and compact packaging for the most demanding thermocouple applications.



NEED CUSTOMS?

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 **UL** MEETS 94V-0
  **CE**
 RoHS COMPLIANT
 REACH COMPLIANT
 FAA FLAME TESTED

Applications
 Temperature Sensing, Heating & Air Conditioning, Cooking Equipment

Cable

Type	Conductor Gauge	No. of Conductors	Diameter [inches]		Part Number
			Width	Height	
J	28 AWG	1	0.14	0.14	TC-J-01
		2	0.27	0.14	TC-J-02
		4	0.54	0.14	TC-J-04
		8	1.08	0.14	TC-J-08
K	28 AWG	1	0.14	0.14	TC-K-01
		2	0.27	0.14	TC-K-02
		4	0.54	0.14	TC-K-04
		8	1.08	0.14	TC-K-08

Dimensions



Cable Assemblies



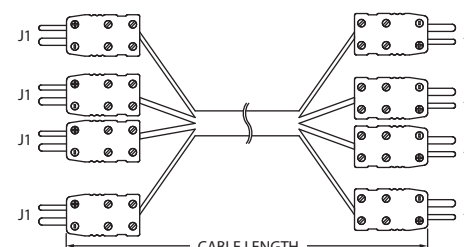
Please contact Cicoil for other connectors and length options.

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

Notes

1. Append onto base cable Part Number for complete assembly.
Example: TC-J-24-CA003
2. Connector ratings may differ from cable ratings; refer to manufacturer specifications.

Assembly Dimensions



Connectors

- Type K Signal (J1): Omega, P/N SMPW-CC-K-M
- Type J Signal (J1): Omega, P/N SMPW-CC-J-M

Cable Specifications

All engineering values are nominal and subject to change.

Mechanical

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)

Environmental

Temperature Rating: -65°C to +260°C

Moisture Rating: Submersible, Salt Water Resistant

Clean Room Rating: Class 1, Zero Particulates

Extreme Environments: Sunlight, UV Light, Alcohol, Chemical and Oil Resistant

Electrical

Outer Jacket Dielectric Strength: 450 volts/mil (17.7 kv/mm)

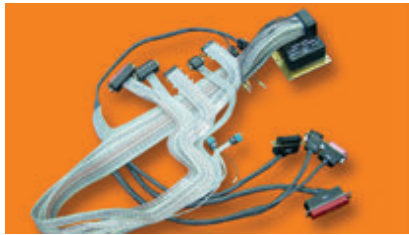
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Save Space with Custom Flat Cables



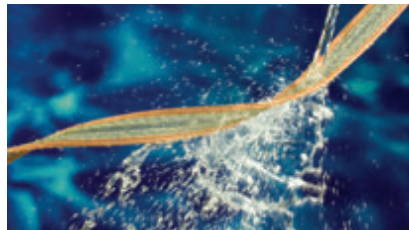
Cicoil custom cables solve many critical space, weight, and assembly issues. Packaging many conductors using flat cables provides solutions in high performance, tight-fitting military and aerospace applications. And Cicoil's unique cable forming capability means cables can take virtually any shape, eliminating costly flex circuits or wiring costs.

Tiny Cables. Flex Circuit Alternative.



Soft and pliable cables encapsulated in medical grade Flexx-Sil™ jacketing encapsulates wires as small as 44 AWG. Resists alcohol and chlorine bleach washes, and easily withstands autoclaving. Compatible with all medical connectors.

Wet and Wild



The water-repellent characteristics of Flexx-Sil™ jacketing make our cables immune to immersion, high humidity, fungus, and damp operating environments. Ideal for washdown, auto-clave, and other wet applications.

Flexibility: The King of Motion



Flexibility and flat profile make them the undisputed champion of motion control applications. Also available with our Gliderite coating that prevents binding in densely packed carriers. Our Motion Series cables are ready for 1-, 2- or 3-axes systems. Bulk cables are available in continuous lengths; or have Cicoil provide a complete assembly, 100% tested and ready to install.

Bring on the Heat...and Cold!



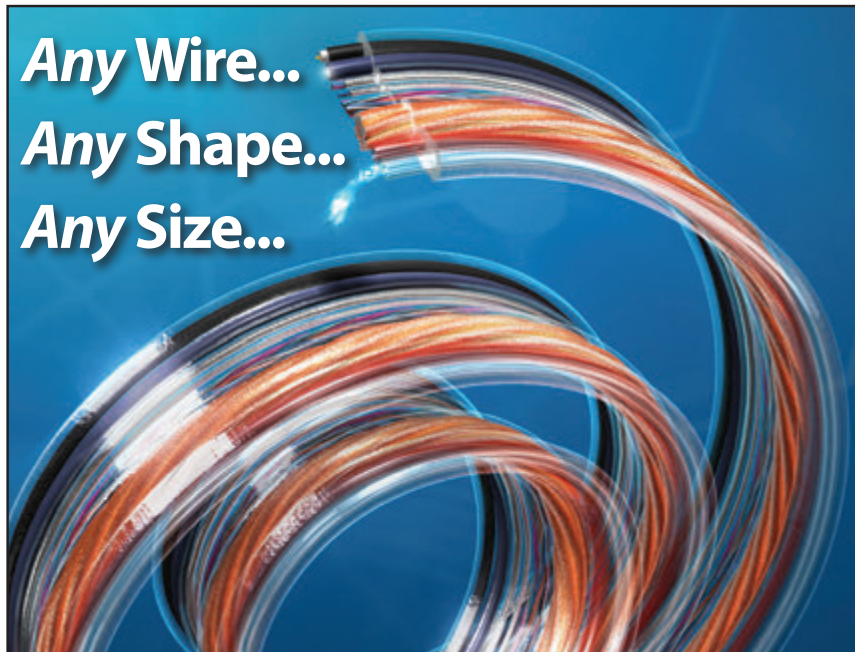
Cicoil delivers exceptional reliability under a broad range of temperatures. Our cables retain their electrical properties and flexibility in temperatures from -65°C to +260°C. They also withstand exposure to high levels of ultraviolet, radiation and ozone with no adverse effects.

Online Configurator



Go to Cicoil.com and see how easy it is to design the specific cable you need. Combine signal, power, tubing, video into a single high-flex flat cable, then get an instant engineering drawing and price for your own cable! Plus Cicoil will deliver your custom flat cable in two week or less. Check out this great design tool at Cicoil.com.

Any Wire...
Any Shape...
Any Size...



Cicoil crystal-clear flat cables deliver unsurpassed versatility & performance!

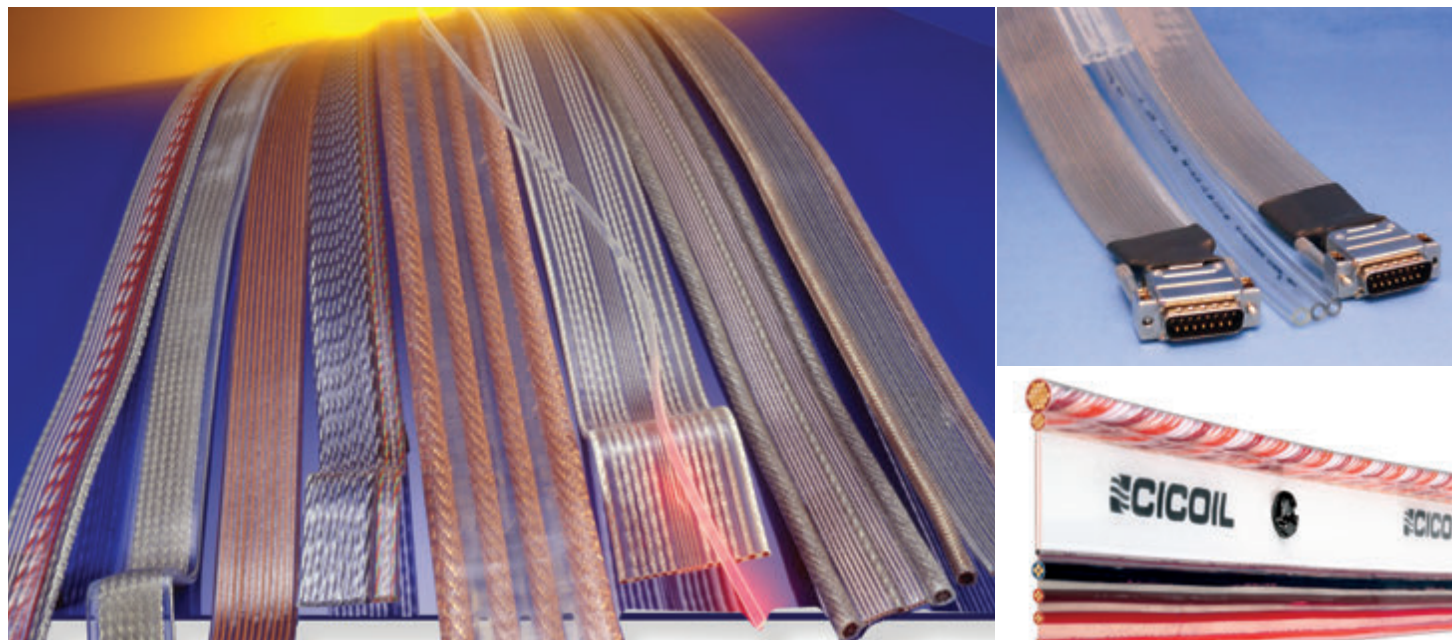
- **Perfect Fit:** Cicoil's patented extrusion process gives you exactly the cable you need, in the smallest possible package.
- **Flexible:** The most flexible cable you can buy, for the toughest motion applications.
- **Extreme Environments:** Excels in temperatures from -65°C to 260°C, and under exposure to water, oil and the harshest chemicals.
- **Quality:** Jet fighters rely on Cicoil cables, and so can you. Our ISO 9001 (AS9100) quality system ensures "mission-critical" reliability.



Bare Wire, Insulated and Shielded Conductors, Twisted Pair, Coax, Fiber Optics, Tubing

CICOIL
The Clear Choice

661.295.1295 • www.cicoil.com



Customizing Cicoil Flat Cables

Cicoil's patented extrusion process enables the production of virtually any flat cable configuration. But it doesn't end there. Within a single cable you can integrate power wire, signal wire, hollow tubing, and fiber optics. Add elements to provide special attributes, such as GlideRite™ for low friction, FlexRail™ for carrier-free repetitive motion, or StripMount™ for fast and easy installation.

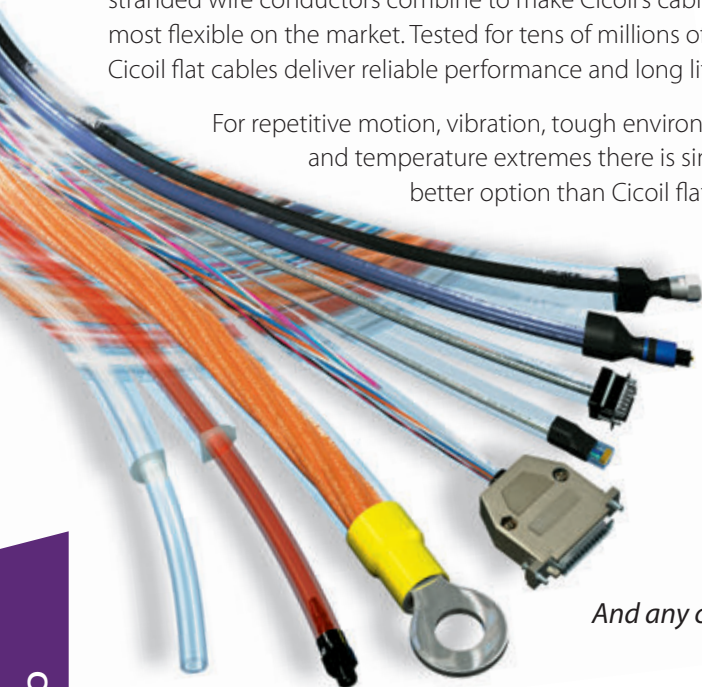
This sections covers the basics.

Unlimited Flat Cable Design	26
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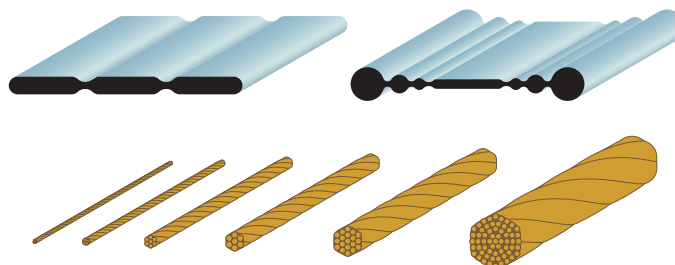
Unlimited Flat Cable Design

Create exactly the cable needed, in the smallest possible package. Save space and reduce cost. The flexible cable jacket and finely-stranded wire conductors combine to make Cicoil's cables the most flexible on the market. Tested for tens of millions of cycles, Cicoil flat cables deliver reliable performance and long life.

For repetitive motion, vibration, tough environments, and temperature extremes there is simply no better option than Cicoil flat cables.



And any connector!

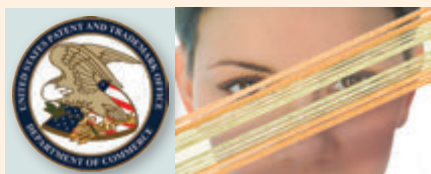


These patented flat cables are available with wire gauges from 4 to 44 AWG, in virtually any configuration required. Cicoil's patented extrusion process allows multiple wires to be placed in a flat cable, precisely controlling the wire spacing, the insulation thickness, and the overall cable shape.

Specify Cicoil Flat Cables when...

- PVC will melt, break, or burn
- PTFE is too stiff for repetitive motion
- Operation is in temperature and environmental extremes
- Cables must withstand medical or industrial chemicals
- Repetitive motion, vibration, or shock will damage other cables
- Cables must be soft to the touch
- Application must meet NASA or ESA outgassing requirements

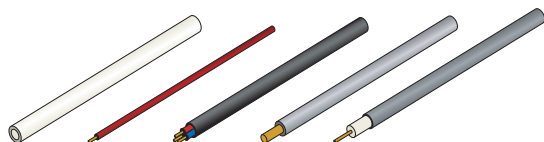
Cicoil Patented Technologies



Cicoil invented the highest performance, most versatile flat cables on the planet,

and we are extremely proud to have received numerous US and worldwide patents for our unique technologies and products. Cicoil's ongoing innovations enable us to design and manufacture high performance cables that exceed the demands of our customers' toughest applications.

Any Wire or Cable Element



Cicoil's patented extrusion process allows the addition of an unlimited variety of conductors, such as coaxial, video, and fiber optics. Design your own cable with our easy-to-use Configurator (See next page).

- Bare Wire, Insulated and Shielded Conductors, Twisted Pair, Coax, Fiber Optics, Tubing

Flat Cables with Tubing

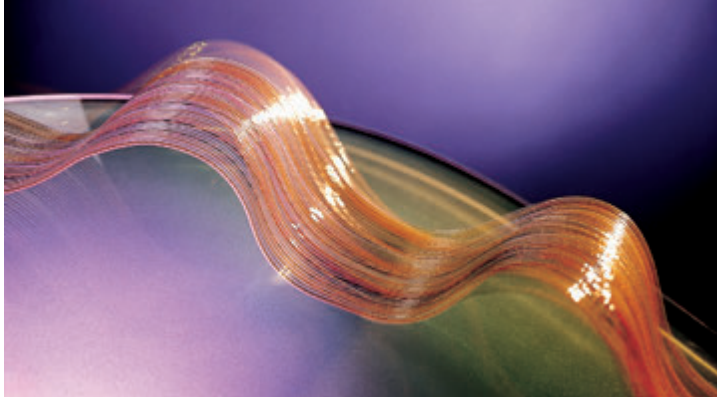


Add hollow tubing to cables for transporting fluid and gasses or make a flat cable with only tubes.

- Standard PTFE, Tygon® and PVC tubes can be integrated in any cable
- Most diameter sizes supported
- Specify any location and number of tubes in combination with other conductors
- More information on Page 30

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

Design Your Own Flat Cable in Just Minutes! Over 200 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!

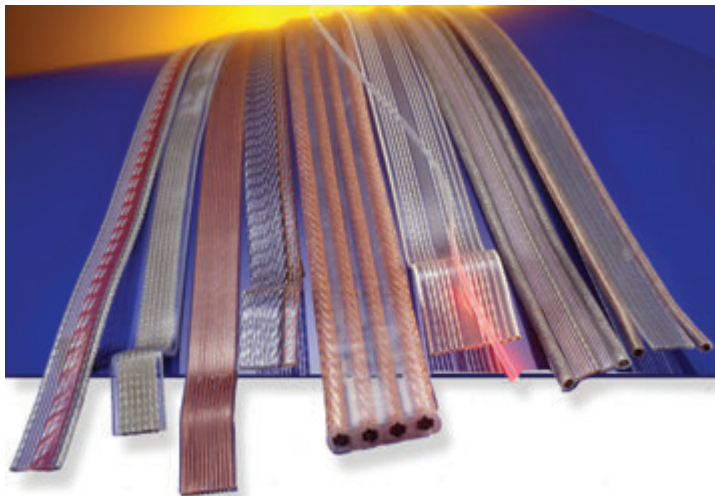
Your custom cable is manufactured and shipped within two weeks of your order.



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:

<http://www.cicoil.com/cables/configurator.asp>



Flexible Flat Cables & Cable Assemblies

1

Drag & Drop From Menu of Choices



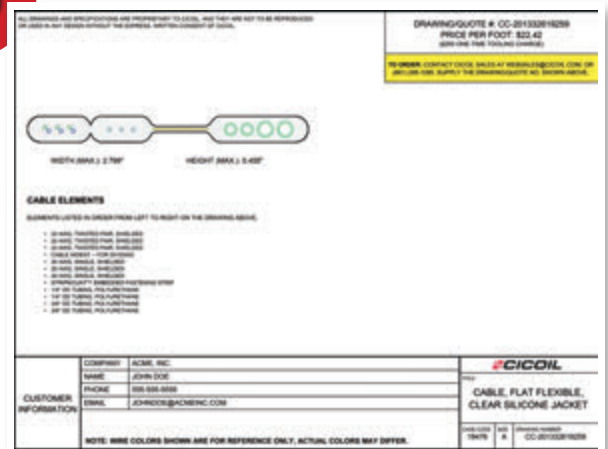
2

See Your Cable Built in Real Time

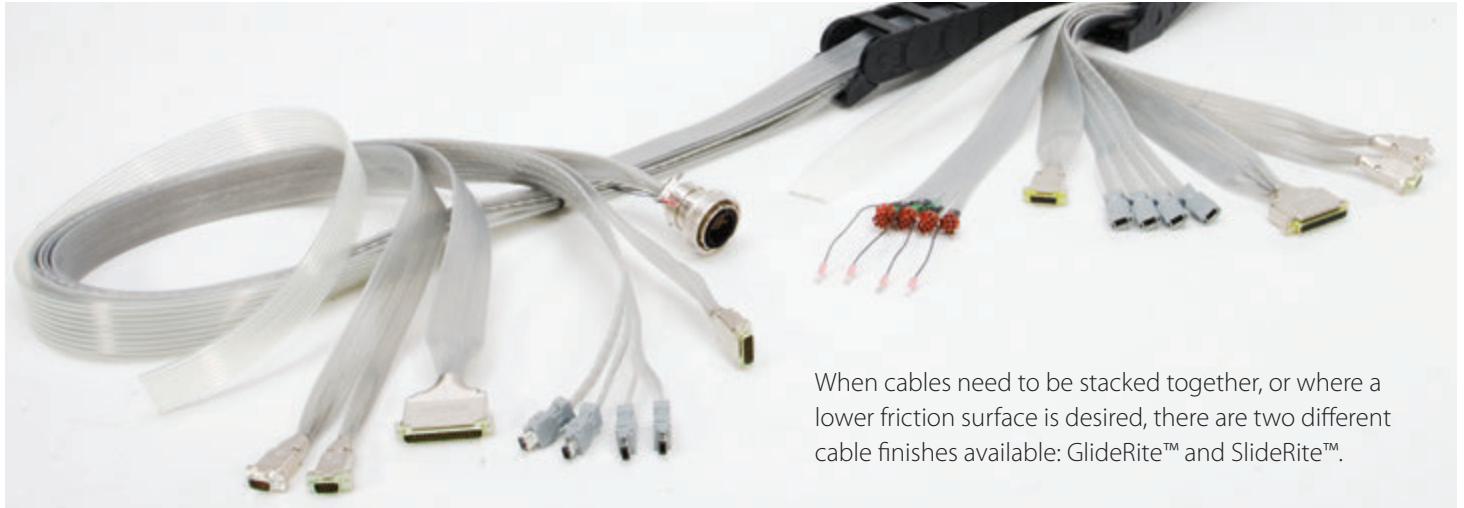


3

Get a Drawing with Pricing



Low Friction Options



When cables need to be stacked together, or where a lower friction surface is desired, there are two different cable finishes available: GlideRite™ and SlideRite™.

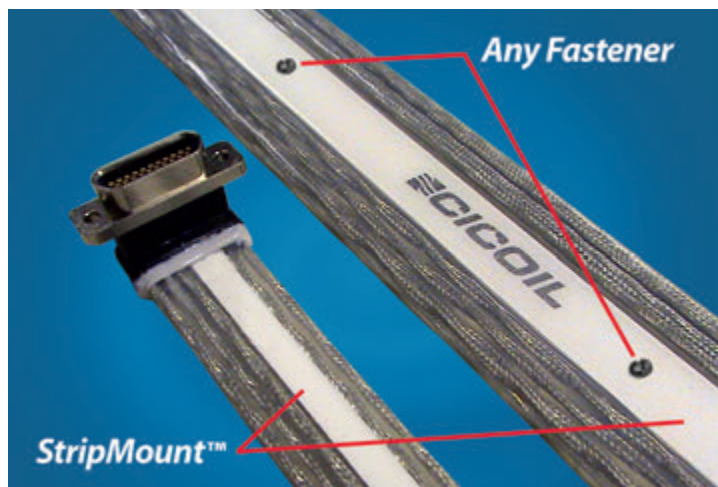
GlideRite™:

- The lowest friction available, the cable is as slippery as Teflon®
- Compound is chemically bonded to the cable, and will not rub or peel off
- Cable retains all performance characteristics, including temperature range and flexibility (See Tech Note).
- Continuous lengths not available, cable needs to be supplied in 30-80 foot lengths

SlideRite™:

- Reduced friction, similar to a PVC cable jacket
- Compound is chemically bonded to the cable, and will not rub or peel off
- Cable retains all performance characteristics, including temperature range and flexibility
- Continuous lengths can be coated
- Makes cables slightly cloudy in color

StripMount™ Integrated Mounting Strip

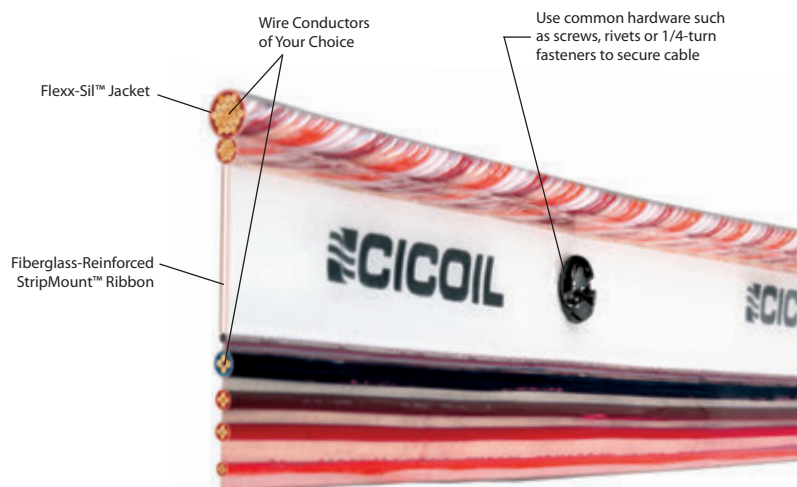


Cicoil's StripMount™ design makes it quick and easy to mount cables to any surface. The patented design allows for holes to be easily punched or drilled through the StripMount™ cable reinforcement at whatever intervals you need. Use any fasteners to attach the cable to any surface. Rather than using expensive, difficult cable management systems, StripMount™ lets you attach cables anywhere. You can even stack up and drill through multiple cables!

Benefits:

- Standard fasteners mount cables to any surface
- Saves space by eliminating cable conduit and cable tie systems
- Fiberglass-reinforced strip has 250 lbs. holding force
- Stackable: Multiple cables can be stacked and secured by a single fastener

StripMount™ is available with *any* Cicoil cable.



Flat Cables with Tubing

Cicoil excels at incorporating tubing into our flat cables. Flat cables can include tubing for gases and/or liquids, right alongside power, signal, data or video conductors. We also manufacture many cables that are 100% tubing, in a wide variety of sizes, configurations and tubing materials.

Versatility & Performance

- PTFE, PFA, Polyurethane, Tygon® and PVC Tubes can be used in Cicoil flat cables
- Multiple tube diameters are available, including a variety of tube diameters in a single flat cable
- Tubing can be included virtually anywhere, in any quantity, in any flat cable
- 'Tubing Only' cables also available, in multiple variations
- Simplify design and packaging by combining tubing with power, signal, data and video conductors, all in a single flat cable
- Custom shaped cables with tubing
- Class 1 Clean Room Rated; Free of Halogens, Contaminants and Particulates



SuperTuff™ Cable Jacketing



Standard Cicoil Flexx-Sil™ jacketing carries a Durometer Rating of 65 (Shore A), and is very strong and durable. For more rugged environments, where cable is to be subject to impact or abrasion, we recommend that you specify Cicoil's **SuperTuff™** formulation to deliver a Durometer Rating of 85.

Available with any flat cable.

Colored Cable Jacketing

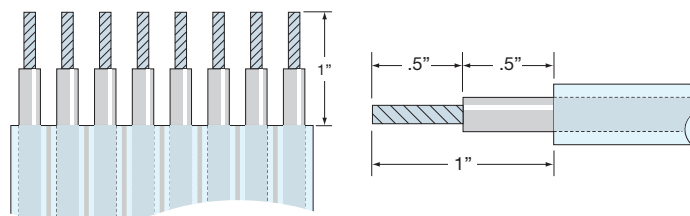


Cicoil produces colored cable jackets upon request. Black, white and lots of colors in between. Let us know what you need.

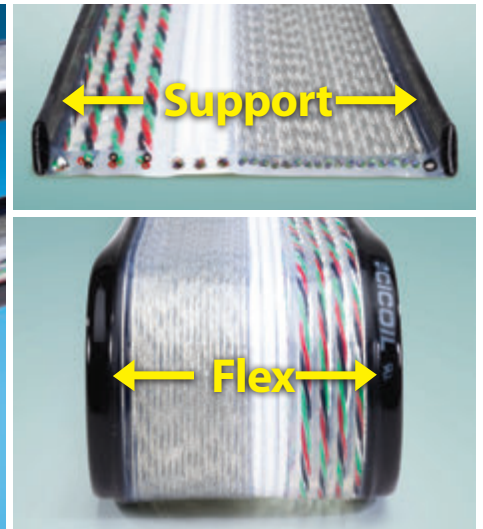
Cable End Preparation

Select this option to have Cicoil prepare one or both ends of cable for connectors or other termination. Cable will be stripped as illustrated.

- Cable jacket is removed 1" from end of conductors.
- Insulation (if present) is stripped 0.5" from end of conductors.



FlexRail™ Self-Supporting Cable



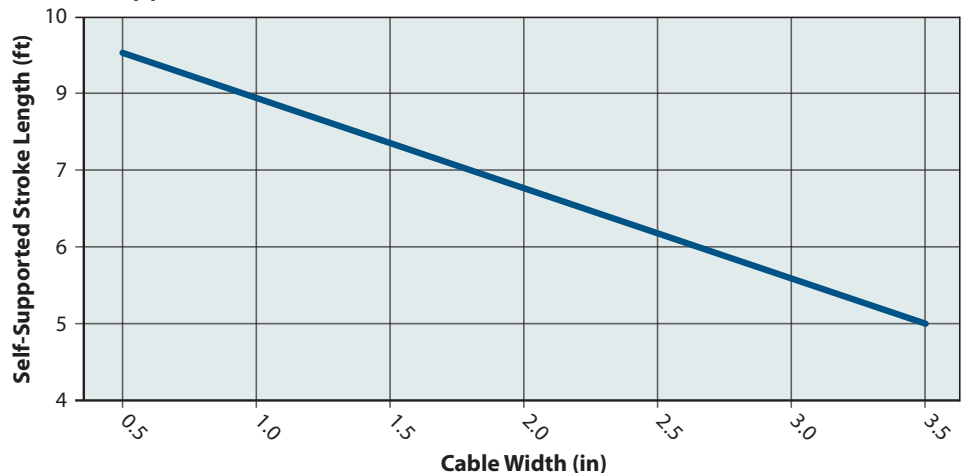
Revolutionary Design Eliminates Cable Tracks!

Features

- Works with any Cicoil flat cable
- Up to 10 feet self-supported lengths (longer lengths available-consult factory)
- Maintains cable in compact, parallel alignment for tight space applications
- Smooth rolling motion for high accuracy motion applications
- Works in any orientation: horizontally, vertically, or at any angle
- FlexRail™ works in temperatures from -65°C to +260°C
- Rugged and reliable: rated for millions of flexing cycles

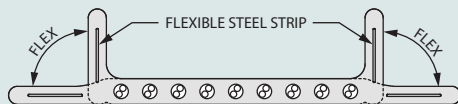
Our new FlexRail™ option makes any Cicoil flat cable completely self-supporting. FlexRail™ encapsulates a strong, flexible steel strip onto both sides of a flat cable. The steel strip provides cantilevered support for the cable, while allowing the cable to smoothly flex in a linear motion application. The patent-pending FlexRail™ design keeps the cable parallel along its entire length, enabling tighter bend radiuses and more compact cable designs than is possible with a cable carrier. Its smooth rolling motion, compact size, and quiet operation make FlexRail™ cables far superior to cable carriers in most linear motion applications.

Stroke Support Chart

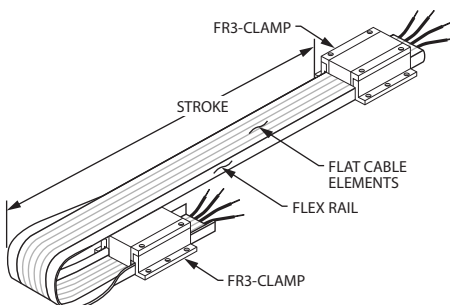


For width not indicated in the chart above please contact Cicoil. Based on standard cable thickness.

FlexRail™ Supports and Flexes

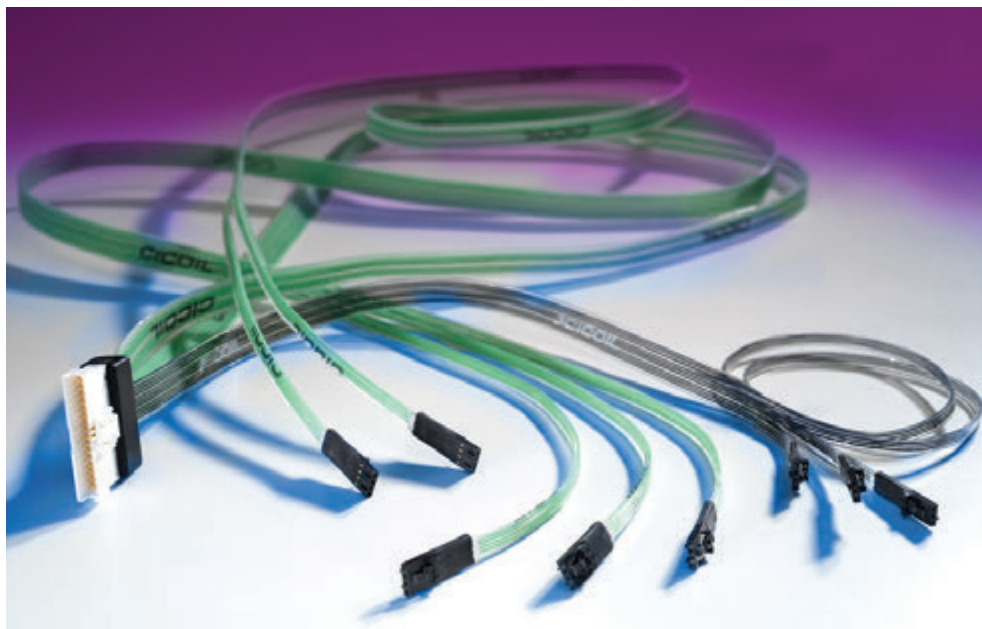


Complete Flex-Sil™ encapsulation of conductors and FlexRail™ strips enable a one piece self-supporting, yet extremely flexible, cable.



How to Order

1. Select a Cicoil flat cable, or design one using the online Cable Configurator
2. Check Stroke Support Chart to ensure stroke length needed is within FlexRail™ specification (contact Cicoil for longer stroke lengths).
3. Specify 'FlexRail™' option and length of cable (taking into account total stroke needed).
5. Specify connectors and/or cable end prep needed (flying leads, stripped, etc.)
6. Clamps are recommended (see drawing). Specify 'FR3-Clamp' option to order clamps for your specific cable.



Cicoil Cable Assemblies

Cicoil will produce complete cable assemblies to your specifications with the connectors of your choice.

Cicoil has designed and manufactured thousands of custom cable assemblies. Our experienced engineers work closely with our customers, designing assemblies to meet the most demanding requirements, often in mission-critical applications. Challenge us with your toughest specs and give Cicoil's design engineers an opportunity to show you why **"Specials Are Standard at Cicoil."**

Each and every cable assembly is 100% tested for electrical performance and physical dimensions before shipment to a customer. Our new, automated cable testing equipment is capable of inspecting 2,000 point-to-point connections, as well as hi-pot, resistance, and other electrical tests. Sophisticated SPC software allows rigorous six-sigma and Pareto analysis, for continuous improvement of our processes and products.

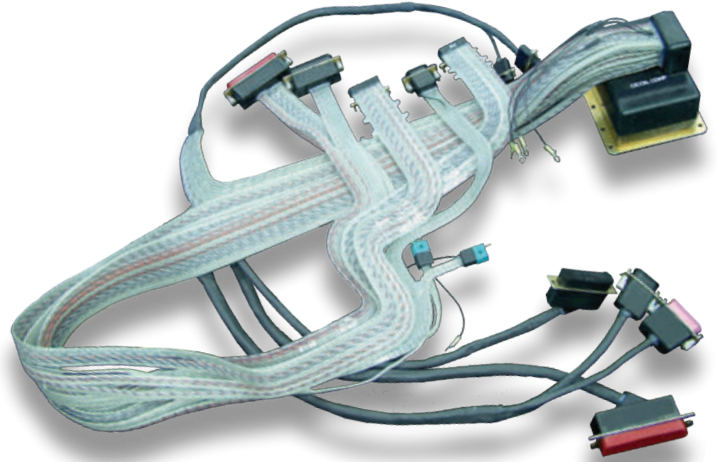
Custom Cable Assemblies from Cicoil

32-33

Cable Assemblies – “Specials Are Standard at Cicoil”

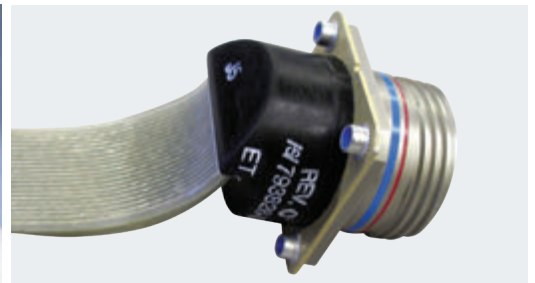
Cicoil's experienced engineering team works with customers to design cable assemblies that meet the specific needs of the toughest applications. Using advanced Solid Modeling and Cable Design Software, our engineers are able to meet the most difficult requirements of the most challenging, mission-critical applications. Custom-shaped cables, with complex molding, tubing, or vacuum requirements, utilizing a wide variety of connectors, are standard at Cicoil.

See below for examples of our custom assemblies. Please call Cicoil to speak to an engineer about your application.



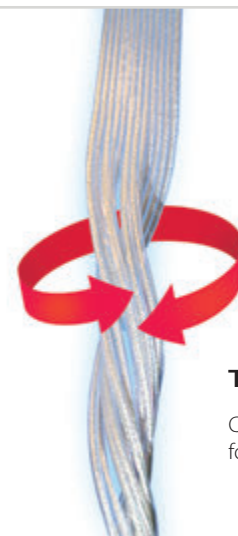
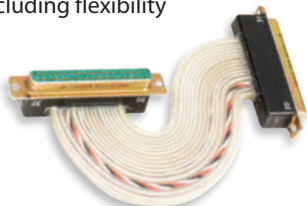
Any Connector

- 'D' Sub, Micro 'D', and Nano connectors for small gauge wire
- Circular connectors, Mil-Spec and Industrial
- Lightweight Fiberglass 'Header' Connectors machined in-house
- Assemblies available with virtually any connector



Custom Shapes - Formed Cables

- Custom shaped cable assemblies fit precisely into compact spaces
- Complex formed shapes possible, using our 3D modeling software
- Formed cables retain all performance characteristics, including flexibility



Torsional Flex

Cables are easily slit for Torsional Flexing.

Space/Vacuum

- Space/Vacuum Cables meet NASA and ASTM E-595 Low Outgassing Requirements of <1% TML (Total Material Loss), and <0.1% CVCM (Collected Volatile Condensable Material)
- Cables are 100% tested and certified to be low outgassing
- Cables meet Class 1 Clean Room requirements, with zero particulates



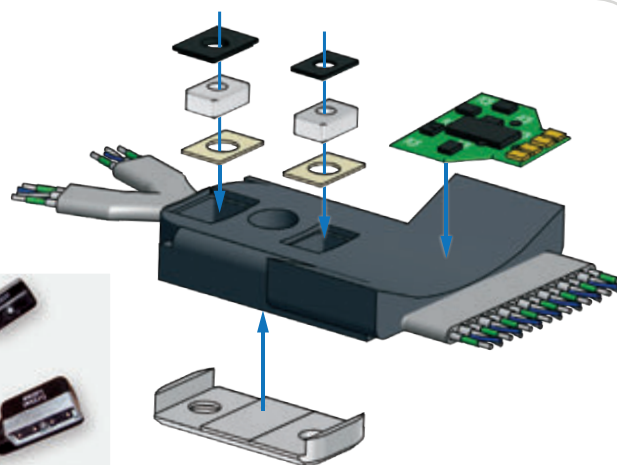
Tubing

- Tubing can be incorporated into any Cicoil Flat Cable
- Teflon®, PVC, Polyurethane or Tygon® Tubing Options available, in standard sizes up to .375" diameter
- Flat 'Tubing Only' cables available, with a mix of virtually any tubing types and sizes
- Tubing Assemblies with Tri-Clamp Fittings, Barbed connectors or Luer Adapters available



Molding

- Molded connector backshells from hard or flexible Mil-Spec materials
- Complex molding capabilities, including PCBs, metal plates, and insulated junctions
- All tooling designed and manufactured in-house, for fast prototyping



Complex 3D Mold-Making Capabilities

Save Space with Custom Flat Cables



Cicoil custom cables solve many critical space, weight, and assembly issues. Packaging many conductors using flat cables provides solutions in high performance, tight-fitting military and aerospace applications. And Cicoil's unique cable forming capability means cables can take virtually any shape, eliminating costly flex circuits or wiring costs.

UAVs Soar with Flat Cables



Cicoil flat cables can include power, signal, data and video conductors in one compact, lightweight package, saving valuable space and weight on UAVs. And the Flexx-Sil™ jacket operates in extreme conditions, including temperatures from -65°C to +260°C, and it also cushions the conductors against vibration and turbulence.

Online Configurator



Go to Cicoil.com and see how easy it is to design the specific cable you need. Combine signal, power, tubing, video into a single high-flex flat cable, then get an instant engineering drawing and price for your own cable! Plus Cicoil will deliver your custom flat cable in one week or less. Check out this great design tool at Cicoil.com.

Bring on the Heat...and Cold!



Cicoil delivers exceptional reliability under a broad range of temperatures. Our cables retain their electrical properties and flexibility in temperatures from -65°C to +260°C. They also withstand exposure to high levels of ultraviolet, radiation and ozone with no adverse effects.

Every Launch Counts - Rely on Cicoil



Cicoil flat cables are used extensively within a variety of modern guided missiles and their delivery systems. Their flat profile saves space and weight, while a seamless Flexx-Sil™ encapsulation provides incredible shock absorption. When one launch can make the difference rely on Cicoil.

Certified for Space Travel



Approved by NASA for space flight, Cicoil flat cables exceed outgassing specifications for vacuum and space use. They provide very broad temperature capability, ranging from -65°C to +260°C, and also deliver exceptional resistance to radiation and ozone.

"Shock & Awe" Ready Cables

This 120mm guided projectile sustains 10,000 Gs of force when fired. Cicoil Flexible Flat Cable was selected to provide robust electrical connections due to its resilience and space-saving attributes.

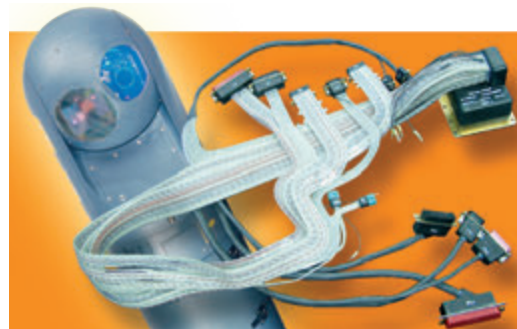
Cicoil® High Flex Flat Cables

- Perform in temperatures from -65°C to +260°C
- Enables compact, lightweight assemblies
- Flexible flat cables fit in tight spaces
- Complete assemblies, including any connectors, made in-house
- AS9100 certified quality

Visit our website or call to speak to an engineer.

www.Cicoil.com

Cicoil cable assemblies are used in thousands of mission-critical aircraft, ground- and air-missiles, guided ordinance, and space applications. Our AS9100 certified quality system ensures that each cable assembly is rigorously tested to perform in the toughest places. Precision in-house cable production and assembly capabilities allow us to respond quickly to prototype or production needs.



CICOIL®
The Clear Choice

PH: 661.295.1295



Cicoil Cable Technology

Cicoil Flat Cables are The Clear Choice™ for repetitive motion, vibration, harsh environments, temperature extremes, and confined spaces. They provide unsurpassed flexibility, while simultaneously providing superior durability and the ability to operate in extreme environments. This section covers the many technical reasons why Cicoil flat cables are The Clear Choice™ for the most demanding applications.

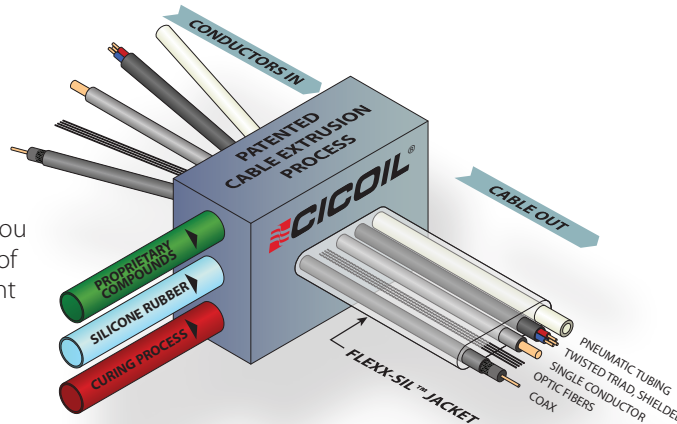
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Patented Extrusion Process

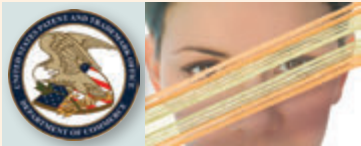
The exclusive, patented Cicoil extrusion process produces flat cables in continuous lengths. Cicoil's process combines multiple elements into a single flat cable, including:

- Single Conductor
- Shielded Conductors
- Tubing
- Cat 5e
- Camera Link™
- Fiber Optics
- Coax and Twinax

This capability can save you space and reduce much of complexity of your current cabling requirements.



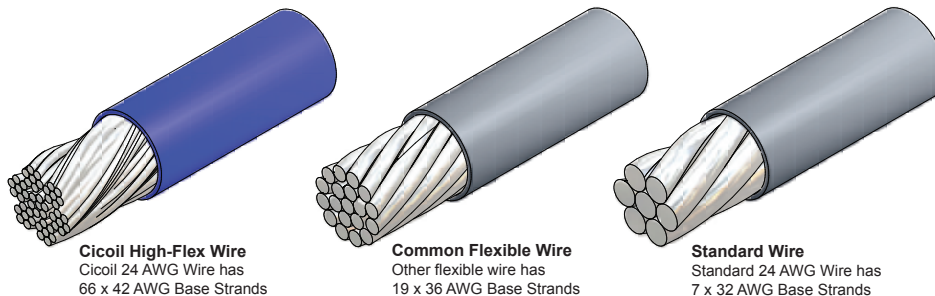
Cicoil Patented Technologies



Cicoil invented the highest performance, most versatile flat cables on the planet, and we are extremely proud to have received numerous US and worldwide patents for our unique technologies and products. Cicoil's ongoing innovations enable us to design and manufacture high performance cables that exceed the demands of our customers' toughest applications.

The Key to Superior Flexibility: Finer Base Strands

Most industrial wire is made up of multiple wire strands, called 'base strands', rather than being made of a solid piece of metal. Multiple strands make the wire more flexible, allowing it to bend and flex more easily than solid metal.



The finer the base strand, the more flexible the wire. As shown above, standard 24 AWG wire has 7 base strands, 'flexible' wire has 19 base strands, while Cicoil High-Flex wire has 66 base strands. All Cicoil wire has base stranding of 40 AWG minimum, versus 36 AWG and larger in other 'flexible' wires. **Cicoil wire conductors have 2x to 3x more base strands than competitive 'flexible' wire.** This makes Cicoil wire extremely flexible, as wires with smaller base stranding will have a much smaller bend radius than wires with larger stranding. In addition, finer stranded wire has significantly longer life in flexing applications, as bending stresses are distributed across many more wires strands, thereby dissipating the strain on the overall wire conductor.

Cicoil flat cables only use High-Flex, finely stranded wires, which are the most flexible wires available. The combination of our high-flex wire and the ultimate flexibility of our Flex-Sil™ insulation make Cicoil flat cables the most flexible flat cable you can buy.

When you need the ultimate in flexibility, you need Cicoil.

Top 10 Reasons to

1. Reliability

The simplicity of flat cable with its parallel conductor geometry eliminates many of the common sources of wiring error and malfunction. Registration of the conductors is one-to-one with the terminating connector or board so that proper contact assignment is almost automatic.

2. Weight Reduction

The use of flat cable often eliminates much of the conventional wire weight. Such things as redundant insulating materials, fillers and tapes are not required. In addition, the composite flat cable construction is so mechanically strong that it is not necessary to have large conductors for strength. The copper cross-section can thus be reduced to what's required to carry the current load or to satisfy voltage drop requirements.

3. Space Efficiency

Eliminating unnecessary insulating, fillers and tapes reduces the bulk and physical volume of flat cables. In addition, their low profile enables them to hug surfaces and take advantage of tight, or normally-unused space. A rectangular cross-section allows flat cables to stack, or layer, with almost no wasted dead space between cables, providing maximum conductor density for a given volume.

4. Flexibility

Flat cable is extremely flexible when bent in the plane of its thin cross-section. This flexibility has been utilized in applications where continuous or high flexing is necessary, e.g. drawers, doors, rotating arms, etc.

5. Greater Strength

Strength is enhanced by the fact that all conductors and insulation equally share tensile loads.

Flat Cables VS Round Cables

Use Flat Cables

6. Consistent Electrical Characteristics

Because the conductor spacing is fixed and the geometry of the cable is constant, the electrical characteristics, such as impedance, capacitance, inductance, time delay, crosstalk and attenuation, are consistent.

7. Greater Current Carrying Capacity

Flat cables have greater surface-to-volume ratio than their round cable counterparts, consequently having higher efficiency in dissipating heat. This allows a higher current level for a given temperature rise and conductor cross-section.

8. Reduced Skewing Effects

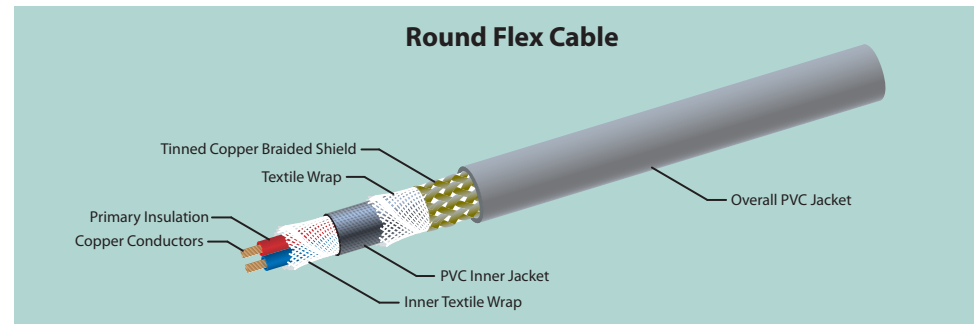
Due to the conductors having the exact physical and electrical length, along with a continuous and consistent dielectric, time delays between signals within a given flat cable are minimized.

9. High-Density Interconnections

The cabling density achievable using flat cable is superior to that using conventional cable because of the high wire-to-cable cross-sectional density. Layers of flat cable are more effectively packed for higher conductor density than round cable.

10. Ease of Handling

Flat cable folds and bends readily, conforms to the mounting area, fastens easily with clamps, adhesive, or double-faced tape, and eliminated the installation and lacing difficulties associated with round wire cabling. Visible conductor in a fixed position within the dielectric simplify coding, inspection and circuit tracing.



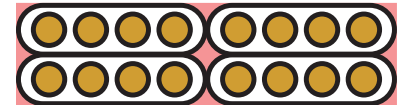
Cicoil flat cables have many advantages over round flex cables. Round cables feature insulated wires in a bundle which is surrounded by several layers of other material. The bundle is usually wrapped in either a textile material or a polymer chosen to minimize frictional heating as the cable moves. A PVC jacket surrounds these layers. In shielded cables, there is an additional set of layers consisting of another low-friction wrap, braided copper, and an overall jacket of PVC or other material selected for abrasion resistance. A problem with this construction is its use of multiple layers of insulation and special low-friction materials necessary to reduce the friction that arises as cables go through numerous cycles of repetitive motion.

Cicoil's Flat Cables make more efficient use of insulating material. It needs no low-friction tapes and fillers because conductors don't move within the Flexx-Sil™ material that forms the outer jacket. And when bent in the plane of its thin cross section, Cicoil Flat Cables have inherently more flexibility than round cable. The flat form factor of Cicoil cables also provides better heat dissipation than round cables because there is more surface area for a given volume. The larger surface area lets flat cables carry a higher current level for a given temperature rise and for conductors of a given cross section. Conductors in flat cable also have a fixed geometry that makes for consistent and non-varying electrical qualities. The spacing of conductors in the extruded Flexx-Sil™ jacketing never changes as the cable moves. Thus cable impedance, inductance, capacitance, time delay, crosstalk, and attenuation all remain constant. Similarly, the conductors in the cable all have the same physical and electrical length. This, coupled with the fact that the dielectric dimensions stay constant, means that signal skewing and differential time delays between signals in the cable stay at a minimum.

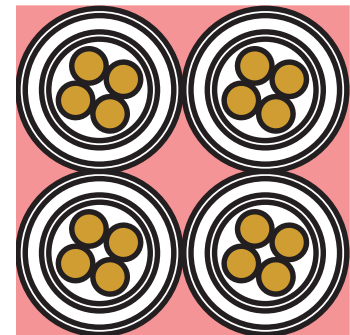
Cicoil flat cables form an inherently high-density interconnect system. Packing density of flat cable is higher than is possible with round cables. The fact that conductors can be visible in the clear Flexx-Sil™ extrusion simplifies coding, inspection, and tracing circuits for trouble shooting.

Flat Cables for Efficient Packaging

Cicoil Flat Cable



Common Round Cable



Using Cicoil Flat Cable vs Round Cable allows an equivalent number of conductors in a much smaller space. When compactness is one of the attributes you are striving for, Cicoil Flat Cable is your best option.

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 -65°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 Clean Room 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	-65 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

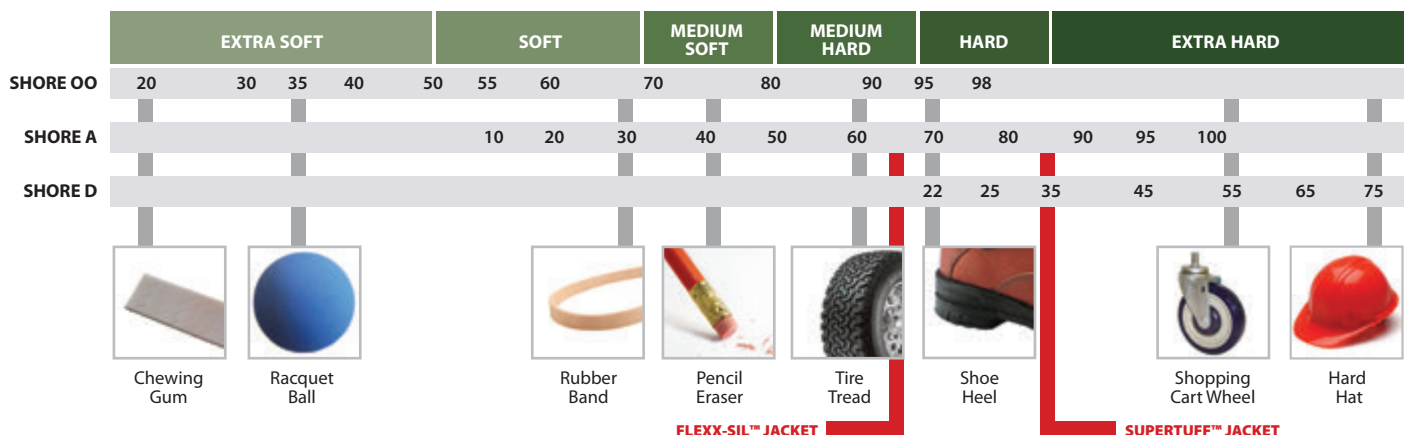
Chemical Resistance

For more information visit: <http://www.cicoil.com/PDF/chemc2.pdf> (11 page document)

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 Clean Room Cables

Cicoil cables are suitable for use in class 1 to 100,000 clean room 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

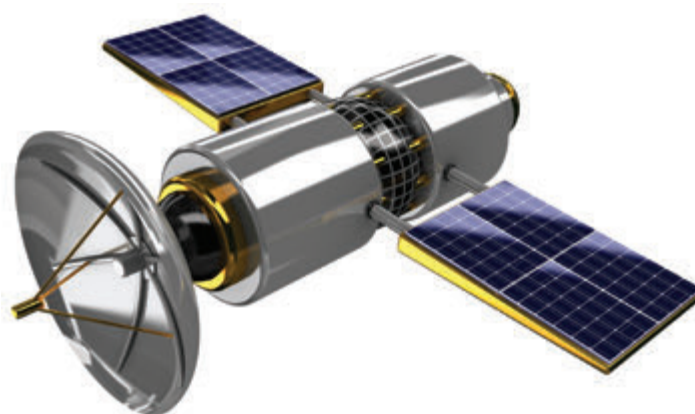
Other Ratings:

NASA Outgassing Specification: Spec 1124

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

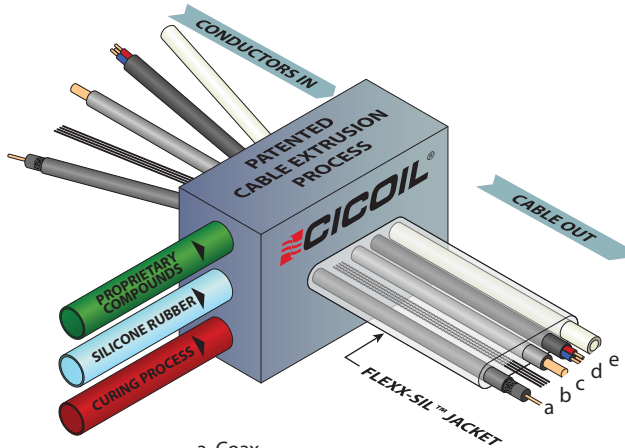
Notes:

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



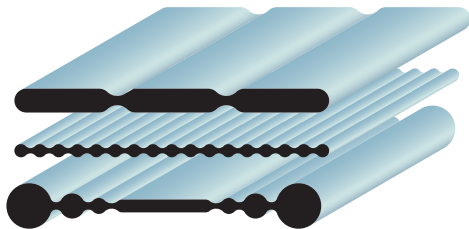
Extruded Flat Cables VS PTFE Flat Cables

Extruded Flat Cables



- a. Coax
- b. Optic Fibers
- c. Single Conductor
- d. Twisted Triad, Shielded
- e. Gas or Liquid Tubing

- Extruded in continuous lengths
- Automated, climate controlled process
- Easy setup of wide variety of cables
- Flexx-Sil™ jacket has complete integrity, totally surrounding the cable elements in a durable one-piece construction

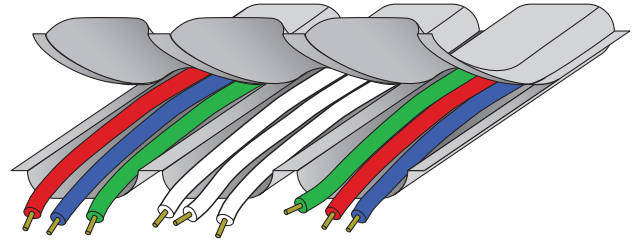


- Cable shape customizable and infinitely repeatable

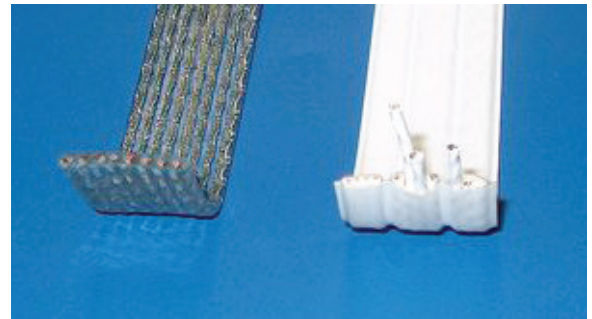


- -65°C to +260°C (-85°F to +500°F). Our flat cable temperature capability exceeds even specialized PTFE jacketed cables.

PTFE Flat Cables



1. **2-Piece Construction:** Two PTFE shell halves are bonded together to produce the flat cable jacket for the enclosed wires.



2. **Loose Wires:** Wires are loose inside the two-piece cable jackets, rubbing against each during flexing cycles, and requiring clamping devices to hold in place.



3. **High Stiffness:** PTFE jacketing is fairly stiff, resulting in less flexibility and higher bend radiuses than highly flexible Flexx-Sil™ jacketing. Image above shows the greater natural flexibility of Cicoil extruded flat cable.

4. **Limited Variation.** Manufacturing process to produce two-piece PTFE flat cables results in a limited number of variations, and limited cable widths and lengths.

VS

Extruded Flat Cables	STRENGTH & PERFORMANCE		PTFE Flat Cables
Cable is solid, one-piece construction, due to the continuous extrusion process.	VS		Two-piece construction is an inherent weakness, as cable bonding is more likely to separate during operation, flexing, or under exposure to heat, cold, and/or chemicals.
Each element in Cicoil cables are completely surrounded by a Flexx-Sil™ jacket, ensuring that they do not rub against each other and wear during operation.	VS		Conductors are loose inside the cable halves, which can lead to premature wear as they rub together during operation.
Cicoil Flexx-Sil™ material is naturally much more flexible than PTFE, allowing tighter bend radiuses and longer flex life.	VS		PTFE is stiff, requiring larger bend radiuses, which takes up more space and limits flex life.
Cicoil flat cables handle extreme heat and cold.	VS		PTFE cables burn and melt under exposure to fire, and become very stiff and crack in extremely cold temperatures.
Flexx-Sil™ is 'self-healing' from small punctures, and cable damage can easily be repaired in the field.	VS		Any damage to PTFE shell can't be repaired, necessitating a new replacement cable.

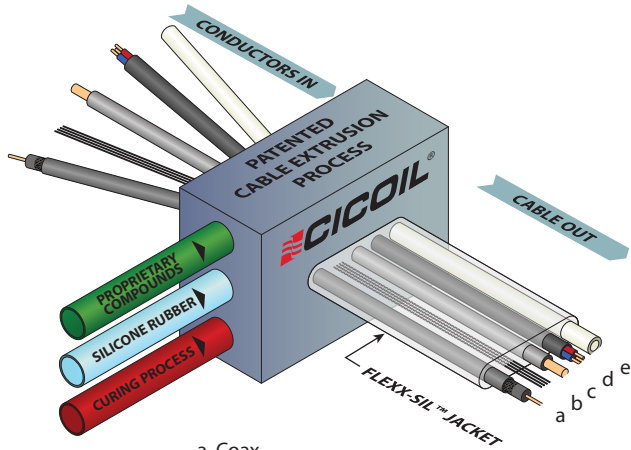
Extruded Flat Cables	VERSATILITY & COST		PTFE Flat Cables
Virtually any outside cable profile can be created, exactly as the application requires.	VS		Pre-formed PTFE shells limit the cable profile and design.
Wide variety of wire conductors, tubing, mounting strip, even fiber optics can be easily incorporated into the cable.	VS		Existing cable shells limit the variety of conductors, and range of sizes, that can be incorporated into a single cable.
Cable conductors are completely surrounded by the Flexx-Sil™ jacket, requiring limited clamping.	VS		Loose wires require extensive clamping, adding weight, inertia, and cost to overall cable.
Quickly and easily make new cables, virtually unlimited in width and length. New cables require only 100 foot minimum, and a small tooling cost.	VS		Existing cable shells limit cable width and length. For new cable designs, there are often high minimums and/or tooling costs.

Summary

The results are clear: Cicoil's extrusion technology is the modern, automated way to produce high quality flat cables. PTFE flat cables are limited in reliability and performance, while often resulting in higher design and equipment costs.

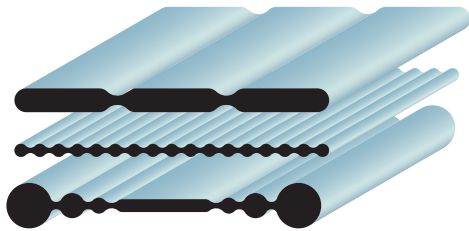
Extruded Flat Cables VS Molded Flat Cables

Extruded Flat Cables



- a. Coax
- b. Optic Fibers
- c. Single Conductor
- d. Twisted Triad, Shielded
- e. Gas or Liquid Tubing

- Extruded in continuous lengths
- Automated, climate controlled process
- Easy setup of wide variety of cable and tubing
- Flexx-Sil™ cable jacket is produced with complete integrity and without any breaches through the encapsulation



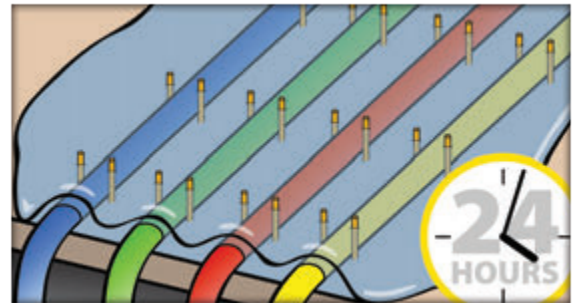
- Cable shape customizable and infinitely repeatable

VS

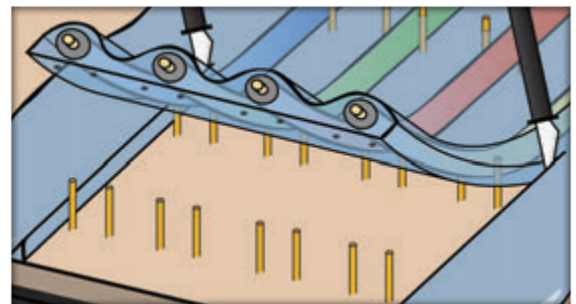
Molded Flat Cables



1. Wires are stretched between pins in a mold, and then liquid silicone plus additives are poured over the wires.



2. Multiple pours are needed to get proper thickness, and the molded cable takes 24-48 hours to fully cure.



3. The cured cable is cut out of the mold, leaving sharp edges and multiple holes.



4. The holes are filled in by hand, and the cable needs to be cured again.

Extruded Flat Cables	QUALITY	Molded Flat Cables
Cable thickness precisely controlled to within .005", and conductor spacing accuracy to within .002".	VS	Large variation in thickness, and inaccurate conductor spacing. Gravity causes molded cables to be thicker at the bottom, and thinner at the top. Thickness will vary throughout the length of the cable.
Computer-controlled extrusion process means entire cable exactly the same.	VS	Manual pouring and curing method means each cable will be unique, and there will be large variations among different cable batches.
Continuous cable lengths, as long as needed	VS	Limited by physical mold, usually no longer than 6 feet
Extruded cable cured continuously, with no debris or material contamination.	VS	Molded cables take many hours to fully cure. While curing, the gooey cable will collect dust, metal chips, and other airborne debris.

Extruded Flat Cables	STRENGTH & RELIABILITY	Molded Flat Cables
Cable is solid, one-piece construction, due to the continuous extrusion process.	VS	'Bed of Nails' in tool leaves many holes in cable when pulled from the mold. These holes are then filled by hand, and the cable is cured again, resulting in a weaker cable construction.
Cicoil cables have rounded radiuses on each end, making them stronger and also more flexible.	VS	Molded cables are cut from the mold with Exacto blades, resulting in sharp, square edges. This greatly lessens the strength and the flexibility of the cable.

Extruded Flat Cables	VERSATILITY & COST	Molded Flat Cables
Virtually any outside cable profile can be created, exactly as the application requires.	VS	Manual pouring process does not allow complex or variations in profile, as the molding material will conform to the shape of the conductors.
Wide variety of wire conductors, tubing, mounting strip, even fiber optics can be easily incorporated into the cable.	VS	Conductor variation is limited, and tubing, fiber optics, etc., are not available.
Quickly and easily make new cables, only \$250 tooling cost.	VS	Expensive tooling for new cables, with long lead times.

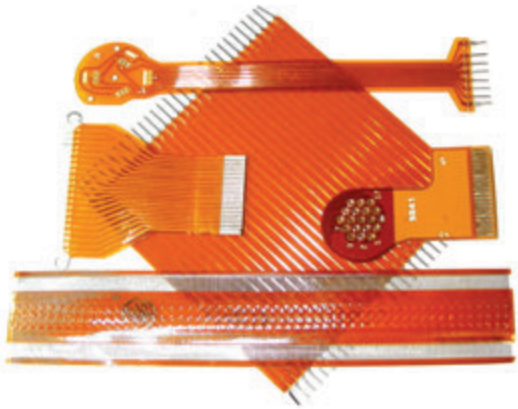
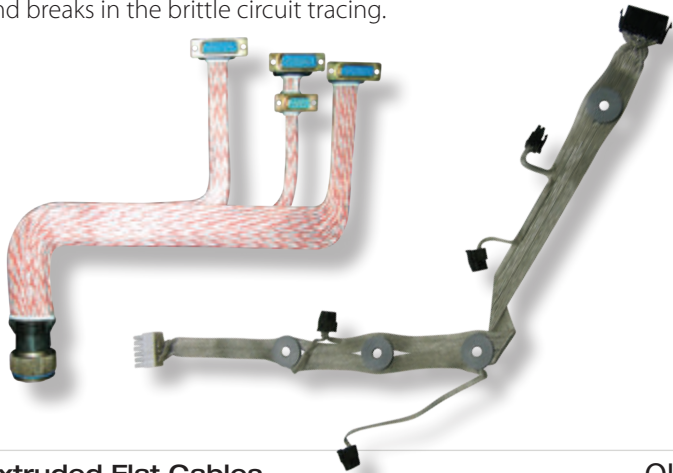
Summary

The results are clear: Cicoil's extrusion technology is the modern, automated way to produce high quality flat cables. The old fashioned method of hand pouring liquid to make molded cables is inefficient, inconsistent, and results in a lower quality flat cable.

Flat Cables VS Flex Circuits

Flex circuits have some useful properties; however, many designers try to make use of them beyond the limits of the flex circuit's capability. The reality is that despite the name, flex circuits have limited flexing capability. Over flexing and stress can cause cracks and breaks in the brittle circuit tracing.

When failure is not an option, Cicoil flat cable provides true flexibility and tremendous resilience to shock and vibration. And our flat cables are available in miniature configurations, with wires as small as 44 AWG.



Extruded Flat Cables	QUALITY	Flex Circuits
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Each wire can have its own shield.	VS	Shielding attained by using adjacent conductors or flat shield planes above and below the circuit trace layer; results in larger and stiffer assemblies.
High strand count, high flexibility and flex life. Can be withstand >10 million+ flex cycles	VS	Have solid, flat conductors and flex life below a million cycles.

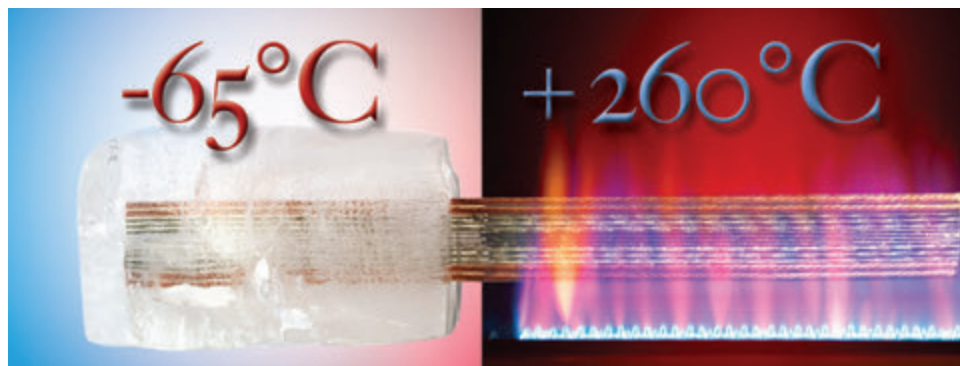
Extruded Flat Cables	STRENGTH & RELIABILITY	Flex Circuits
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CICOIL flat cable is durable and will withstand severe impact and rough handling.	VS	Flex circuits are very ridged and susceptible to micro- cracks and failure in severe vibration applications
CICOIL flat cable is durable and will withstand severe impact and rough handling.	VS	Flex circuits are more fragile. They can be easily dented, bent and damaged from minor impact or improper handling.

Extruded Flat Cables	VERSATILITY & COST	Flex Circuits
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Can include twinax, coax, digital communications, power and twisted pair wires. Pneumatics and fiber optics can also be included.	VS	Single conductors only (typical).
Can be formed to custom fit in equipment to aid installation to make installation a quick task.	VS	Can be shaped to fit the installation path. This eases assembly and maximizes real estate use.
Inexpensive custom cable tooling of \$250. Tooling is made in-house in less than a day.	VS	Large initial tooling costs. Once made, tooling is expensive to change or new tooling may be required.
Short lead time of 1- 2 weeks using wire from our large inventory.	VS	Long lead times are typical and flex circuits does not lend itself to rapid prototyping.
Cable is produced in continuous lengths (bulk) that can be cut to suit various applications.	VS	Flex circuits are individually made and the size is fixed according to the tooling.
Flat cable can be installed in tight spaces where equivalent round cable won't fit.	VS	Flex circuits can be used in small spaces where equivalent round cable won't fit.

Handling Harsh Environments



Harsh Environment Cables: Cicoil's patented extrusion process is at the heart of manufacturing extreme environment cables that retain electrical properties and flexibility over a long life.

High Temperature Cables: Temperature to +260°C (+500°F). Cicoil flat cable exceeds the high temperature capability of typical PVC jacketed cables and even specialized PTFE jacketed cables.

Low Temperature Cables: Temperature to: -65°C (-85°F). Cicoil flat cable exceeds the low temperature capability of typical PVC jacketed cables and even specialized PTFE jacketed cables.

Ultraviolet Resistant Cables: Our Flexx-Sil™ formulation enables ultraviolet resistant cables that withstand exposure to high levels of radiation and ozone with no adverse effects. Cicoil cables will perform well even after 50+ years in direct sunlight.

Waterproof Cables: Cicoil Flexx-Sil™ cable jacketing produces waterproof cables and flat cable assembly products. Silicone enjoys inherent water repelling characteristics and produces superior water resistant cables. Cicoil waterproof cables are impervious to immersion, high humidity, fungus,

and damp operating environments, making our cables ideal for washdown, autoclave, and other wet applications.

Low Humidity Cables: Neither extremely dry conditions nor low humidity will adversely affect either the flexibility or life of the Flexx-Sil™ jacketing on Cicoil flat cables and cable assemblies in any way.

Saltwater Cables: Cicoil Flexx-Sil™ jacketed flat cables suffer no degradation from the corrosive effects of salt spray or seawater exposure, meeting all applicable specifications for shipboard use and marine environments.

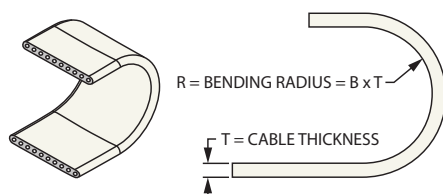
Cleanroom Cables: Cicoil flexible flat cable is non-particulating, and is suitable for Class 1 clean room and vacuum environments.

Chemical Resistant Cables: Cicoil's patented extrusion process produces chemical resistant cable, acid resistant cables, alcohol resistant cables and de-ionized water resistant cables.

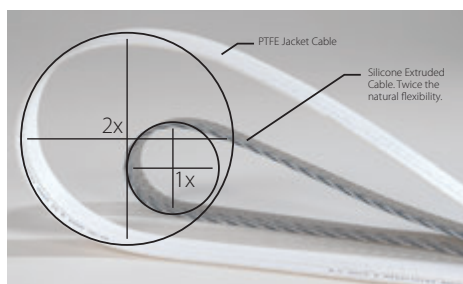
Bend Radius and Life Cycles

Specifying cable in applications characterized by repeated motion should allow for two key qualities: *allowable bend radius* and *life cycles under constant flexing*.

The bend radius of Cicoil Flat cable, like that of any flat cable, depends on the gauge of the wire and type of conductors used in the cable. In general, the finer the gauge of the conductors, the smaller the allowable bend radius. To calculate the bend radius of Cicoil flat cable, simply multiply the cable thickness by a factor 4-6x.



Most industrial automation equipment today operates 24/7, often with robotic elements that execute rigorous motions repeatedly, sometimes thousands of times a day. These applications stress the electrical cabling. Standard cabling will not last in these applications, as the cables are not designed to flex continuously.



Functionally comparable flat cables using PTFE jackets have a bend radius more than twice as large as Cicoil flat cables. Fitting in a more compact space, Cicoil flat cables serve in uses that may not be suitable for PTFE cables.

Flat cables are best for continuous flexing. Their wire conductors can individually flex in a single plane, which provides optimum flex life.

Under continuous flexing, conductors containing multiple strands of fine-gauge wire will last the longest. Wire in Cicoil cables are typically composed of 40 AWG wire (or even finer gauge). The finer-gauge base wire exhibits less coldworking under constant flexing. And minimal cold-working enables Cicoil cables to last through **tens of millions of flexing cycles**.

Quality



Cicoil's Quality System is ISO 9001 certified, to the rigorous AS9100 Aerospace standard. Our average customer quality rating is 99.98%, and our quality system received an extremely high 96.4% score during a recent AS9100 quality audit.

Each and every cable assembly is 100% tested for electrical performance and physical dimensions before shipment to a customer. Our new, automated cable testing equipment is capable

of inspecting 2,000 point-to-point connections, as well as hi-pot, resistance, and other electrical tests. Sophisticated SPC software

allows rigorous six-sigma and Pareto analysis, for continuous improvement of our processes and products.

Certificates of compliance, including actual test data, are available upon request. We retain all inspection and quality records for at least ten years, so customers can be confident that the products they receive meet every specification and quality standard required, and that we have documentation to back it up.

Almost every aircraft flying today uses Cicoil cables, in mission-critical flight control and instrumentation functions. For over fifty years, Cicoil cables have performed flawlessly in thousands of flight, aerospace, space, medical and industrial applications. Mission-critical equipment, and often human life, depends on the quality of Cicoil cables, and each and every person at Cicoil is justly proud of our flawless quality record.

Cicoil cables exceed the most stringent regulatory requirements. Approvals from laboratories such as UL and compliance to worldwide standards including FAA, CE, CSA, RoHS, REACH, and others demonstrates the superiority of Cicoil technologies.



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.



Current Rating Guide for Wire

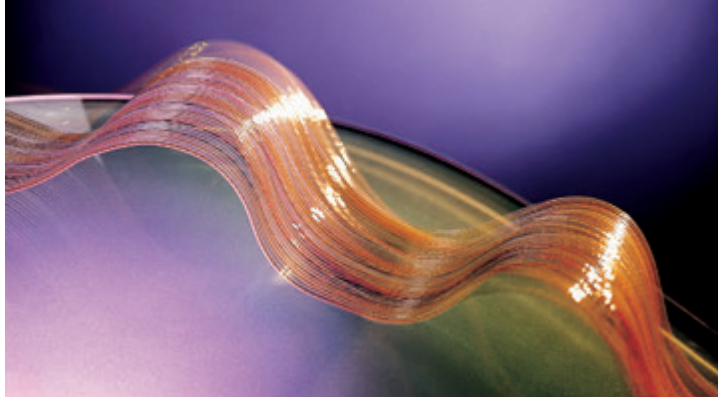
Please see the current rating guide below. You may use this guide to obtain estimated current ratings for wire.

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
0000	0.46	11.684	0.049	0.16072	380
000	0.4096	10.40384	0.0618	0.202704	328
00	0.3648	9.26592	0.0779	0.255512	283
0	0.3249	8.25246	0.0983	0.322424	245
1	0.2893	7.34822	0.1239	0.406392	211
2	0.2576	6.54304	0.1563	0.512664	181
3	0.2294	5.82676	0.197	0.64616	158
4	0.2043	5.18922	0.2485	0.81508	135
5	0.1819	4.62026	0.3133	1.027624	118
6	0.162	4.1148	0.3951	1.295928	101
7	0.1443	3.66522	0.4982	1.634096	89
8	0.1285	3.2639	0.6282	2.060496	73
9	0.1144	2.90576	0.7921	2.598088	64
10	0.1019	2.58826	0.9989	3.276392	55
11	0.0907	2.30378	1.26	4.1328	47
12	0.0808	2.05232	1.588	5.20864	41
13	0.072	1.8288	2.003	6.56984	35
14	0.0641	1.62814	2.525	8.282	32
15	0.0571	1.45034	3.184	10.44352	28
16	0.0508	1.29032	4.016	13.17248	22
17	0.0453	1.15062	5.064	16.60992	19
18	0.0403	1.02362	6.385	20.9428	16
19	0.0359	0.91186	8.051	26.40728	14
20	0.032	0.8128	10.15	33.292	11
21	0.0285	0.7239	12.8	41.984	9
22	0.0254	0.64516	16.14	52.9392	7
23	0.0226	0.57404	20.36	66.7808	4.7
24	0.0201	0.51054	25.67	84.1976	3.5
25	0.0179	0.45466	32.37	106.1736	2.7
26	0.0159	0.40386	40.81	133.8568	2.2
27	0.0142	0.36068	51.47	168.8216	1.7
28	0.0126	0.32004	64.9	212.872	1.4
29	0.0113	0.28702	81.83	268.4024	1.2
30	0.01	0.254	103.2	338.496	0.86
31	0.0089	0.22606	130.1	426.728	0.7
32	0.008	0.2032	164.1	538.248	0.53
Metric 2.0	0.00787	0.200	169.39	555.61	0.51
33	0.0071	0.18034	206.9	678.632	0.43
Metric 1.8	0.00709	0.180	207.5	680.55	0.43
34	0.0063	0.16002	260.9	855.752	0.33
Metric 1.6	0.0063	0.16002	260.9	855.752	0.33
35	0.0056	0.14224	329	1079.12	0.27
Metric 1.4	.00551	.140	339	1114	0.26
36	0.005	0.127	414.8	1360	0.21
Metric 1.25	.00492	0.125	428.2	1404	0.20
37	0.0045	0.1143	523.1	1715	0.17
Metric 1.12	.00441	0.112	533.8	1750	0.163
38	0.004	0.1016	659.6	2163	0.13
Metric 1	.00394	0.1000	670.2	2198	0.126
39	0.0035	0.0889	831.8	2728	0.11
40	0.0031	0.07874	1049	3440	0.09

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

Design Your Own Flat Cable in Just Minutes! Over 200 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!

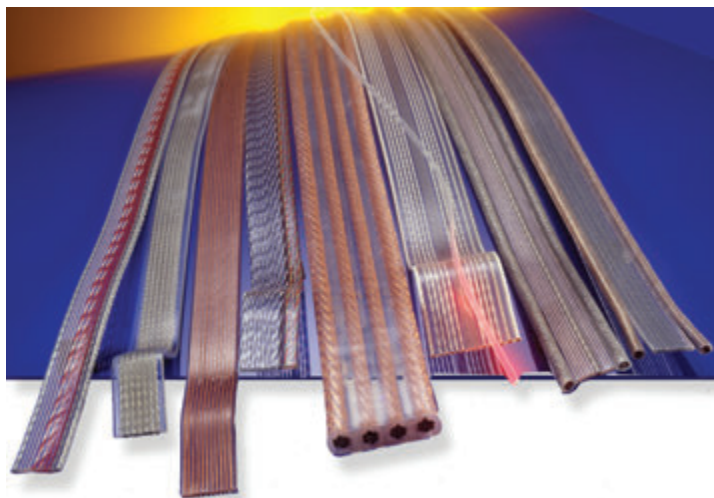
Your custom cable is manufactured and shipped within two weeks of your order.



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:

<http://www.cicoil.com/cables/configurator.asp>



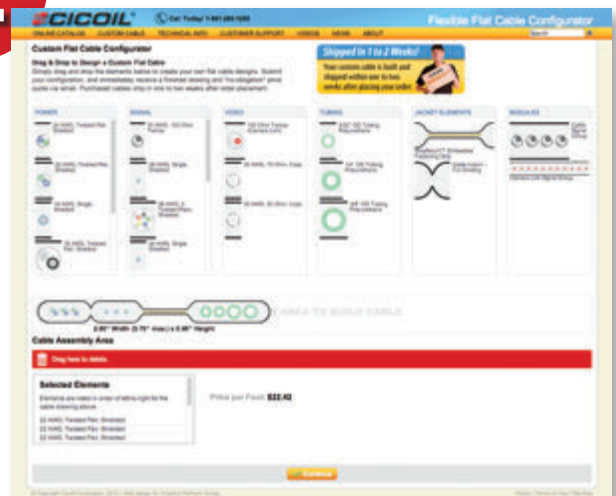
1

Drag & Drop From Menu of Choices



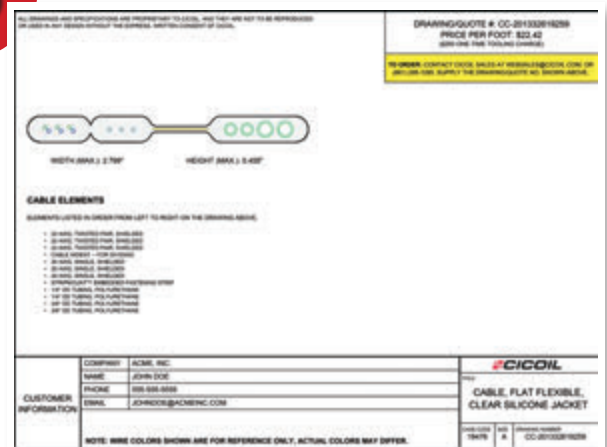
2

See Your Cable Built in Real Time

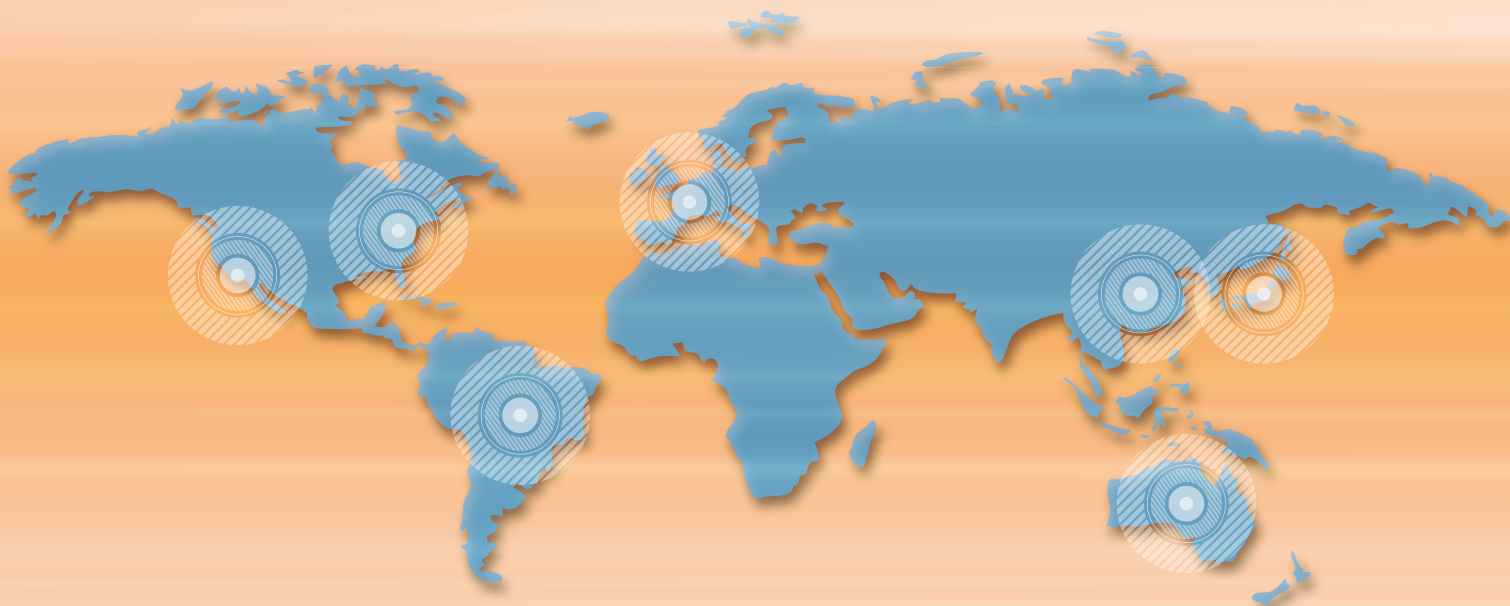


3

Get a Drawing with Pricing



Worldwide Availability, Sales and Support



Cicoil Flat Cable and Cable Assemblies are available worldwide through a network of sales offices, representatives and distributors.

World Headquarters

Cicoil

24960 Avenue Tibbitts
Valencia, CA 91355

Contact us directly for Quotes,
Sales and Support.

Phone: **1-661-295-1295**

Email: **flatcable@cicoil.com**

Website: **www.cicoil.com**

Reps | Distributors

To find your local Cicoil Rep or
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1-661-295-1295

Or look up on our website:

www.cicoil.com

Technical Support

Find detailed technical documentation,
How-To videos, and much more at:

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Or call:

1-661-295-1295

Cicoil Products Also Available Through:



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1-800-344-4539

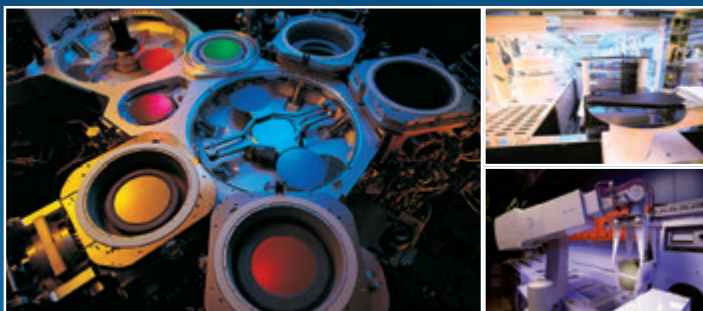
Cicoil has been the leader in high performance flat cable technology for over fifty years. Our cables are used in thousands of demanding applications, in a multitude of industries. Whenever high performance flat cables are needed, Cicoil is The Clear Choice.

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



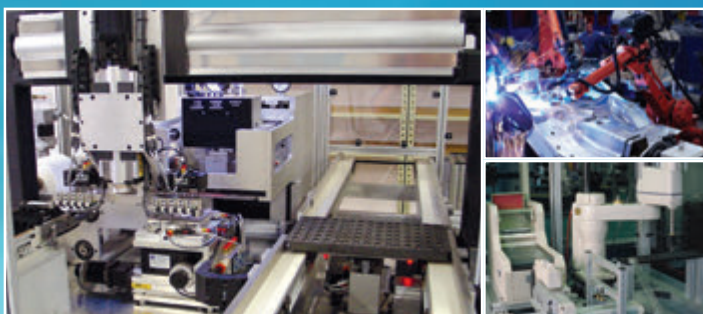
Cicoil Flexx-Sil™ Cables and Cable Assemblies have been used by most major semiconductor equipment manufacturers, in some of the most demanding applications in the industry. Wafer robots, deposition equipment, cleaning robots, and wafer inspection are some of the applications that use Cicoil cables.

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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