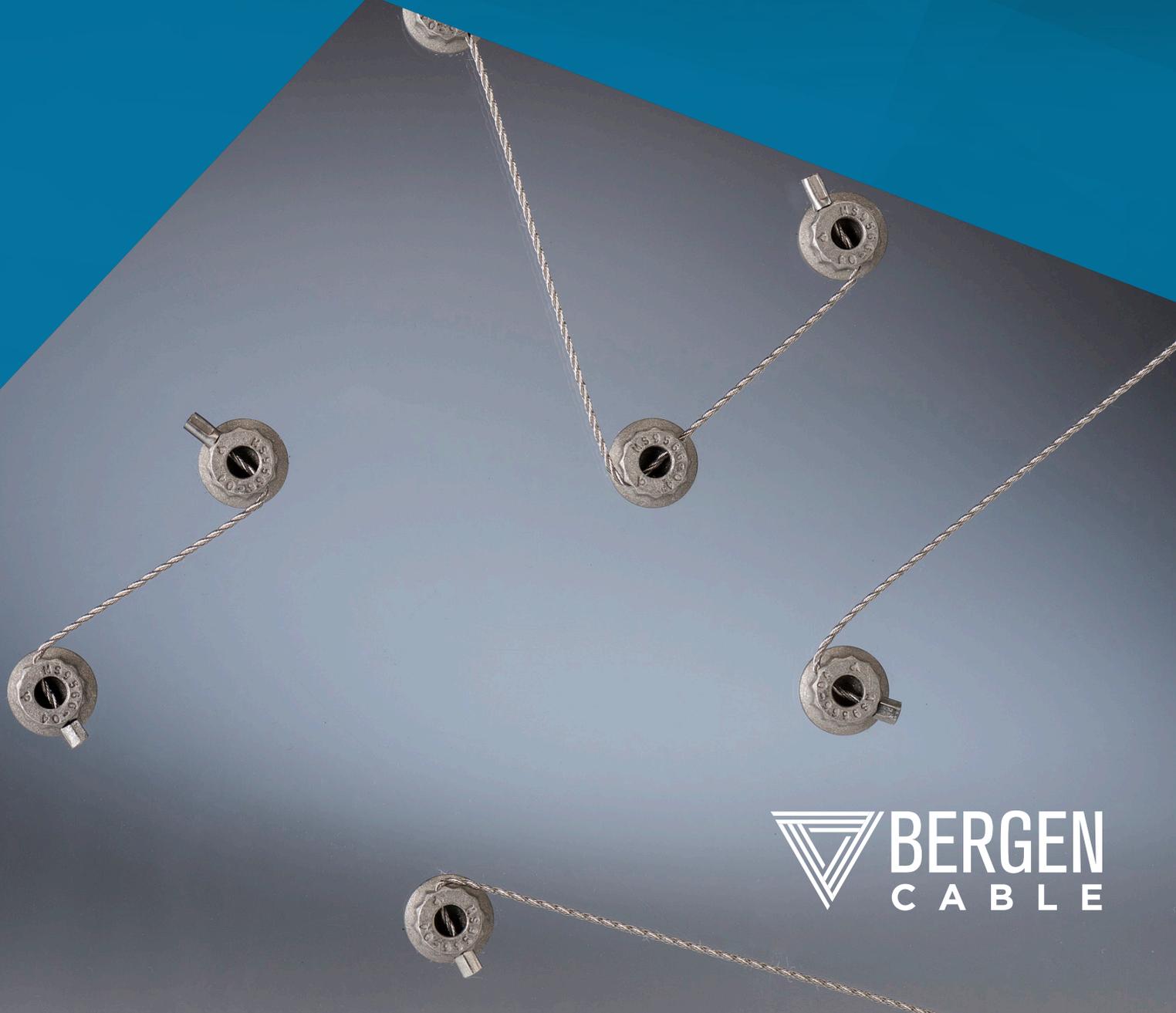


THE BERGEN

Safety Cable™ System

*The Most Advanced Concept in Fastening Technology is now
the World Standard for Fastener Retention.*



 **BERGEN**
CABLE

HOW TO USE THE SYSTEM



The Safety Cable™ Terminator Tool

The unique tensioning/crimping Terminator Tool tensions the cable, crimps the ferrule on the cable, and cuts the cable flush with the ferrule. This tool utilizes the best principles of ergonomic design, user-friendly features, and improved operational durability. It is so user friendly that an entry level technician can learn the Safety Cable installation method in less than 30 minutes.

The short length of this tool allows the user to get into tight places where access is restricted. The ergonomic design comfortably fits the operator's hand. The robust construction and the precise dimensional quality of the tool provide the reliability and repeatability that you are looking for. The tool nose can be rotated 360° for the optimum position of each Safety Cable™ installation while allowing the tool to stay in a comfortable ergonomic position.

The tension setting on the Safety Cable™ Terminator Tool is fully adjustable by the user. The cable tension can easily be increased or lessened by turning an adjustment screw in the tension wheel assembly.

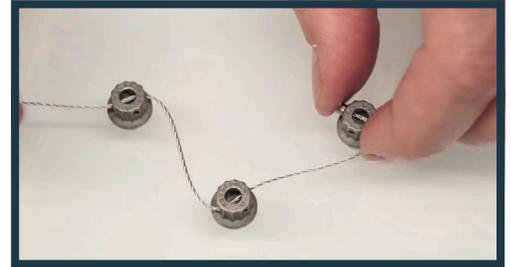
This series of ergonomic Terminator Tools will enhance the efficiency and cost savings that can be realized from the use of Bergen Safety Cable™ System as an alternative to lockwire.

The Safety Cable™ Terminator Tools are available in three cable diameter configurations: a tool .022" diameter cable, one for .032" diameter cable, and one for .040" diameter cable. A specific tool is required to apply each diameter cable. If you are installing different diameters of cable, you will need multiple tools. All tools are available with a 3", 5" or 7" inch nose.

TOOL TYPE	TOOL PART NUMBER	CABLE DIAMETER	NOSE LENGTH
.022" Tools	BM203	.022"	3"
	BM205	.022"	5"
	BM207	.022"	7"
.032" Tools	BM323	.032"	3"
	BM325	.032"	5"
	BM327	.032"	7"
.040" Tools	BM403	.040"	3"
	BM405	.040"	5"
	BM407	.040"	7"

Terminator Tool (PKG 1 per Box)

STEP 1 Install Cable



STEP 2 Apply Ferrule



STEP 3 Tension Cable



STEP 4 Crimp & Cut



Get a Step-By-Step Video at BergenCable.com

From Aerospace OEMs to Overhaul and Repair

Safety Cable Improves Safety While Reducing Costly Installation and Removal Time

Loose fasteners on aircraft engines have provided engineers with a challenge since the very beginnings of flight. They not only jeopardize the parts they secure but can fall into the wrong part of the engine. Yet lockwiring fasteners is a time consuming and troublesome process.

Safety Cable™ was developed in 1987 by Bergen Cable Technology in conjunction with GE Aircraft Engines and has replaced what was once one of the most troublesome, time-consuming and error-prone of all manufacturing and repair processes—lockwiring of fasteners—and replaced it with a simple two-step procedure. It is the safest, most cost effective, easiest to install fastener retention system available.

The system consists of Bergen Cable Technology cable, ferrules and a patented, all in one tensioning, crimping and cutting tool. It permits manufacture and repair in half the time* required for lockwire, reduces rework and inspection while eliminating installation hazards through removal of any sharp edges that can injure operators or tear protective clothing.

After a cable is threaded through the fasteners and a loose ferrule inserted, the crimping tool tensions the assembly, crimps the loose ferrule and cuts the excess cable flush to the ferrule—all in one smooth motion.

The entire system is so user friendly that entry-level technicians can learn the Safety Cable™ installation method in less than thirty minutes—and be ready to competently and efficiently secure fasteners on even the most complex, hard to reach components.

Today, Bergen's Safety Cable™ System is saving countless hours in aerospace manufacturing for companies such as General Electric Aircraft Engines, Boeing, Pratt and Whitney, Rolls Royce, and Woodward Governor.



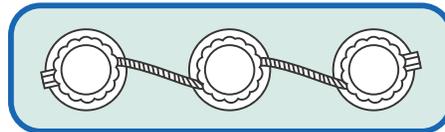
DRAMATIC TIME SAVINGS IN INSTALLATION AND REMOVAL— WITH A BETTER FINISHED PRODUCT

The best way to appreciate the dramatic improvement in installation efficiency made possible by the Safety Cable™ System is to compare it with installing fasteners the old fashioned way with lockwire.



BEFORE SAFETY CABLE™

Lockwiring just two fasteners required threading a single strand of wire through the fastener holes, manually doubling it over and twisting it with a pair of pliers—all while maintaining a positive pull and allowing for sufficient flex. To compound these installation difficulties, operators needed to determine which direction the twist should go from one fastener to the next to assure that the wire would not slip up and over the bolt-head or leave a gap at the beginning of the twist. In addition, "pigtailed" required no less than four twists. The procedure was repeated until—finally—excess wire was cut off and the end twisted under to prevent snagging. One mistake and the entire, time-consuming process had to be repeated.



AFTER SAFETY CABLE™

This inefficient, error-prone process of lockwire ended with the advent of Safety Cable™. Today, operators simply install cable through fasteners in a neutral or positive position, insert a loose ferrule onto the cable, string the end of the cable through a special Bergen tool and tension the assembly to the preset load. The tool crimps the ferrule and cuts the cable flush to the ferrule in one smooth motion.

Bergen's innovative Safety Cable™ System provides international and domestic OEM and aftermarket customers in aerospace, government, military, shipbuilding, power generation,

electronics, drilling systems and pipelines with a new level of safety and quality assurance—with a fastener retention system that saves time and money while assuring a better finished product.

*Tests on engines at GE Aircraft Engine facilities demonstrate that the use of Safety Cable™ results in a 50% reduction in installation time with consistently superior quality and lower assembly costs.

APPROVALS AND LISTINGS

FAA

Defined for use in aircraft by FAR 43.13(a). Classified as a standard part under FAR 21.303(b)(4). Major engine and airframe manufacturers publish and maintain FAA approved 70-XX-XX series standard documents.

SAE

Approved for procurement and installation under AS567, AS4536, AS3509, AS3510, AS3511 and AS3655.

NASA

Approved for use by document number CR-4473.

Military

Meets all requirements of MIL-STD-763 and various service branch technical manuals. Meets all requirements of NASM33540. Meets performance and material specifications of NASM20995.

NSN

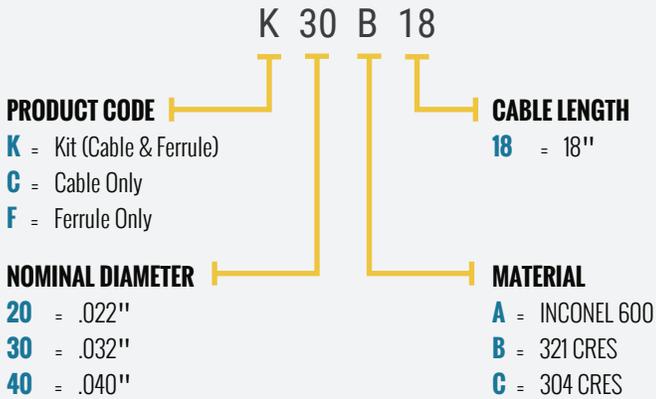
National stock numbers have been assigned to specific sizes of our tools and components. Contact Bergen for details.

OEM

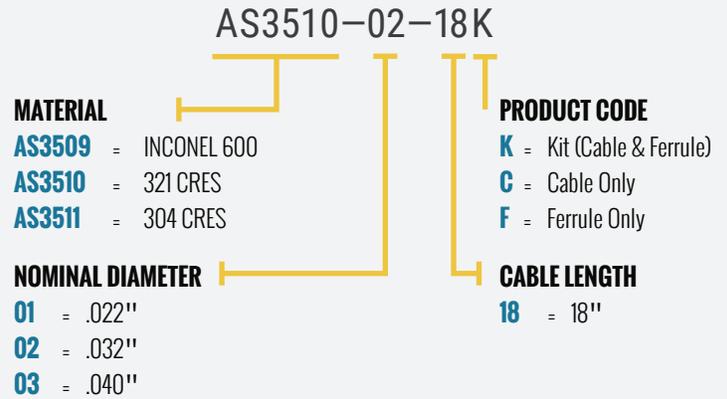
Many companies operating in diverse industries have developed standards and drawings for Safety Cable.

Ordering Safety Cable™ Components

PART NUMBER SYSTEM



SAE PART NUMBER SYSTEM



Safety Cable™ Kits

50 Cables w/ Ferrule Magazine + 50 Ferrules in Magazine
 Inconel 625 (AS3655) is available, call for details.



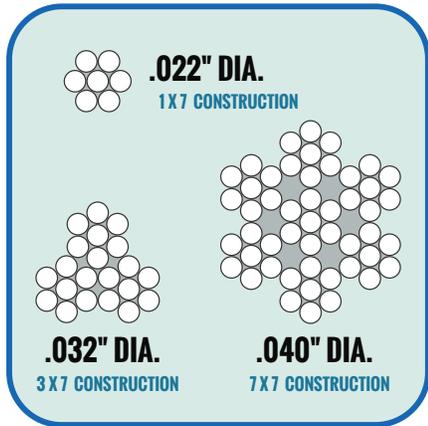
Safety Cable™ Cables

50 Safety Cables™
 Inconel 625 (AS3655) is available, call for details.

PART NUMBER		NOMINAL CABLE DIAMETER	CABLE LENGTH
(INCONEL 600) AMS 5687 AS3509	(321 CRES) AMS5689 AS3510		
K20A09	K20B09	.022"	9"
K20A12	K20B12	.022"	12"
K20A18	K20B18	.022"	18"
K20A21	K20B21	.022"	21"
K20A24	K20B24	.022"	24"
K30A09	K30B09	.032"	9"
K30A12	K30B12	.032"	12"
K30A18	K30B18	.032"	18"
K30A21	K30B21	.032"	21"
K30A24	K30B24	.032"	24"
K40A09	K40B09	.040"	9"
K40A12	K40B12	.040"	12"
K40A18	K40B18	.040"	18"
K40A21	K40B21	.040"	21"
K40A24	K40B24	.040"	24"

PART NUMBER			NOMINAL CABLE DIAMETER	CABLE LENGTH
(INCONEL 600) AMS 5687 AS3509	(321 CRES) AMS5689 AS3510	(304 CRES) AMS5697 AS3511		
C20A09	C20B09	C20C09	.022"	9"
C20A12	C20B12	C20C12	.022"	12"
C20A18	C20B18	C20C18	.022"	18"
C20A21	C20B21	C20C21	.022"	21"
C20A24	C20B24	C20C24	.022"	24"
C30A09	C30B09	C30C09	.032"	9"
C30A12	C30B12	C30C12	.032"	12"
C30A18	C30B18	C30C18	.032"	18"
C30A21	C30B21	C30C21	.032"	21"
C30A24	C30B24	C30C24	.032"	24"
C40A09	C40B09	C40C09	.040"	9"
C40A12	C40B12	C40C12	.040"	12"
C40A18	C40B18	C40C18	.040"	18"
C40A21	C40B21	C40C21	.040"	21"
C40A24	C40B24	C40C24	.040"	24"

CABLE CROSS SECTION



Safety Cable™ Ferrules

50 Ferrules per Magazine

Inconel 625 (AS3655) is available, call for details.

PART NUMBER			NOMINAL CABLE DIAMETER
(INCONEL 600) AMS 5687 AS3509	(321 CRES) AMS5689 AS3510	(304 CRES) AMS5697 AS3511	
F20A	F20B	F20C	.022"
F30A	F30B	F30C	.032"
F40A	F40B	F40C	.040"

LENGTH NOTE

Choose a length that allows the cable to route through the pattern and then into the tool using the formula:

$$\begin{aligned} & \text{LONGEST PATTERN LENGTH} \\ & + \text{TOOL NOSE LENGTH} \\ & + 7 \text{ INCHES} \\ & = \text{CABLE LENGTH} \end{aligned}$$

MATERIAL NOTE

321 CRES is standard for the Aerospace Industry. Most Safety Cable™ products are available in small quantities from our inventory (150 piece minimum order). Each Safety Cable™ component is manufactured and packaged to the stringent requirements of SAE AS4536 and AS3509 or AS3510 or AS3511 part Specifications.

Contact Bergen for special Safety Cable applications.

Safety Cable™ Accessories

Periodic verification of tool settings is done with the Torque Verification Block. Indenter and tensioning mechanism settings should be verified periodically.



TB201

Torque Verification Block

Quickly checks method of correct tool operation.



TW-150

Precision Torque Wrench

Use with torque verification block.



45-6N

Cutter / Gripper

Remove lockwire or safety cable.



BCT-MPT-250C

Load Tester

Lab model electronic load tester for tension and ferrule pull-off tests.

Complete Safety Cable™ System Toolbox

Safety Cable™ System Toolboxes are a composite of all the necessary components, and instructions to efficiently install Safety Cables™. A Terminator tool, cables, ferrules, verification block, and accessories are packaged in a durable case, organized by contoured foam cavities, and include installation instructions. Kits with multiple size Terminator tools and cable diameters are also available. **Contact us for details.**



Supporting Excellence in Aviation Since 1942

Starting in 1942, Bergen Cable has been the name associated with wire rope and mechanical cable assemblies. We are a leader in providing solutions in the development of new products as well as providing value engineering assistance to existing products. Our long-standing reputation for excellence stems from our experienced team of professionals. Operators to engineers are supported with the best equipment, fine-tuned manufacturing techniques and the highest standard of quality assurance.

As your cable connection for mechanical controls, we at Bergen Cable have a built-in flexibility in our manufacturing process to meet the ever changing design and quality demands of our customers. We have experience in a wide range of applications including Aerospace, Aircraft, Furniture, Medical, Military, Transport, Robotics and OEM.

Connect with Bergen Cable and we will work with your engineering team to develop a cost effective, reliable solution—designed to your exact specifications and meeting your needs for reliable, robust and long-life cable assemblies. Whatever your requirements, we can provide prototypes, short runs, production runs and just-in-time (Kanban) deliveries.

The right solution for your cable assembly requirements can save your company money while ensuring the most effective design for your application. Whatever your mechanical control cable needs—consult us first.

Some of the most demanding product applications rely on Bergen Cable, that's why many of the top OEMs refer to us as their "Cable Connection."

We invite you to connect with us to meet all your cable assembly requirements.

**Call us at 973.276.9596, fax us at 973.276.9566,
or email us at sales@bergencable.com.**

Bergen Cable Technology, Inc.

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Fairfield, NJ 07004 USA

BergenCable.com

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