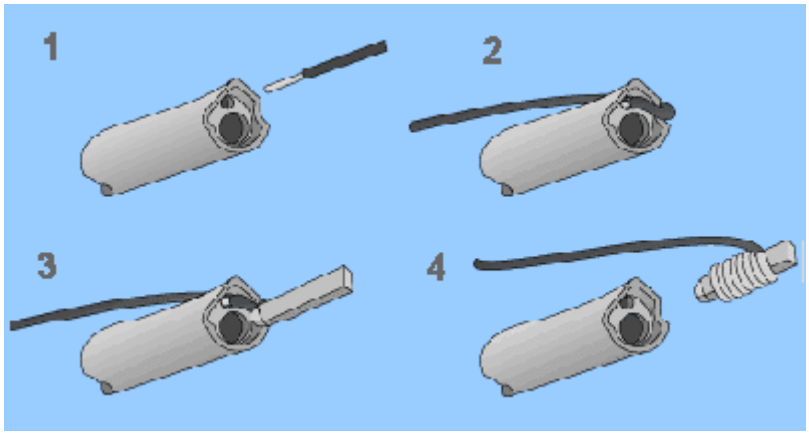
Tec-Alert Newsletter

Wire Wrapping

In 1952, a new technology was discovered by The Bell Laboratory, Western Electric Company to form a consistent gas-tight electrical connection by tightly wrapping wire around a terminal with two sharp edges. This advanced technology would open the door to meet the needs of more complex electronic equipment, allowing for more terminals in less space. Since then, the electronic, telecommunication and aviation industries have recognized wire wrapping as the most reliable, stable and common method of connecting signal and power terminals in today's advanced work force.

Wire Wrap Guide:

How to Make Wire Wrapped Connections



Step 1: Insert the pre-stripped wire into the wire slot of the wrapping bit.

Step 2: Anchor the wire in the notch of the wrapping sleeve.

Step 3: Insert the terminal into the center hole of the wrapping bit.

Step 4: Activate the wire wrapping tool. This rotates the wrapping bit and wraps the wire around the terminal.

Helpful Wire Wrapping Tips

• Coiling the wires around the sharp corners of a .025 in. square receptacle post creates a wire wrapped termination.

• A clean metal-to-metal contact between the wire and the post can be achieved by bending the wire around the sharp corner, breaking the oxide layer of both surfaces, thus revealing an oxide-free surface.

• Try to avoid kinks in the wire when stripping.

• Don't use wire that will break easily.

• The minimum number of turns is based on wire gauge and the type of wrap.

• Standard Wrap = Coils bare wire only around the post

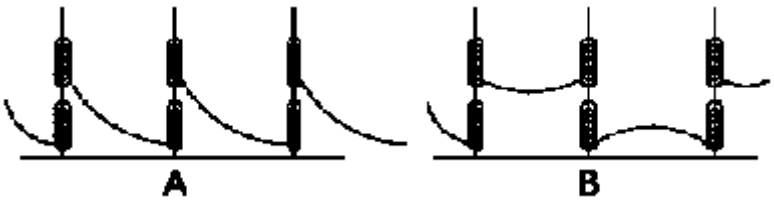
• Modified Wrap = Coils the wire and a portion of insulation increasing the ability to withstand vibration.

• When using wire wrap guns, make sure to not hold too tightly against the board to prevent bunched up, messy coils around the base of the post.

• Holding a wrap gun with too little pressure can result in spaces between the coils on the post, making the post visible.

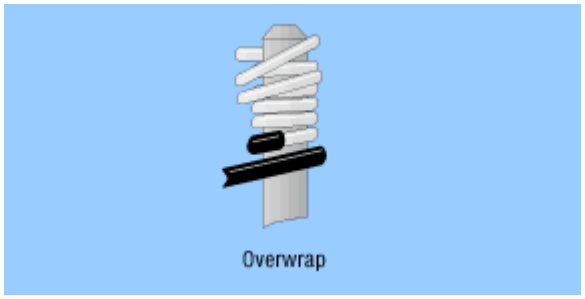
• Pulling the trigger of the wrap gun too hard will result in broken wire inside the gun barrel.

• "Backforce" features on electric wrap guns are important to prevent against overwrapping from excessive force.

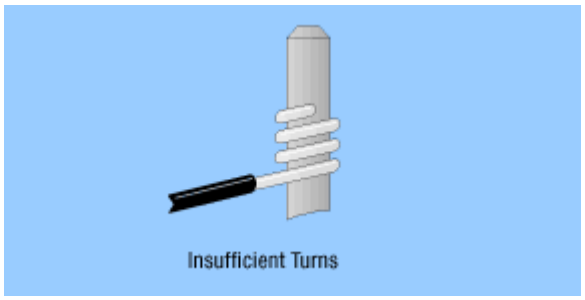


• Proper Daisy Chain – wiring several points together can be easy if done correctly. Figure A and B show the proper and improper way to daisy chain. If a mistake was made, the entire wire would have to be unwrapped in Figure A. In contrast, Figure B you would have at the most three wires to unwrap to remove any wire in the chain. This is the preferred approach.

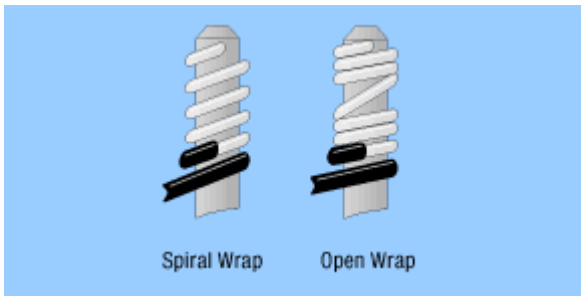
Common Wire Wrapping Problems:



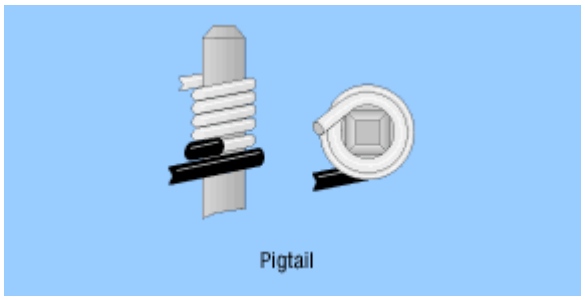
• The Overwrap - Don't press too hard! Wires will slip over the preceding turn if you push down too hard on the wrap tool while turning. Make sure to practice to ensure a quality connection.



• Insufficent Turns – Push wire all the way into wire slot. Improperly feeding of wire into the wire slot of the bit results in insufficient turns of wire for regular wraps or insufficient insulation turns for modified wraps.



• Spiral Wrap/ Open Wrap – Don't remove the tool too quickly! Wire turns more than 0.005 inches apart, called spiral or open wraps, are caused by too rapid a removal of the wrapping tool.



• Pigtails – Select the proper bit and sleeve. When a wire has not been completely wrapped the result is a “pigtail”. This results if the size of the bit is improperly matched to the terminal diagonal.

Wire Wrap Glossary

Anti-Backforce (ABF): This means that the gun, whether electric or pneumatic, has a spring mechanism behind the wire wrapping bit. When the operator pulls the trigger the spring will compress causing the bit to recede back into the wire wrapping sleeve. This allows the operator who is inexperienced to wrap perfectly everytime.

AWG: Abbreviation for American Wire Gauge

Bare Wire: Bare wire refers to the wire after the insulation has been removed or wire which is produced without insulation.

Bit Radius: This is the distance from the center of the terminal hole of the wire wrap bit to the outside wall of the wire wrap sleeve. This information is used to determine if there is enough space between pins for a wire wrapping bit and sleeve to fit.

Carpel Tunnel Syndrome: This medical symptom is sometimes attributed to repetitive motion injuries usually caused by a tool that is not ergonomically designed for the operator.

cfm: Abbreviation for cubic feet per minute.

Funnel: This term refers to the end of the wire wrapping sleeve where the wire is inserted. The point where the wire is inserted the end of the wire wrap sleeve has been flared to make it easier to insert the wire.

in: Abbreviation for inch(es).

Insulated Sleeve: This term refers to a wire wrapping sleeve where shrink wrap has been shrunk around the wire wrap sleeve. This plastic wrap insulates the sleeve from any electrical current which might be passing through the wire wrapping pin at the time.

kg: Abbreviation for kilogram(s).

Kynar wire: This refers to the type of insulation which is surrounding the wire. Other types of insulation which we do not recommend are tefzel and teflon.

Modified Wrap: The first 1/2 to 2 wraps are made with insulation wrapped around the terminal post. These wraps are in addition to the recommended wraps made with bare wire.

mm: Abbreviation for millimeter(s).

No Funnel: This term refers to a wire wrapping sleeve in which the end of the sleeve has not been flared, basically a straight tube.

Notch: This term refers to two small half circles which appear on the sides of the wire wrap sleeve where the wire enters. Once the wire has been placed into the bit and sleeve the remainder is placed into the notch so that it will not be pinched when pushed down around the

terminal post.

Notch Depth: This term refers to the depth of the notch which appears on both sides of the end of a wire wrapping sleeve.

Notch Width: This terms refers to the width of the notch which appears on both sides of the end of a wire wrapping sleeve.

NPT: Abbreviation for National Pipe Thread

oz: Abbreviation for ounce(s).

PSIG: Abbreviation for pounds per square inch gauge.

RPM: Abbreviation for revolutions per minute.

Sleeve Thickness: This terms refers to the actual thickness of the wall of the wire wrapping sleeve.

Slim Nose: This term refers to a wire wrapping sleeve in which the end of the sleeve where the wire is inserted is tapered down to a smaller outside diameter. This type of sleeve allows the operator to wire wrap in areas where the spacing between pins is unusually tight.

Standard: This term refers to a standard wire wrapping gun which does not have ABF.

Standard Wrap: This term refers to the fact that only bare wire is wrapped to the terminal post.

Terminal Diagonal: This term refers to the distance between two opposite points which are the furtherest apart on a wire wrapping terminal post.

Terminal Hole Depth: This term refers to depth of the hole in the wire wrapping bit which is seen at the end of the bit.

Terminal Hole Diameter: This term refers to the diameter of the hole in a wire wrapping bit which is seen at the end of the bit.

Terminal Post: This term refers to the post which the wire will be wrapped around by the operator.

3W: This term refers to the three prong plug which is found at the end of the 20 foot power cord.

2W: This term refers to the two prong plug which is found at the end of the 20 foot power cord.

Unique Indexing Mechanism: This term refers to mechanism within the wire wrapping gun which causes the wire wrapping bit to line up in the same position every single time you wire wrap.

Unwrapping Direction: This term refers to direction you could unwrap a wire wrap. This can be in a right hand direction or left direction depending on the direction the original wrap was done.

Voltage: This term refers to an electric potential or potential difference expressed in volts. Any country may be using 110, 115, 120, 220, 230, 240 or even 48 volts for the electrical power source.

Wall I.D.: This term refers to the inside diameter of a wire wrapping sleeve.

Wire Diameter: Same as wire size; refers to the actual diameter of wire with insulation.

Wire Gauge: This term refers to the size of the wire as indicated by the terms AWG (American), SWG (British) or mm (metric version). Wire gauge of 18 AWG would convert to .0403" (1.022mm) of bare wire.

Wire Size: Same as wire diameter; refers to the actual diameter of the wire with insulation.

Wire Wrap Bit: This term refers to a wire wrap bit which consist of a terminal hole and a wire trough in which the wire to be wrapped is placed. When this wire wrap bit is used in conjunction with the proper wire wrapping sleeve the operator will obtain a perfect wire wrap to the terminal post.

Wire Wrap Sleeve: This term refers to wire wrap sleeve which consists of a straight tube which may or may not be tapered at the end. When this wire wrap sleeve is used in conjunction with the proper wire wrapping bit the operator will obtain a perfect wire wrap to the terminal post.

Wrap(s): This term refers to how many times an insulated or bare wire is wrapped 360 degrees around a terminal post. A 1/2 wrap would mean that the wire went around the terminal post 180 degrees.

The wire wrap information and graphics were provided courtesy of Standard Pneumatic at www.standardpneumatic.com and OK Industries, Inc. at www.okindustries.com.

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