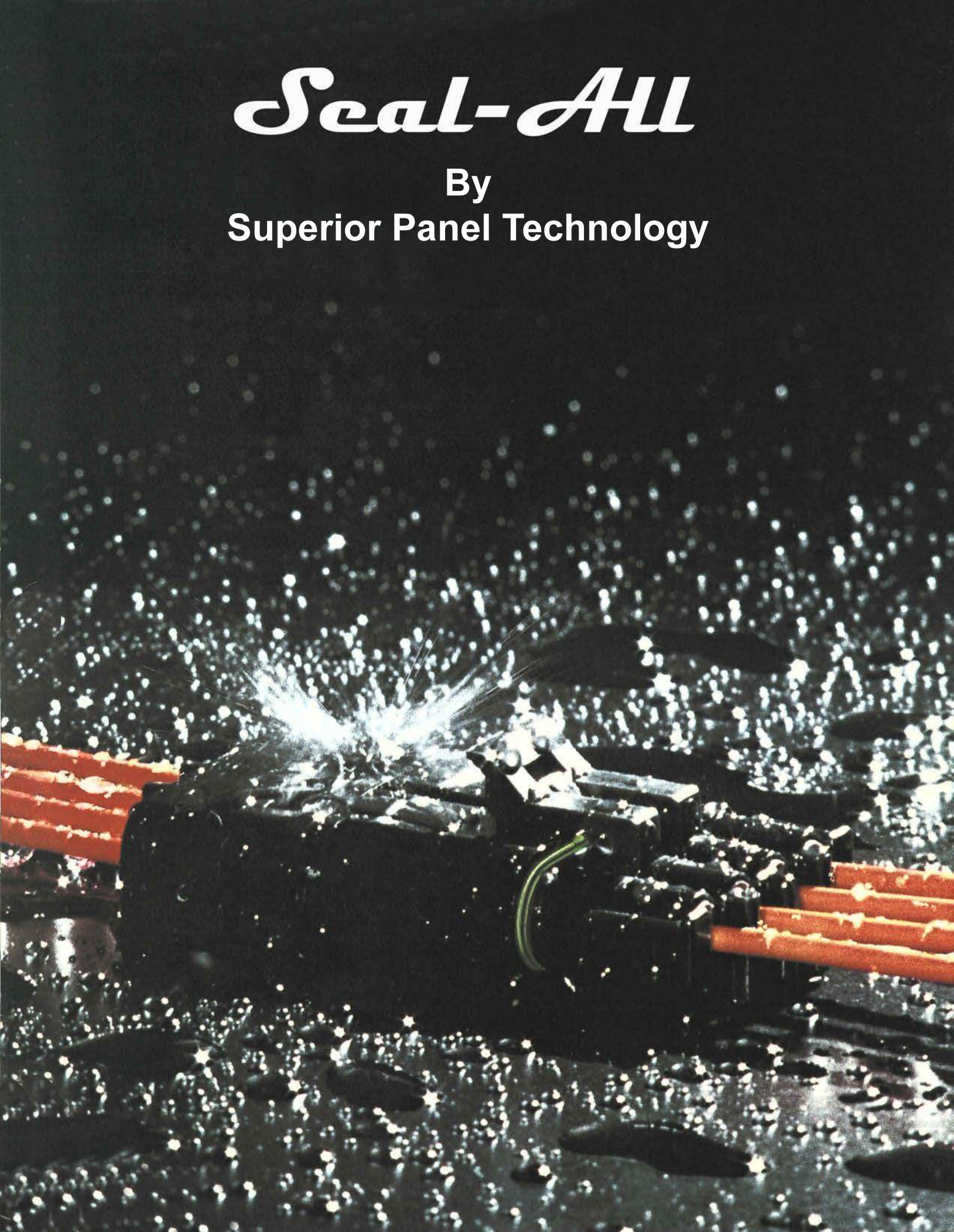
Seal-All

By
Superior Panel Technology



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General Information

INTRODUCTION

Seal-All is a new concept in environmental connection systems.
It was designed by engineers to withstand exposure to extreme temperatures, moisture and harsh engine compartment fluids and chemicals, with unfaltering performance.

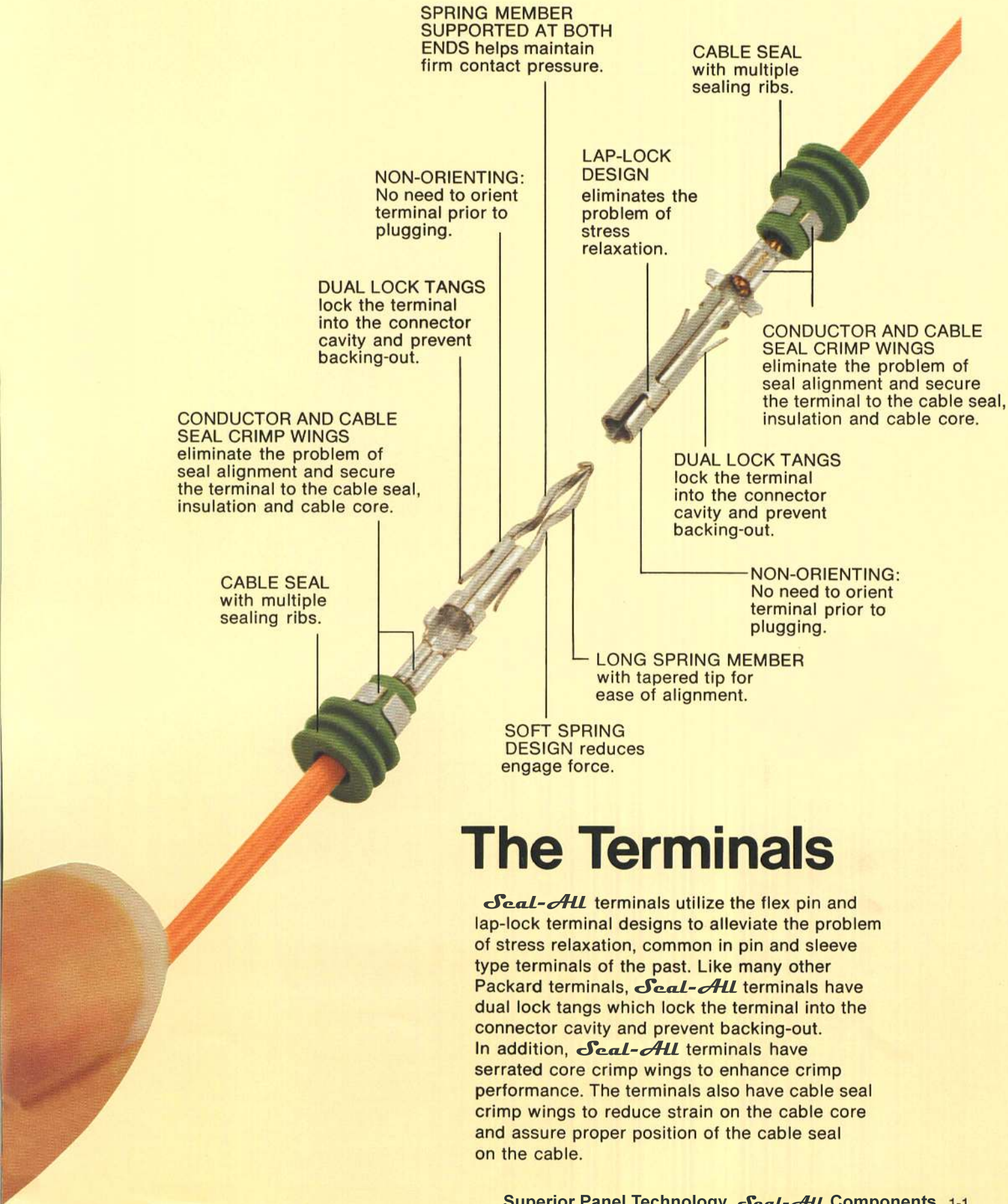
The *Seal-All* Manual is a comprehensive marketing and engineering tool, containing useful ordering information, as well as the most up-to-date engineering specifications and application guidelines available. In addition, the manual includes sections on assembly specifications and tooling, so you can assemble *Seal-All*

It is our sincere hope that you will take the time to study this manual and use it as a reference tool.

HOW TO USE THIS MANUAL

The *Seal-All* Components section will familiarize you with the system and some of its innovative design features. Electrical, mechanical and environmental characteristics can be found in the section entitled, "Product Performance Characteristics."

In addition, there is a section on "Assembly Specifications," with step-by-step assembly instructions and artwork; and a section on "Assembly Tooling," with technical information about SPT tooling available for *Seal-All* assembly.

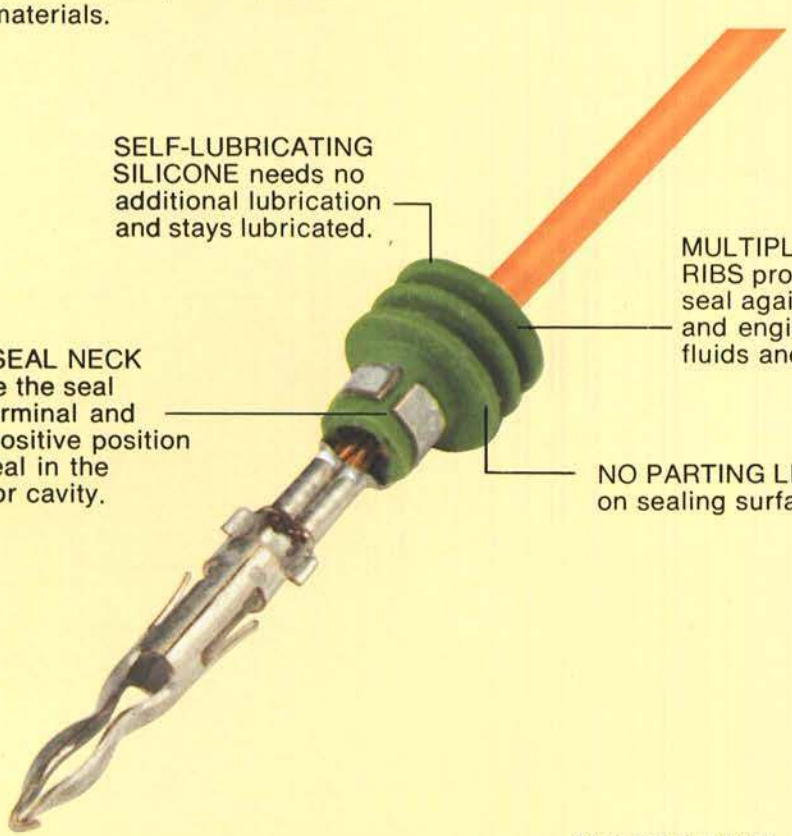


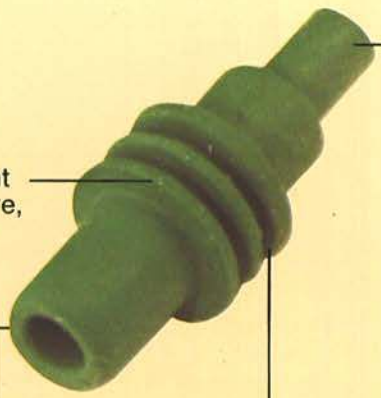
The Terminals

Seal-All terminals utilize the flex pin and lap-lock terminal designs to alleviate the problem of stress relaxation, common in pin and sleeve type terminals of the past. Like many other Packard terminals, *Seal-All* terminals have dual lock tangs which lock the terminal into the connector cavity and prevent backing-out. In addition, *Seal-All* terminals have serrated core crimp wings to enhance crimp performance. The terminals also have cable seal crimp wings to reduce strain on the cable core and assure proper position of the cable seal on the cable.

The Cable Seal

The self-lubricating silicone cable seal needs no additional lubrication, reduces assembly engage force and stays lubricated. Silicone contains no sulphur, or acid-producing chemicals, and will not stain, deteriorate or corrode other materials.



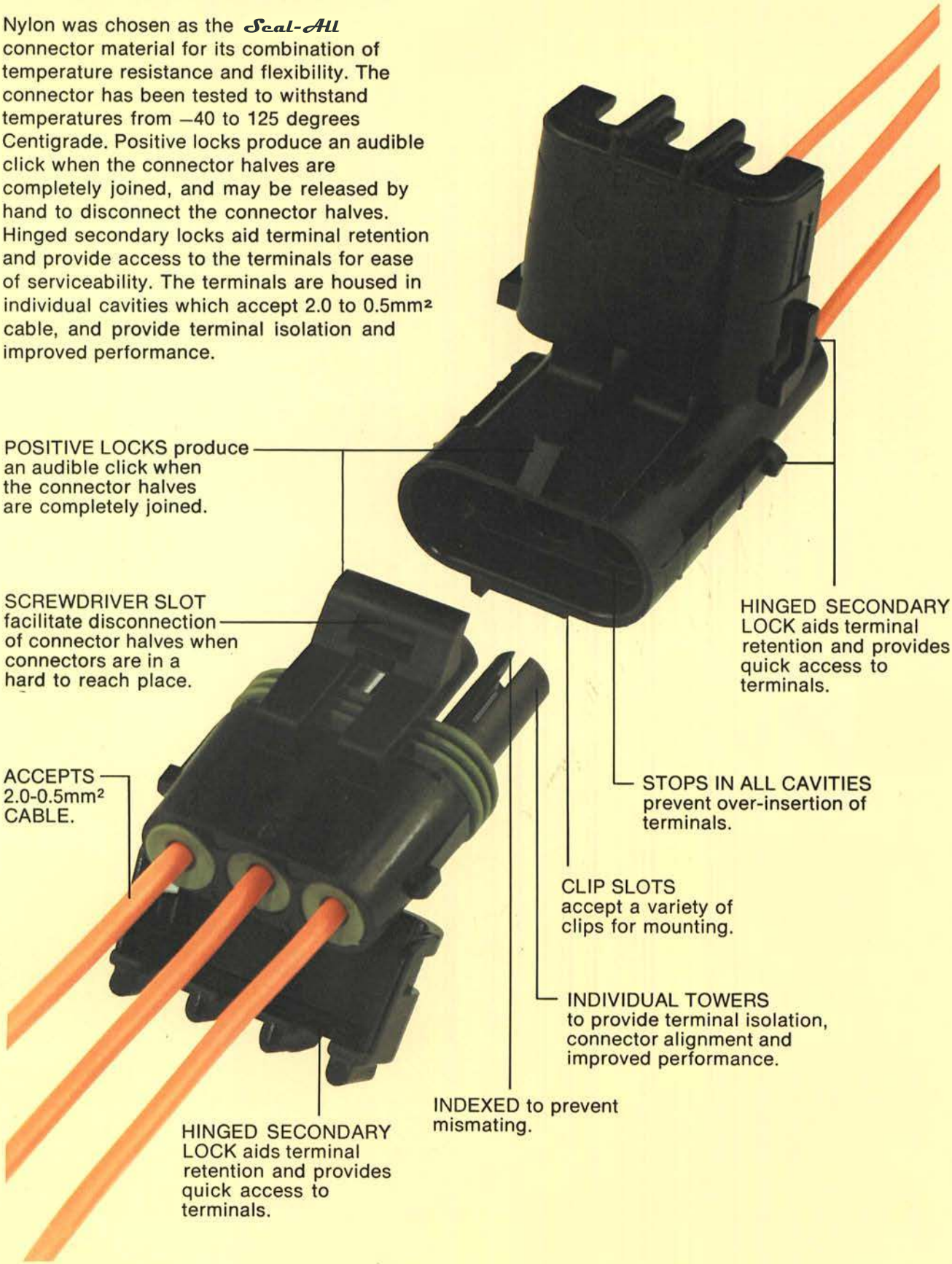


The Cavity Plug

The cavity plug, made of self-lubricating silicone, is designed to fill unused connector cavities, and has the same sealing characteristics as the *Seal-All* cable seals.

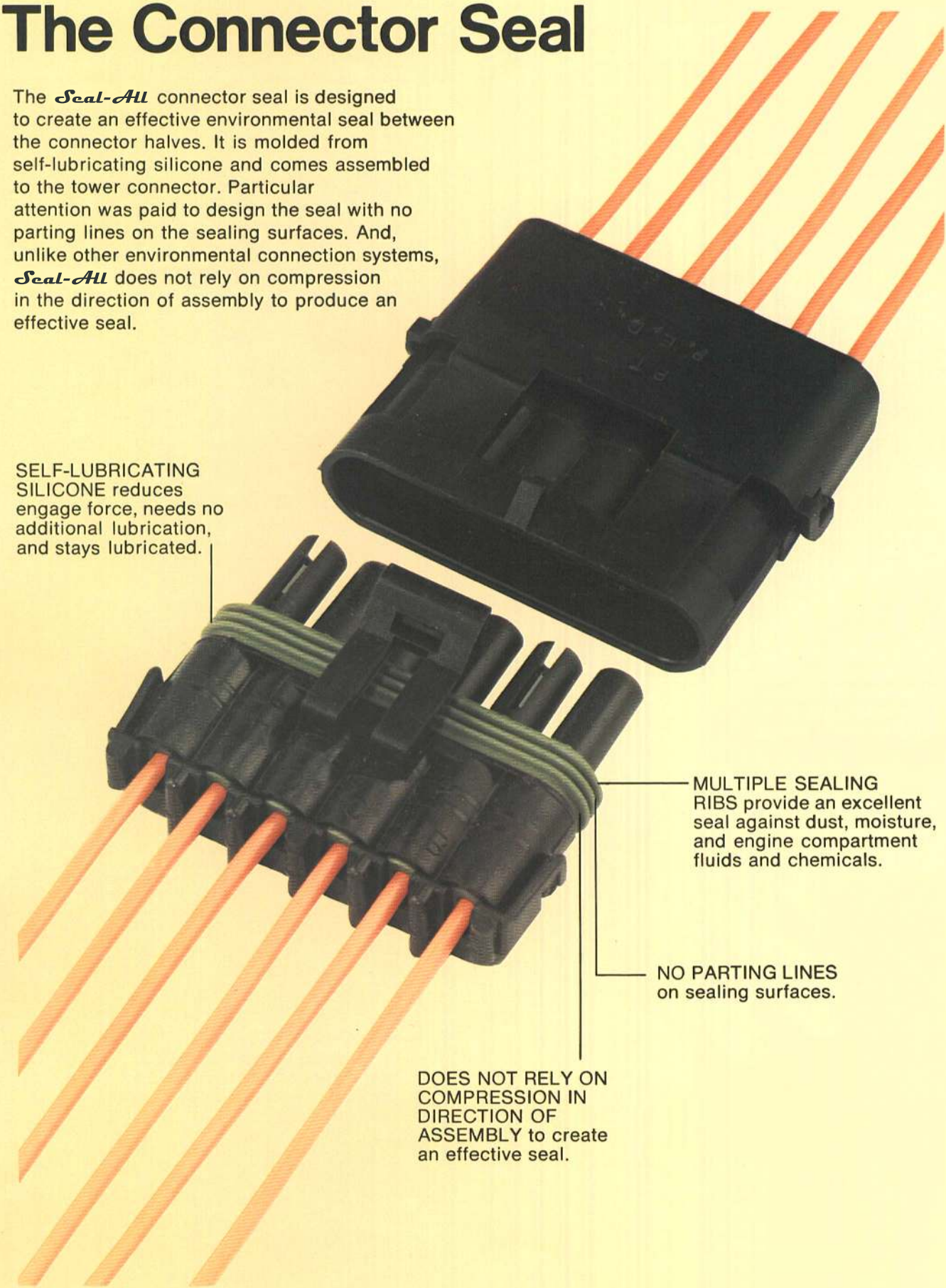
The Connectors

Nylon was chosen as the *Seal-All* connector material for its combination of temperature resistance and flexibility. The connector has been tested to withstand temperatures from –40 to 125 degrees Centigrade. Positive locks produce an audible click when the connector halves are completely joined, and may be released by hand to disconnect the connector halves. Hinged secondary locks aid terminal retention and provide access to the terminals for ease of serviceability. The terminals are housed in individual cavities which accept 2.0 to 0.5mm² cable, and provide terminal isolation and improved performance.



The Connector Seal

The *Seal-All* connector seal is designed to create an effective environmental seal between the connector halves. It is molded from self-lubricating silicone and comes assembled to the tower connector. Particular attention was paid to design the seal with no parting lines on the sealing surfaces. And, unlike other environmental connection systems, *Seal-All* does not rely on compression in the direction of assembly to produce an effective seal.



Product Performance Characteristics

IMPORTANT

In order to attain the following electrical, mechanical and environmental characteristics, it is essential that:

1. Superior Panel Technology *Seal-All* components be used exclusively.
2. Superior Panel Technology assembly tooling be used.
3. Components be assembled according to Superior Panel Technology assembly specifications.

Electrical Characteristics

- Operating Temperature Range: –40 to 125 degrees Centigrade
- Voltage, Operational: 0.05 vDC to 16 vDC
- Rated Current: 20 amperes*
- Termination Resistance: Less than 10 milliohms, with an open circuit potential of 50 millivolts maximum.
- Termination Voltage Drop: Less than 200 millivolts at 20 amperes
- Isolation Resistance: Greater than 200 megohms at 500 vDC
- Continuity: No intermittencies greater than 100 ohms for more than 1.0 microsecond

*Current rating on 0.8mm² cable at room temperature.

Mechanical Characteristics

TERMINAL RETENTION IN CONNECTOR*

In-line connections	53 Newtons Minimum
Panel-mount connections	90 Newtons Minimum

CONNECTOR TO CONNECTOR RETENTION FORCE: 145 Newtons Minimum

MATING FORCE (CONNECTOR TO CONNECTOR)

Connector Type	Mating Force (Newtons)
One-way in-line	80 maximum
Two-way in-line	85 maximum
Three-way in-line	90 maximum
Four-way in-line	95 maximum
Six-way in-line	135 maximum

INDEXING AGAINST MISMATING (CONNECTOR TO CONNECTOR)

Connector Type	Mating Force (Newtons)
One-way in-line	135 minimum
Two-way in-line	175 minimum
Three-way in-line	175 minimum
Four-way in-line	175 minimum
Six-way in-line	175 minimum

*Force required to break continuity.

Environmental Characteristics

The *Seal-All* environmental connection system has been tested using three basic environmental seal tests: salt fog, immersion and immersion flex.

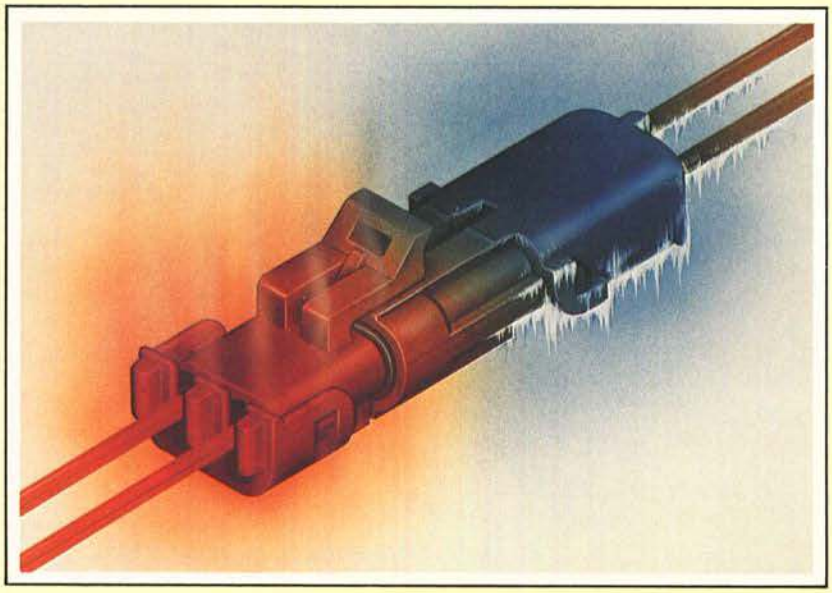
Prior to testing, a mated connector assembly is preconditioned using one of the following test preconditionings: Thermal cycling, temperature/humidity cycling, fluid compatibility, dust, gravel bombardment, weather/ozone, shock, or vibration. After preconditioning, the contact interface millivolt drop and isolation resistance are measured. The assembly is then subjected to one of the three environmental seal tests to verify the sealing integrity of the connection system. Testing is carried out until all preconditioning and seal test combinations are exhausted.

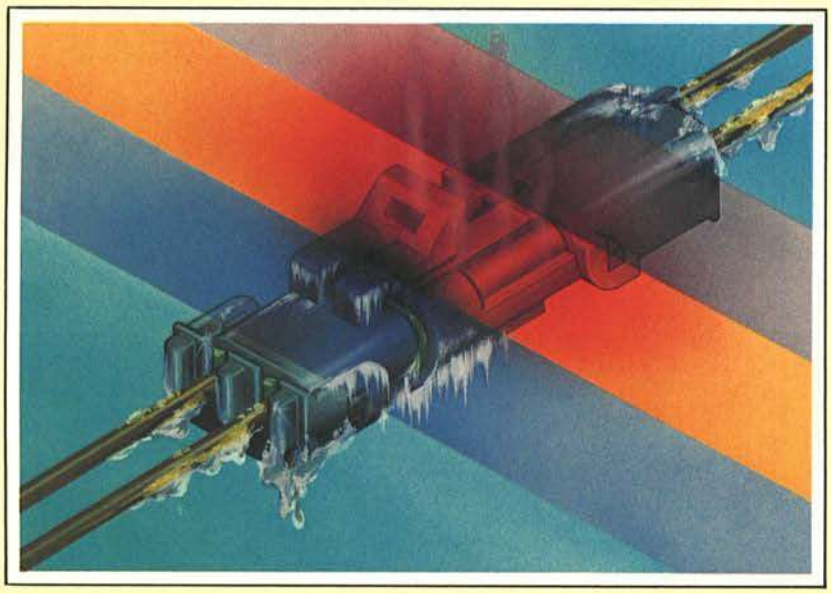
Environmental seal tests are also performed on virgin connector assemblies (assemblies which have not been preconditioned).

Test Preconditioning

Thermal Shock

The mated connector assemblies are exposed to a series of thermal shocks from –40 to 125 degrees Centigrade. The continuity requirement must be met during the exposure.





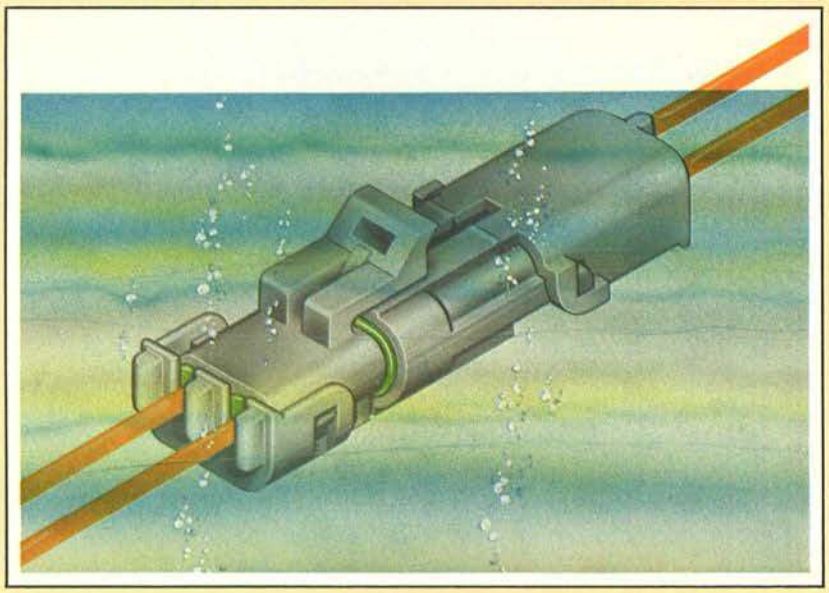
Temperature/Humidity

The mated connector assemblies are exposed to a series of cycles consisting of:

- 95 percent relative humidity at 37 degrees Centigrade
- –40 degrees Centigrade
- 125 degrees Centigrade
- Room temperature

And a final cycle of 24 hours of 95 percent relative humidity at 37 degrees Centigrade.

Test Preconditioning



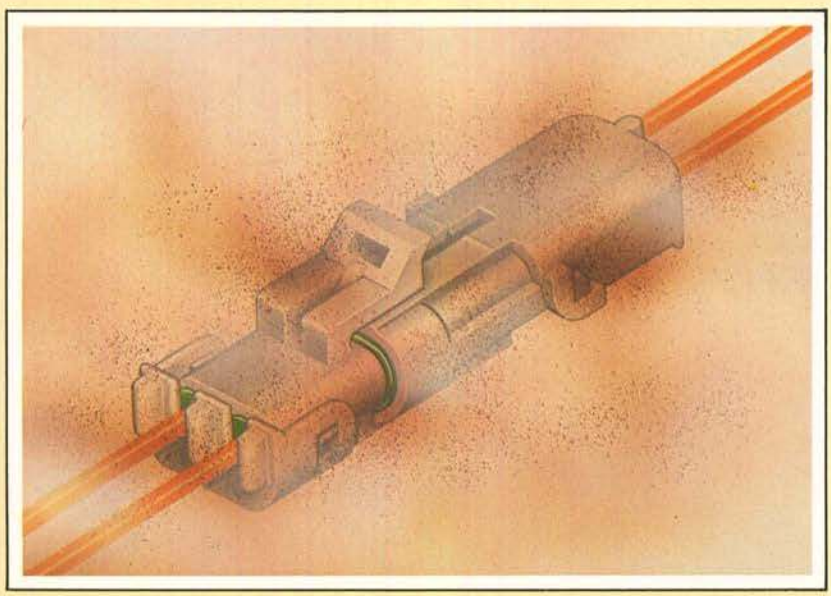
Fluid Compatibility

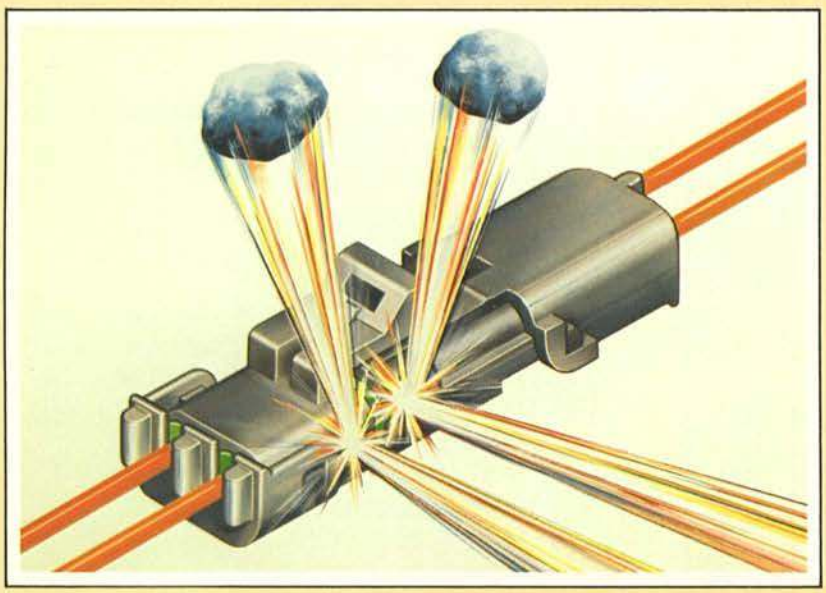
The mated connector assemblies are exposed to a series of complete immersions in:

- Brake fluid
- ASTM number three oil
- ASTM reference fuel C
- Engine coolant
- Automatic transmission fluid
- Windshield washer fluid
- Power steering fluid
- Diesel fuel

Dust

The mated connector assemblies are exposed to "Arizona dust" which is agitated periodically. "Portland cement" may be substituted for "Arizona dust."

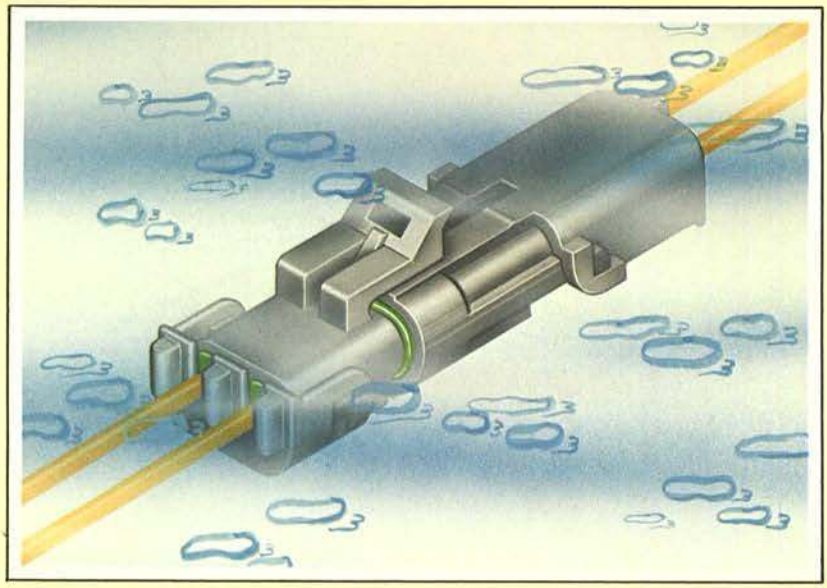




Gravel Bombardment

The mated connector assemblies are exposed to high velocity bombardment by gravel in a test chamber (SAE J400).

Test Preconditioning

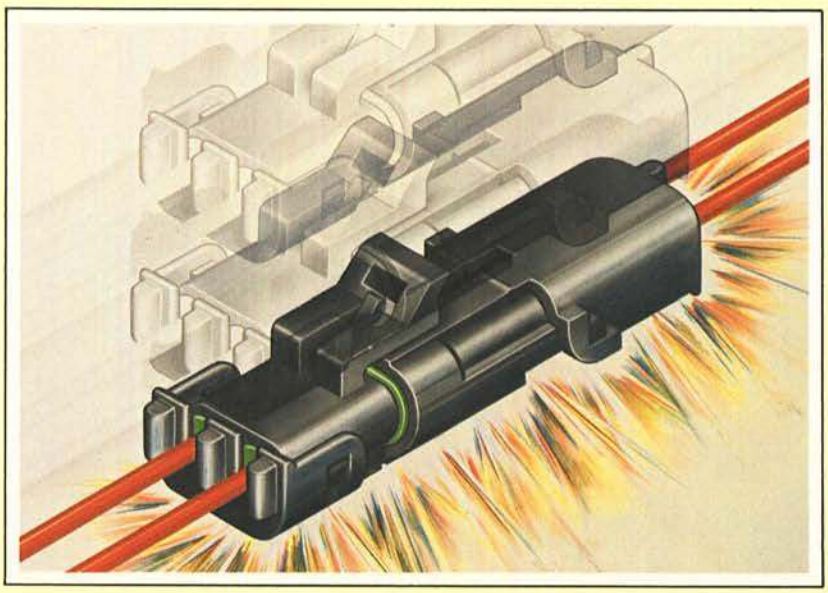


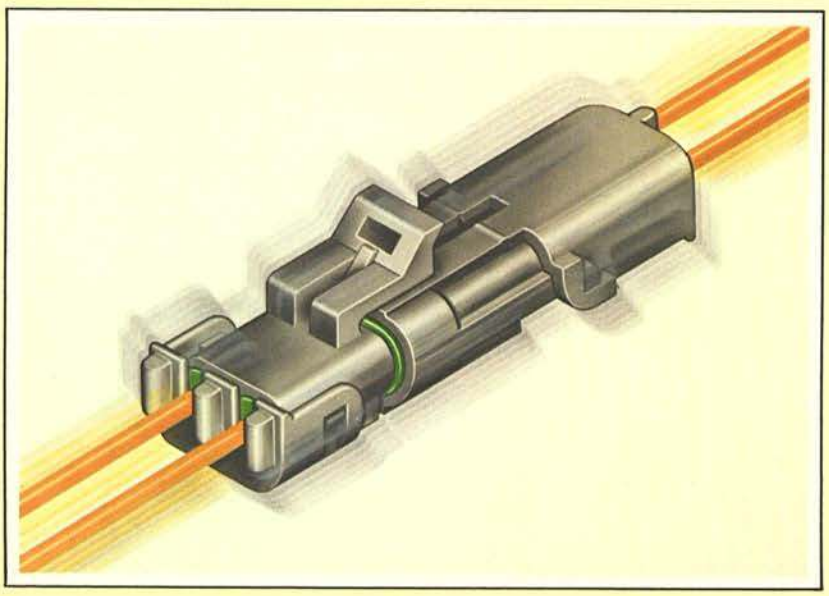
Weather/Ozone

The mated connector assemblies are exposed to ozone in an ASTM D1149 chamber.

Shock

The mated connector assemblies are exposed to a series of shocks, 50 g peak, along each perpendicular axis. The continuity requirement must be met during each exposure.

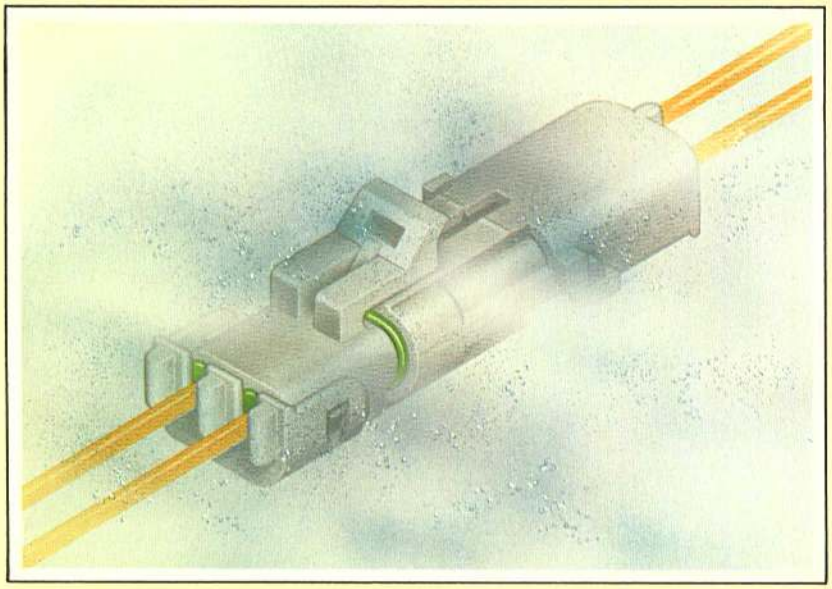




Vibration

The mated connector assemblies are exposed to vibration in each plane with a constant displacement of 1.5 mm from 10-70 hertz and a constant acceleration of 15 g's from 70-500 hertz. The continuity requirement must be met during each exposure.

Environmental Seal Tests

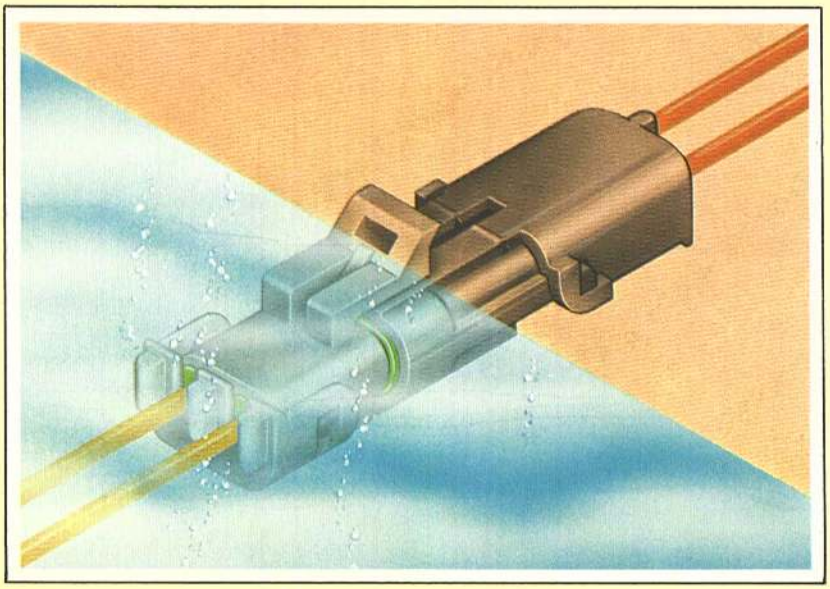


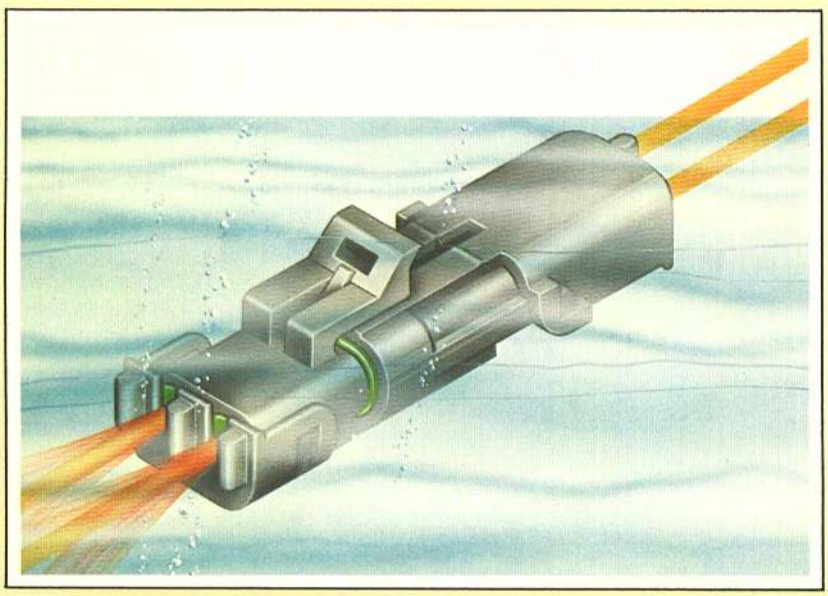
Salt Fog Test

The mated connector assemblies are exposed to a salt fog at 35 degrees Centigrade. Isolation resistance immediately following the exposure must exceed 200 megohms at 500 volts DC.

Immersion Test

The mated connector assemblies are exposed to dry air at 125 degrees Centigrade, followed by a complete submersion in room temperature saline solution. Isolation resistance immediately following the exposure must exceed 200 megohms at 500 volts DC.





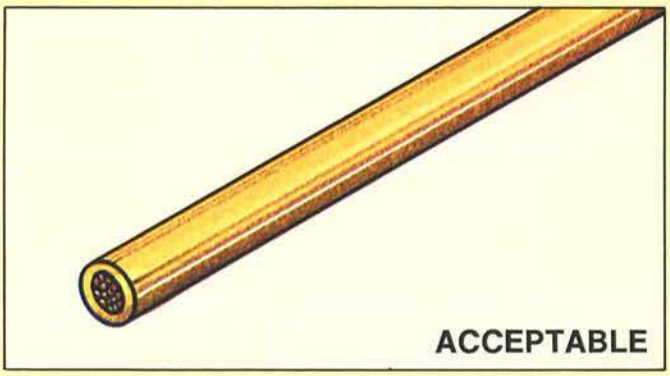
Immersion Flex Test

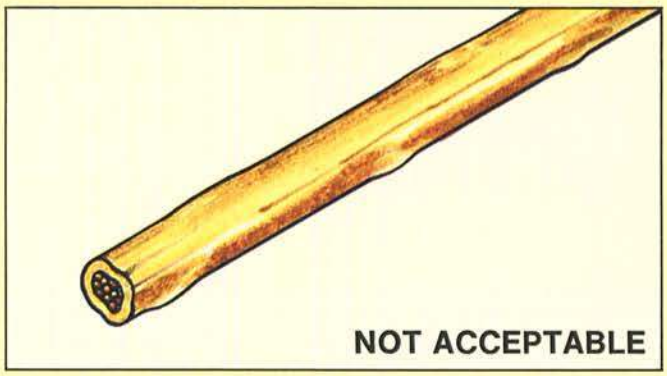
The mated connector assemblies are exposed to 500,000 cycles of lateral cable travel during a complete submersion in saline solution. Isolation resistance immediately following the exposure must exceed 200 megohms at 500 volts DC.

NOTE: The above tests are performed on preconditioned and virgin *Seal-All* connector assemblies.

Assembly Specifications

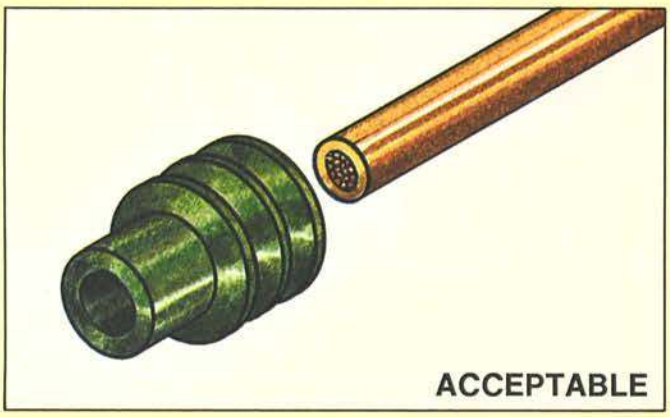
CABLE SURFACE

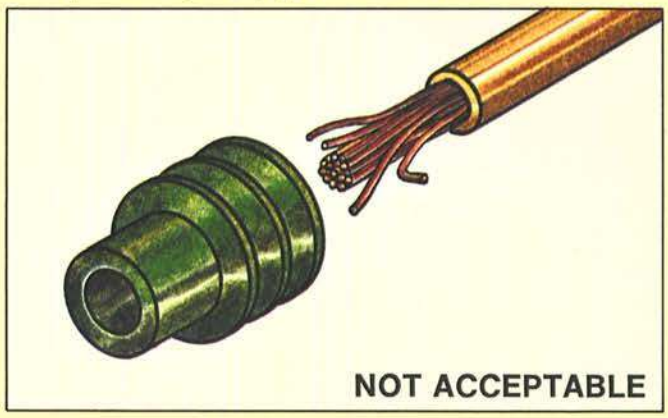




The outside diameter of the cable must be round and free of surface imperfections and dirt. (Reference SAE J1128 or ISO/DIS 6722/1).

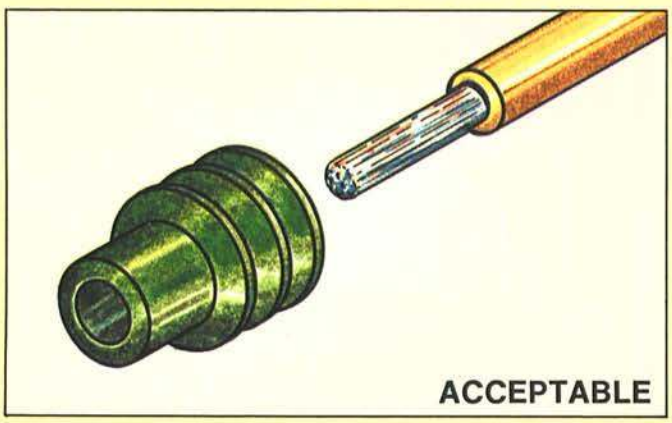
APPLYING THE CABLE SEAL: Crimp Only Applications

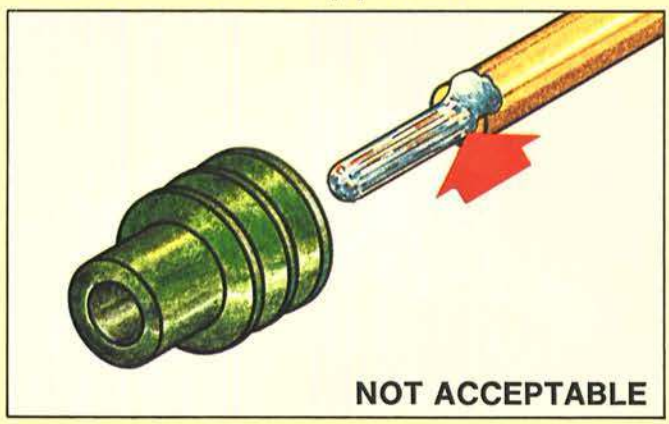




For crimp-only applications, cable seals should be applied to unstripped wire leads.

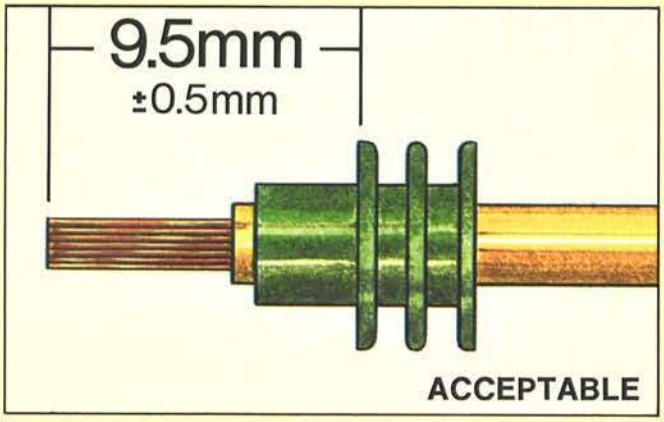
APPLYING THE CABLE SEAL: Soldered-Core Applications

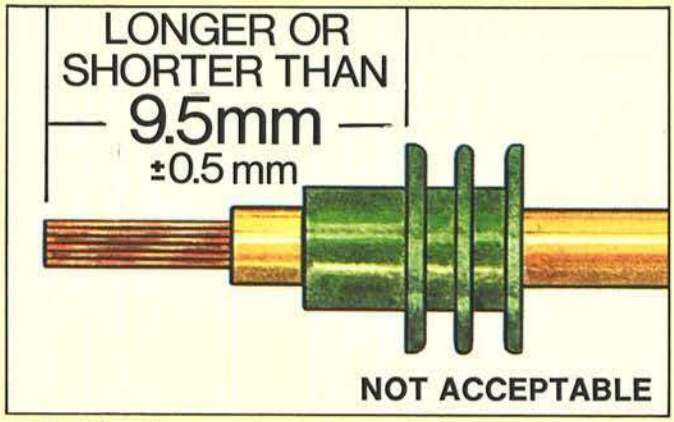




For soldered-core applications, the cable core should be stripped and soldered prior to cable seal application.

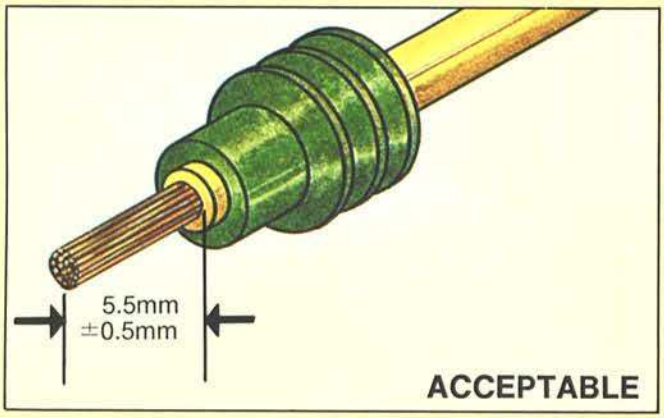
POSITIONING THE CABLE SEAL

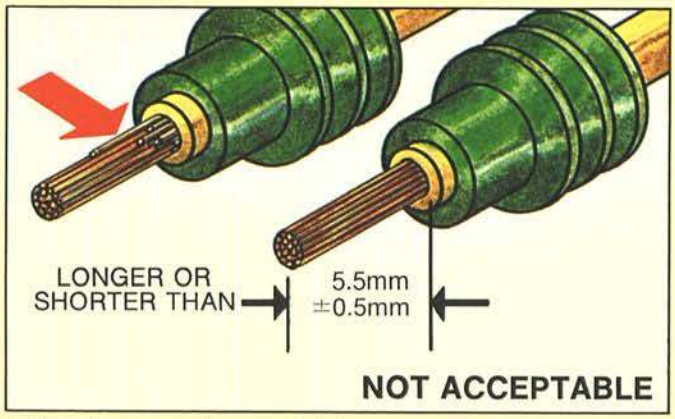




The cable seal must be positioned properly on the cable. The distance from the end of the stripped core to the leading edge of the first sealing rib should be 9.5 mm. (Reference Dimension)

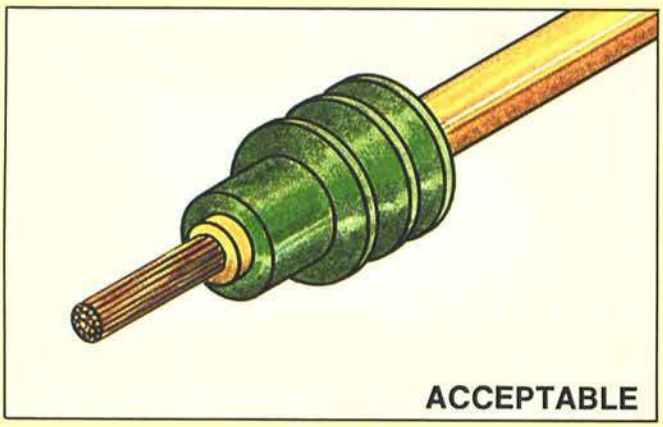
STRIP LENGTH

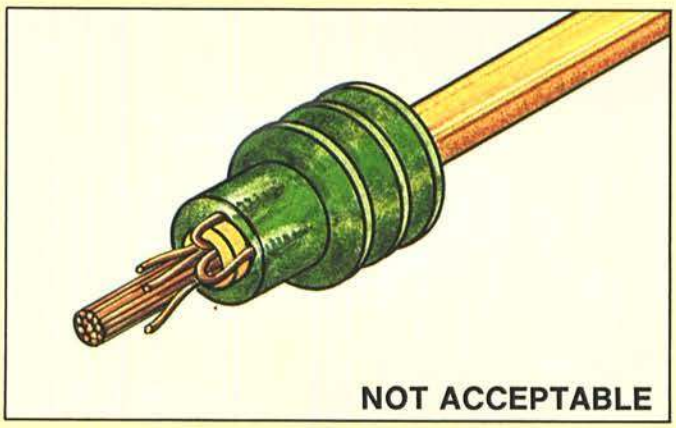




Strip length must be 5.5 mm ±0.5 mm. Cut or nicked strands are not acceptable.

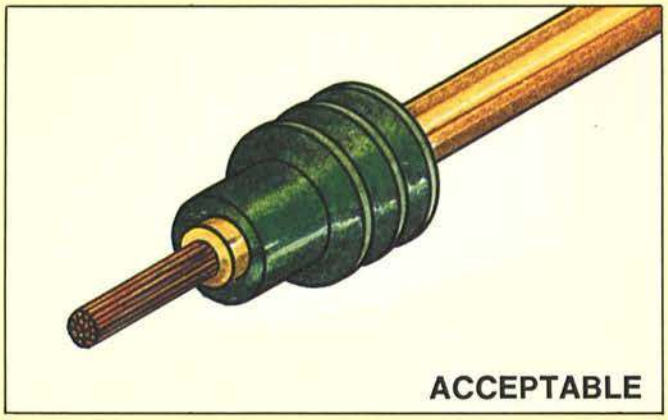
LOOSE WIRE STRANDS

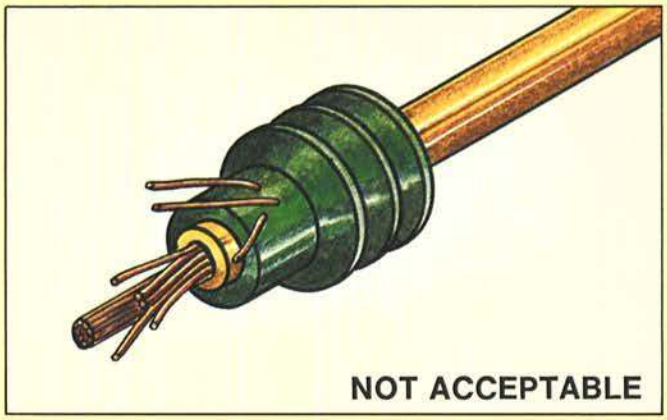




Loose wire strands between the cable seal and cable insulation are not acceptable.

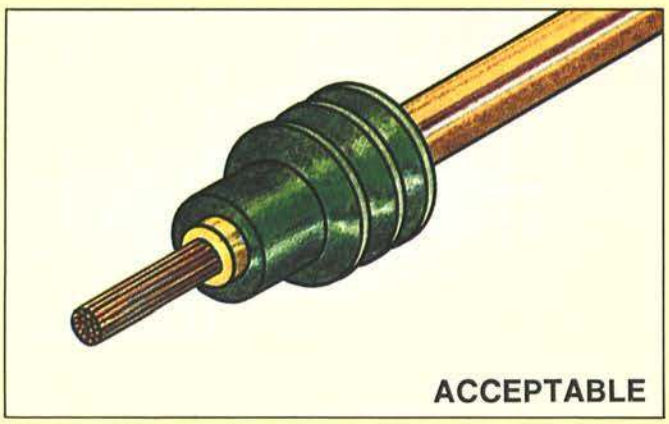
PIERCED CABLE SEALS

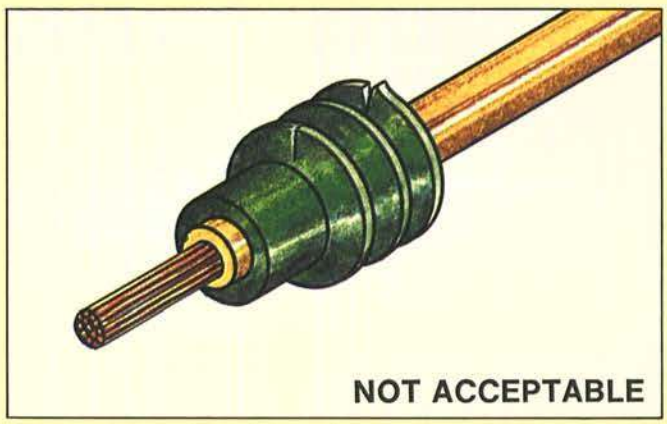




Wire strands must not pierce the cable seal.

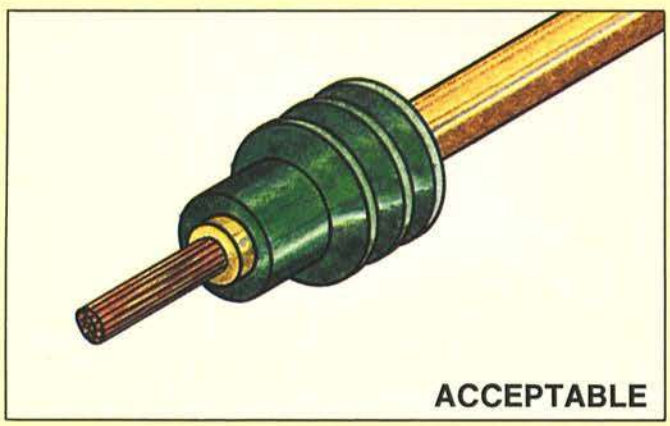
CABLE SEAL AND CONNECTOR SEAL RIBS

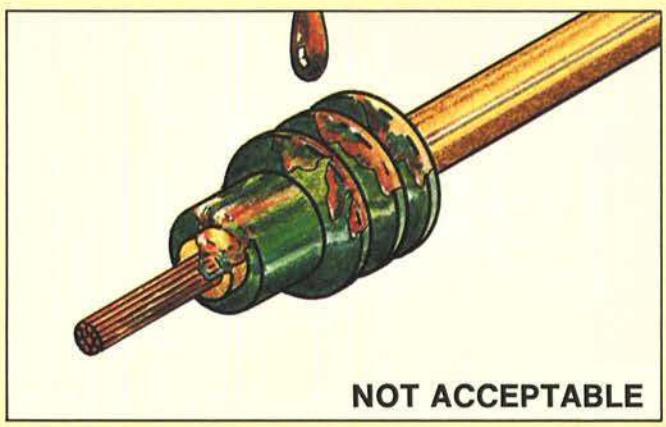




Cable seal ribs and connector seal ribs must be free of cuts. Care should be taken not to cut or tear sealing ribs when servicing the connector system.

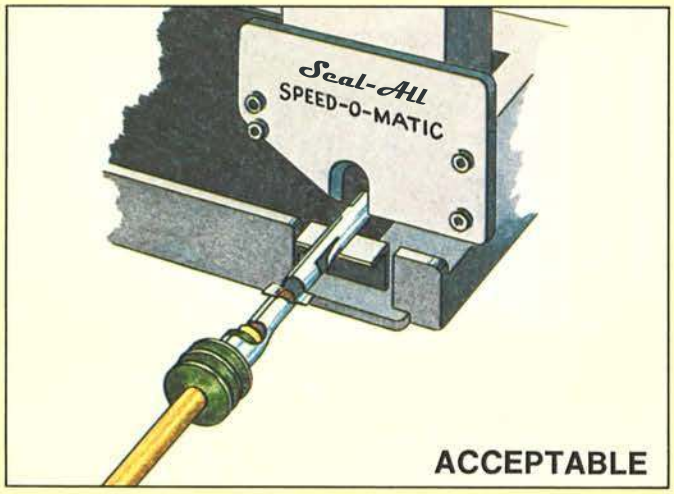
PROCESS AIDS

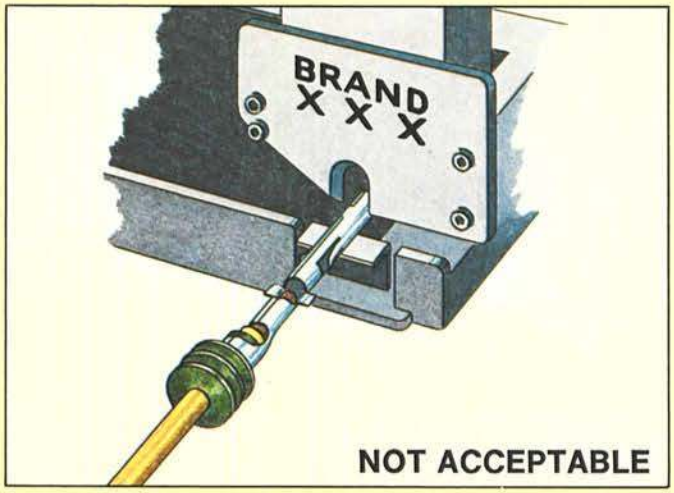




Foreign material or lubricants must not be used as cable seal or connector seal assembly process aids. Care should be taken to keep cable seals and connector seals free of dust, dirt, paint and other foreign materials.

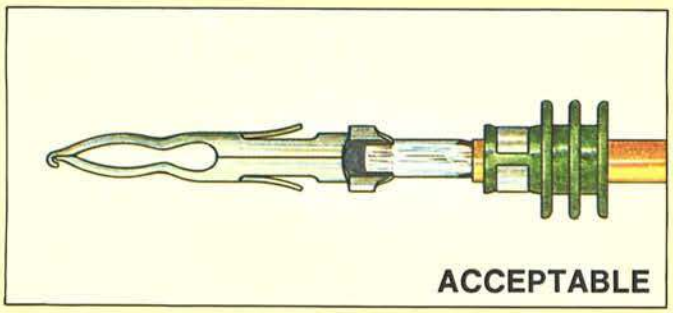
ASSEMBLY TOOLING

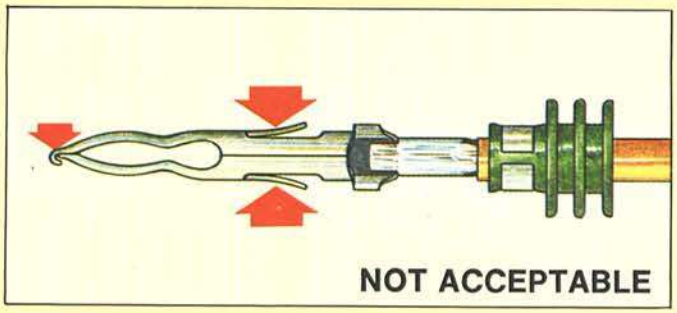




TERMINATING SOLDERED-CORE CABLE

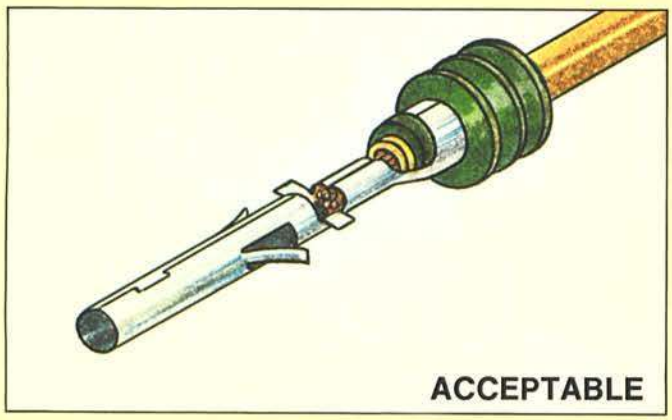
Seal-All

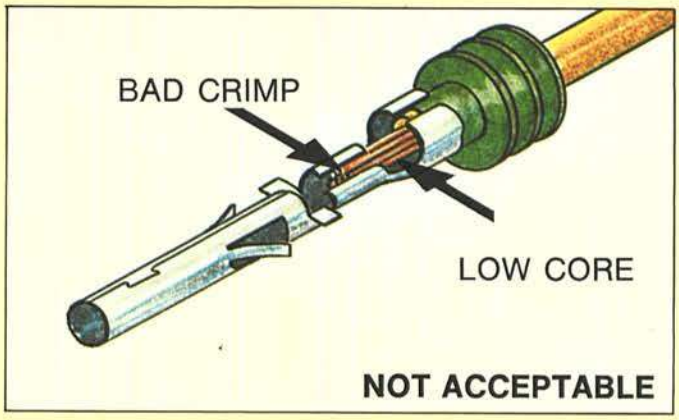




For soldered terminations, the stripped, soldered cable core should be reflowed after crimping the terminal. Excessive heat can damage the terminal. Particular caution is necessary to avoid welding the tip of the male terminal and to avoid losing spring characteristics of the dual lock tangs.

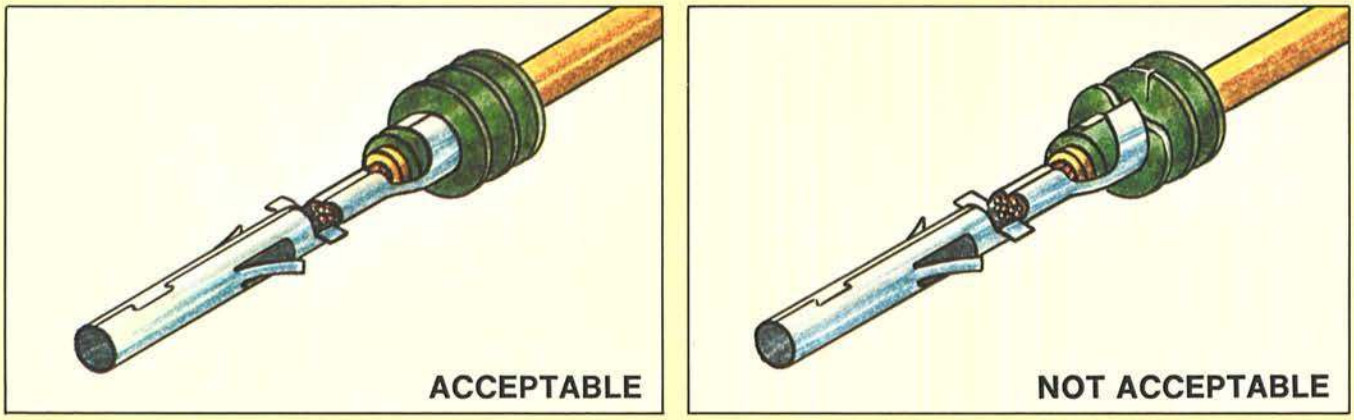
CORE CRIMP HEIGHTS





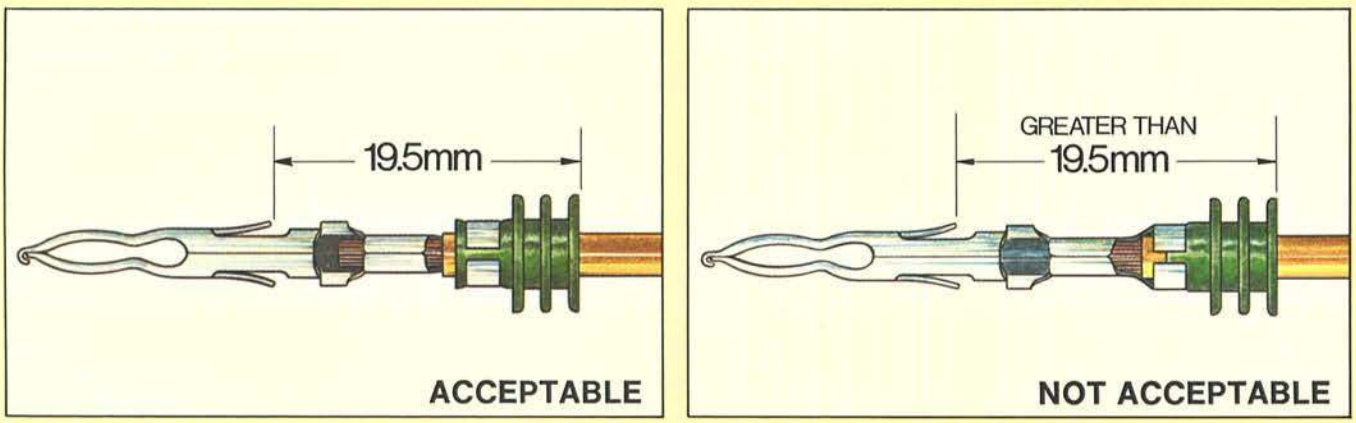
Terminals can be manualy crimped using:
Seal-All economy crimpers (#WHTSACT) or
Seal-All Professional Crimper (#WHTPSAC)

DAMAGED SEAL RIBS



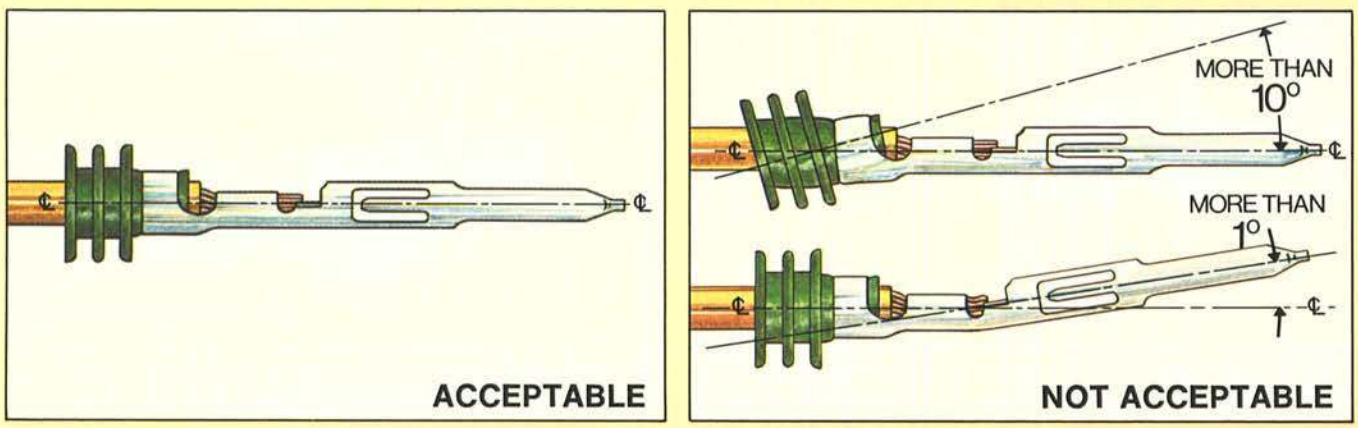
Seal ribs which are cut or caught under terminal insulation wings are not acceptable.

TERMINAL AND CABLE SEAL DIMENSION



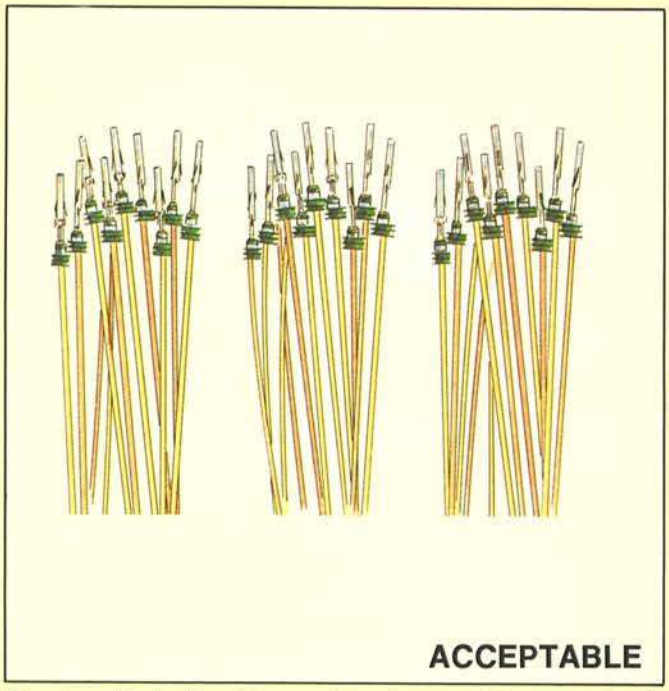
The distance from the back of the terminal locking tangs to the back of the cable seal may not exceed 19.5 mm., or the terminated cable seal will not assemble properly to the connector body.

TERMINAL, CABLE SEAL AND CABLE ALIGNMENT



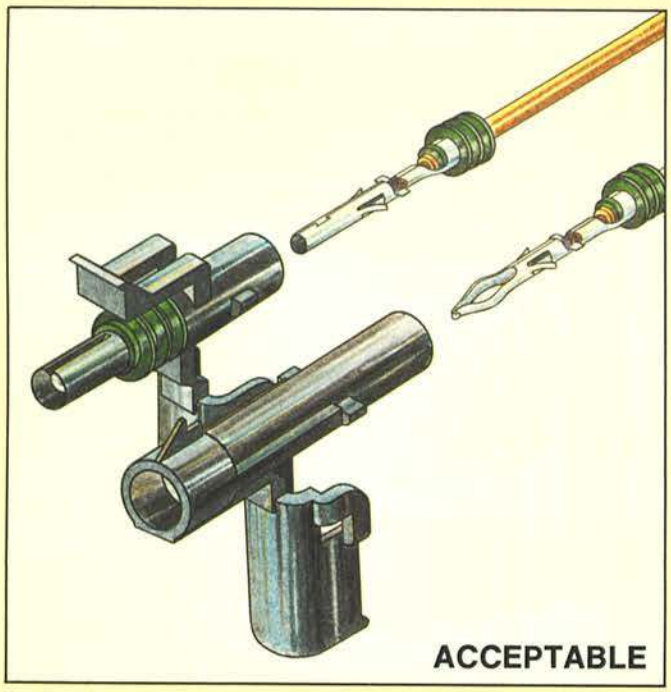
The terminal, cable seal and cable must be aligned properly. The center lines of the terminal, cable seal and cable must be aligned as shown in the illustration above. Terminal misalignment may result in excessive connector engage forces and/or terminal damage.

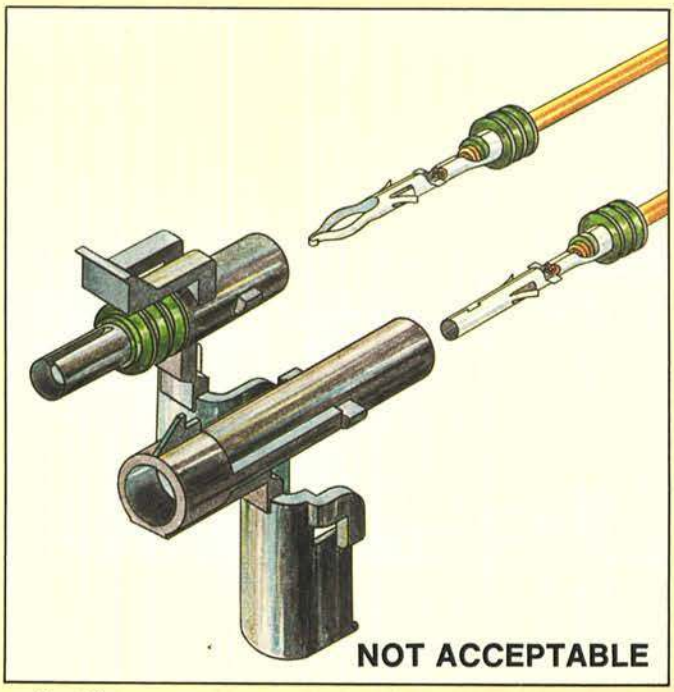
HANDLING THE TERMINATED CABLE SEAL LEAD ASSEMBLY



The terminated cable seal lead assembly must be handled with special care. Small bundles are recommended to prevent damage to the cable seal ribs.

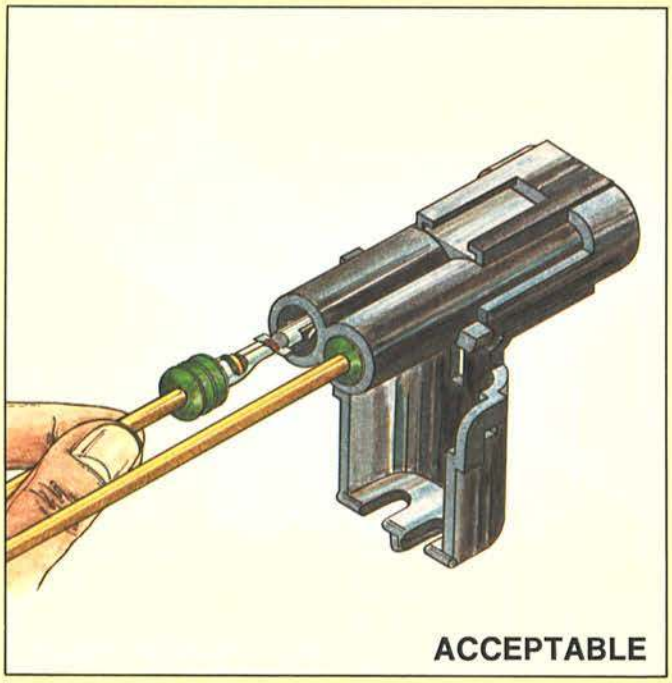
TERMINAL TO CONNECTOR COMPATIBILITY

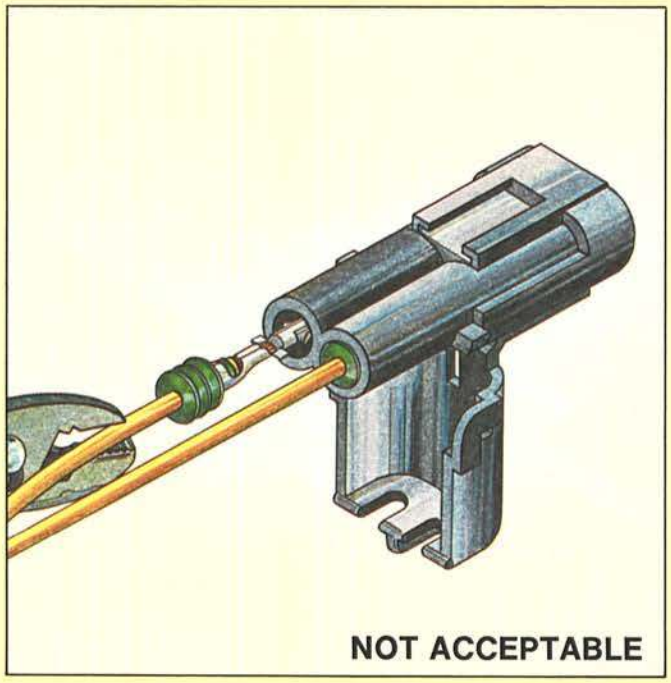




For in-line applications: Sleeve terminals must be used with tower connector and connector seal assemblies, and pin terminals with shroud connectors. (For panel-mount applications: Pin terminals must be used with tower connector and connector seal assemblies.)

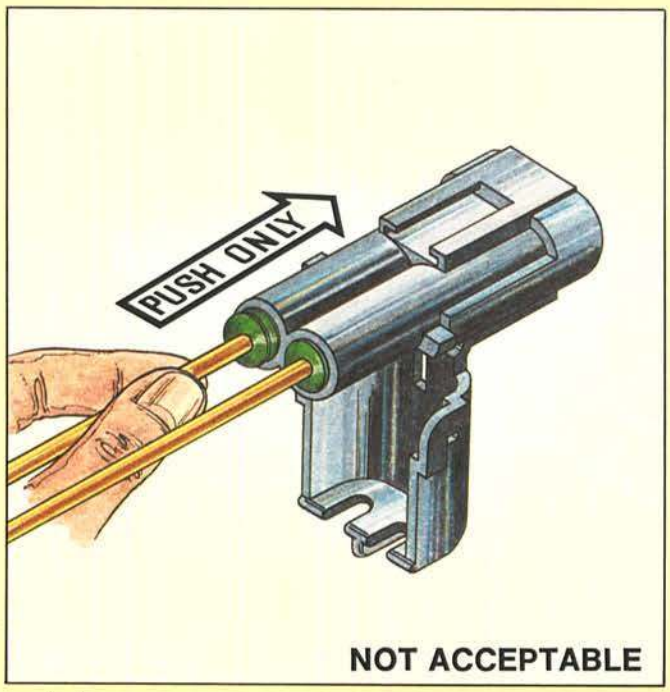
ASSEMBLY TO CONNECTOR





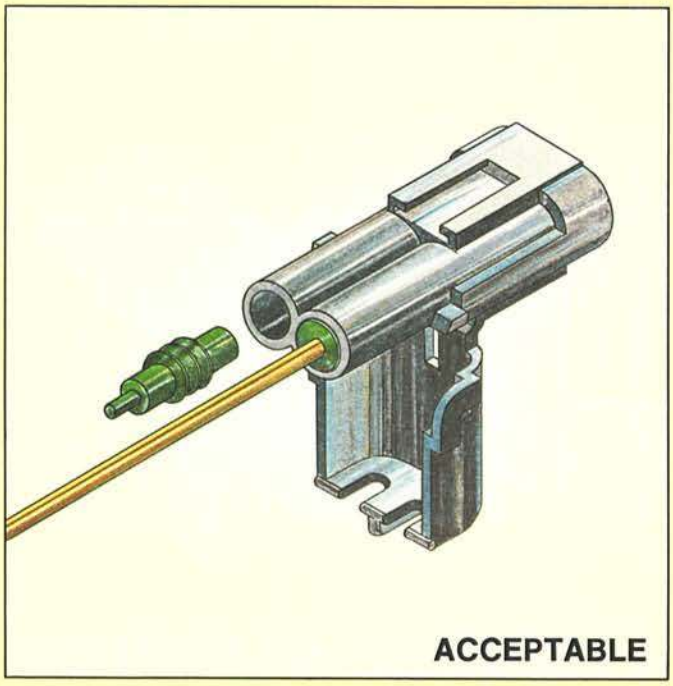
Assemble the terminated wire assembly to the connector manually.

PLUGGING THE TERMINALS



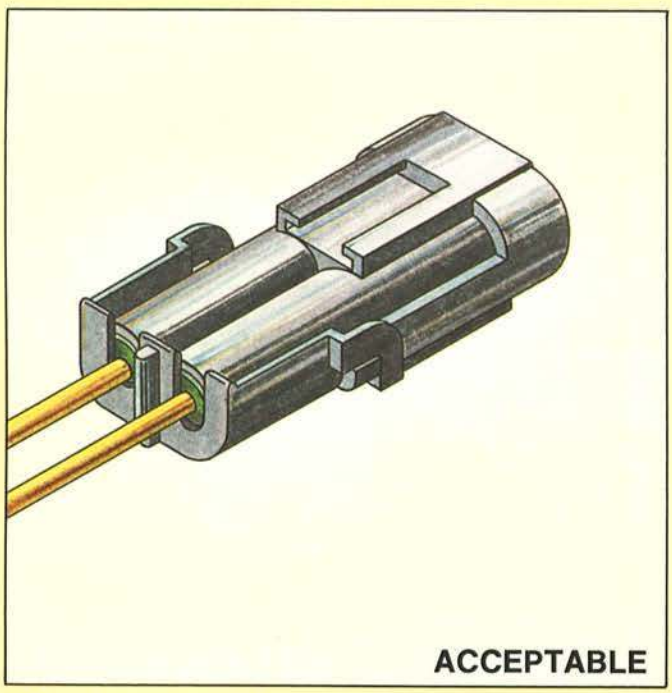
The "push, click, tug" method of plugging is recommended to prevent unseated terminals.

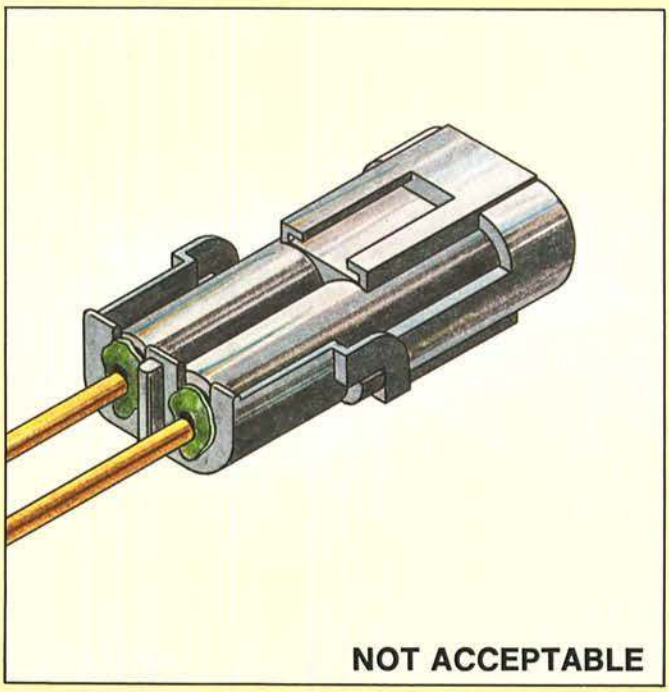
EMPTY CAVITIES



Empty terminal cavities must be filled with a cavity plug.

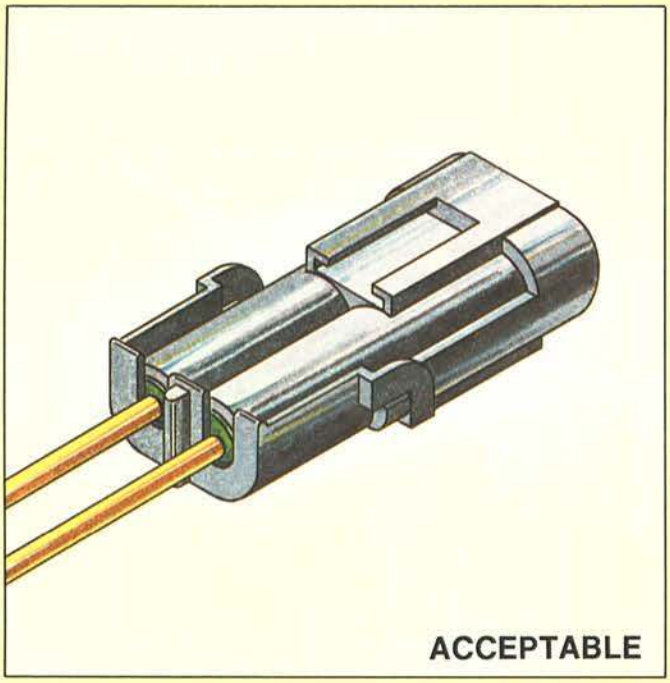
POSITION OF CABLE SEALS IN CONNECTOR BODY

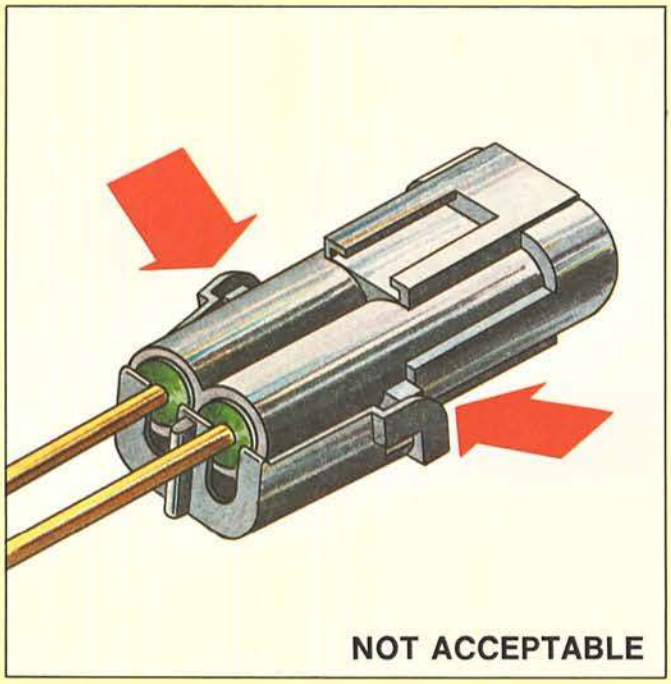




At least two ribs of the cable seal must be inside the connector cavity. The third rib may be outside the cavity, but must not be deformed by closure of the secondary lock.

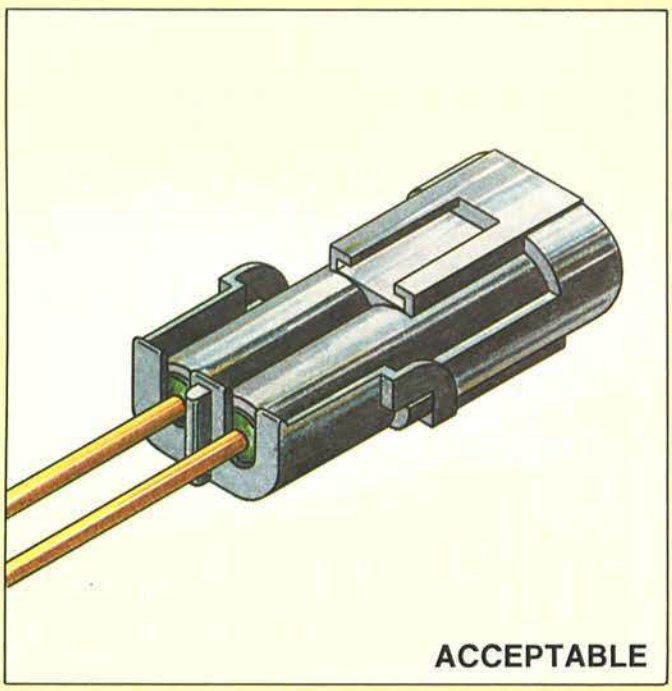
SECONDARY LOCK

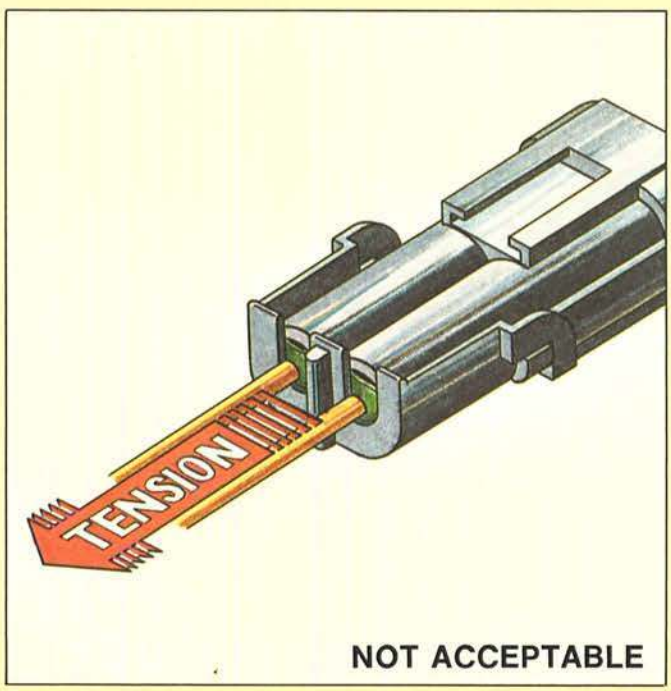




The secondary lock must be latched on both sides of the connector.

CONNECTOR WIRE TENSION

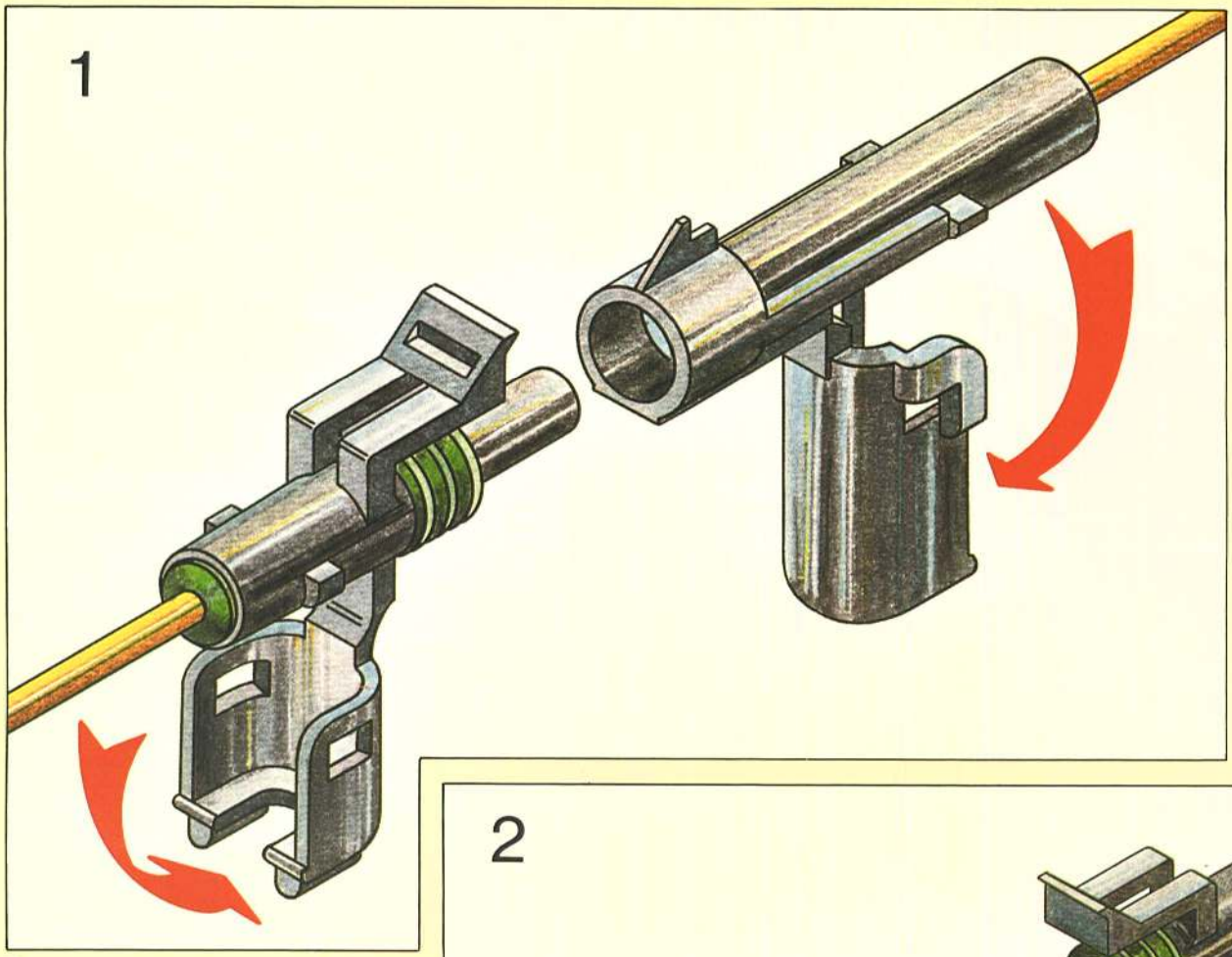




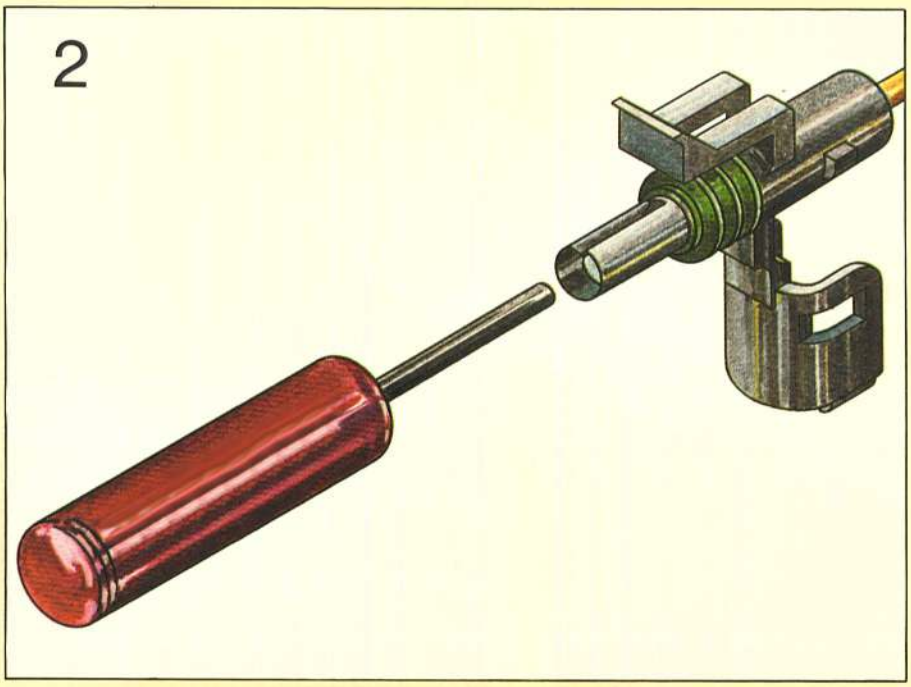
Care should be taken to minimize tension on connector wire leads.

Repair Procedure

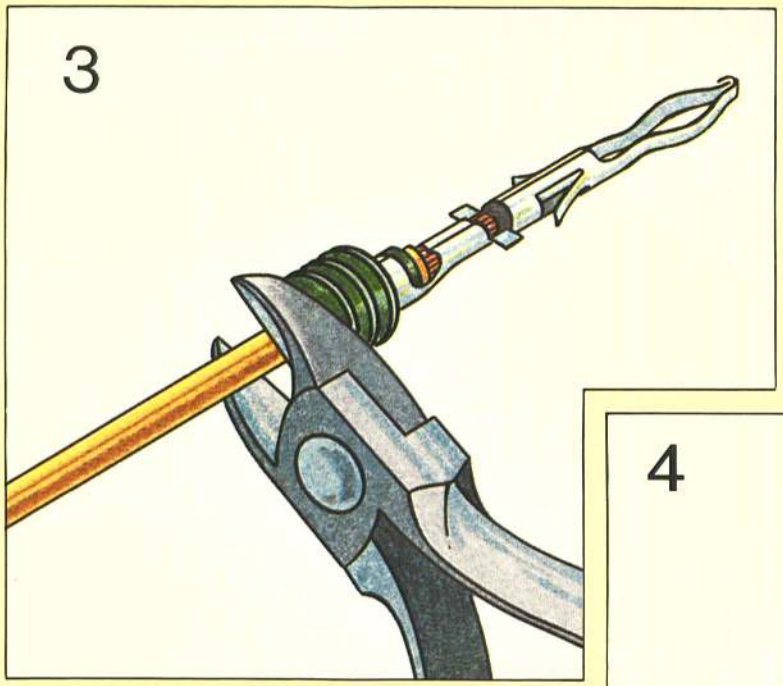
The following procedure should be used to repair *Seal-All* connectors.



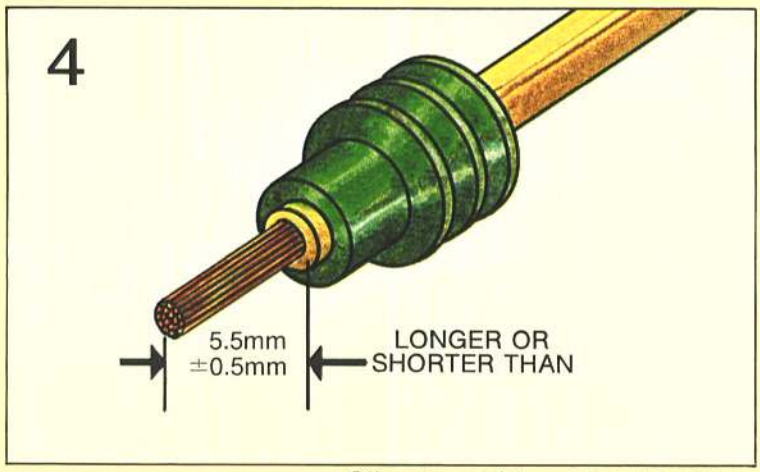
Disconnect the connector bodies. Unlatch and open secondary lock on connector.



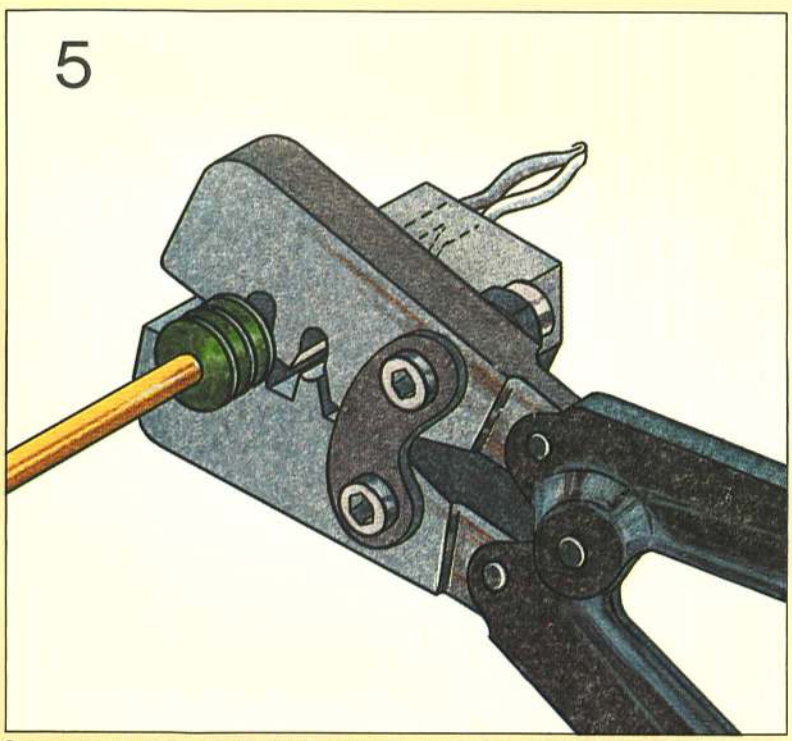
Remove terminals using Seal-All terminal removal tool (#WHTSATRT)



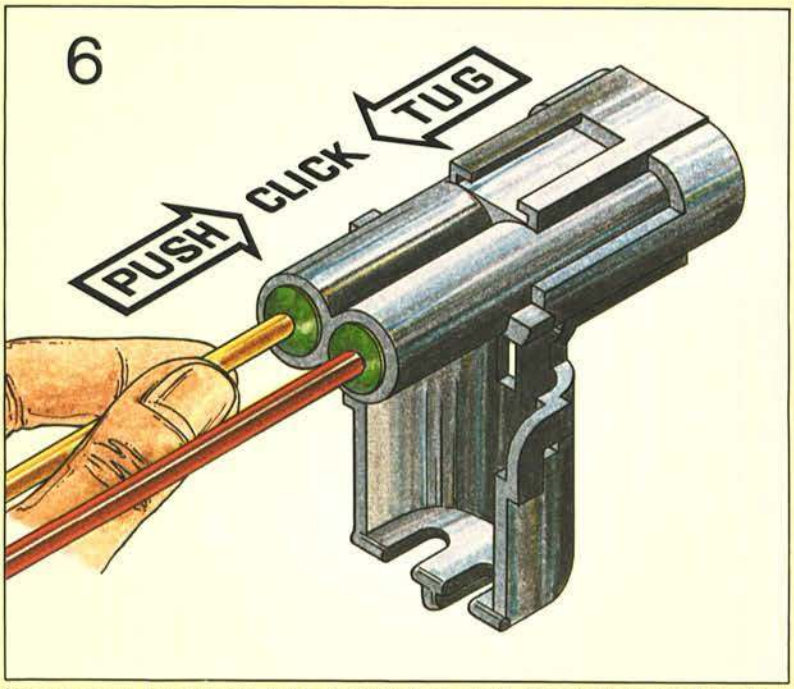
Cut wire immediately behind cable seal.



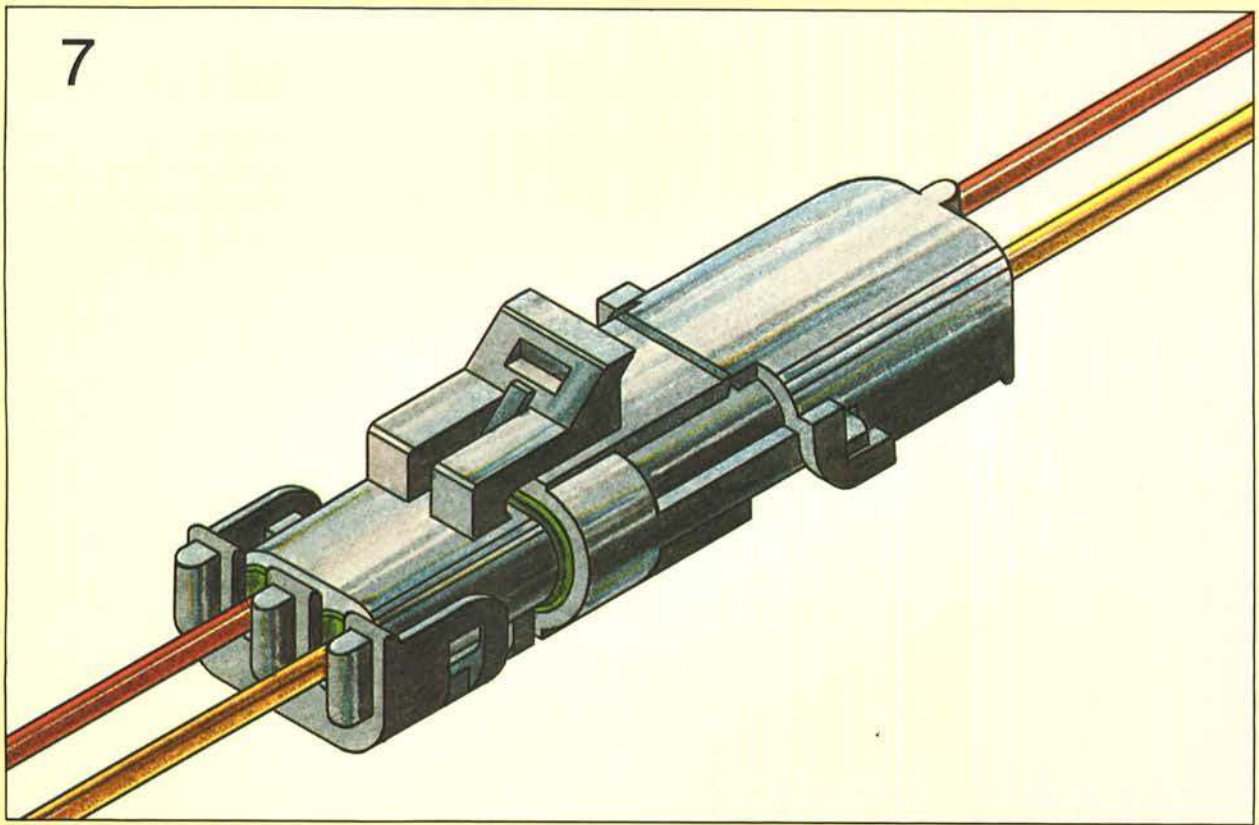
Slip new cable seal onto wire in direction shown. Strip 5.5 mm ±0.5 mm insulation from wire. Position cable seal as shown.



Crimp new terminal onto wire using standard crimp tool (#WHTPSAC or WHTSACT)
(Note: Core crimp must be soldered with rosin core solder. Insulation crimp must grip cable seals as shown. Only slight pressure should be applied for this crimp.)



Insert new terminals into connector until they click and lock into place. Be sure to maintain indexing by placing the proper wires into the same cavities as the original connector.



Close and latch secondary lock on connector body, and mate the connector halves.