

“MAXPAK” Square Cartridge Heater Lead Selection.....review for optimum performance.

Lead selection is a crucial aspect of application design. The appropriate lead system will maximize application reliability, minimize system maintenance and can simplify heater installation and removal for cleaning purposes. We recommend that the heater lead system requirements for each application be reviewed for the following operational characteristics, which could result in premature lead failure.

1. Is the lead area exposed to extreme temperatures.

Standard leads are rated at 842°F/450°C continuous operating temperature. If any portion of the leads are exposed to temperatures exceeding this rating an alternate lead option must be considered. In most tooling applications a short mineral insulated cable extension, ceramic filled tube extension or ceramic bead insulated pins will allow the leads to be connected in an area not exposed to temperature extremes.

2. Are potential contaminants present in the lead area.

Contaminants in the lead area can be absorbed into the heater and will carbonize causing grounding of the heater. If contaminants are present it will be necessary to move the lead exit area to a contamination free location or have the heater manufactured with a lead seal option. If space permits, a gasket and cover or a sealed electrical box can be added to the tooling to provide the required lead seal.

3. Will the leads be subject to severe vibration and flexing.

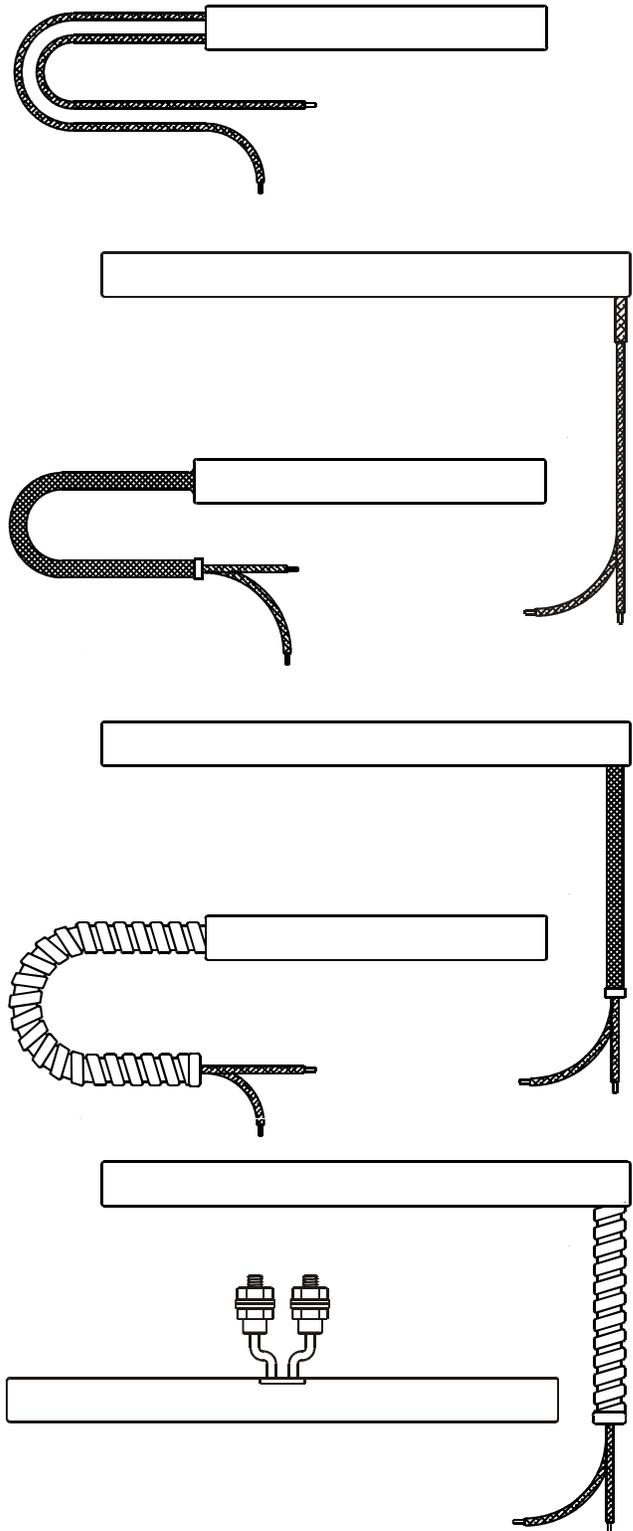
Heaters in many tooling applications are mounted in rapidly moving parts which can result in rapid lead failure. We recommend that these applications be equipped with some type of quick disconnect to permit easy replacement of the lead wiring when lead failures occur. Post terminals, terminal strips, terminal connectors, plugs and electrical boxes mounted on the heater or the moving heated part can all provide this quick wiring replacement feature.

4. Must heaters be removed often for system maintenance.

Post terminals, terminal strips, terminal connectors and plugs can all provide a quick disconnect feature to simplify heater removal. These connection methods can be applied directly to the heater, installed in a box secured to the tool or installed in a recess machined into the tooling.

5. Will the heated assembly be removed from the processing equipment and reinstalled on a frequent basis.

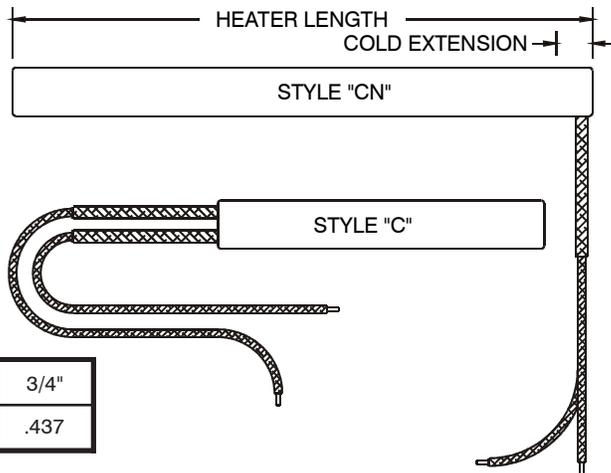
Most heated assemblies can be equipped with single or multiple circuit male plugs mounted directly to the tool or in an electrical box mounted on the tool. Plug systems simplify tool removal and eliminate damage to the heater leads during removal, handling and reinstallation.



Square Cartridge Lead Options

Style "C" And "CN" Crimp Connected Leads

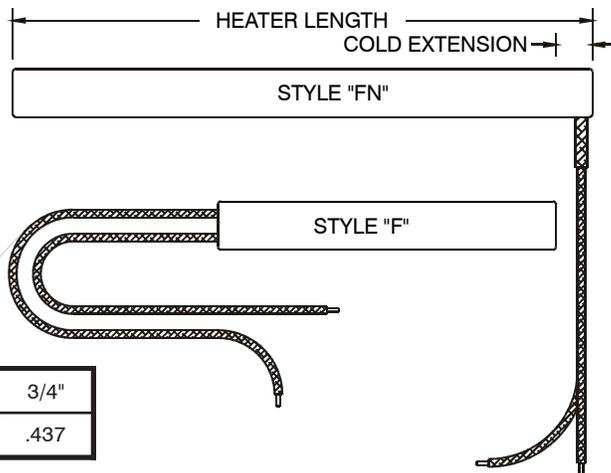
The "C" and "CN" lead configurations consist of stranded lead wire externally crimp connected to the solid pins exiting the heater. Style "C" leads exit straight out the end of the cartridge while the leads of the style "CN" exit out the side of the sheath at 90 degrees. The lead end of the style "CN" is covered by a welded in end cap. The pin and connection area of both styles are sheathed in an insulating layer of silicone rubber coated fiberglass sleeving. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Both "C" and "CN" lead styles are best suited to applications where lead flexing is minimal. A lead length of 10 inches, including the solid pin extension, is standard. When ordering, specify "C" or "CN" leads and the desired lead length.



Cartridge Size	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
Cold Extension	.250	.375	.375	.375	.375	.437	.437

Style "F" And "FN" Full Flexible Leads

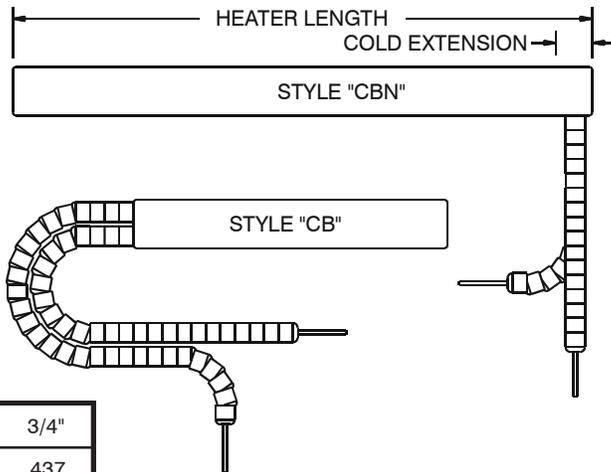
The "F" and "FN" style leads are internally connected to provide a fully flexible lead exit from the ceramic end cap. Style "F" leads exit straight out the lead end of the cartridge while the leads of the style "FN" exit out the side of the sheath at 90 degrees. The lead end of the style "FN" is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style "F" and "FN" leads can be bent sharply at the ceramic end cap without exposing or breaking the conductor and are popular in applications where the lead exit area is restricted. The table below shows the minimum allowable cold section required. A lead length of 10 inches is standard. When ordering, specify "F" or "FN" leads and the desired lead length.



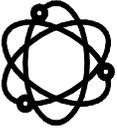
Cartridge Size	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
Cold Extension	.250	.375	.375	.375	.375	.437	.437

Style "CB" And "CBN" Ceramic Bead Insulated Leads

The "CB" and "CBN" style leads provide a customer specified length of solid pin leads with high temperature ceramic bead insulation. Style "CB" leads exit straight out the lead end of the cartridge while the leads of the style "CBN" exit out the side of the sheath at 90 degrees. The lead end of the style "CBN" is covered by a welded in cap. The lead styles "CB" and "CBN" are intended for applications where the heater leads are exposed to temperatures exceeding the rating of the standard lead insulation. "CB" and "CBN" leads are often combined with an additional length of crimped on conventional leads. Standard leads include 6 inches of beads on 8 inch pins. When ordering, specify "CB" or "CBN" leads, ceramic bead length and required pin length. Include any crimp connected lead length desired.



Cartridge Size	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
Cold Extension	.250	.375	.375	.375	.375	.437	.437

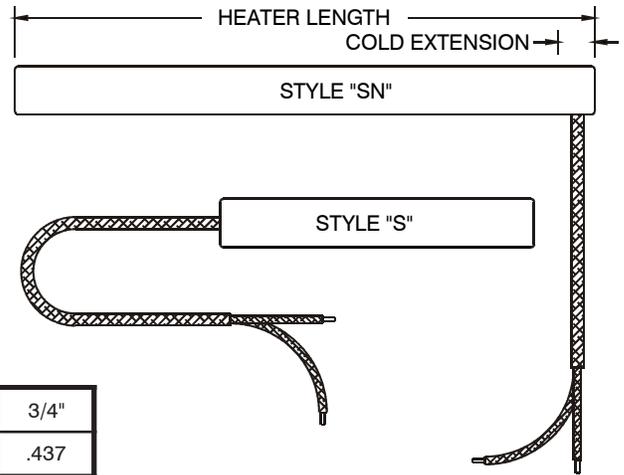


Square Cartridge Lead Options

Style "S" And "SN" Sleeve Protected Leads

The "S" and "SN" style leads feature full flexible leads with protective silicone coated fiberglass sleeving. Style "S" leads exit straight out the lead end of the cartridge while the style "SN" leads exit out the side of the sheath at 90 degrees. The lead end of the style "SN" is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style "S" and "SN" leads are popular in applications where external wiring is required and where some additional protection is necessary. The table below shows the minimum allowable cold section required. A lead length of 12 inches with 10 inches of braid is standard. Unless otherwise specified, leads are 2 inches longer than the requested braid length. When ordering, specify "S" or "SN" leads and desired lead and braid length.

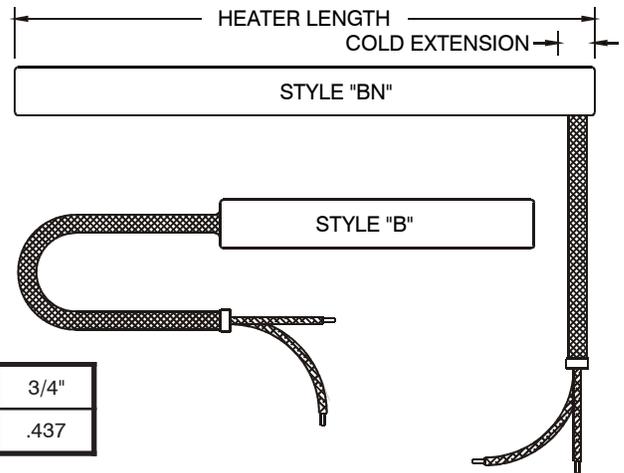
Cartridge Size	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
Cold Extension	.250	.375	.375	.375	.375	.437	.437



Style "B" And "BN" Braid Protected Leads

The "B" and "BN" style leads feature full flexible leads with protective stainless steel overbraid. Style "B" leads exit straight out the lead end of the cartridge while the style "BN" leads exit out the side of the sheath at 90 degrees. The lead end of the style "BN" is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style "B" and "BN" leads are popular in applications where external wiring is required and where some additional protection is necessary. The table below shows the minimum allowable cold section required. A lead length of 12 inches with 10 inches of braid is standard. Unless otherwise specified, leads are 2 inches longer than the requested braid length. When ordering, specify "B" or "BN" leads and desired lead and braid length.

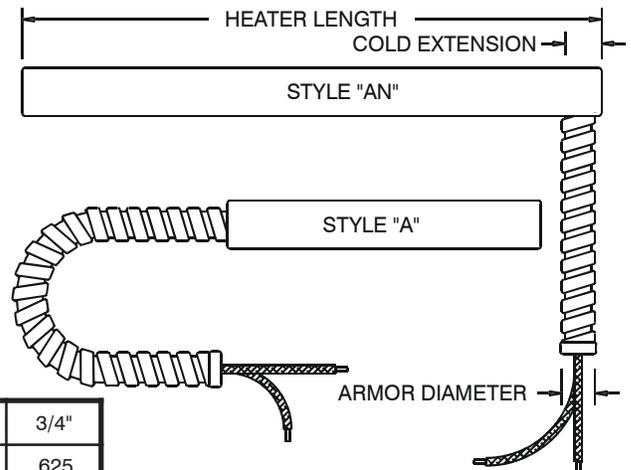
Cartridge Size	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
Cold Extension	.250	.375	.375	.375	.375	.437	.437



Style "A" And "AN" Armor Protected Leads

The "A" and "AN" style leads feature full flexible leads with protective stainless steel armor. Style "A" leads exit straight out the lead end of the cartridge while the style "AN" leads exit out the side of the sheath at 90 degrees. The lead end of the style "AN" is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style "A" and "AN" leads are popular in applications where external wiring is required and additional protection is necessary. The table below shows the minimum allowable cold section required. A lead length of 13 inches with 10 inches of armor is standard. Unless otherwise specified, leads are 3 inches longer than the armor length. When ordering, specify "A" or "AN" leads and desired lead and armor length.

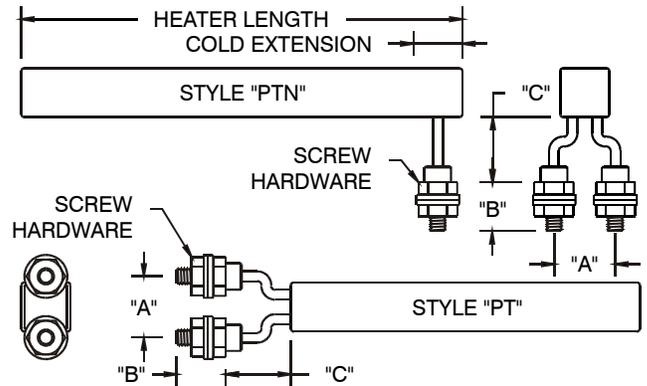
Cartridge Size	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
Cold Extension	.312	.375	.375	.500	.500	.625	.625
Armor O.D. (Max.)	.207	.207	.244	.275	.345	.437	.493



Square Cartridge Lead Termination Options

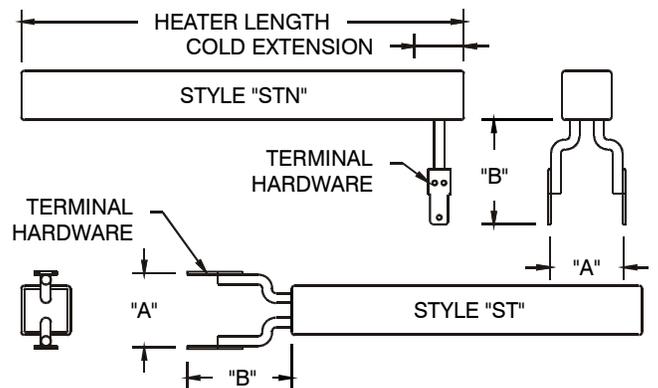
Style "PT" And "PTN" Post Terminals

The standard "PT" and "PTN" post terminals consists of stainless steel terminals securely welded to the pins exiting the heater and are available on heaters 1/2 inch or more in cross section. Special versions of the post terminal termination utilizing terminal blocks are available for all square cartridge sizes. The post terminal lead system provides a secure external termination for heaters installed in hard wired electrical systems where simple removal of individual heaters without disturbing the wiring. Standard post terminal configurations will be supplied on square cartridges 1/2 inch or larger unless otherwise specified. When ordering, specify "PT" or "PTN" termination. Include a sketch or description of any special terminal dimensions and thread specifications.



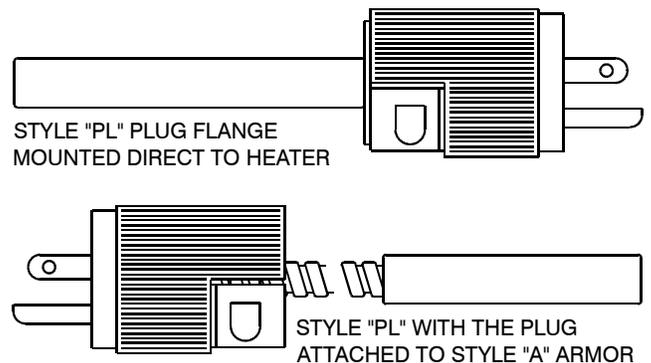
Style "ST" And "STN" Spade Termination

The "ST" and "STN" style terminations feature attached male spade connectors. The quick connect spade connectors are available in a range of standard sizes and configurations and can be attached to any of the square cartridge sizes. The style "ST" and "STN" terminations provide convenience in applications where the frequent connection and disconnection of the heater is required. When ordering, specify style "ST" or "STN" termination and note any special spade terminal size or design required. Include a sketch or description of any special terminal dimensions and thread specifications. Leads with matching female connectors can also be supplied. If required, please include the required lead type and lead length when placing your order.



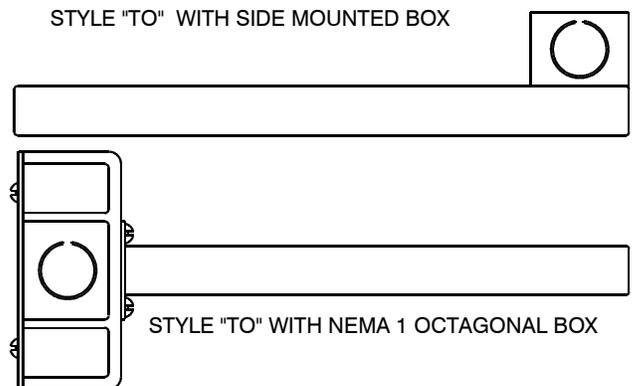
Style "PL" Plug Termination

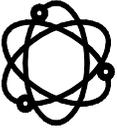
The "PL" style lead termination features an attached male plug with nylon dead front design and molded-in cord grip. High temperature european style plugs are also available. Other optional plugs include straight and twist-lock blade types in both grounded and ungrounded versions. The style "PL" plug termination can be attached directly to a heater or to any protected lead configuration. When attached directly to the heater a cold section may be required. The style "PL" termination is primarily intended for those applications where the frequent connection and disconnection of the heater is required. When ordering, specify style "PL" termination and provide a complete description of the plug or the manufacturers plug catalog number. Please also include mounting method, lead style and lead lengths when placing your order. A sketch may be required for special plug arrangements



Style "TO", "TM" And "TE" Box Termination

The "TO", "TM" and "TE" electrical box terminations feature electrical box enclosures mounted to the lead exit area of the heater. Box style terminations enclose the heater lead connections and provide application environmental protection. Style "TO" features a standard NEMA 1 octagonal box, style "TM" a NEMA 4 moistureproof box and style "TE" a NEMA 7 explosion proof box. Style "TO", "TM" and "TE" terminations are useful in applications where external wiring must conform to specific wiring codes or in applications where additional protection of electrical connections is necessary. When ordering, specify "TO", "TE" or "TE" box termination and desired terminal or lead style. If a specific box is required, please provide a complete description or manufacturers box catalog number.

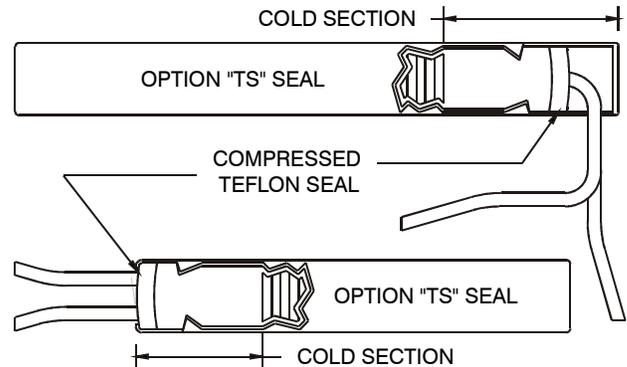




Square Cartridge Lead Seal Options

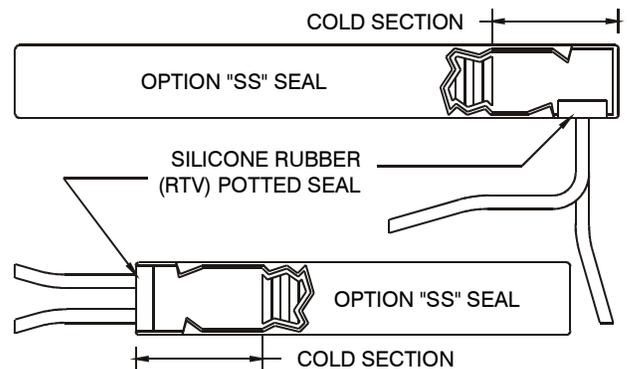
Style "TS" Compressed Teflon Plug Lead Seals

The style "TS" lead seals feature a swaged in teflon seal plug and teflon leads. The resulting lead construction provides a contamination resistant seal which reduces the possibility of contamination from liquids such as water and oil. The teflon seal is most effective in applications where the seal is exposed to temperatures below 275 °F. Depending on the application a 1 inch or longer cold section may be required to insure that the teflon seal and leads are maintained below recommended temperature limits. Teflon seals can be combined with most standard lead styles. When ordering specify seal option "TS". Please include desired lead style and length.



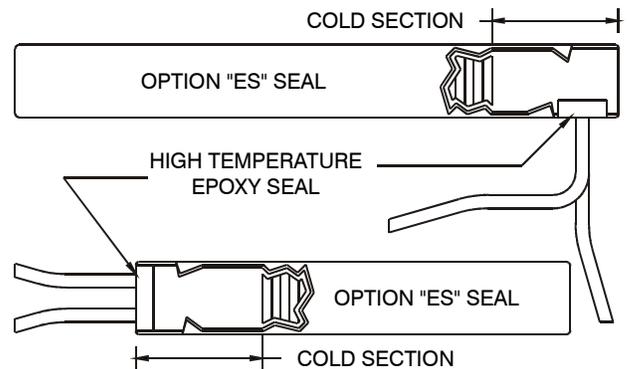
Style "SS" Silicone Rubber Potted Lead Seals

The style "SS" lead seals consist of silicone rubber sealant potted into a cavity at the lead end of the cartridge. The resulting seal construction reduces the possibility of contamination from liquids such as water and oil. The silicone rubber potted lead seal is most effective in applications where the seal is exposed to temperatures below 450 °F. Depending on the application a 1 inch or longer cold section may be required to insure that the silicone rubber seal and leads are maintained below recommended temperature limits. Silicone rubber seals can be combined with most standard lead styles. When ordering specify seal option "SS". Please include desired lead style and length.



Style "ES" Epoxy Potted Lead Seals

The style "ES" lead seals consist of high temperature epoxy potted into a cavity at the lead end of the square cartridge. The epoxy sealed lead construction provides both contamination and abuse resistance. The seal reduces the possibility of contamination from liquids such as water and oil. The standard epoxy seal is most effective in applications where the seal is exposed to temperatures below 500 °F. Epoxy with temperature ratings of 600 °F and 700 °F is available for higher temperature seal applications. Depending on the application a 1 inch or longer cold section may be required to insure that the epoxy seal is maintained below recommended temperature limits. Epoxy seals can be combined with most standard lead styles. When ordering specify seal option "ES". Please include desired lead style and length.



Style "CS" MI Cable Lead Seals

The style "CS" lead seals consist of two high temperature, single conductor, mineral insulated cables, braze sealed to the square cartridge. Leads are terminated into sealed transition fitting on each cable. The mineral insulated cable provides both contamination and physical abuse resistance. The seal reduces the possibility of contamination from liquids such as water and oil. The sealed cable area at the end of the cartridge can withstand temperatures up to 1200 °F. This construction requires a 1/2 inch cold section, in which to terminate the cable. Style "CS" seals can be combined with most standard lead styles. When ordering specify seal option "CS". Please include cable length, desired lead insulation and lead length.

