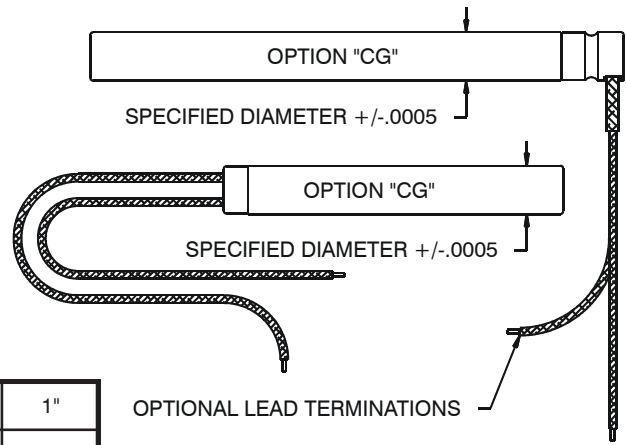


## Round Cartridge Mechanical Construction Options

### Option "CG" Centerless Grinding

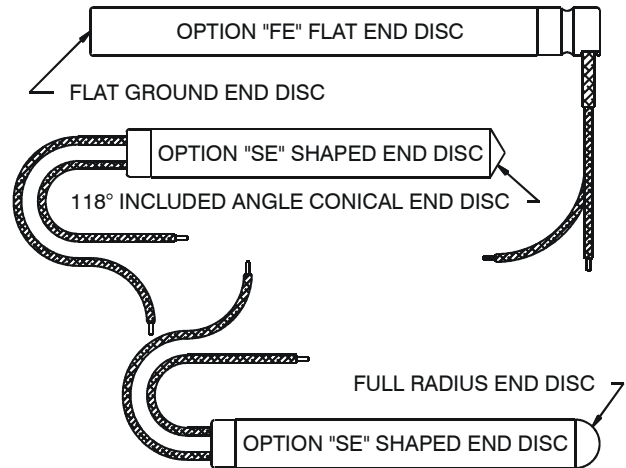
Cartridges can be centerless ground to precision diameter tolerances for improved cartridge to hole fit. This option is particularly useful in metal block heating applications where the cartridge is required to operate at the upper limits of its watt density capabilities. Please note that standard units are ground to a smaller than standard actual diameter. Diameter tolerances are held to  $\pm .0005$  on centerless ground cartridge heaters. When ordering, specify Option "CG". Cartridge heaters with finished diameters not shown in the table or with special diameter tolerances can be supplied. Please note any special requirements on your order.

Cartridge Dia.	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Precision Dia.	.241	.302	.363	.488	.613	.738	.984



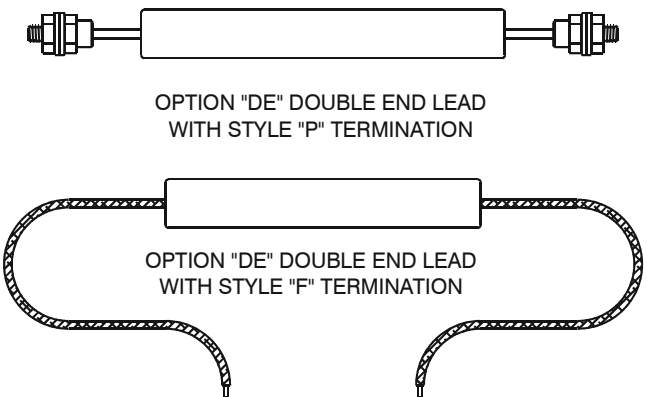
### Option "FE" And "SE" Flat And Shaped End Disc

A flat or shaped end disc configuration can be substituted for the normally concave end disc sealing the end of the cartridge. The flat and shaped end discs are commonly used to increase heat transfer into the extremities of an application by using a matching, flat bottomed or shaped hole. These options are useful in applications where process temperature at the end of the heated component is critical. These special end discs are often used in conjunction with distributed wattage to insure heat uniformity. Common shape variations include a 118 degree included angle cone designed to match the standard angle at the bottom of a drilled hole. When ordering please specify option "FE" or "SE". When option "SE" is selected, please enclose a sketch or clear description of the required shaped end disc configuration.



### Option "DE" Double End Termination

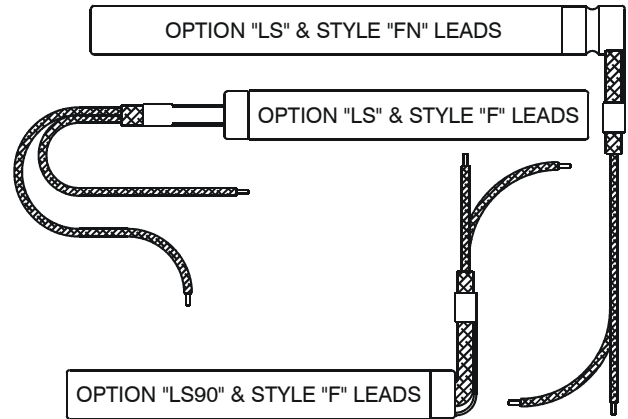
The double end lead termination provides an alternative lead connection system for heating applications with special wiring requirements. Common applications for the double end lead system include the retrofit of tubular elements utilizing existing wiring and multiple heater assemblies requiring combinations of series and parallel wiring to bus bar systems in applications where space is limited. The double end termination system is typically supplied with post terminals but can be equipped with any desired lead configuration and protection system. The full range of electrical and thermal construction options can be supplied in the double end termination configuration. Please specify option "DE" and include the desired lead style and lead length in your order.



## Round Cartridge Mechanical Construction Options

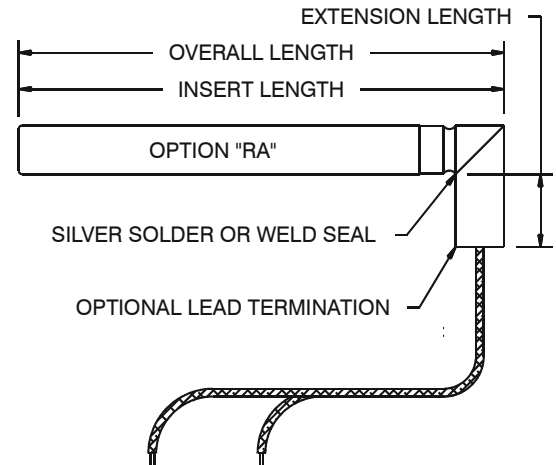
### Option "LS" Lead Support Clip

The lead support clip provides a simple and secure restraint system for the cartridge heater leads. A 3/4 inch long support clip is standard on heaters less than 1/2 inch in diameter. A 1 1/4 inch long clip is used on heaters 1/2 inch and larger in diameter. Support clips normally exit at the same angle as the lead style selected. Other exit angles can be supplied on request. Support clips can be used with all plain, sleeved and wire braid protected lead styles. Lead support clips are useful in protecting leads from external stress and can be utilized as pull tabs to simplify heater removal for maintenance. Clip supports in special configurations or with mounting holes can be supplied if required. To order, specify "LS" option and include any special requirements. Please include lead configuration in your order.



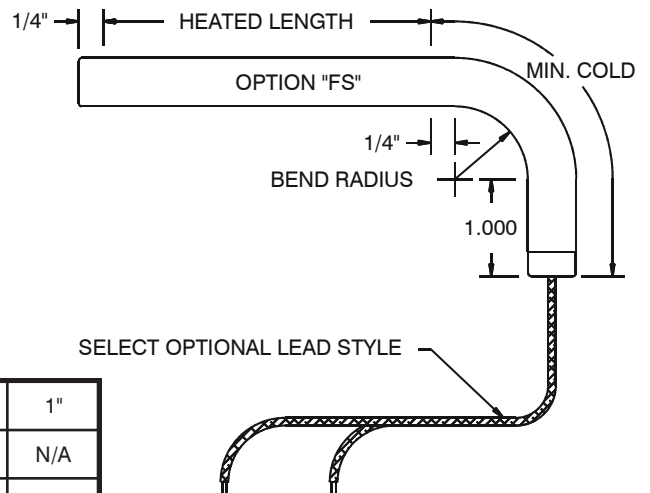
### Option "RA" Right Angle Sheath Extension

The "RA" construction option features a 90 degree tube extension securely brazed to the main sheath of the heater. This protective extension provides extra durability in applications where the lead exit area of the cartridge may be subject to extreme abuse. While the diameter of the tube extension is normally the same as that of the cartridge, it can also be supplied in customer specified alternate diameters. The extension is constructed of the same alloy as that used for the cartridge sheath. All standard lead constructions can be fitted to the right angle extension. To order, specify "RA" option and note your desired extension length as well as any special features you require. Include the desired lead configuration in your order.



### Option "FS" Formed Sheath

The "FS" formed sheath construction option provides a one piece 90 degree exit formed in a cold zone of the cartridge. The formed sheath construction is useful in liquid heating applications where the heater must make a 90 degree bend inside an enclosure and a fully sealed one piece sheath design is preferred. The formed end can also provide a self supported reorientation of the cartridge leads. The minimum radius of the bend varies in relation to the cartridge diameter. Minimum allowable bend radius for the various common cartridge diameters is indicated in the chart below. To order, specify "FS" option noting any special radius, bend angle and cold length requirements. Insure that your order includes the desired lead style.



Cartridge Dia.	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Min. Bend Radius	1/2	1/2	1/2	3/4	1	1 1/4	N/A
Min. Cold Length	2 1/4	2 1/4	2 3/8	2 7/8	3 3/8	3 7/8	N/A