

PG/PBN Element Guide

Element Properties

- Operates up to 1200°C (can operate at higher temperature for short periods of time, max 1500°C)
- Chemically inert to acidic or alkaline gases, organic solvents, most liquids, molten metals, and graphite.
- Electrical isolation due to PBN layer
- High thermal shock resistance
- High uniformity of heating face that qualifies to a uniformity percentage of; $\pm 2\%$ on heaters under 30mm and $\pm 5\%$ on heaters over 30mm on defined hot zone area
- High durability & thermal conductivity (1.6W/m-c)
- Fast ramp rates of 300°C/min for heaters over 30mm
- Low mass resulting in fast response (1.90-2.05 g/cc)
- Low outgassing making suitable for UHV

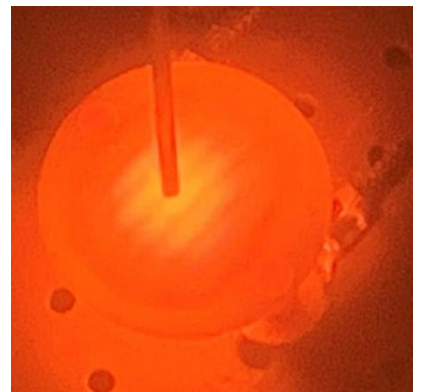
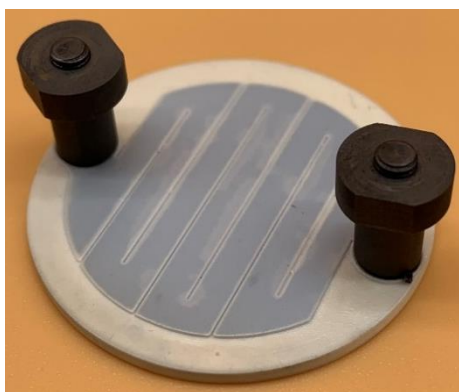
PG/PBN Specification

PG (Pyrolytic Graphite) and PBN (Pyrolytic Boron Nitride) combine through the process of high temperature CVD (Chemical Vapor Deposition) manufacturing to form a ceramic heating element capable of incredibly high thermal performance and stability.

An element path is machined into the PG layer to produce the element track and power connections prior to coating with PBN to insulate the PG Layer. Areas of exposed PG are left surrounding through holes for power connections which are typically located outside of the desired hot zone to give a better thermal uniformity or for compact areas can be located within the hot zone. Suitable for use in UHV, High Vacuum up to 1200°C and in air up to 300°C (exposed graphite pads will oxidise above this). PBN will start to oxidise at 800°C.

Applications

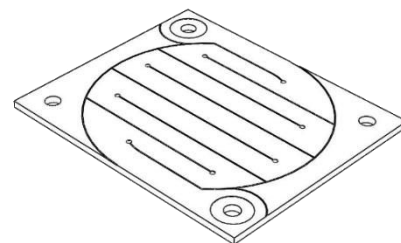
PG/PBN Elements have a wide range of applications. PBN products are well suited for use in Molecular Beam Epitaxy, Metal Organic Chemical Vapour Deposition (MOCVD), Crystal Growth and many other similar applications where high purity and chemical stability are required. PG/PBN elements are well suited for vacuum environments or in highly corrosive environments.



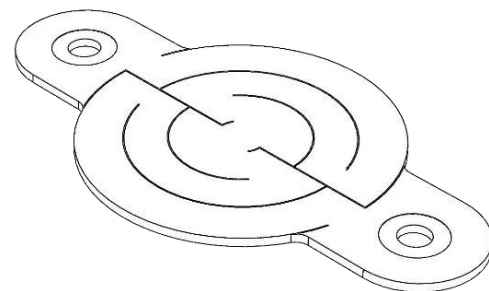
PG/PBN Heating Element Sizes

Thermic Edge offers a wide range of standard PG/PBN elements ranging from 0.5" to 4" circular elements and up to 2" circular with tabs along with 1" to 3" rectangular heating elements. Thermic Edge is also able to offer a variety of bespoke elements along with custom sizes/designs to suit your specifications and requirements.

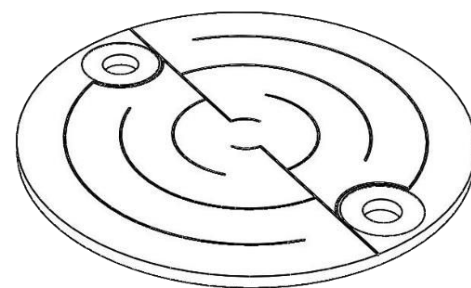
| Part No. | Heated Dia. | Resistance* (Ω) | Estimated Power** (W) |
|----------|-------------|--------------------|--------------------------|
| PCPBNR10 | 1" | 10-15 | 450 |
| | 25.4mm | | |
| PCPBNR20 | 2" | 10-15 | 1800 |
| | 50.8mm | | |
| PCPBNR30 | 3" | 10-15 | 4600 |
| | 75mm | | |



| Part No. | Heated Dia. | Resistance* (Ω) | Estimated Power** (W) |
|----------|-------------|--------------------|--------------------------|
| PCPBNP05 | 0.5" | 10-15 | 180 |
| | 12.7mm | | |
| PCPBNP07 | 0.75" | 10-15 | 270 |
| | 19.0mm | | |
| PCPBNP10 | 1" | 10-15 | 450 |
| | 25.4mm | | |
| PCPBNP17 | 1.75" | 10-15 | 1300 |
| | 44.5mm | | |
| PCPBNP20 | 2" | 10-15 | 1800 |
| | 50.8mm | | |



| Part No. | Heated Dia. | Resistance* (Ω) | Estimated Power** (W) |
|----------|-------------|--------------------|--------------------------|
| PCPBNC05 | 0.5" | 9.6-14.4 | 180 |
| | 12.7mm | | |
| PCPBNC10 | 1" | 10-15 | 450 |
| | 25.4mm | | |
| PCPBNC15 | 1.5" | 10-15 | 1050 |
| | 38.1mm | | |
| PCPBNC17 | 1.75" | 10-15 | 1300 |
| | 44.5mm | | |
| PCPBNC20 | 2" | 10-15 | 1800 |
| | 50.8mm | | |
| PCPBNC30 | 3" | 15-30 | 4600 |
| | 72mm | | |
| PCPBNC35 | 3.5" | 15-30 | 5800 |
| | 88.9mm | | |
| PCPBNC40 | 4" | 31.5-38.5 | 7200 |
| | 102mm | | |

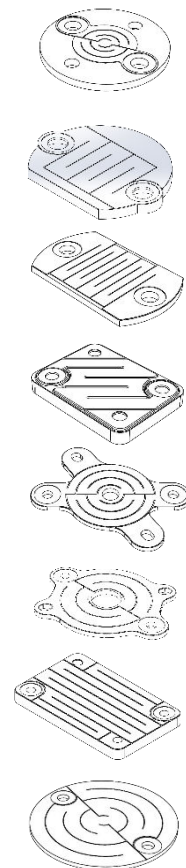


* Resistance at room temp.

** Estimated Power for unshielded element at 1000°C.

*** All Elements 1.3mm +/-0.3 unless otherwise specified

| Part No. | Heated Area (mm) | Size (mm) | Thickness (mm) | Resistance* (Ω) | Estimated Power** (W) |
|----------|------------------|-----------|----------------|--------------------------|-----------------------|
| PCPBNS01 | Ø9 | Ø 18 | 1.1 | 10-14 | 90 |
| PCPBNS02 | 10x10 | 20x15.5 | 1.5 | 5-10 | 172 |
| PCPBNS03 | 10x10 | 20x15 | 1 | 18-22 | 82 |
| PCPBNS04 | 16x12 | 16x12 | 2 | 5-10 | 100 |
| PCPBNS05 | Ø16.6 | 30x25 | 1 | 13-22 | 313 |
| PCPBNS06 | Ø22 | 30x25 | 1 | 13-22 | 275 |
| PCPBNS07 | 24x15 | 24x15 | 2 | 27-33 | 306 |
| PCPBNS08 | Ø38 | Ø50 | 1.5 | 15-20 | 400 |



Accessories

Thermic Edge also offers a range of accessories in specific kits for PG/PBN heaters to allow for electrical connections.

- Power Leg Screws in the following materials:
 - Graphite – Round head M2, M2.5, M3, M4 & M5
 - Ceramic – Round Head M2, M2.5, M3, M4 & M5
 - Ceramic – Countersunk Head M2.5, M3, M4 & M5 (counter sunk elements available upon request)
- Graphite Power Legs in a range of lengths and thread combinations.
- Graphite Nuts M2, M2.5, M3, M4 & M5, 3mm thick.
- Graphoil contact washers 0.5mm thick to suit above screw sizes.
- Pure Nickel Ring crimp terminals to suit above leg sizes.

