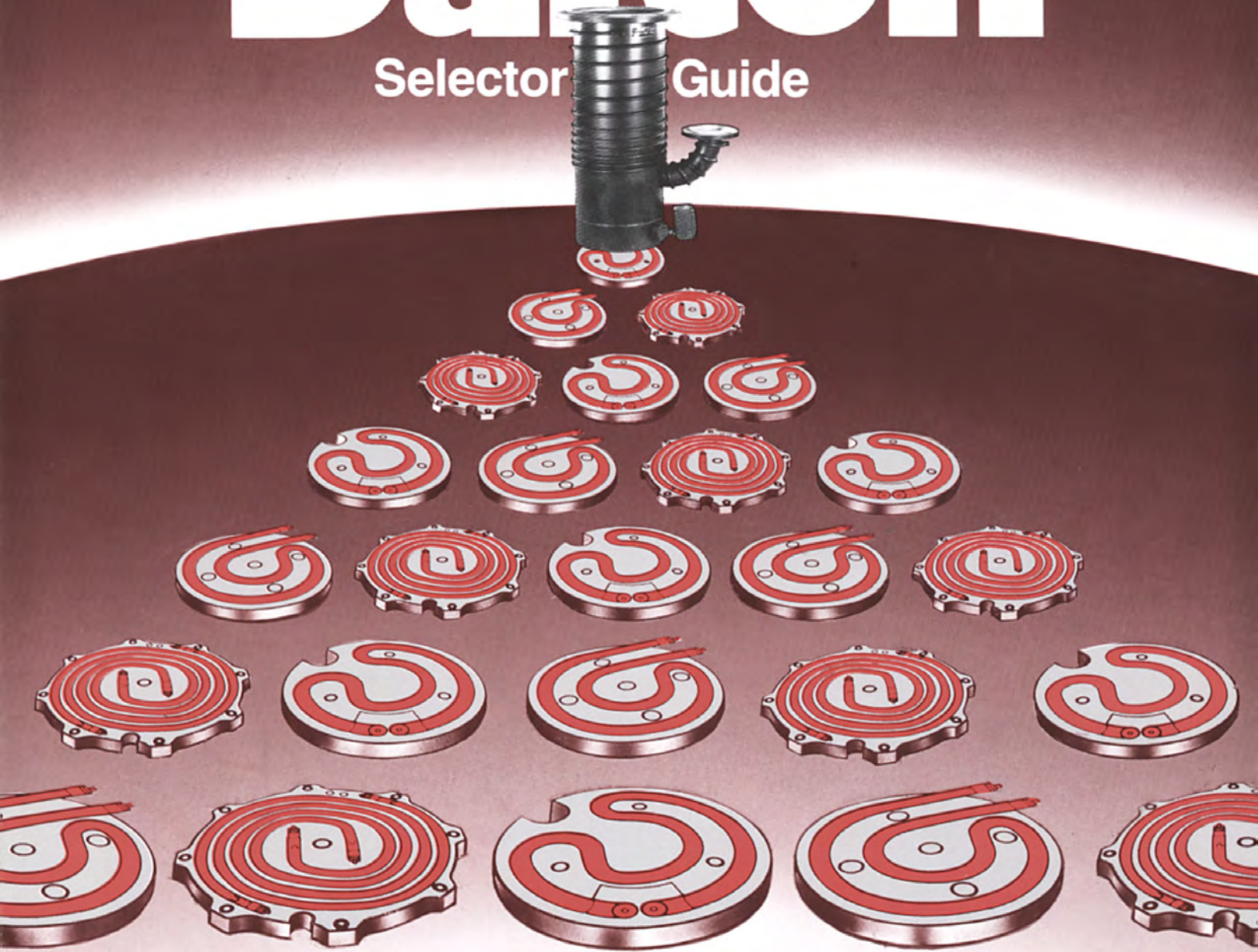


Dalton

Selector Guide



Heaters for Vacuum Diffusion Pumps

“Diff-Therm, the Proven Standard”

The Diff-Therm heater is a combination of high quality, tubular heating elements and grey iron castings (Platens and Rings) swaged together under 50 tons per square inch pressure. For over twelve years of service to the vacuum industry in the United States and Canada, these heaters have been the industry standard for long life, for uniformly distributed process heat and for efficient power generation.

Dalton Electric Heating manufactures stock Diff-Therm heaters for 2" through 48" Diffusion Pumps in over 100 combinations of electrical ratings and casting sizes (see current Trade Price Schedule). We also manufacture Diff-Therm heaters in custom casting dimensions and electrical ratings for use on obsolete and foreign-made pumps.

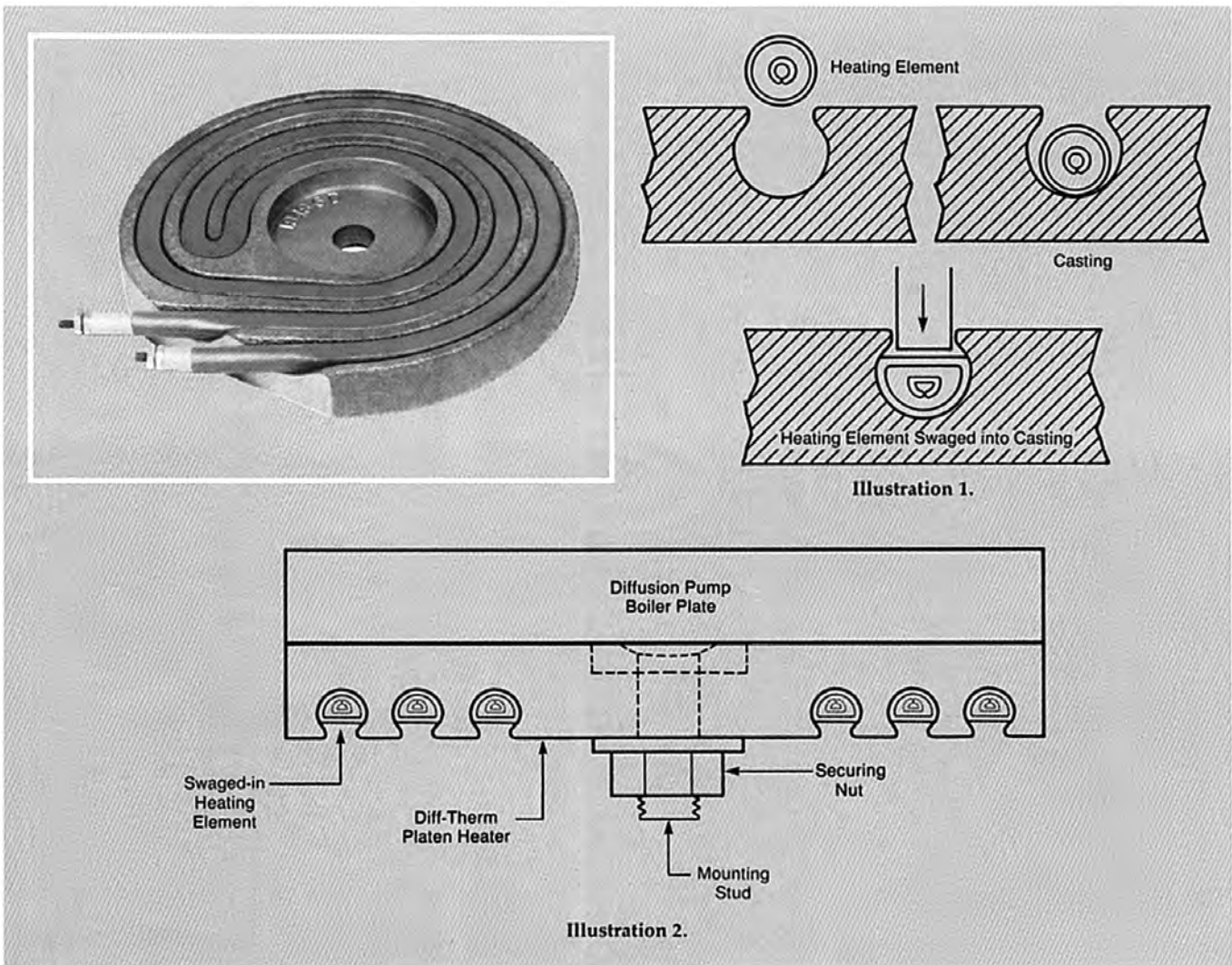
In summary, Diff-Therm heaters provide you with...

- easy heater selection;
- timely deliveries;
- easy installation;
- superior process heating;
- longer heater life.

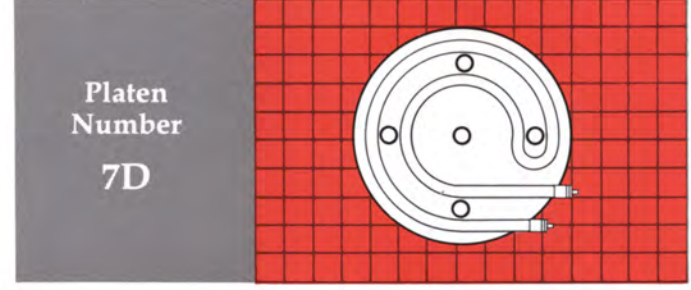
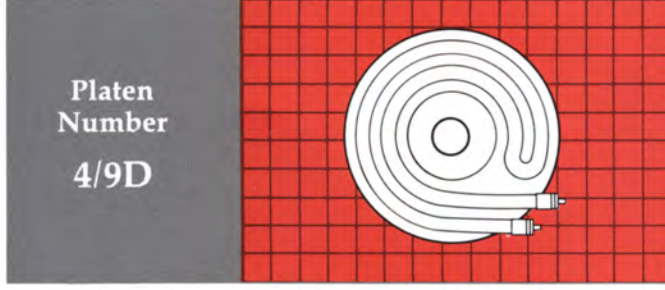
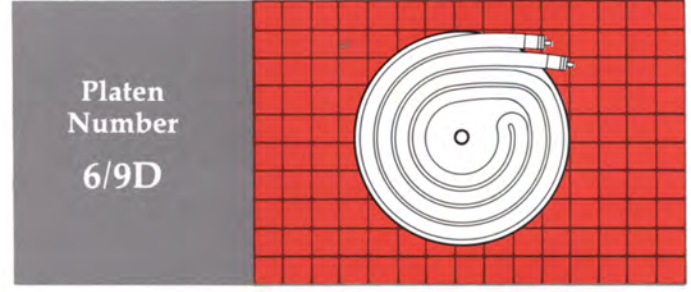
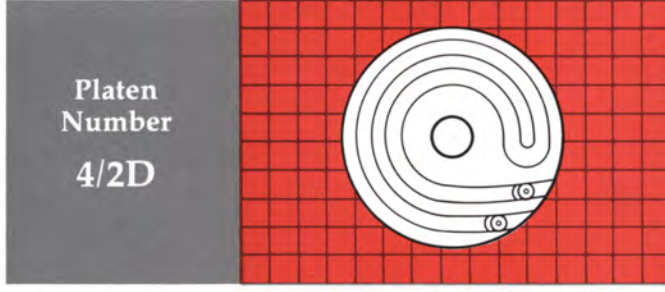
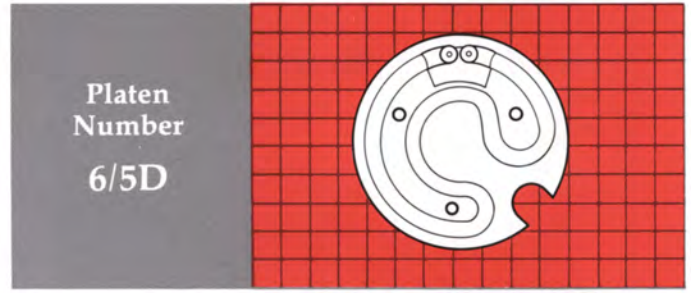
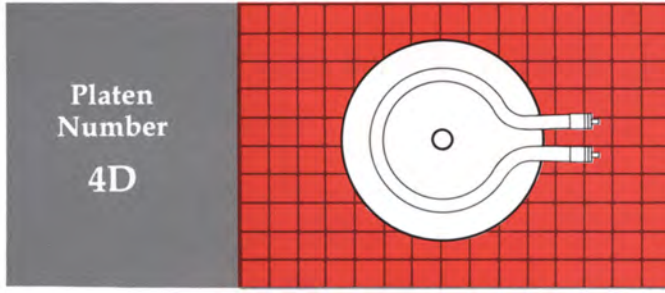
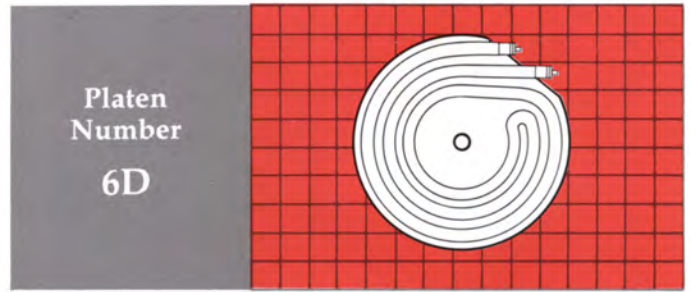
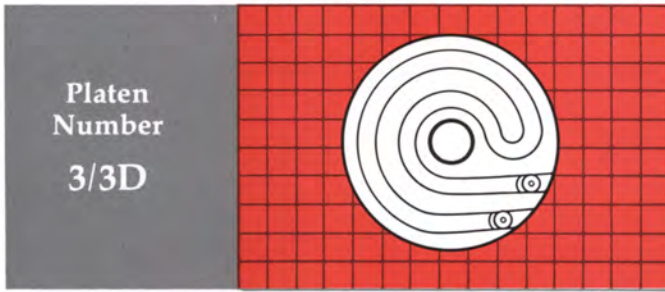
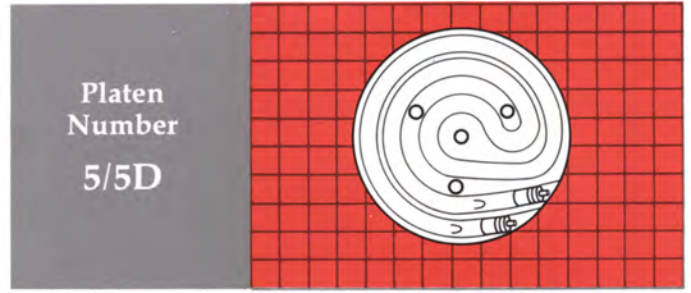
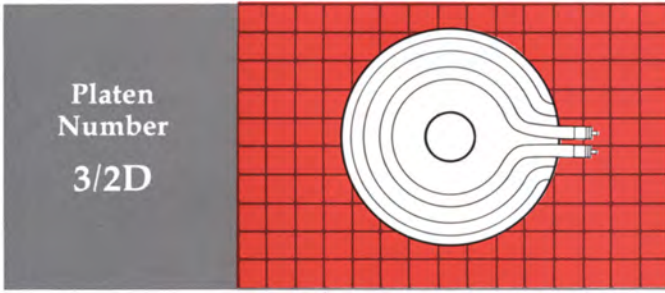
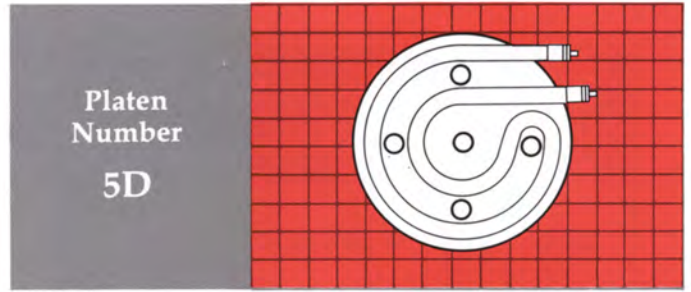
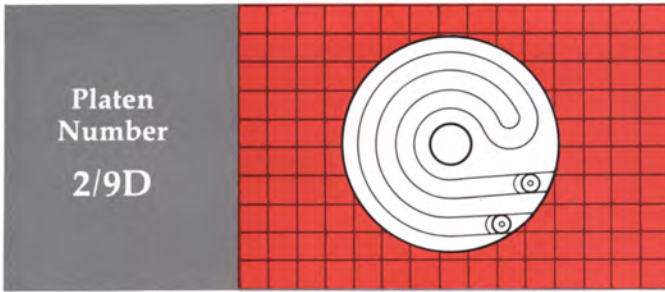
They are the proven, industry standard.

Illustrations 1 and 2 below tell the story of Diff-Therm's performance superiority over other, bolt-on Diffusion Pump heaters. Dalton manufactures tubular heating elements using only high purity magnesium oxide, nickel chrome resistance wire and stainless steel terminals for internal components. Special filling equipment and methods compact the magnesium oxide inside and around the resistor helix to extreme density which, coupled with swaging, gives Diff-Therm heating elements high dielectric strength and efficient internal heat conduction. These properties are then maximized as the heating elements are further compacted by being swaged into undercut grooves in the Diff-Therm castings. This process locks the heating elements into contact with the castings, creating uniform heat conduction into the castings along the entire length of the grooves.

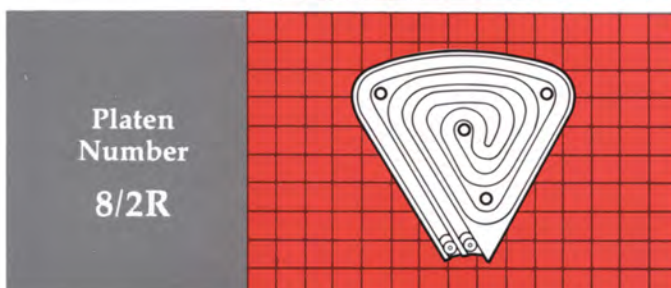
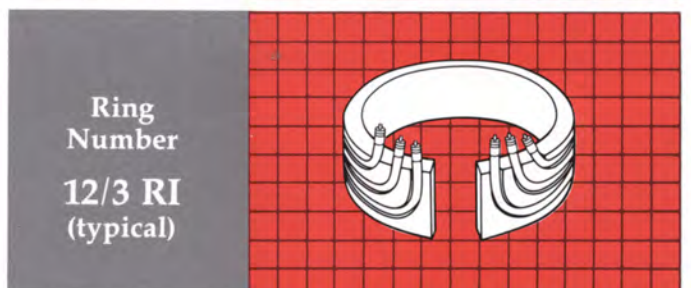
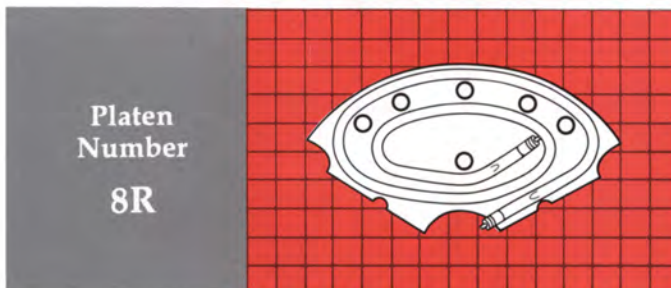
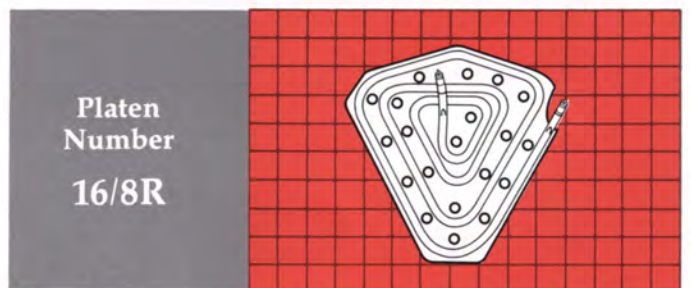
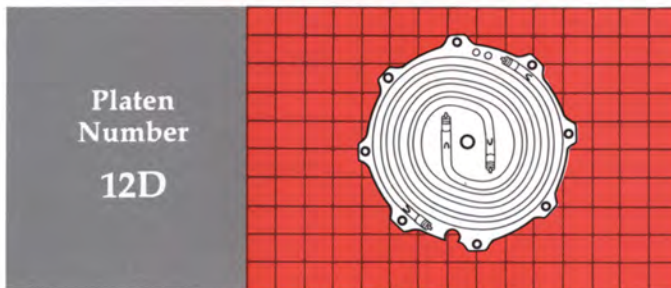
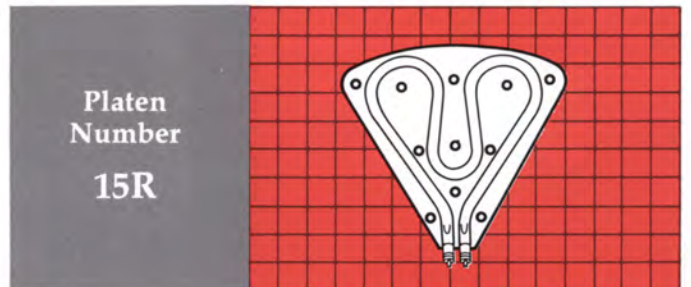
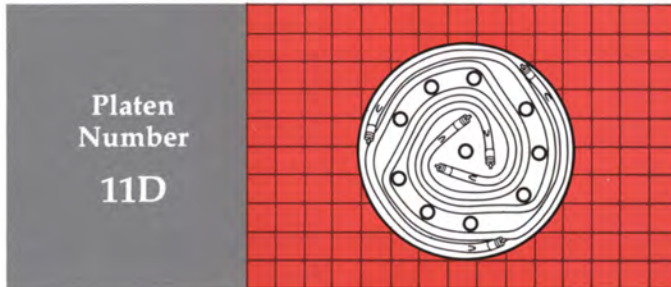
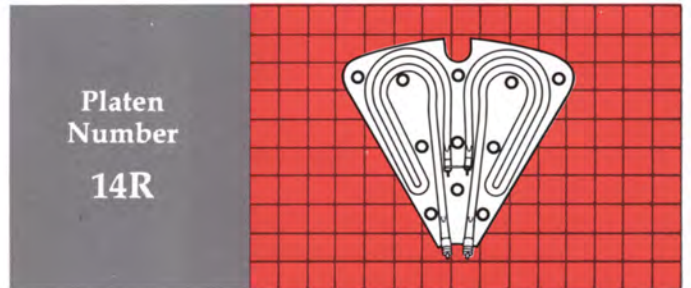
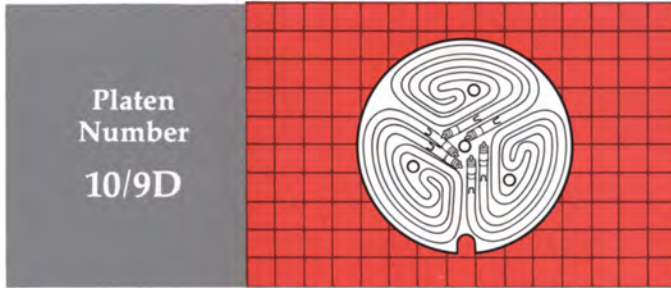
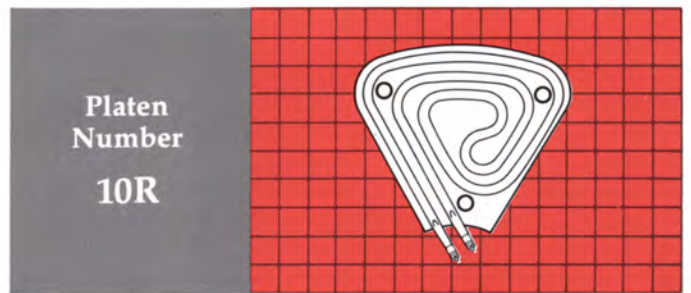
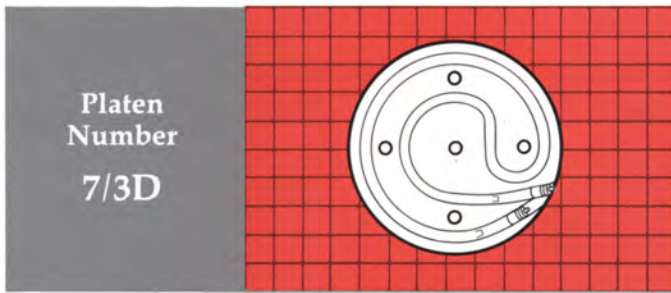
The surface of a Diff-Therm casting, which will be in contact with the Diffusion Pump boiler plate, is machined to a flat, smooth finish. When the assembled heater is bolted onto the Pump, heat is conducted efficiently and uniformly into the boiler plate for a steady vaporization of the Pump fluid.



Diff-Therm Platen and Ring Illustrations



Diff-Therm Platen and Ring Illustrations



**Refer to Page 6 for Additional
Diff-Therm Heater Information**

“Watt-Flex[®], a Superior Cartridge Heater”

Patent Nos. 3,934,333, 3,982,099 and 4,349,727 (other patents pending)

The Watt-Flex cartridge heater, like Diff-Therm, is a demonstration of Dalton’s advanced craftsmanship in the constructing and special configuring of high quality, tubular heating elements. The heater’s only internal components are the nickel chrome resistance coil, high purity/fine-grained magnesium oxide and stainless steel terminals. These components are compacted to maximum density by a proprietary filling process and by the bending, crushing and swaging of the heating element to its final, cartridge heater dimensions. Used in the vaporizing of Diffusion Pump fluid, Watt-Flex heaters...

- will not seize in bores;
- deliver process heat more efficiently;
- last up to three times longer.

Dalton manufactures stock Watt-Flex heaters for certain CVC and Varian Diffusion Pump models (see current Trade Price Schedule). Watt-Flex heaters are also manufactured in metric and English diameters to custom lengths and electrical ratings.



Easy Removability

DALTON WARRANTS THE REMOVAL OF WATT-FLEX HEATERS FROM DIFFUSION PUMP BORES AND SLEEVES. If you have to remove Watt-Flex heaters by drilling, we will replace the lost heaters free of charge! We are able to do this because Watt-Flex construction eliminates warpage which is the primary cause of bore seizure in other cartridge heaters. As shown in Illustration 1, conventional, cylindrically sheathed cartridge heaters warp when temperature differentials exist along the heater sheath. The temperature differentials occur since only one side of the heater is in contact with the bore. The result is often seizure during removal. With Watt-Flex, each half of the heater expands independently when energized and contracts when de-energized. Warpage is eliminated and heater removal is generally accomplished in minutes, not hours.

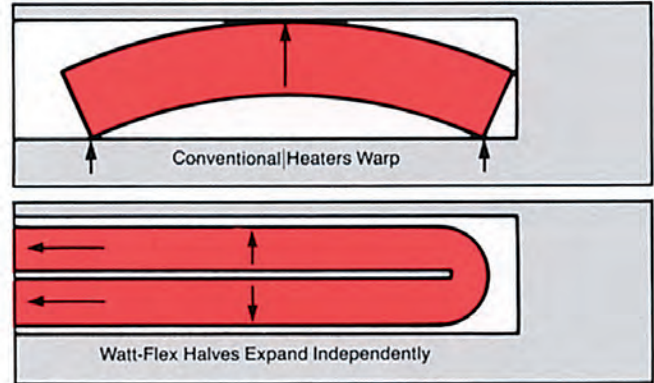


Illustration 1.

Efficient Heat Conduction

When the Watt-Flex heater is energized and expands outwardly against the wall of the surrounding bore (Illustration 2), the metal-to-metal contact between heater and heater plate results in efficient heat conduction and a smooth vaporization of Diffusion Pump fluid. Conventional cartridge heaters, owing to limited bore contact, produce less efficient radiant heating (Illustration 2).

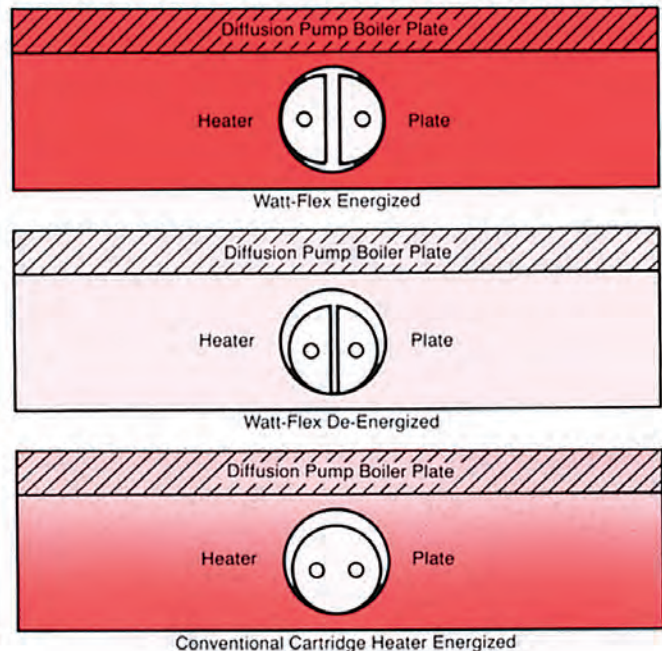


Illustration 2.

Longer Heater Life

The life of a resistance heater is directly related to its internal operating temperature; the higher the temperature, the shorter the life. Because of Watt-Flex’s greatly improved heat conduction into Diffusion Pump heater plates, the Watt-Flex resistance coil runs much cooler than conventional cartridge heater coils. The result is a significant increase in heater life.

SELECTOR INDEX¹

Diff-Therm Heaters for Vacuum Diffusion Pumps

Diffusion Pump Manufacturer ²	Platen Number	Platen Diameter (D) or Radius (R) ³	Number of Heating Elements in Platen	Location of Heating Element Terminals ⁴
CVC Products	2/9D	2 ¹⁵ / ₁₆ "-D	One	Inside - 90°
Denton Vacuum, High Vacuum Equipment	3/2D	3 ¹ / ₄ "-D	One	Outside - 0°
Perkin-Elmer, Veeco	3/3D	3 ⁵ / ₁₆ "-D	One	Inside - 90° or 45°
Varian/NRC, Edwards High Vacuum	4D	4 ¹ / ₃₂ "-D	One	Outside - 0°
Perkin-Elmer, Hitachi	4/2D	4"-D	One	Inside - 90° or 45°
Varian/NRC, CVC Products, Edwards High Vacuum	4/9D	4 ⁷ / ₈ "-D	One	Outside - 0°
Varian/NRC, High Vacuum Equipment, Torr Vacuum	5D	5 ¹ / ₈ "-D	One	Outside - 0°
Cooke Vacuum Products	5/5D	5 ¹ / ₂ "-D	One	Inside - 45°
Varian/NRC, Edwards, Veeco	6D	6"-D	One	Outside - 0°
CVC Products	6/5D	6 ¹ / ₂ "-D	One	Inside - 90°
CVC Products, Edwards High Vacuum	6/9D	6 ¹⁵ / ₁₆ "-D	One	Outside - 0°
Varian/NRC, High Vacuum Equipment, Torr Vacuum	7D	7"-D	One	Outside - 0°
Cooke Vacuum Products	7/3D	7 ¹ / ₂ "-D	One	Inside - 45°
CVC Products	10/9D	11 ¹ / ₁₆ "-D	Three	Inside - 45°
Varian/NRC, Torr Vacuum	11D	10 ¹⁵ / ₁₆ "-D	Three	Inside - 45°
Varian/NRC	12D	12 ¹ / ₂ "-D	Two	Inside - 45°
Varian/NRC	8R	8 ¹ / ₄ "-R	One	Inside - 45°
CVC Products	8/2R	8 ¹ / ₄ "-R	One	Inside - 90°
Varian/NRC, Edwards High Vacuum	10R	9 ¹ / ₄ "-R	One	Inside - 45°
Varian/NRC	14R	14 ¹ / ₄ "-R	Two	Inside - 45°
Varian/NRC	15R	14 ¹ / ₄ "-R	One	Inside - 45°
Varian/NRC	16/8R	16 ¹ / ₂ "-R	One	Inside - 45°

1. Refer to Dalton Trade Price Schedule for comprehensive pricing information on Stock and Custom Heaters for Diffusion Pumps. Also includes Pump Model Numbers and Sizes, OEM Heater Numbers, Heater Watts and Volts, Dalton Part Numbers, etc. Consult Factory for Platen Dimensions and details not listed above.

2. Diff-Therm Heaters originally designed for Diffusion Pumps of these manufacturers.

3. Radii listed above are measured between apex of the angle formed by extending Platen sides to a point and outside edge of Platen (see illustrations on page 5).

4. "Inside" and "Outside" relate terminal locations to the Platen perimeters. The angles listed are between the terminals and the surfaces of the Platens.

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