Manufactured from aluminum or bronze alloys, the platen heater consists of a tubular heating element that is designed and formed to provide maximum efficiency and temperature uniformity on the working surface of the casting. The platens can also be designed with integral cooling tubes or as stand alone cooling platens for chilling applications. The working surface of the platen heater can be supplied with various machined finishes to customer specifications. Durex can also provide a ground surface for stringent flat surface requirements. In addition, surface coatings of electroless nickel, Teflon®, and hard-coat anodizing can be applied per application requirements.

Mounting options can be cast in the design of the platen or machined as a secondary process. These options include threaded stand-offs, cast-in anchors, ribbed back supports, tapped holes, and mounting slots. Electrical terminations can be threaded terminals, flexible wire, three-prong electrical plugs, or NEMA housings. Durex manufactures all platen designs to customer specification. Engineering assistance is available to help create a new design or modify your existing one using our FEA analysis profiles and rapid prototype simulations.

**Design Features**
- Aluminum or bronze cast alloys
- Custom machined surfaces
- Surface coatings of electroless nickel, Teflon®, or anodized
- Liquid cooling option
- Flexible electrical terminations
- Single or three-phase electrical circuits
- Custom mounting options

**Typical Applications**
- Heat transfer presses
- Foodservice equipment
- Die heaters
- Packaging equipment
- Commercial pre-heaters
**Cast-In Heater Terminations**

**Electrical Terminations**

**TYPE S**
10-32 threaded screw terminal with ceramic insulator. Included nuts and washers. Type S standard for cast-in heaters. 6-32, 8-32 and metric sizes also available.

**TYPE A**
Right angle terminal block seated on mica washers with 10-32 threaded stud. Included nuts and washers.

**TYPE R**
Screw lug terminal seated on mica washers and welded to pin. Includes 8-32 screw for wire connection.

**TYPE T**
Ceramic insulator with ceramic top for insulation of electrical connections. Includes complete Type "S" termination with 10-32 threaded stud.

**TYPE HS**
Ceramic to metal hermetic seal is silver soldered directly to heating element for moisture-proof termination. 10-32 screw terminal includes nuts and washers.

**Cooling Tube Terminations**

**TYPE C1**
Plain cooling tube cut to standard 3” length extending from heater. Specify longer length if required.

**TYPE C2**
37° Flare nut fitting allows for cooling tube connection to compression fitting.

**TYPE C3**
Compression fitting mounted directly to cooling tube provides seal for high pressure hook up. Available in standard ⅜” and ½” NPT. ⅜” Dia. #55-0010  ½” Dia. #55-0011

**TYPE C4**
Brazed seal with locknut provide an effective seal for high pressure applications. Mating fittings available upon request.

**TYPE C5**
Brazed angle fitting mounted directly to cooling tube with right angle ⅜” FPT as standard. Specify L dimensions.

**TYPE C6**
Cast-in fitting with standard ⅜” FPT for quick installation of cooling lines with no additional fittings.
Cast-In Heater

Protective Housings

TYPE B1
Explosion proof cast iron housing with ½” NPT double hub. Single phase design shown. Larger housing for 3 phase design also available.

TYPE B2
Explosion proof cast iron housing with ½” NPT single hub. Single phase design shown. Larger housing for 3 phase design also available.

TYPE B3
Standard size stainless steel sheet metal box with two ½” electrical knockouts. Other sizes and types available.

TYPE B4
Stainless steel terminal enclosure with male ERGE plug mounted on top. Mating connections available upon request.

TYPE B5
Die cast aluminum enclosure with ½” or ¾” threaded electrical connections mounted to vented cooling tower. Other sizes and types available for single and 3 phase designs.

TYPE B6
Explosion proof box with ½” NPT single hub, designed for low profile applications. Single phase only. Different hub configurations are available.
Cast-In Heater Specifications & Special Services

<table>
<thead>
<tr>
<th>Cast Materials</th>
<th>Max. Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum 443</td>
<td>800°F (427°C)</td>
</tr>
<tr>
<td>Aluminum 319/356</td>
<td>700°F (371°C)</td>
</tr>
<tr>
<td>Bronze / Copper alloys</td>
<td>1400°F (769°C)</td>
</tr>
<tr>
<td>Iron</td>
<td>900°F (482°C)</td>
</tr>
</tbody>
</table>

If required, other cast materials are available.

CAST-In PROCESS
Cast-In perm-molded system uses steel permanent molds. No bake sand system for special castings and short production runs.

MACHINE FINISH
CNC machining is performed for tight tolerances and complex configurations. Milled finishes are provided per specification. Belt sanding, lapping and polishing available to meet application specifications.

Standard Machine Finish Range: 64-125 rms
Fine Finish Per Specifications: 8-32 rms
Standard Flatness:
  Belt Sanded: .015
  Milled: ± .005
  Lapped: .001

HOLEs, CUTOUTs, THERmowELLS
Mounting or clearance holes, cutouts, and thermowells for inserting temperature measurement probes, cast-in or machined per your specifications.

INSERTs
Threaded studs, precision component parts, bushings and special design parts cast accurately in place.

ELECTRICAL
Resistance tolerance NEMA standard +10% -5%.

Volatges:

<table>
<thead>
<tr>
<th>Element Diameter</th>
<th>.200</th>
<th>.260</th>
<th>.315</th>
<th>.430</th>
<th>.475</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Volts</td>
<td>240</td>
<td>240</td>
<td>277</td>
<td>600</td>
<td>600</td>
</tr>
</tbody>
</table>

(Three phase available on large heaters.)
Maximum watt densities depends on size and application. Consult a Durex engineer.

UL COMPONENT RECOGNITION
DA series cast-in heaters are recognized per file E110394.

RADIOGRAPH (X-RAY)
Confirmation of internal element configuration and casting soundness available through x-ray.

PLATING / COATING
Electroless nickel plating, anodize, Teflon® coatings and special blasted surfaces are available per customer specification.

PRESSURE TESTING
High pressure leakage testing done in-house per application requirements.

HEAT TREATING
Stress relieving and aging through heat treating available as required.

CMM INSPECTION
Coordinate Measuring Machine used for precision quality control of tight tolerance machining requirements.

HELIUM LEAK
Detect microleakage from casting body.

TEMPERATURE UNIFORMITY
Confirm heat uniformity across the finished surface.

CLASS 1000 CLEAN ROOM
Clean room assembly and packaging per class 1000 standards.

SOLIDWORKS 3D MODELING
Engineering software provides 3D models of proposed or existing product designs.

CUSTOM PACKAGING
Customer specific packaging for delicate surfaces, large multi-product shipments, or long term storage.

LIFE CYCLE TESTING
Life cycle test chamber for long term testing of uniformity and performance characteristics.

MATERIAL CERTIFICATIONS
Precise records and certifications on materials which require traceability to specific standards.

SENSOR CALIBRATION
NIST traceable calibration lab for calibration and certification of any temperature sensor requirements.

FEA ANALYSIS
Preview of proposed design construction using FEA analysis.
1. Always ensure that cast-in heaters are properly mounted to the application to avoid warping of flat heaters or “walking” of barrel heaters. After the initial start-up, retighten the heater mounting system to assure complete surface contact. Periodically check bolts or straps and tighten as required maintenance.

2. Tighten all liquid cool connections securely to avoid rupture from internal steam pressures. Cast-in C6 fittings or brazed connections are the most reliable. Properly maintain these connections to avoid leaks that will destroy the heater. Do not operate heating and cooling simultaneously to avoid thermal shock of the cooling tubes.

3. It is recommended that water used for liquid cooling applications be treated to avoid corrosion and hard water deposits that will clog the cooling tubes over time.

4. Install proper temperature control prior to operation of the heaters to ensure protection from over-temp situations which may damage the heater or equipment. Periodically changing temperature sensors is good preventive maintenance.

5. Electrical terminals must be properly insulated and made tightly to ensure safe operation. All heater installations must be properly grounded. All electrical terminations must be made per applicable Electrical Safety Codes and O.S.H.A. regulations.

6. Do not operate the heaters outside of the rated voltage and temperature of the design. This will cause the heaters to fail.

7. Always disconnect the electrical power to heaters prior to service.

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**Electrical Data**

![Wye or Star Connection](image1)

![Delta Connection](image2)

![3-Phase Open Delta](image3)

![2-Phase 4 Wire](image4)

![2-Phase 3 Wire](image5)

The energy put out by a heating unit is measured in watts. The power factor is always unity.

- Single Phase, \( W = P = EI \)
- Three Phase Delta, \( W = 3EI = 1.73 EI \)
- Three Phase Wye, \( W = 3el = 1.73 EI \)
- Two Phase 4 Wire, \( W = 2PI = 2 EI \)
- Two Phase 3 Wire, \( W = 2PR = 2 EI \)

(Voltage between outside wires = 1.41e)

Phase Amps = \( I = \frac{W}{E \times PF} \)

A.C., 3 Phase Amps = \( I = \frac{W}{1.73 E \times PF} \)

A.C., 2 Phase 3 Wire: Middle wire amps = Amps in outside wire x 1.41

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**Ohms Law**

- \( W = \text{Power, Watts} \)
- \( E = \text{E.M.F. Volts} \)
- \( I = \text{Current, Amperes} \)
- \( R = \text{Resistance, Ohms} \)
- \( \text{PF} = \text{Power Factor} \)

\[ I = \frac{W}{E} = \frac{E}{R} \]

- \( W = \text{Watts} \)
- \( E = \text{Volts} \)
- \( I = \text{Amps} \)

\[ VOlts = \frac{Watts \times Ohms}{Amps} \]

\[ Volts = \frac{Watts}{Amps} \]

\[ Ohms = \frac{Volts}{Amps} \]

\[ \text{Amps} = \sqrt{\frac{Watts}{Volts}} \]

\[ \text{Watts} = \text{Volts} \times \text{Amps} \]

\[ \text{Volts}^2 \times \text{Ohms} \]

\[ \text{Watts} = \text{Volts}^2 \times \text{Ohms} \]

190 Detroit Street, Cary, Illinois 60013 • Phone: 847-639-5600 • Fax: 847-639-2199 • Web: www.durexindustries.com • TOLL FREE: 800-762-3468