Infrared Radiant Heaters

The Safest, Most Efficient Alternative Wherever Flameless Heat is Required

Catalytic heating is the product of intensive research efforts to quantify the effectiveness of catalysts in promoting the reaction of combustive gases with oxygen or air to produce heat. There is no flame to create a hazard, and catalytic heat can operate efficiently on low-cost natural gas, butane or propane.

The use of catalytic heaters has been approved and accepted for dozens of industrial and petrochemical applications.

How the Catalytic Principle Works

The normal ignition temperature of natural gas (80%) in air (20%) at atmosphere pressure is given as 1260°F. In the presence of the catalyst, the reaction occurs with sufficient velocity to begin a chain reaction at 225°F. Thus, if natural gas is brought into contact with the catalyst at 225°F in the presence of oxygen, it is oxidized to carbon dioxide and water vapor. Sufficient heat is, therefore, evolved to raise the temperature of the bed of the heater and oxidation will continue as long as gas and oxygen are supplied.

No flame is produced under these conditions, since the gases are well below ignition temperature (1260°F). However, approximately the same amount of heat is produced as if the gas had been burned in the normal manner.

The thermal efficiency of a catalytic heater is substantially higher than a conventional heater. In the catalytic heating principle, a considerably larger proportion of the heat produced is radiant heat of wavelengths of 2–16 microns, and much less heat is required to heat the evolved gases.

Practically no heat is utilized to heat the large volume of nitrogen associated with the oxygen as in a conventional heater because most of the heat content of the carbon dioxide and water is recovered as radiant heat.

In a catalytic heater, the temperature attained in the catalyst bed is determined by two factors: the flow of the gas to the catalyst bed, and the rate at which oxygen diffuses through the bed to replace what was consumed in the reaction.

If the rate of gas flow is too high, not enough oxygen can enter to completely burn the gas. If the rate is too low, the gas is burned deeper in the bed and the surface cools. Therefore, the temperature of a catalytic heater is self-limiting and the system will operate stably for long periods of time without intervention as long as gas and air are supplied.

The Catalytic Principle

Catalytic heat is radiant heat. Radiant heat, like light, is electromagnetic wave energy that travels in straight lines at 186,000 miles per second, casts shadows, may be transmitted, absorbed or reflected by matter, and may be focused or dispersed by lenses or prisms of the proper material.

A source of radiant energy – such as a catalytic heater – floods the area around it with heat energy in the same way that light floods the area around it. The intensity of the heat energy varies with the square of the distance (as does light) and travels any distance without loss as long as it does not contact matter which absorbs it.

The absorption of radiant energy by various materials is a property specific to each material. Certain wavelengths will be absorbed to a considerable extent, others less, and some very little or not at all. Thus, each molecular substance has an infrared absorption spectrum which is a fingerprint of that substance. The absorption data for many substances can be found in an atlas of infrared absorption spectra.

Since the absorption of radiant heat is highly selective, there are many excellent application opportunities. By selecting proper substances to act as a filter between the source and object to be heated, all but the desired wavelengths can be filtered out.

Sample Applications for Bruest Catalytic Heaters

- Compressor Gas Preheat
- Regulators and Control Valves
- Gas Wellhead Heaters
- Peak Shaving Vaporizer Valves
- Enclosures of all Types
- Oil Production Well Injection, Offshore Platform Approved
- Personnel, Fixed or Portable
- Space Heaters, Compressor Stations
- Pipeline Heaters

Bruest Catalytic Heaters are approved for use by THE CANADIAN STANDARDS ASSOCIATION and FACTORY MUTUAL SYSTEM for hazardous locations Class 1, Group D, Division 2.
PRODUCE FLAMELESS INFRARED RADIANT HEAT
• Factory Mutual System and Canadian Standards Association approved for Group D locations
• Bruest gas fueled flameless infrared radiant heaters are extremely safe
• Face temperature approximately 850° F
• Bruest heaters can be thermostatically controlled
• Long life catalyst pad - No moving parts
• Over 50 years field proven reliability
• Easily Installed in the field
• Fuel - natural, L.P. (propane), or butane gas
• sizes - 1500 - 72,000 BTU input

TYPICAL APPLICATION
• Used for freeze protection and instrument heating on:
  CHOKES
  INSTRUMENTATION
  METERS
  ORIFICE TAPS
  REGULATORS
  VALVES
• Used for emergency heating - portable self-contained units:
  REMOTE AREAS
  PERSONNEL

FREEZE PROTECTION
For measurement or regulation equipment heating. Heaters are normally installed in an enclosure designed to fit a specific piece of equipment. This affords protection from wind or rain when used outdoors and improves heat transfer to the equipment.

INSTRUMENT HEATING
Small heaters can be positioned to focus radiant heat directly on control instruments that experience localized freeze problems. Thermostatic controls are available to prevent overheating equipment with sensitive seals and internal parts.
# Catalytic Heater Specifications

**Standard, FM and CSA Model Heaters**

**Stainless Steel**

<table>
<thead>
<tr>
<th>Heater Model</th>
<th>BTU/HR Input</th>
<th>N.G. CU.FT/HR</th>
<th>L.P. Cu.Ft/Hr</th>
<th>Heater Dimensions Inches</th>
<th>Fuel Inlet NPT</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-6</td>
<td>1500</td>
<td>1.5</td>
<td>.6</td>
<td>6.12 H x 6.12 W x 6.0 D</td>
<td>1/4&quot;</td>
<td>8 lbs.</td>
</tr>
<tr>
<td>R-8</td>
<td>2500</td>
<td>2.5</td>
<td>1.0</td>
<td>8.12 H x 8.12 W x 5.5 D</td>
<td>1/4&quot;</td>
<td>6 lbs.</td>
</tr>
<tr>
<td>8-8</td>
<td>2660</td>
<td>2.7</td>
<td>1.1</td>
<td>8.12 H x 8.12 W x 6.0 D</td>
<td>1/4&quot;</td>
<td>8 lbs.</td>
</tr>
<tr>
<td>6-12</td>
<td>3000</td>
<td>3.0</td>
<td>1.2</td>
<td>6.12 H x 12.12 W x 6.0 D</td>
<td>1/4&quot;</td>
<td>8 lbs.</td>
</tr>
<tr>
<td>R-12</td>
<td>5000</td>
<td>5.0</td>
<td>2.0</td>
<td>12.12 H x 12.12 W x 6.0 D</td>
<td>1/4&quot;</td>
<td>11 lbs.</td>
</tr>
<tr>
<td>10-12</td>
<td>5000</td>
<td>5.0</td>
<td>2.0</td>
<td>10.12 H x 12.12 W x 6.0 D</td>
<td>1/4&quot;</td>
<td>11 lbs.</td>
</tr>
<tr>
<td>12-12</td>
<td>6000</td>
<td>6.0</td>
<td>2.4</td>
<td>12.12 H x 12.12 W x 6.0 D</td>
<td>1/4&quot;</td>
<td>12 lbs.</td>
</tr>
</tbody>
</table>

Other various sizes

**NOTE:**

1. Specify when ordering:
   
   (a) Model of heater - FM - CSA - Standard
   - Standard heaters are for use in non-hazardous locations
   - FM approved heaters are for use in Class 1-Division 2-Group D locations
   - CSA approved heaters are for use in Class 1-Division 1 - 2 - Group D locations

   (b) Fuel.
   - Natural, L.P. (propane), or butane gas

   (c) Starting voltage.
   - 12 volt DC • 120 volt AC • 240 volt AC • 480 AC

2. Heaters are designed and orificed to operate on a standard fuel inlet pressure of 3 1/2" or 7" W.C. for natural gas and 11" W.C. for L.P. (propane) and butane gas.

3. FM model heaters are approved by Factory Mutual Research for use in Class 1 - Division 2 - Group D locations, and are equipped with a thermocouple - safety shut-off valve - and steel junction box. Explosion proof junction box is optional at an additional charge.

4. Canadian Standards Association model heaters are approved for use in Class 1 - Division 1 and 2 - Group D locations, and are equipped with a thermocouple - safety shut-off valve - explosion proof junction box - appliance type regulator (natural gas only) and manual shut-off valve.
PRODUCE FLAMELESS INFRARED RADIANT HEAT

- Factory Mutual System and Canadian Standards Association approved for Group D location
- Bruest gas fueled flameless Infrared radiant heaters are extremely safe
- Face temperature approximately 850° F
- Bruest heaters can be thermostatically controlled
- Long life catalyst pad - no moving parts
- Over 50 years field proven reliability
- Easily installed in the field
- Fuel - natural, L.P. (propane), or butane gas
- Sizes - 1500 - 72,000 BTU input

TYPICAL APPLICATIONS

- Used for Building Heating
  COMPRESSOR BUILDING
  FIRE PUMP BUILDING
  METER HOUSE HEATING
  PERSONNEL HEATING-FIXED OR PORTABLE
  PIPE LINE HEATING
  OFFSHORE PLATFORMS

- Used for Instrument Heating
  CONTROL INSTRUMENTS
  SMALL REGULATORS
  SMALL VALVES
  ELECTRONIC MEASUREMENT

- Used for Freeze Protection
  CHOKES
  DUMP VALVES
  LEVEL CONTROLLERS
  METERS
  ORIFICE FITTINGS
  VALVES
  REGULATORS

METER HOUSE HEATING

Small Capacity Bruest rectangular heaters are used extensively for heating meter houses, and when applied properly, they will prevent freezing in almost any climate in addition to the extreme safety they provide. Bruest heaters conserve energy by heating troublesome equipment, frequently replacing larger, more expensive line type heaters.

HAZARDOUS SPACE HEATING

When heat is required in an area where a hazardous condition exists, Bruest has the answer. Typical applications are compressor buildings, meter houses, flammable materials storage, offshore platforms and many other similar locations.
# CATALYTIC HEATER SPECIFICATIONS

*Standard, FM and CSA Model Heaters*

*Stainless Steel*

<table>
<thead>
<tr>
<th>HEATER MODEL</th>
<th>BTU/HR. INPUT</th>
<th>CU.FT./HR. N.G.</th>
<th>HEATER L.P.</th>
<th>HEATER H</th>
<th>HEATER W</th>
<th>DIMENSIONS INCHES</th>
<th>STARTING VOLTAGES</th>
<th>FUEL INLET NPT</th>
<th>SHIPPING WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-24</td>
<td>6000</td>
<td>6.0</td>
<td>2.4</td>
<td>6.12</td>
<td>24.12</td>
<td></td>
<td>6.5 x x - - -</td>
<td>1/4&quot;</td>
<td>12 lbs.</td>
</tr>
<tr>
<td>12-24</td>
<td>12000</td>
<td>12.0</td>
<td>4.8</td>
<td>12.12</td>
<td>24.12</td>
<td></td>
<td>6.5 x x - x -</td>
<td>1/4&quot;</td>
<td>17 lbs.</td>
</tr>
<tr>
<td>12-36</td>
<td>18000</td>
<td>18.0</td>
<td>7.2</td>
<td>12.12</td>
<td>36.12</td>
<td></td>
<td>6.5 x x - - -</td>
<td>1/2&quot;</td>
<td>23 lbs.</td>
</tr>
<tr>
<td>12-48</td>
<td>24000</td>
<td>24.0</td>
<td>9.6</td>
<td>12.12</td>
<td>48.12</td>
<td></td>
<td>6.5 - x x x x</td>
<td>1/2&quot;</td>
<td>38 lbs.</td>
</tr>
<tr>
<td>12-60</td>
<td>30000</td>
<td>30.0</td>
<td>12.0</td>
<td>12.12</td>
<td>60.12</td>
<td></td>
<td>6.5 - x x x x x</td>
<td>1/2&quot;</td>
<td>42 lbs.</td>
</tr>
<tr>
<td>12-72</td>
<td>36000</td>
<td>36.0</td>
<td>14.4</td>
<td>12.12</td>
<td>77.25</td>
<td></td>
<td>6.5 - x x x x x</td>
<td>1/2&quot;</td>
<td>46 lbs.</td>
</tr>
<tr>
<td>18-36</td>
<td>28000</td>
<td>28.0</td>
<td>11.2</td>
<td>18.12</td>
<td>36.12</td>
<td></td>
<td>6.5 - x x x x</td>
<td>1/2&quot;</td>
<td>40 lbs.</td>
</tr>
<tr>
<td>18-48</td>
<td>37000</td>
<td>37.0</td>
<td>14.8</td>
<td>18.12</td>
<td>48.12</td>
<td></td>
<td>6.5 - x x x x x</td>
<td>1/2&quot;</td>
<td>50 lbs.</td>
</tr>
<tr>
<td>18-60</td>
<td>45000</td>
<td>45.0</td>
<td>18.3</td>
<td>18.12</td>
<td>60.12</td>
<td></td>
<td>6.5 - x x x x</td>
<td>1/2&quot;</td>
<td>55 lbs.</td>
</tr>
<tr>
<td>24-48</td>
<td>50000</td>
<td>50.0</td>
<td>20.0</td>
<td>24.12</td>
<td>48.12</td>
<td></td>
<td>6.5 - x x x x</td>
<td>1/2&quot;</td>
<td>62 lbs.</td>
</tr>
<tr>
<td>24-60</td>
<td>60000</td>
<td>60.0</td>
<td>24.4</td>
<td>24.12</td>
<td>60.12</td>
<td></td>
<td>6.5 - x x x x</td>
<td>1/2&quot;</td>
<td>68 lbs.</td>
</tr>
<tr>
<td>24-72</td>
<td>72000</td>
<td>72.0</td>
<td>28.8</td>
<td>24.12</td>
<td>77.25</td>
<td></td>
<td>8 - x x x x x</td>
<td>1/2&quot;</td>
<td>89 lbs.</td>
</tr>
</tbody>
</table>

**NOTE:**

1. Specify when ordering:
   a. Model of heater - FM - CSA - Standard
      i. Standard heaters are for use in non-hazardous locations
      ii. FM approved heaters are for use in Class 1-Division 2-Group D locations
      iii. CSA approved heaters are for use in Class 1-Division 1 - 2 - Group D locations
   b. Fuel
      i. Natural, L.P. (propane), or butane gas
   c. Starting voltage
      i. 12 volt DC • 120 volt AC • 208 volt AC • 240 volt AC • 480 volt AC

2. Heaters are designed and orificed to operate on a standard fuel inlet pressure of 3 1/2" W.C. for natural gas and 11" W.C. for L.P. (propane) gas.

3. FM model heaters are approved by Factory Mutual Research for use in Class 1-Division 2 - Group D locations, and are equipped with a thermocouple - safety shut-off valve - and steel junction box. An explosion proof junction box is optional at an additional charge.

4. Canadian Standards Association model heaters are approved for use in Class 1 - Division 1 and 2 - Group D locations, and are equipped with a thermocouple - safety shut-off valve - explosion proof junction box - appliance type regulator (natural gas only) - and manual shut-off valve.
Freez-Fiter

Pilot-Regulator Heater Fights Freeze-ups
- Use to heat gas supply to controllers, pilots and instrument regulators
- Heat source - Bruest flameless catalytic heater
- Fuel gas - natural, L.P. (propane), or butane gas
- Low fuel consumption
- FM models suitable for use in Class 1, Division 2, Group D locations
- CSA models suitable for use in Class 1, Division 1 and 2, Group D locations
- Single coil standard - dual coil model available (Use with 2 regulators)
- Low pressure fuel gas regulator comes with unit (Maximum 50 Psi inlet pressure)
- Preheat fuel gas tube

FREEZ-FILTER SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>EXCHANGER COIL</th>
<th>HEATER</th>
<th>CASE DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>3/8&quot; OD - Type 304 Stainless Steel • Operating Pressure - 2500 PSI-Max. • Test Pressure - 5000 PSI • Exchanger Coil Pipe Fittings - 1/4&quot; NPT</td>
<td>Bruest-SR-8 Catalytic Heater • Start-up Voltage - 12 Volt or 120 Volt • Stainless Steel Case • 2500 BTU Input • Fuel - Natural Gas at 3 1/2&quot; W.C. • LP Gas at 11&quot; W.C.</td>
<td>Size 12&quot; x 12&quot; x 4&quot; with 1&quot; Fiberglass Insulation • Stainless Steel Case</td>
</tr>
<tr>
<td>4000</td>
<td>Same as Above</td>
<td>Bruest-SR-12 Catalytic Heater • Start-up Voltage 12 Volt or 120 Volt • Stainless Steel Case • 5000 BTU Input • Fuel - Natural Gas at 3 1/2&quot; W.C. • LP Gas at 11&quot; W.C.</td>
<td>Size 16&quot; x 16&quot; x 4&quot; with 1&quot; Fiberglass Insulation • Stainless Steel Case</td>
</tr>
</tbody>
</table>

ACCESSORY OPTIONS
- High pressure fuel gas regulator - 6000 PSI max. - 10-75 PSI outlet - Fisher 1301F
- Thermostat - 100° - 200°F range (INVENSYS)
- Explosion proof junction box is standard on CSA models and optional on FM models
- 16 foot-12V electrical pigtail with battery clips for a standard or explosion proof junction box
- 25 foot-12V electrical pigtail with battery clips for a standard or explosion proof junction box
- Nupro relief valve (set @ 45 psi) 1/4" npt
Pilot Regulator Heater
FIGHTS FREEZE-UPS

Freez-Fiter
Pilot Regulator Heater
APPLICATIONS -
MODEL 1800 AND 4000

- Pilot Operated Regulators
  Grove Flexflow
  American Axial Flow
  Fisher 399 and 310
  Mooney
  Sprague
- Instrument Regulators
- Chromatographs
- Options: preheat fuel tube
PIPELINE HEATER PACKAGES
- Use to heat the gas upstream of pressure regulators and measurement facilities
- Indoor or outdoor installation
- Pipe sizes - 2" through 20" (contact factory for larger sizes)
- Simple field installation
- Stainless steel construction
- Over 50 years of field proven reliability
- Contact factory for correct sizing.

<table>
<thead>
<tr>
<th>HEATER MODEL</th>
<th>PIPE SIZE</th>
<th>BTUH INPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6-24</td>
<td>2&quot;</td>
<td>6,000</td>
</tr>
<tr>
<td>2-6-24</td>
<td>2&quot;, 3&quot;, 4&quot;</td>
<td>12,000</td>
</tr>
<tr>
<td>2-12-24</td>
<td>4&quot;, 6&quot;, 8&quot;</td>
<td>24,000</td>
</tr>
<tr>
<td>2-12-36</td>
<td>4&quot;, 6&quot;, 8&quot;, 10&quot;</td>
<td>36,000</td>
</tr>
<tr>
<td>2-12-48</td>
<td>4&quot;, 6&quot;, 8&quot;, 10&quot;</td>
<td>48,000</td>
</tr>
<tr>
<td>2-12-60</td>
<td>4&quot;, 6&quot;, 8&quot;, 10&quot;</td>
<td>60,000</td>
</tr>
<tr>
<td>2-12-72</td>
<td>4&quot;, 6&quot;, 8&quot;, 10&quot;</td>
<td>36,000</td>
</tr>
<tr>
<td>2-18-36</td>
<td>4&quot;, 6&quot;, 8&quot;, 10&quot;</td>
<td>56,000</td>
</tr>
<tr>
<td>2-18-48</td>
<td>4&quot;, 6&quot;, 8&quot;, 10&quot;</td>
<td>74,000</td>
</tr>
<tr>
<td>2-18-60</td>
<td>4&quot;, 8&quot;, 10&quot;</td>
<td>90,000</td>
</tr>
<tr>
<td>2-24-48</td>
<td>4&quot;, 8&quot;, 10&quot;</td>
<td>100,000</td>
</tr>
<tr>
<td>2-24-60</td>
<td>4&quot;, 8&quot;, 10&quot;</td>
<td>120,000</td>
</tr>
<tr>
<td>2-24-72</td>
<td>4&quot;, 8&quot;, 10&quot;</td>
<td>144,000</td>
</tr>
</tbody>
</table>

*Stainless steel reflector replaces one heater.
Pipeline Heater Package Dimensions available upon request.

LARGER PIPELINE HEATER PACKAGES AVAILABLE UPON REQUEST
- Standard model heaters are for use in non-hazardous locations
- FM model heaters for use in Class 1, Division 2, Group D locations
- CSA model heaters for use in Class 1, Division 1 and 2, Group D locations
- Specify start-up Voltage - 12V - 120V - 240V - 480V
- Specify fuel - natural, L.P. (propane), or butane gas
- Accessories -
  Fuel gas manifold and regulator
  Explosion proof junction boxes
PORTABLE HEATERS

- Bruest portable heaters produce safe infrared radiant heat, to heat people and equipment.
- Bruest portable heaters are safe. Factory Mutual models are approved for use in Class 1, Division 2, Group D locations.
- Canadian Standards Association models are approved for use in Class 1, Division 1 and 2, Group D locations.
- Bruest portable heaters are ideal to provide temporary heat for equipment and personnel in compressor - instrument - meter - and well head buildings.
- Bruest portable heaters are adjustable so the infrared heat can be directed to where it is needed.
- Fuel: natural, L.P. (propane), or butane gas.
- Sizes: 24,000 BTU/HR. input - 72,000 BTU/HR. input.
- Smaller size portable heaters are available for use with small propane bottles - Contact factory for information.

### RATINGS AND DIMENSIONS

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>BTU/HR. START-UP VOLTAGE</th>
<th>DIMENSIONS IN INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH20M</td>
<td>24,000</td>
<td>12-120-240</td>
</tr>
<tr>
<td>PH30M</td>
<td>36,000</td>
<td>12-120-240</td>
</tr>
<tr>
<td>PH40M</td>
<td>50,000</td>
<td>120-240-480</td>
</tr>
<tr>
<td>PH50M</td>
<td>60,000</td>
<td>120-240-480</td>
</tr>
<tr>
<td>PH60M</td>
<td>72,000</td>
<td>120-240-480</td>
</tr>
</tbody>
</table>

HEIGHT | 49"  | 49"  | 49"  | 49"  | 49"  |
WIDTH  | 31"  | 43"  | 55"  | 67"  | 79"  |
DEPTH  | 25"  | 25"  | 25"  | 25"  | 25"  |

SPECIAL ORDERS AVAILABLE UPON REQUEST
- Enclosures provide spot heating for valves, instruments and regulators that require heat to function in cold weather.
- Enclosures are made of 304 stainless steel.
- Two-piece construction facilitates field installation.
- Enclosures protect the heaters from wind, rain and snow.

ENCLOSURES & HEATER FOR THE FOLLOWING APPLICATIONS

CHOKES
- Best
- Merla
- OCT
- Willis
- K-F

DUMP VALVES
- Fisher
- Kimray
- Merla
- Norrseal

LEVEL CONTROLLERS
- Fisher
- Norrseal

METERS
- American
- Equimeter
- Roots

REGULATORS
- American
- Fisher
- Grove
- Kimray
- Equimeter
- Mooney

ORIFICE FITTINGS
- Daniel
- Peco

Heat Input
\[ Q = MC_p \Delta T \]

Heat Input
\[ Q = MC_p \, T \]
Q = Heat Input, BTU/HR.
M = Flow Rate, LB/HR = (0.0764)(SG)(SCFH)
C_p = Specific heat of Gas, BTU/LB. °F. (=0.75)
\( \Delta T \) = Temperature Drop Due to Regulation, (= 1° F/15 PSI)
HEATER/ENCLOSURES FOR REGULATING EQUIPMENT

TO AVOID DELAY WHEN ORDERING ENCLOSURES, PLEASE FURNISH THE FOLLOWING INFORMATION:

Manufacturer - Fisher, American, Equimeter, Grove, Roots, Huber-Yale, Mooney, etc.
Model Number - 630, 627, 041, 399, 83, etc.
Body Type - A, D, ET, etc.
Operator or Pilot - 657, ZSC-100, etc.
Size - 2", 3", etc.
End Connections - screwed, flanged, etc.
Flange Pressure Rating - 300#, 600#, etc.
Orientation - Vertical or horizontal

GENERAL INFORMATION
Most 1" enclosure applications require one or two model R-8 heaters
Most 2" and larger enclosure applications require one or two model R-12 heaters
Applications on 6" and larger valves generally require one or two 12-24 heaters
Custom enclosures are available for special applications
Fuel gas manifolds are optional to facilitate field installation

TYPICAL BODY ONLY ENCLOSURE