No More FROZEN ASSETS

BRUEST
CATALYTIC HEATERS

. . . Protect Every

• Compressor • Wellhead • Regulator • Pipeline

with Lean, Efficient Catalytic Technology.

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800.835.0557 • Fax: 620.331.3402

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

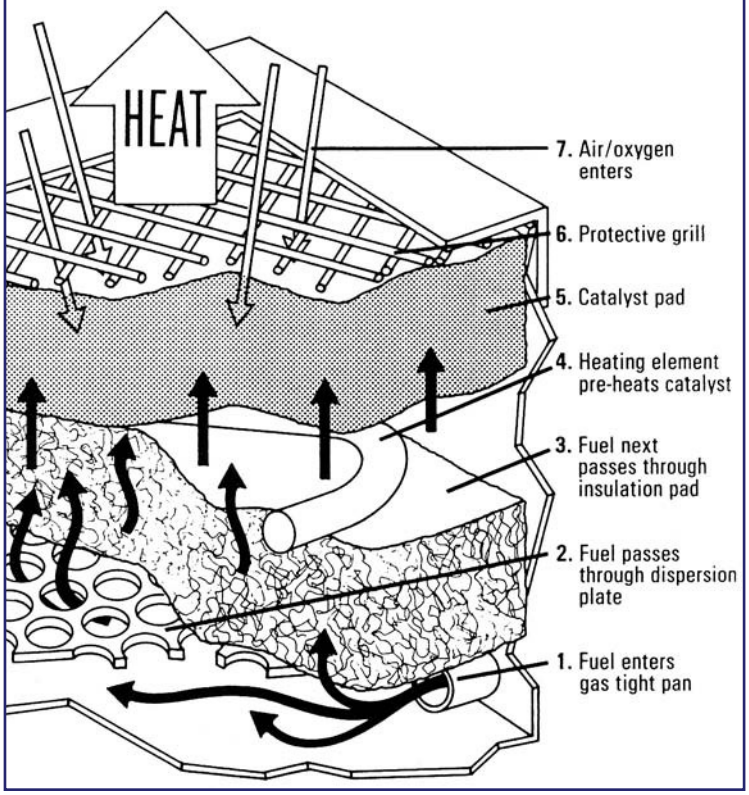
Catalytic heat is radiant heat. Radiant heat, like light, is electromagnetic wave energy that travels in straight lines at 186,000 miles per second, casts shadows, may be transmitted, absorbed or reflected by matter, and may be focused or dispersed by lenses or prisms of the proper material.

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.

SIMPLIFIED CATALYTIC HEATER DIAGRAM



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.

BRUEST
CATALYTIC HEATERS

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For over 50 years, Bruest Catalytic Heaters has provided protection from freeze damage for sensitive measurement, regulation and distribution equipment. We believe ours are the most reliable and best performing catalytic heaters made. We have consistently been the leaders in designing innovative solutions to freeze problems as gas has become a major energy source for America.

Our products are easy to install, and perform on both everyday applications and more involved gas systems.

Selection of a Bruest catalytic heater assures a top quality product that will deliver many years of maintenance-free service. Some of our systems have been in constant use for thirty years without the need for overhaul or repair.

One additional factor you may find compelling: every Bruest catalytic heater has a special warranty of two full years – double the warranty provided by other catalytic heater manufacturers.

We at Bruest constantly strive to improve our products with an ongoing development program focused on the changing needs of the gas industry.

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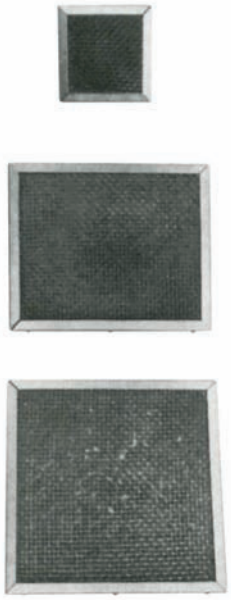
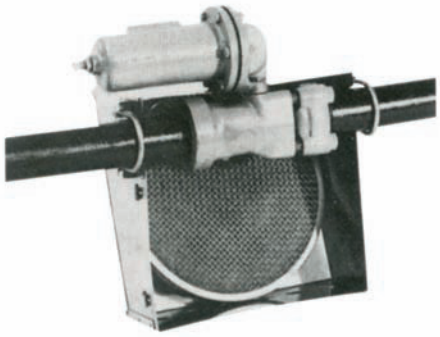
ROUND AND SQUARE CATALYTIC HEATERS PRODUCE FLAMELESS INFRARED RADIANT HEAT

- 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 gas, L.P. (propane) or butane gas
- Sizes: 1500 - 72,000 BTU input



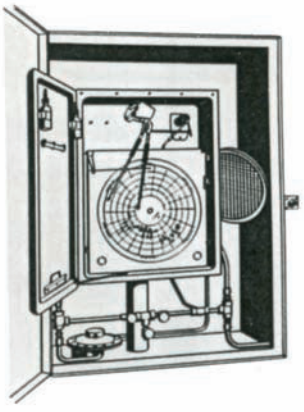
TYPICAL APPLICATIONS

- Freeze protection and instrument heating on:
  - > Chokes
  - > Instrumentation
  - > Meters
  - > Orifice Taps
  - > Regulators
  - > Valves
- Emergency heating – portable self-contained units for:
  - > Remote Areas
  - > Personnel



FREEZE PROTECTION FOR MEASUREMENT OR REGULATION EQUIPMENT

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.



FREEZE PROTECTION FOR INSTRUMENTS

Small heaters can focus radiant heat directly on control instruments that are at risk for localized freezing. 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

HEATER MODEL	BTU/HR. INPUT	CU.FT/HR.. N.G	CU.FT/HR.. L.P.	HEATER DIMENSIONS INCHES H	W	D	FUEL INLET NPT	SHIPPING WEIGHT
6-6	1500	1.5	.6	6.12	6.12	6.0	1/4"	8 lbs.
R-8	2500	2.5	1.0	8.12	8.12	5.5	1/4"	6 lbs.
8-8	2660	2.7	1.1	8.12	8.12	6.0	1/4"	8 lbs.
6-12	3000	3.0	1.2	6.12	12.12	6.0	1/4"	8 lbs.
R-12	5000	5.0	2.0	12.12	12.12	6.0	1/4"	8 lbs.
10-12	5000	5.0	2.0	10.12	12.12	6.0	1/4'	11 lbs.
12-12	6000	6.0	2.4	12.12	12.12	6.0	1/4"	12 lbs.
Other sizes								

NOTE:

1. Specify when ordering:

   a) Model of heater - FM - CSA - Standard
   - Standard catalytic heaters are for use in non-hazardous locations
   - FM approved catalytic heaters are for use in Class 1, Division 2, Group D locations
   - CSA approved catalytic heaters are for use in Class 1, Division 1 and 2, Group D locations

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

   c) Starting voltage
   - 12 volt DC
   - 120 volt AC
   - 208 volt AC
   - 240 volt AC
   - 480 volt AC

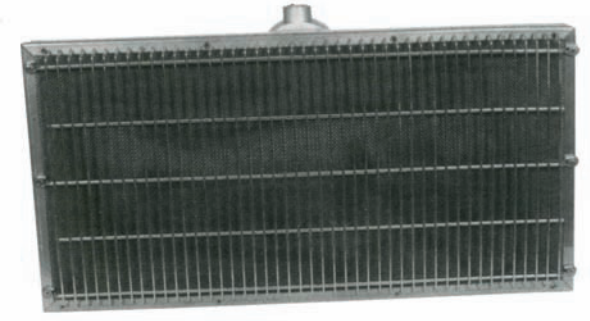
2. Catalytic heaters are designed and orificed to operate on a standard fuel inlet pressure of 3 1/2˝ or 7˝ W.C. for natural gas and 11˝ W.C. for L.P. (propane) and butane gas.

3. FM model catalytic 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 catalytic 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.

RECTANGULAR CATALYTIC HEATERS 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 gas, L.P. (propane) or butane gas
- Sizes: 1500 - 72,000 BTU input



TYPICAL APPLICATIONS

- Building heating
  - > Compressor Buildings
  - > Fire Pump Buildings
  - > Meter House Heating
  - > Personnel Heating-Fixed or Portable
  - > Pipeline Heating
  - > Offshore Platforms
- Instrument heating
  - > Control Instruments
  - > Small Regulators
  - > Small Valves
  - > Electronic Measurement Devices
- 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, will prevent freezing in almost any climate, with exceptional safety. 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. Examples include compressor buildings, meter houses, flammable materials storage, offshore platforms and many other locations.

CATALYTIC HEATER SPECIFICATIONS

Standard, FM and CSA Model Heaters

Stainless Steel

HEATER MODEL	BTU/HR. INPUT	CU.FT/HR. N.G.	CU.FT/HR. LP.	HEATER DIMENSIONS INCHES H	W	D	STARTING VOLTAGES 12V-DC	120VAC	208 VAC	240 VAC	480 VAC	FUEL INLET NPT	SHIPPING WEIGHT
6-24	6000	6.0	2.4	6.12	24.12	6.5	x	x	-	-	-	1/4"	12 lbs.
12-24	12000	12.0	4.8	12.12	24.12	6.5	x	x	-	x	-	1/4"	17 lbs.
12-36	18000	18.0	7.2	12.12	36.12	6.5	x	x	-	x	-	1/2"	23 lbs.
12-48	24000	24.0	9.6	12.12	48.12	6.5	-	x	x	x	x	1/2"	38 lbs.
12-60	30000	30.0	12.0	12.12	60.12	6.5	-	x	x	x	x	1/2"	42 lbs.
12-72	36000	36.0	14.4	12.12	77.25	6.5	-	x	x	x	x	1/2"	46 lbs.
18-36	28000	28.0	11.2	18.12	36.12	6.5	-	x	x	x	x	1/2"	40 lbs.
18-48	37000	37.0	14.8	18.12	48.12	6.5	-	x	x	x	x	1/2"	50 lbs.
18-60	45000	45.0	18.3	18.12	60.12	6.5	-	x	x	x	x	1/2"	55 lbs.
24-48	50000	50.0	20.0	24.12	48.12	6.5	-	x	x	x	x	1/2"	62 lbs.
24-60	60000	60.0	24.4	24.12	60.12	6.5	-	x	x	x	x	1/2"	68 lbs.
24-72	72000	72.0	28.8	24.12	77.25	8	-	x	x	x	x	1/2"	89 lbs.

NOTE:

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   a) Model of heater - FM - CSA - Standard
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   - CSA approved catalytic heaters are for use in Class 1, Division 1 and 2, Group D locations

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

   c) Starting voltage
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