



The type of furnace plays an important role in element orientation and manner of installation. For example, a bell furnace that is constantly moved would be designed much differently than a stationary pit furnace. Other furnaces requiring special consideration include car bottoms, tip-ups, and furnaces that see vibration, such as roller rails.

EES systems have been provided for:

- Melting, holding, and annealing furnaces for non-ferrous metals
- Continuous strip and coil annealing furnaces for the steel industry
- A wide variety of heat treating furnaces

Physical Characteristics

	R	ZR
Color	white	white
Density, pcf (kg/m^3)	10, 12, 15 (160, 192, 240)	10, 12, 15 (160, 192, 240)
Thickness, in (mm) (standard)	6 - 12 (152 - 305)	6 - 12 (152 - 305)

The Pyro-Bloc Electric Element Support (EES) System is a complete engineered package which includes Pyro Bloc Y modules, heating elements, hanging systems, and detailed drawings, that are a cost-effective method of hanging electric heating elements from Pyro-Bloc modules. EES system was patented over 20 years ago on the pre-embedded tubes, located within a ceramic fiber module, and the supporting hooks and washers.

Design

Each system is designed to the requirements of the customer's specific application. Designs include:

- Determining alloy - the alloy selection is determined by the atmosphere and temperature of the furnace.
- Wall loading - depending on the wattage requirements, elements are designed in a rod overbend, ribbon, or coil configuration. Rod overbend is by far the preferred configuration due to long life and excellent heat radiation.
- Wiring design - in a 3-phase circuit, which is standard for industrial furnaces, the amperage determines whether the elements should be wired in a "wye" or "delta" connection.
- Watt density - watt density is the power loading in watts per square inch of surface area of the heating element and indicates the potential for the surface to transmit heat energy. This is a basic factor of element operating temperature and overall element life. Thermal Ceramics' watt density designs have historically been more conservative than industry standards.

Applications

Pyro-Bloc® EES™ System

Product Information

Physical Properties

	R	ZR
Maximum temperature rating, °F (°C)	2400 (1316)	2600 (1427)
Melting point, °F (°C)	3200 (1760)	3200 (1760)
Continuous use limit, up to °F (°C)	2200 (1204)	2450 (1343)

Chemical Analysis, nominal %

Alumina, Al ₂ O ₃	47	37.5
Silica, SiO ₂	53	47
Zirconia, ZrO ₂	-	15.5
Loss of ignition, L.O.I.	trace	trace
Other	trace	trace

Thermal Conductivity

BTU•in/hr•ft²•°F (w/m•k) (ASTM C 201)

Mean temperature	10 pcf (160 kg/m ³)	12 pcf (192 kg/m ³)	15 pcf (240 kg/m ³)
@ 500°F (260°C)	0.52 (0.07)	0.50 (0.07)	0.49 (0.07)
@ 1000°F (538°C)	1.04 (0.15)	0.96 (0.14)	0.84 (0.12)
@ 1500°F (816°C)	1.81 (0.26)	1.66 (0.24)	1.43 (0.21)
@ 2000°F (1093°C)	2.68 (0.39)	2.45 (0.35)	2.19 (0.31)

Installation

The foundation of the Electric Element Support System is the one-step welded Pyro-Bloc Y module. Attachment hardware is contained within the module itself, effecting a fast, easy installation. The edge-grain monolithic construction minimizes heat loss and heat storage, and permits rapid furnace cycles.

Elements are suspended with ceramic hangers from pre-embedded tubes also located within the module. There are no conductors to the shell; therefore the system is thermally and electrically isolated within the furnace. Each system includes a detailed instruction manual and engineered installation drawings.

Design and Installation

There are a number of factors which must be considered when designing a Thermal Ceramics Pyro-Bloc EES System, including temperature, atmosphere, contaminants and type of furnace. The provided examples are as a guide only. Contact your nearest Thermal Ceramics representative for further information.

Data are average results of tests conducted under standard procedures and are subject to variation.

Data contained in this brochure are intended as a guide only. For specifications and estimating purposes, contact your nearest Thermal Ceramics representative.

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