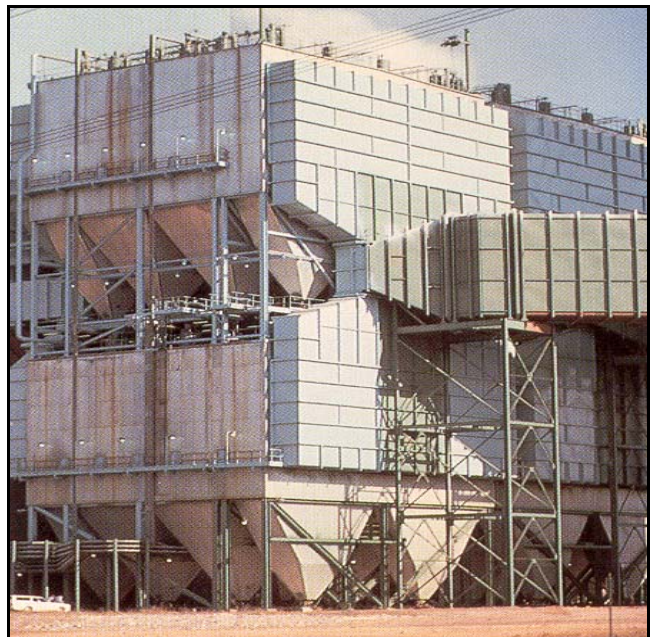




HB HEATING MODULE SYSTEMS

RECOMMENDED SPECIFICATION



FLY ASH HOPPER HEATING APPLICATIONS
ON ELECTROSTATIC PRECIPITATORS,
BAGHOUSES, FABRIC FILTERS AND
OTHER TYPES OF DUST COLLECTORS



RECOMMENDED SPECIFICATION

FLYASH HOPPER HEATING SYSTEMS

For normal temperature maintenance and 150°F start up conditions

1.0 Scope

This specification is intended to define the parameters for the design of flyash hopper heating systems for flue gas particulate (flyash) removal equipment.

The normal flue gas temperature will be *(insert)*°F

The anticipated dew point of the flue gas will be *(insert)*°F.

2.0 Hopper Heating System

General

The vendor shall design, specify and provide a heating system for the particulate (flyash) collection hoppers that is capable of meeting the criteria in all sections of this specification.

The maximum anticipated hopper excursion temperature will be *(insert)* °F.

The hopper shall be thermally insulated with a *(insert)* inch thickness of *(insert)* type insulation.

The heating equipment and system shall be FM (Factory Mutual) and CSA approved and comply with the requirements of IEEE Standard 1069-1991, IEEE Standard 515-1997 and the current requirements of the US and Canadian National Electric Codes.

The maximum anticipated wind speed will be *(insert)* mph.

The design safety factor shall be *(insert)* %

The heating system shall be designed to provide a balanced load, operating directly on a *(insert)* VAC *(insert)* phase power supply.

3.0 System Design Requirements

The hopper heating system shall be capable of maintaining a hopper skin temperature of *(insert)* °F, as measured 30 inches above the hopper throat during normal operation.

Heater sizes shall be customized to provide maximum heater coverage and eliminate cold spots.

The heating system shall include a flexible throat heater to provide direct heat to the hopper outlet.

During start up and shutdown periods, the heating system shall also be capable of preheating the hoppers to a ΔT of 150°F above ambient in all areas directly covered by heating modules. *Preheat temperature requirements shall be reached in a maximum of 8 hours.*

4.0 Equipment Specifications

The heating system shall be designed for operation in a minimum ambient temperature of *(insert)*°F

The equipment shall be low watt density surface heating equipment, as specified in Section 5.0

The equipment shall be modular in design to simplify installation and minimize installation costs.

The equipment shall have a flexible heater face to ensure continuous and intimate contact with the irregular hopper surfaces.

The equipment shall be designed to withstand the natural and induced vibration associated with the normal operation of flyash collection systems, including the shock loading generated by operator actions on strike plates and pounding anvils.

Heating equipment, including heater cold leads shall be moisture resistant.

Heating systems shall be individually packed such that all of the heaters for one hopper are contained within one carton. This requirement will simplify installation, reduce erection times and costs and avoid excessive handling and potential damage.

The equipment shall be designed and rated to provide a service life in excess of 20 years.

5.0 Heater Design

Each heater shall be of the modular design, with heating element, electrical insulation materials, thermal insulation, heater cold leads and mounting pan assembled and supplied as one unit. *Strip Heaters, Rod Heaters, MI Cable and Rigid Metal Module style heaters are unacceptable.*

The heating module shall be constructed of high temperature materials capable of withstanding 850°F.

The heating element material shall be a Ni-Chrome resistance alloy, used in a flat foil or ribbon configuration to provide maximum and uniform distribution of heat across the entire heating surface in contact with the hopper. *Wire and mesh type heating elements are not acceptable.*

Heating element circuitry shall be configured and connected to provide a low watt density, uniformly distributed heat source within each heating module. Low watt density design is a critical qualification for reliable heater operation on flyash hoppers and *heating module watt densities in excess of 360 watts/sq.ft (2.5 w/sq.in) are totally unacceptable.*

Each heating module shall have a high temperature, *non metallic*, glass cloth heater face, designed and constructed such that continuous and intimate contact between the heater face and the uneven and irregular hopper surface can be guaranteed. *Strip Heaters and heating modules with any form of rigid metal heater face are not acceptable.*

Heating module cold lead cables shall consist of two 600 volt rated, fiberglass insulated conductors, combined within an outer (sacrificial) jacket of silicone rubber that provides moisture and climatic protection during storage, pre-installation and pre-commissioning periods. *Non-jacketed, fiberglass insulated conductors are not acceptable.*

Heating module cold leads shall be customized lengths that extend from the heating module to the power junction box *without splices.*

Each heating module shall have a 2 inch high designation letter that shall be used to identify the heating module characteristics, values and installation position on the hopper, as shown on the system layout drawing.

Heating modules shall be supplied with one (or more) aluminum mounting channels, mounting studs, nuts and washers. Each mounting channel shall also be labeled with a 2 inch high letter that matches the letter designation of the heating module to be installed.

6.0 System Design

The heating module system design and layout shall provide *maximum heater coverage in the lower areas of the hopper, including a flexible throat heater for direct heating of the hopper outlet.*

The total kW installed on each hopper shall be uniformly distributed over the total area of heating module being supplied. The heating modules shall provide *uniform power output and evenly distributed heating throughout the system.*

The heating module system shall be designed with the *maximum number of individual heating modules operating directly on the line voltage.* Series connected heating modules are acceptable only in limited instances. *Under no circumstances shall the combined total kW load on one complete chain of series connected heating modules exceed 15% of the total system load.*

All series connections shall be completed within the Power Junction Box. Splice type series connections under the hopper insulation are not acceptable.

Heating systems that consist exclusively of heating modules connected in series chains are totally unacceptable.

Heating system vendor shall be responsible for the design and supply of a complete system, including heating modules, heating module mounting hardware and heating module mounting stud location templates.

Each hopper heating system shall be supplied with (a minimum of) one Power Junction Box to facilitate the connection of the heating modules to the power supply.

A custom designed mounting bracket shall be supplied with each Power Junction Box. This bracket shall be welded to the hopper surface to support the Power Junction Box at its designated location outside of the hopper insulation. Each mounting bracket shall incorporate conduit tubes that provide safe, protected routing for the heating module cold leads to pass from the hopper surface, through the hopper insulation and cladding and into the Power Junction Box.

Heating system layout drawings and wiring diagrams shall be supplied by the vendor. These drawings shall show the physical size of each heating module complete with ohm, watts and voltage values. Layout drawings must also show each heating module located in its designated position on the hopper, complete with the cold lead exit point and cold lead length.

The system wiring diagram shall show how each heating module is connected with the specified power supply, including individual phase connections and balancing details for 3Ø power supplies.

All 3Ø power supplies shall be balanced as closely as possible.

The contents of this document have been used by many Engineering Companies and End Users to specify the unique product and system features essential for the purchase, supply and installation of safe, effective and reliable flyash and dust hopper heating systems.

The HB Heating Module System has been specified and successfully used on many hundreds of major Power and Industrial installations around the world.