

Ceramic Filters – Product Data

What They Do

Ceramic filters are items of industrial equipment that are used to remove particles from gases at high temperatures, possibly in the presence of corrosive substances in the gas stream.

They differ from conventional gas filtration equipment in that they use ceramic filter elements (1), which are extremely stable at high temperatures and in the presence of aggressive gases. This enables the equipment to operate at conditions that are ideal for the process. They do not require the gas to be conditioned in order to protect the filter medium.

Typical applications include: catalyst protection in the chemical industry; treatment of flue gases from incinerators and furnaces, and cleaning of fuel gases produced by gasification / pyrolysis before combustion in an engine.

Ceramic filter elements can also provide support for a renewable bed of reactive material, such as lime, which will combine with components, such as acid gases, in the gas stream as the gas passes through.

How They Work

The ceramic **filter elements** hang vertically from the **header plate**, which separates the **clean** and **dirty sides** of the **filter vessel**. The elements are made with a flange at the open end and this flange is clamped to the header plate by the **clamp plate**. The element is sealed to the header plate by ceramic fibre gaskets and the top end of the filter is often strengthened by reinforcing collars (2). The filter elements are arranged in rows.

Gases pass into the filter vessel from the **inlet duct**, through the filter elements and are discharged from the **outlet duct**. To achieve this flow a pressure difference must be created across the filter vessel, either by applying suction to the clean side or pressure to the dirty side of the filter.

As the gases pass through the porous walls of the filter elements the solid particles entrained in the gas flow are captured on the surface of the elements. In time the layer of solids becomes quite thick and must be removed so that filtration can continue. This cleaning of the elements is performed by the reverse pulse cleaning system (3) and normally takes place while the filter is on-line.

The filter elements are cleaned one row at a time on a controlled basis. When a row is cleaned, the **pulse valve** opens for, typically, 100 msecs, allowing the compressed air in the **air reservoir** to flow down the **pulse tube** and through the small holes located above the open end of each element. This jet of air down the filter element reverses the flow in the filter medium and applies a drag force to the accumulated layer of solids. The drag force detaches sections of the solid layer, exposing fresh areas of filter medium and reducing the pressure drop across the filter vessel.

The detached solids fall to the bottom of the hopper section of the filter vessel where they may be discharged directly to a collection drum. Alternatively, they may be retained in the hopper until discharged through a valve arrangement to a solids handling system.

References

1. Caldo data sheet DS002 'Ceramic Filter Elements – Product Data'
2. Caldo data sheet DS004 'Reverse Pulse Cleaning – Product Data'
3. Caldo data sheet DS003 'Supports & Gaskets for Ceramic Filter Elements – Product Data'

