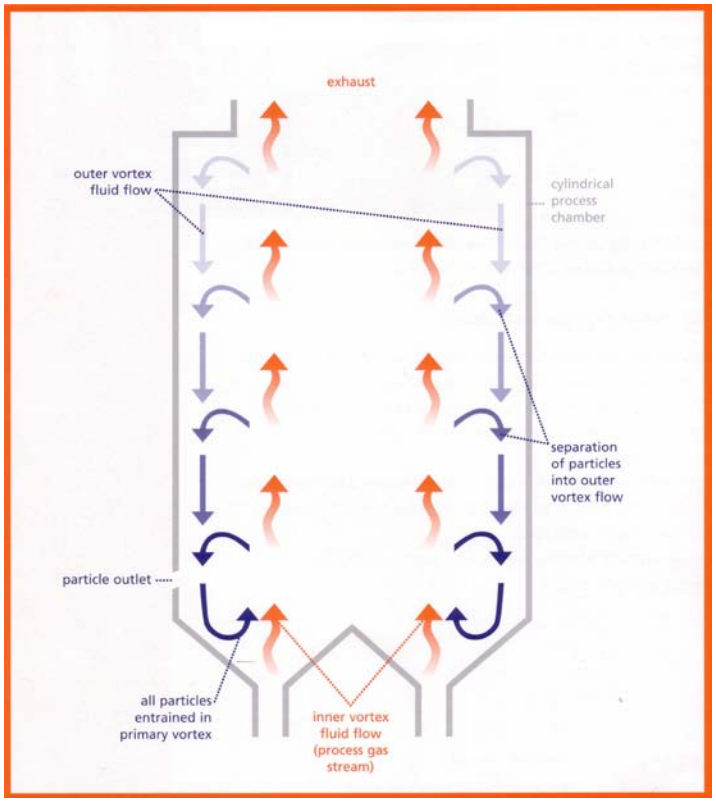
TORBED* Process Reactor Technology

Technology Description

TORBED EXPANDED BED REACTOR ('EBR')

The TORBED Expanded Bed Reactor ('EBR') has been specifically developed to retain a diffuse bed of solid particles in a toroidal circulation pattern within a high velocity process gas stream. The cyclonic motion creates centrifugal forces that separate the particles outwards. The particles then recirculate back to the base of the reactor to be re-entrained in the process gas stream.



An EBR provides faster, more cost effective and efficient gas/solid contacting over a Circulating Fluidised Bed (CFB) and provides the following advantages:

- An equivalent particle retention time to a CFB is easily obtained in a smaller EBR since the horizontal component of the motion provides a longer contact path
- The cyclonic effect within the EBR allows for the separation and direct recirculation of particles in the expanded toroidal bed without the need for cyclones for separation and subsequent re-injection
- The EBR can readily be "fuel injected" (see separate Technology Description for Fuel Injection) to generate process gas temperatures in excess of 1,600°C.
- High gas flow rates with low pressure drop are possible in this new type of reactor. The higher the fluid flows, the better the retention of the smallest particles within the reactor.

Ideal for use in dry gas scrubbing

In gas scrubbing, the more turbulent the contact between reagent particle and gas to be scrubbed, the more effective the process. The EBR is ideal for this application for several reasons:

- lower gas pressure drop than competing systems better fine particle retention
- faster reaction kinetics due to improved mixing and turbulence attrition of the surface of reagent particles providing more complete reagent utilisation
- selective capture of differing particle sizes (which may have different characteristics).

A bank of 5m diameter TORBED EBR dry gas scrubbers in New Zealand

Ideal for use in combustion and gasification

When applied to combustion and gasification applications, the violent circulation of the particles within an EBR continually presents combustible surface area. Ash particles are retained within the EBR until they have been reduced to a small enough size such that they are carried out in the exhaust gas stream from the reactor. This unique capability allows temperature sensitive processes to be accurately controlled for commercial applications that in some cases were not possible before. The EBR is ideally suited to this application for the following reasons:

- ability to retain wide particle size ranges
- precise control of particle process conditions
- high specific throughput per unit volume

One of two 5MWth wood combustors

Contact Details

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