



ATS TorreCat™ Technology

ATS TorreCat™ Technology uses an oxidation catalyst to combust off-gas from a torrefaction reactor and thereby produce low-temperature, low-residual-oxygen combustion flue gases. These low-temperature, low-residual-oxygen combustion flue gases can then be used directly in the torrefaction process, coming into contact with the biomass in both the reactor and the cooler. The direct use of all torrefaction gases and combustion flue gases results in the highest level of heat integration and energy efficiency. In addition, the ability to use the combustion flue gases directly in the cooler eliminates the need for cooling water or, in the alternative, the need to purchase inert gas for cooling.

Benefits of ATS TorreCat™ Technology:

- **Highly integrated system provides superior energy efficiency and energy yields**
 - Heat and VOC's from the cooler and reactor are recovered and used in the process
 - Heat from resultant water vapor is recovered and used in the process
 - Low-temperature oxidation results in reduced heat loss
 - All torrefaction combustion flue gases are used directly in a closed system
 - Enhanced energy efficiency and process integration results in improved energy yields
- **Process-generated inert cooling gas**
 - Allows significant process and heat integration
 - Significantly reduces the cost of cooling
- **Reduced environmental emissions**
 - Low-temperature, catalytic oxidation results in reduced environmental emissions (especially NO_x)
 - VOC's and carbon monoxide from the dryer, reactor and cooler are combusted in the oxidation catalyst
- **Improved product quality and safety**
 - Direct use of inert cooling gas strips residual VOC's resulting in low-residual-VOC torrefied product
 - Low-residual-VOC torrefied product results in safer storage and handling
- **Uses proven technologies**
 - Catalytic oxidation is widely used in many industrial processes and environmental emissions abatement systems
 - Fluidized-bed technologies are widely used in industry

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