HYDROGEN TECHNOLOGIES INC

cleanH2steam Dynamic Combustion Chamber™

Simplified Process Overview

HTI Dynamic Combustion Chamber ™ FUNCTION

The function of the Dynamic Combustion Chamber ™ (DCC™) process is to generate either hot water or steam, without producing any carbon based or NOx Emissions. The process uses Hydrogen and Oxygen as fuel, reacts them in the DCC™ under a slight vacuum, and extracts thermal energy with the use of common industrial thermo-fluid heat transfer components. It is fundamentally a steam condensing boiler.

The scalable process is based on combining pure Hydrogen and Oxygen to form water molecules. This reaction releases 61,000 British Thermal Units (BTUs) per pound of hydrogen. It is this energy, operating in the ultra-violet range that is used to heat water and generate steam. The heat is extracted across typical stainless-steel heat exchangers commonly used in industrial applications. After the reaction, the fuel, now water, is collected in a closed loop system to be electrolyzed and returned as a fuel source. All of the equipment, engineering processes and control systems are based on proven industrial equipment and standard operating procedures.

The HTI condensing process revolutionizes Boiler applications in the following ways;

1. Emits no carbon-based or NOx particles when burning pure hydrogen,
2. Requires no combustion atmospheric air - eliminating parasitic loads from fans, NOx emissions and the need to eliminate flue gas heat,
3. Delivers a boiler thermal efficiency of >97%,
4. Operates quietly compared to traditional boilers.

HTI EQUIPMENT

The HTI DCC process starts with an interactive mass and energy balance of the entire desired process. The process depends on the desired end use for the steam but typically includes an electrolyzer, DCC™ unit, and associated piping and instruments. If electricity production is the desired output the design would include, typically, a steam generator as well. This mass energy balance is the design basis for all unit operations.

The physical configuration of the HTI DCC™ will vary, per application, but in all standard applications uses off-the-shelf, readily obtainable components.

OPERATIONS

The HTI DCC system process originates with two mass flow controllers, one for the Hydrogen gas and one for Oxygen gas. The flow controllers manage the flow rate of fuel to the DCC™ combustion chamber. In the combustion chamber the H2 and O2 react exothermically to create superheated/saturated steam which is then used to heat the thermo-fluid on the shell side of the heat exchanger. The system is closed loop and all of the water created is returned to the electrolyzer to make more fuel. If electricity is desired, the steam is routed to a steam turbine. Hot water, superheated steam and electricity can be created interchangeably depending on the desired equipment configuration.

All the vessels and piping in the HTI DCC™ are insulated to provide a thermal efficiency of >97%.

HTI SAFETY

HTI is dedicated to designing safe equipment and operating that equipment safely. We are focused on using well-known technology and equipment and the use of state-of-the-art monitoring and operating software. In addition to fuel handling and storage, as well as other vendor developed safeguards, HTI has developed a Safety Management Plan and a Risk Management Plan for the process itself. Please see the Handbook for details.