



Tetreon Technologies Product Specification for Thermco Horizontal Furnace Systems

PRODUCT SPECIFICATION

Specification
Number: PET-HF1

February 2005



HIGH FLOW PYROGENIC EXTERNAL TORCH

The Thermco High-Flow External Torch provides controlled combustion of oxygen and hydrogen to form water vapour external to the main furnace process tube. Thermco designed this water-cooled external torch for pyrogenic oxidation systems to maintain diffusion furnace flat zone temperature fluctuations within 1°C. By removing the H₂ injector from the process tube consistent temperatures can be maintained run after run.

- Adding the High Flow External Torch to your system will improve wafer uniformity as a result of the temperature consistency within the process tube. Because the furnace flat zone remains undisturbed by exothermic reactions improved uniformity oxide deposition is achieved from run to run and within a run.
- The external torch is equally effective for full size production or small footprint R&D systems.
- The Thermco water-cooled High Flow External Torch is an easy and quick retrofit for systems in production.
- Temperature fluctuations occur in the torch and not in your process tube.
- Using the external torch, steam oxidation processes can be run safely at lower temperatures.

Safety features:

- A redundant thermocouple senses ignition temperature and if out of range prevents hydrogen flow. This provides an important safety feature for the torch preventing Hydrogen from flowing below a safe ignition temperature.
- An optical UV sensor looks for the combustion flame and turns off the hydrogen flow if no flame is detected. The activation time is customer adjustable from 0 to 30 seconds.
- A stainless steel water jacket surrounds the high temperature areas to protect the operator from injury. Water flow sensors can be used as process alarms.



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PHYSICAL DESCRIPTION

Heating Element

The Heating Element design is based on resistive wires embedded in a ceramic material which is surrounded by a stainless steel shell. This mechanism opens on the longitudinal axis for easy quartz insertion. The dual junction Type B or Type R thermocouple enters the heating area of the element through a hole in the bottom of the element. At each end of the element, fibreglass pillows insulate the sheet metal end caps from the radiated heat of the unit.

Cooling Shroud

The Cooling Shroud opens along the longitudinal axis for easy placement of the steam generator quartzware. The cooling shroud, made of polished stainless steel, absorbs the heat generated by the combustion of oxygen and hydrogen during wafer processing. A flame detection sensor verifies that proper combustion is taking place in the quartzware. The shroud also protects the operator from the hazards of high temperatures generated through gas combustion. Cooling water circulates through Swagelok fittings located on the exterior of the shroud.

Quartzware

The steam generator is a quartz tube that passes through the heating element and the cooling shroud. Hydrogen and oxygen gases are introduced at the heating element end, heated, and then mixed where combustion takes place, producing steam. An uniquely designed H₂ quartz injector allows more residence time before ignition.

Base

The Base holds the adjustment and alignment mechanisms. The heating element is adjustable in all three axes and the cooling shroud is adjustable in two axes. The third axis is adjustable via slots on the base mounting holes.

Compatibility

The high-flow external torch is compatible with horizontal furnace systems which have source cabinet's that are at least 30" deep. It is easily retrofitted on existing systems and for systems measuring 6.75 inches or 8.25 inches from the centre line of the tube to the bottom of the shelf. The torch is compatible with 184/190 to 225/235 or larger process tubes. The system permits height adjustments of ± 0.375 inches.

Internal vs External Tests

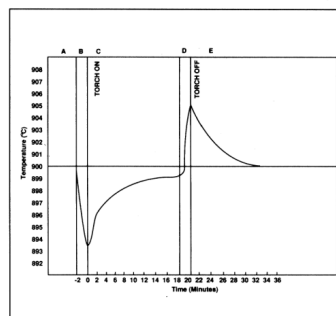


FIGURE 1: Internal Torch

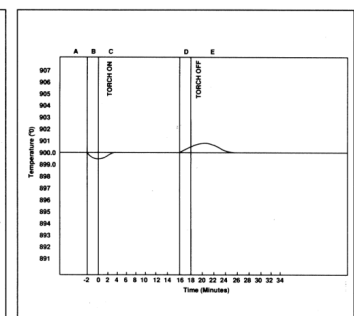


FIGURE 2: External Torch

Head Office:
Tetreon Technologies Limited
Highfield, Rock Road
Washington, Pulborough
West Sussex RH20 3BH United Kingdom

T: +44 (0)1903 892088
E: Info@tetreon.com W: www.tetreon.com

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