



Process-Gas-Abatement System GDC 250



– The Total Vacuum Solution for Semiconductor Fabs –

EBARA Precision Machinery Europe

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Global environmental regulations concerning PFC-Gases are becoming more and more stringent. For that reason EBARA has introduced a redesigned Abatement System, the GDC 250 (Gas Decomposition by Combustion). It is a Burner-Washer Combination optimised to decompose PFC waste gases from Semiconductor production Fabs to an unprecedented low level. The heart of the device is a patented burner achieving utmost efficiency in decomposing the incoming gases, see fig. 1 (System Flow Chart).

The extremely high temperature in the burner allows to destroy even CF_4 to an unknown low level. Up to 4 separate gas inlet lines allow for a total flow of 250 slm (Standard Litre per Minute).

The Combustion Head is followed by a Rapid Gas Cooling Unit to freeze molecular interactions and to fall out particulate. Downstream then follows a 2 stage Water Scrubbing Unit to remove even further solid by-product.

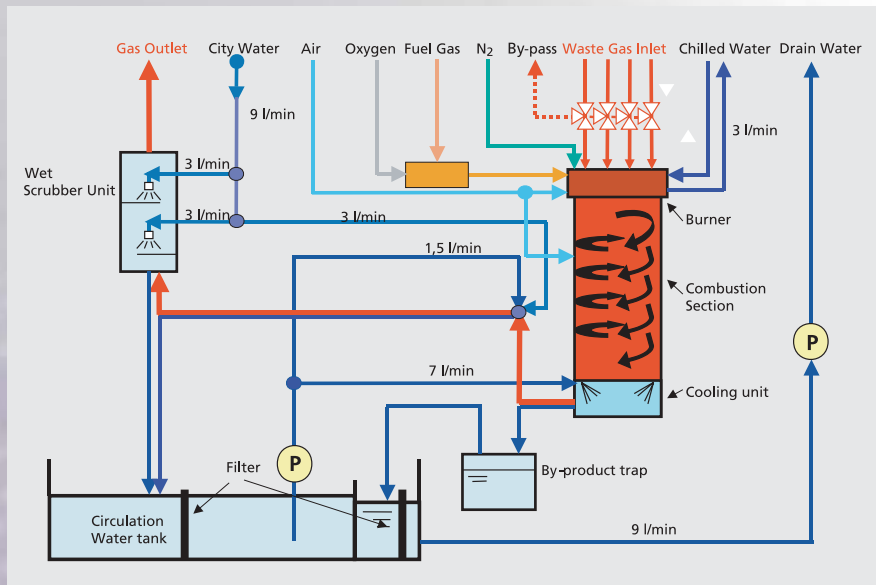


Fig. 1: System Flow Chart

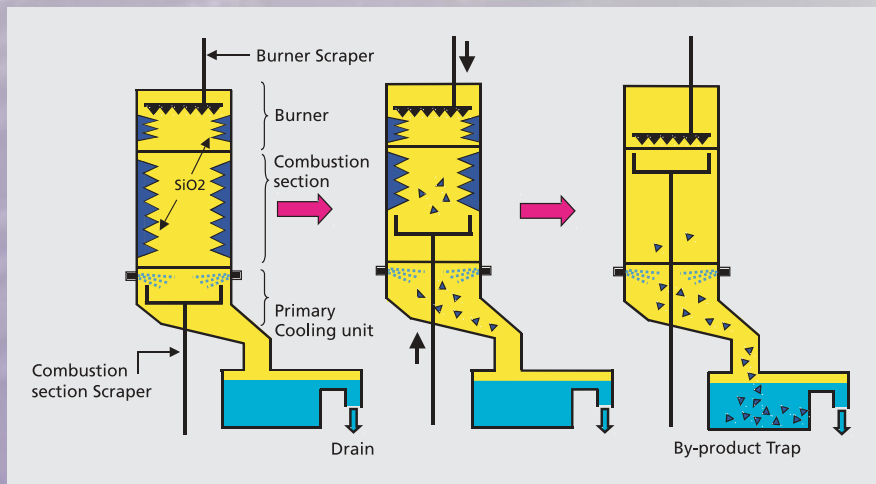


Fig. 2: Scraper Unit: Removal of By-products inside combustion section without opening burner unit

Special **Focus of Design** were given on

- **High Efficiency** (e.g. >99% for PFCs), see table 1 (Gas Abatement Data). Values equal or better than required by TLV-TWA are achieved.
- Highest **Standards of Safety** to eliminate any risks for operators and environment.
- Lowest **Cost of Ownership** through low utility costs, see table 2 (GDC 250 specification) and by long maintenance intervals.
- High grade of **Usability** by using especially designed, **Corrosion Resistant Material**. At the Burner-Combustion Unit a mechanized **Scraper System** allows for cleaning the condensate avoiding the time-consuming opening of that unit, see fig. 2 (Scraper Unit). Customers have the choice between a **Variety of Burner Gases** such as LNG, Propane or Hydrogen.
- Further cost savings during periods of downtime, when switching the system in an **Idle Mode**.

And last but not least

- Best possible **reduction of Nitrogen Oxides, NO_x**, by small amounts of Purge Gas necessary. That is especially true when using EBARA Dry Pumps with their small amounts of N₂-purge required

Table 1: Gas Abatement Data

Gases	Inlet Gas Conc. (Efficiency)	Outlet Gas Conc.	TLV-TWA
SiH ₄	Below LEL*	<5 ppm	5 ppm
TEOS	Below LEL*	<10 ppm	10 ppm
Other gases (NH ₃ etc.)	Below LEL*	<TLV-TWA	
ClF ₃ **	7500 ppm	<0.1 ppm (>99,9%)	0.1 ppm
NF ₃	4,5%	<1 ppm (>99%)	10 ppm
C ₂ F ₆ **	3%	<1 ppm (>99%)	-
CF ₄ **	1%	<1 ppm (>99%)***	-

* Lower Explosive Limit
 ** Efficiency depends on Gas condition
 *** High Fuel Mode

A **variety of options** are available adding value for the customer such as

- **Fan Scrubber Unit** to remove solid particulate from gas stream even further
- **Drain Water Pump** for elevation of waste water
- **Heater on Inlet Line** to prevent condensation
- **Air Purge Unit** to keep exhaust line dry
- **Fuel Leak Sensor**





Technical Data	GDC 250 SA (Natural gas fuel)	GDC 250 SP (Propane gas fuel)	GDC 250 SH (H ₂ gas fuel)
Maximum Flow Rate	250 l/min		
Inlet port	NW 40 x 4 Port (62 l/min in max., gas flow per a port)		
Dimension in mm	900 (w) x 900 (d) x 1800 (h)		
Weight	550 kg		
Power supply	Utility: 1.5 kVA (consumption: 0.8 kVA), single phase 230VAC		
Fuel type	13A Natural gas	Propane gas	Hydrogen
Fuel*	14 [26] l/min	6 [11] l/min	35 [80] l/min
Oxygen*	20 [58] l/min	21 [55] l/min	12 [40] l/min
Air*	140 [100] l/min	140 [100] l/min	140 [100] l/min
Nitrogen	38 l/min (during operation) 100 l/min (during shut down)		
City Water	9 l/min		

* Values in brackets, [], show consumption when abating CF₄.

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