CLEAN ENERGY SYSTEMS

Direct Steam Gas Generator: DSGG400

Product Description

The DSGG400 is a pressurized gas generator that combusts gaseous fuel with oxygen and controls combustion temperature via water injection. It creates thermal energy for power, industrial, or chemical processes while enabling >99% carbon capture and is rated for 20 MW_t when operating on pipeline quality natural gas fuel at design pressures. The combustion products are primarily steam and carbon dioxide (H_2O and CO_2) which enables simple carbon capture via gas liquid separation without the need for harsh chemicals such as amines.

Applications

- Clean Firm Power
- Combined Heat and Power (CHP)
- Industrial Decarbonization
- Clean Steam Production
- Produced Water Treatment & Thermal Enhancement
- Enhanced Oil and Gas Recovery (EOR, EGR)

Features

- Fully containerized or skid mounted solutions for minimal install time and cost
- Fully automated control system via Allen Bradley PLC, e.g. fuel demand, temperature control, load following, etc.
- Independent control over produced gas pressure and temperature
- Easy access maintenance system for full module or component replacement
- Unit can be completely overhauled in <24 hours
- Built to ASME BPVC Section VIII Division 2
- Increased safety via high-speed ignition detection (on the order of <500ms) and minimal stored volume; unit can be tripped, purged, and made safe for internal work in <15min.

Materials of Construction

Typical materials of construction of the DSGG are SS316 for a wide array of applications and corrosion resistance. The burner is manufactured with Inco 600 for high pressure oxygen compatibility. Non-standard applications may require the use of nickel alloys, stabilized stainless such as SS321, copper, or copper alloys.

Typical Dimensions: L 40-45' x W 11' x H 11' (12-14m x 4m x 4m) in operational enclosure

Nominal Operating Conditions

	Nominal	Customizable Range
Thermal Rating	68 MMBtu/hr (20 MW_t)	Up to 205 MMBtu/hr (60 MW_t)
Fuel Type	Pipeline Natural Gas	Other gaseous fuels upon request
Fuel Heating Value	20,260 Btu/lb (47.1 MJ/kg)	3,500 - 51,590 Btu/lb (8.14-120 MJ/kg)
Fuel Flow Rate	3,348 lb/hr (1,518 kg/hr)	Up to 10,000 lb/hr (4,536 kg/hr)
Oxidizer Type	98 mol% Oxygen	90 - 100 mol% Oxygen
Oxidizer Flow Rate	12,816 lb/hr (5,813 kg/hr)	Up to 31,070 lb/hr (14,090 kg/hr)
Diluent Type	Water	Water, salt water, produced water
Diluent Flow Rate*	66,780 – 90,000 lb/hr (30,290 – 40,820 kg/hr)	Based on required drive gas exit temperature
Coolant Type	Boiler quality water	Boiler quality water, ethylene glycol, TEG
Coolant Flow Rate	18,000 lb/hr (8,165 kg/hr)	Varies by design and site conditions
Drive Gas Output	82,944 lbs/hr (37,622 kg/hr)	Up to 311,070 lbs/hr (141,099 kg/hr)
CO_2 Output Flow Rate	1,850 mscfd (100 tonnes per day)	Up to 17,880 mscfd (940 tonnes/day)
Drive Gas Composition	~94 mol% H_2O, 6 mol% CO_2	Up to 90% CO_2 content
Exit Temperature	Saturation up to 3,200 °F (1,760 °C)	
Supply Pressure	1,800 psi (124 bar)	Up 5,000 psi (345 bar)
Exit Pressure	1,500 psi (100 bar)	Up to 4,200 psi (290 bar)
Operating Range	35 – 100% fuel demand	

*Diluent flow rate varies according to temperature control inputs and diluent supply temperature