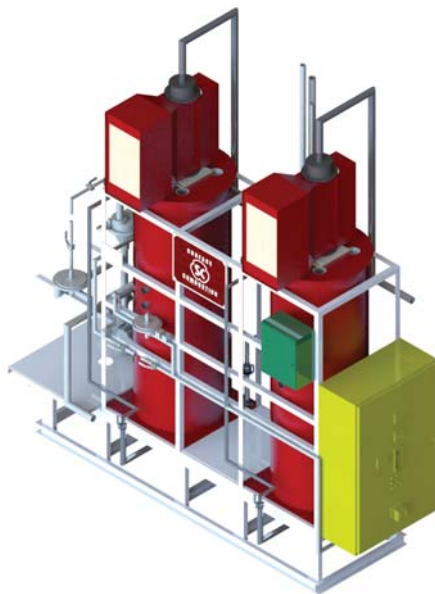


RX[®] Endothermic Atmosphere Gas Generator

Surface[®] generators produce consistent and reliable protective atmospheres



RX[®] Gas Generators produce a highly reducing product gas for controlled furnace atmospheres used in metallurgical heat treatments.

RX[®] endothermic gas is the most suitable base atmosphere for carburizing, carbonitriding, carbon restoration, clean hardening, and annealing of steel. Typical enriching gases added at the furnace for these processes are natural gas, air and ammonia.

RX[®] Endothermic Atmosphere Gas Generator

RX Gas Generators produce atmospheres used in metallurgical heat treatments.

Surface Solutions:

Surface Combustion originally developed RX[®] endothermic atmosphere gas generators for use with controlled atmosphere furnaces. We have the largest installed base of RX generators in North America. The modular style RX Gas Generators provide efficient, low cost, and reliable production of an endothermic gas atmosphere. RX Endothermic gas is nominally comprised of 20% CO, 40% H₂ and 40% N₂ with trace amounts of CO₂, CH₄ and H₂O. It is produced when an air/gas mixture of proper proportions is passed through a heated bed of catalyst.



Surface RX Generators utilize a modular design that improves energy efficiency. The design also decreases maintenance “down time” by allowing each reaction tube to operate independently.

Multiple reaction tube generator designs allow individual reaction tubes to be taken out of production when atmosphere demands are reduced or when the reaction tube requires burnout. The balance of the reaction tubes continue production of

endothermic gas. This flexibility allows for 6:1 turndown while still producing high quality gas composition and maintaining the dew point level.

Processes Include:

- Annealing
- Brazing
- Carbonitriding
- Carbon restoration
- Carburizing
- Ferritic nitrocarburizing (FNC)
- Neutral hardening
- Sintering

Optional Systems:

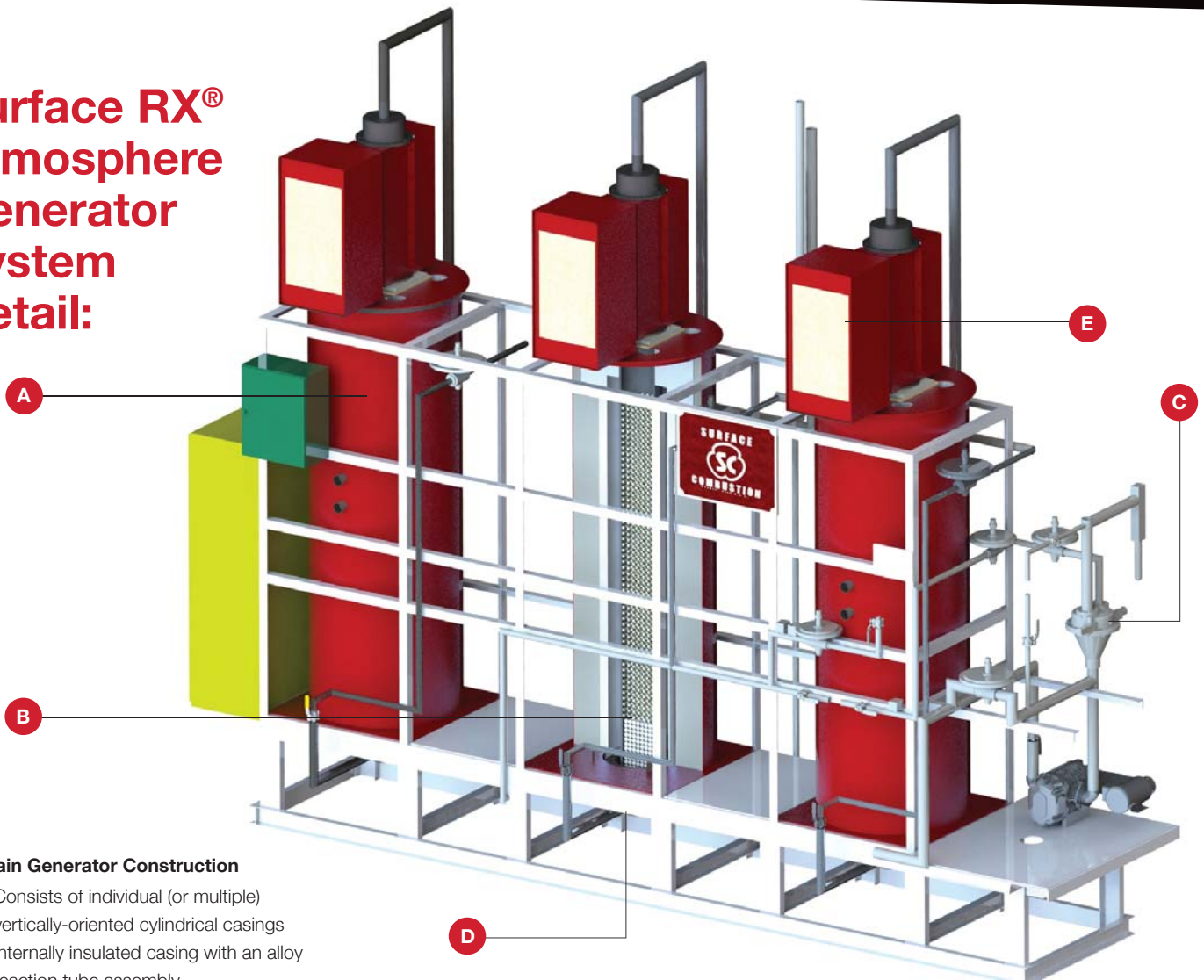
- Advanced diagnostics – dew point, temperature, flow
- Air cooling
- Back-up mixture pump
- Expansion ready
- On-line burnout feature
- Short and tall tubes
- Side removable tubes

Ideal Companion Component with:

Allcase[®] Furnace, Mesh Belt Furnace, Batch and Pusher Tray Furnaces



Surface RX[®] Atmosphere Generator System Detail:



A. Main Generator Construction

- Consists of individual (or multiple) vertically-oriented cylindrical casings
- Internally insulated casing with an alloy reaction tube assembly
- Mounted on a common, raised steel frame which allows for access to the reaction tube inlet assembly and gas-fired ring burner assemblies

B. Reaction Tube Assembly

- Each reaction tube assembly consists of a heavy wall, heat resistant cast alloy tube
- The tubes are filled with special catalyst to promote the endothermic reaction as the heated gas mixture flows up through the tube
- Each reaction tube is easily removed through the top of the generator assembly

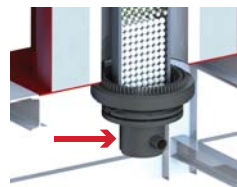
C. Reaction Gas Mixing System

- Surface gas generators utilize a proven air/gas ratio and flow control system to ensure the proper mixture
- The system controls air and natural gas flows throughout the turndown range of the generator and provides the required outlet pressure of the product gas

- The reaction gas mixing system includes a positive displacement mixture pump
- An oil recirculating system extends the life of the oil and reduces maintenance required by frequent oil changes.
- The mixture pump is equipped with a three phase motor with controls and V-belt guard

D. Heating System

- All RX Gas Generators are equipped with an extremely reliable and trouble-free heating system to raise and maintain the temperature of the reaction gas mixture inside each reaction tube assembly



- Each tube assembly is provided with an atmospheric ring burner assembly mounted at the bottom, concentric with the tube, so the hot gases flow vertically along the tube's periphery
- Each burner is electronically ignited and equipped with flame supervision
- The flue gases are exhausted through the top of the generator unit
- One main gas train feeding individual gas trains for each reaction tube is provided as a standard design

E. Product Gas Cooler

- Product gas reactions are "frozen" with high performance water or ENDOQUENCH[®] air coolers located at the top of each reaction tube provided
- They quench the product gas as it is discharged from the reaction tube

Generator Capacities:

Model Number	Reaction Tube(s)	Max. Capacity (cfh)	Max. Capacity (m ³ /hr)
RX-1S RX-1T	1	2,000 3,000	57 85
RX-2S RX-2T	2	4,000 6,000	114 170
RX-3S RX-3T	3	6,000 9,000	170 255
RX-4S RX-4T	4	8,000 12,000	227 340
RX-5T	5	12,000	340

Advanced Diagnostics™ –optional electronic process parameter monitoring by the control system that aids in predictive maintenance.

- Dew point of each retort's RX® gas
- Secondary dew point instrument for cross-checking ESA® dew point sensor.
- Outlet gas temperature per retort
- Individual retort flow
- Reaction air flow

Contact our Aftermarket Parts Specialists for Surface Genuine Replacement Parts such as:

- Air Cooler Piping
- Retorts
- Burner Piping
- Electrical Components
- Instrumentation
- Mixture Pumps
- Outlet and Vent Piping
- Reaction Piping



Available Sensors and Controls:

ESA® – Dew Point Sensor with Surface Combustion's patented design is CQI-9 capable, and offers a low-cost alternative to in-situ probes.

ESA® 8200 – Capable and user friendly: CLX PLC with digital communications and Large HMI with On-Line Help Screens. Control and Trend temperature and dew point; maintenance scheduling; redundant Oxygen probe monitoring.

C6™ E – Micro PLC and economic HMI with temperature and dew point control and alarming.

ESA® 3200 – Micro PLC with Single loop controllers and temperature hi-limits control dew point and RX® flow.



Get started with Surface!

Call Surface with the following information to get your furnace solution underway.

Work Description and your Process needed:

- cycle
- operation
- hours per year
- available space
- operating temperature range
- heat source

We will work with you to develop the best processing solution for your heat treating requirements. This starts with developing a complete process solution and continues through shipment, installation and equipment commissioning.

Once your system is in place we continue working with you for the life of the equipment through our industry leading aftermarket services including customer service, Aftermarket Parts, Rebuild and Upgrade Service. We look forward to working with you.



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