Stack S-design

General Description

SOFCpower-HTceramix provides stacks based on the patented SOFConnex™ technology. The S-design stack has been developed for remote and micro-Combined Heat and Power (CHP) applications up to 1 kW. It is characterized by low pressure drops and can achieve power densities of 1 kW/l or 400 mW/sqcm with electrical efficiencies of above 45%. The stacks can be fuelled with reformed natural gas, reformate gas or hydrogen. The S-design stack manifolds the air externally and the fuel internally and recovers the fuel exhaust stream. The exhaust stream can be used in post combustion, recirculated for reforming (given adapted balance of plant), or, on short stacks, be analyzed for research and development purposes.

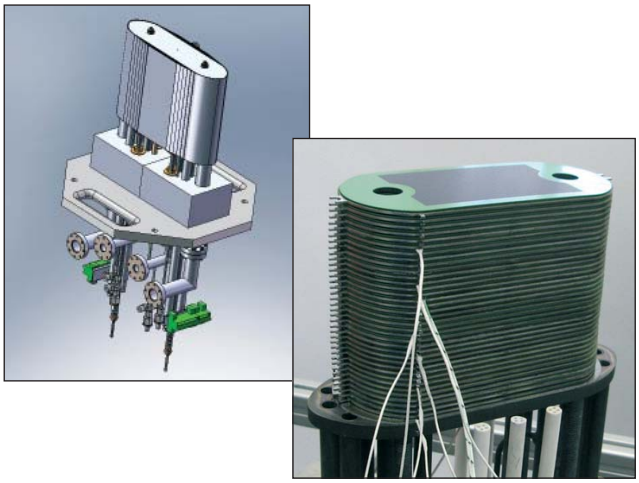
The use of the SOFConnex™ structure improves the thermal cycling tolerance of the stack, avoiding additional performance degradation due to thermal cycling. All the components are designed and manufactured based on low cost, environmentally safe manufacturing techniques using scaleable wet ceramic processes.

The SOFConnex™

HTceramix has developed and patented the SOFConnex™, a unique and innovative gas diffusion layer. This component combines three essential functions of the stack: it accomplishes current collection from the electrodes to the metallic interconnects; it manifolds the fuel between and on the cells; and it seals the gases. The SOFConnex™ integrates the gas distribution on the cell, allowing the use of thin, unmachined metallic sheets instead of expensive, structured bi-polar plates. In assembly, the green ceramic-to-ceramic contact avoids rigid metal-to-ceramic interfaces, a potential source of cell breakage.

Configurations

The S-design stack includes between 1 and 72 cells, corresponding to 16-1000 W nominal power. They are supplied in an adapted setup providing the necessary interfaces for voltage, temperature and current measurements and the gas connections from the test bench or system to the stack. The stack's first start-up is accomplished prior to delivery within our quality control (QC) laboratory, and a QC data sheet of the stack's performance will accompany the stack delivery. The S-design stack enables the customer to recuperate the anode gas. The customer needs to provide the appropriate stack environment, i.e. the gases and the thermal environment. For stacks up to 100 W, we can recommend a standard lab test solution. The integration of bigger stacks requires a relatively high level of experience from the customer side to adapt the test-bench or system to the stack. We offer engineering services in collaboration with the customer.



SOFCPOWER S.r.l.
Via Al Dos de la Roda, 60 - loc. Ciré
I-38057 Pergine Valsugana (TN)
Italy
www.sofcpower.com

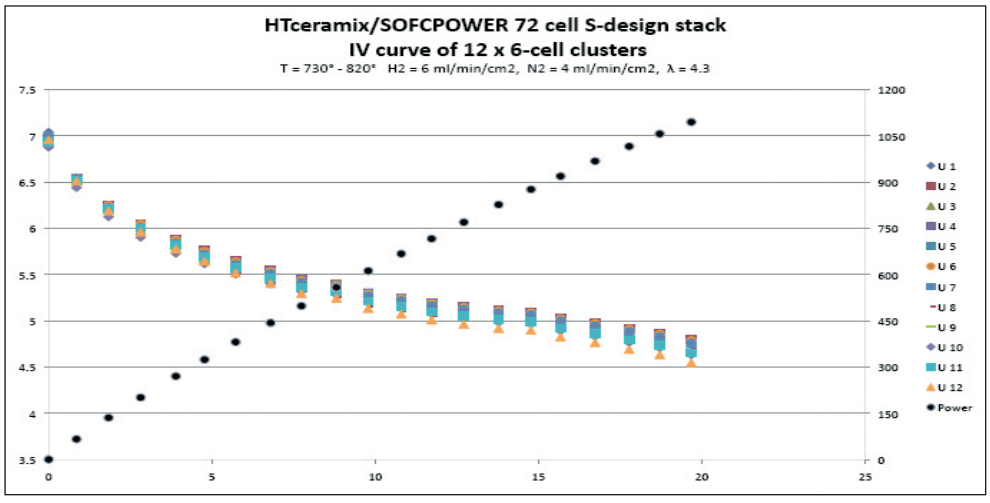
HTceramix SA
Av. des Sports 26
CH-1400 Yverdon-les-Bains
Switzerland
www.htceramix.ch

Stack S-design

S-design stack specifications and operation conditions

Number of cells in stack	1 - 72		
Nominal Stack Power	16 – 1000		W
Ideal current at nominal operation point	Approx. 20		A
Cell's footprint	152 x 70		mm x mm
Active area per cell	50		cm2
Stack's dimensions	Depth	72.6	mm
	Length	290	mm
	Height per cell	2.95/cell	mm
Minimum operating voltage per cell	0.6		V
Ideal operating voltage per cell	0.75		V
Ideal stack operating temperature	800		°C
Max. stack operating temperature	850		°C
Operating pressure	Atmospheric		
Fuel	Hydrogen or reformate		
Hydrogen volume flow rate per cell	200-400 [4-8ml/min.cm2]		ml/min
Hydrogen humidification ratio	~3% (bubbler @ ambient temperature)		
Oxidant	Air		
Oxidant flow rate ratio (lambda)	2-4		
Stack air inlet temperature	700-800		°C
Stack fuel inlet temperature	700-800		°C
Nominal pressure drop on air side	20		mbar
Nominal pressure drop on fuel side	20		mbar
Mechanical pressure on stack	6		N/cm2

Specifications subject to change without notice



* These results were obtained under our ideal laboratory conditions. HTceramix-SOFCpower offers no guarantee of identical performance under other laboratory conditions.

SOFCPOWER S.r.l.
Via Al Dos de la Roda, 60 - loc. Ciré
I-38057 Pergine Valsugana (TN)
Italy
www.sofcpower.com

HTceramix SA
Av. des Sports 26
CH-1400 Yverdon-les-Bains
Switzerland
www.htceramix.ch