

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003

**COMPLETE
SPECIFICATION**

(See Section 10; rule 13)

TITLE OF THE INVENTION

“STACK ASSEMBLY”

APPLICANT

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The following specification particularly describes
the invention and the manner in which
it is to be performed

AMENDED CLAIMS

received by the International Bureau on 30 August 2012 (30.08.12)

1. Solid oxide fuel or electrolysis cell stack assembly (100, 200, 300, 400, 500, 600) suited for connection to a solid oxide fuel or electrolysis cell system, said assembly comprising
- at least one solid oxide fuel or electrolysis cell stack (103, 203, 403, 503, 603), the at least one stack comprises a plurality of fuel cells or electrolysis cells, the at least one stack comprises a top face, a bottom face, a plurality of side faces, fuel gas inlet (107, 507), fuel gas outlet (108, 508), oxidant gas inlet (106, 506) and oxidant gas outlet (105, 505),
 - a rigid housing (101, 201, 301, 401, 501, 601) with one closed top end, one open bottom interface end opposite the closed end and at least one side, the housing is enclosing the at least one stack top face and the plurality of side faces, the open bottom interface end is adapted to be connected to an interface counterpart of said solid oxide fuel or electrolysis cell system and provides interface for fuel gas and oxidant gas between the at least one stack and said system,
 - at least one flexible compression force mat (211, 411, 511, 611) positioned inside the housing between the at least one stack top face and the closed top end of the housing, the compression force mat provides compression force for the at least one stack
 - at least one flexible fixation mat (110, 210, 410, 610) positioned inside the housing between at least one of the

plurality of stack side faces and the at least one side of the housing,

wherein said assembly further comprises a flexible-interface-fixture (104, 204, 404, 504, 604) positioned adjacent to the open bottom interface end of the housing whereby it at least partly encloses the at least one stack within the housing and at least partly covers the bottom face of the at least one stack, wherein the thickness of the flexible-interface-fixture is in the range of 0.1 - 3 mm, said flexible-interface-fixture has a flexural stiffness of between 0,01 Nm and 5000 Nm, whereby it is rigid enough to provide fixture of the at least one stack in said housing when the at least one stack is not in operation, but sufficiently flexible to allow for transfer of at least a part of the compression force from the compression force mat through the at least one stack, further through the flexible-interface-fixture and against the interface counterpart of the solid oxide fuel or electrolysis cell system when the at least one stack is in operation.

2. Solid oxide fuel or electrolysis cell stack assembly according to claim 1, wherein the flexural stiffness of the flexible-interface-fixture is between 0,1 Nm and 1000 Nm, preferably between 1 Nm and 500 Nm at 20°C.

3. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein said open bottom interface end of the housing and said flexible-interface-fixture are planar, parallel and has an external interface surface which is in the same plane when connected to the interface counterpart of the solid oxide fuel or electrolysis cell system.

4. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein said open bottom

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interface end of the housing is provided with a flange (102, 202, 302, 402, 502, 602) suited for connection to the interface counterpart of the system, said flange can be an integrated part of the housing, or it can be attached to the housing by means of welding, bracing, screws or it can be a loose flange with a mechanical fit around the housing.

5. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein the flexible-interface-fixture is a steel plate connected to the open bottom interface end of the housing.

6. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein the flexible-interface-fixture is connected to the housing by means of welding, bracing, screws or a mechanical fit.

7. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein the width of the flexible-interface-fixture corresponds to the inner width of the open bottom interface end of the housing, whereby the flexible-interface-fixture can be mounted inside said open bottom interface end of the housing.

8. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein at least one gasket (209, 409, 509, 609) is provided between the bottom face of the at least one stack and the flexible-interface-fixture to provide a sealing between at least one fuel or oxidant gas inlet or outlet of the at least one stack and the flexible-interface-fixture, and wherein the pressure necessary to provide a gas tight seal of said gasket is provided at least partly by the flexible compression force mat when the assembly is connected to the

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interface counterpart of said system and the at least one stack is in operation.

9. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein the at least one stack has external manifolding for the oxidant gas and internal manifolding for the fuel gas, one side face of the at least one stack has external manifold oxidant gas inlet, one side face of the at least one stack has external manifold oxidant gas outlet and the bottom face of the at least one stack has internal manifold fuel gas inlet and internal manifold fuel gas outlet.

10. Solid oxide fuel or electrolysis cell stack assembly according to any of the claims 1 - 7, wherein the at least one stack has external manifolding for both the oxidant gas inlet and outlet and the fuel gas inlet and outlet, and wherein the at least one flexible fixation mat provides a gas sealing between at least two of the gas inlets and outlets of the at least one stack.

11. Solid oxide fuel or electrolysis cell stack assembly according to any of the claims 1 - 7, wherein the at least one stack has internal manifolding for both the oxidant gas inlet and outlet and the fuel gas inlet and outlet.

12. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein the housing is made by casting, deep-drawing, selective laser melting or welding, and wherein the housing is provided with stiffening and strengthening external and/or internal ribs (112, 312, 412, 512, 612).

13. Solid oxide fuel or electrolysis cell stack assembly according to claim 12, wherein the housing at least has internal

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stiffening and strengthening ribs, and wherein at least a part of said ribs are adapted to provide flow guidance of at least a part of the oxidant or fuel gasses.

14. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein at least one of the at least one side of the housing is formed as at least one stiffening and strengthening profile.

15. Solid oxide fuel or electrolysis cell stack assembly according to claim 13, wherein at least one of said profile(s) provide space for further elements of the assembly such as current collectors.

16. Solid oxide fuel or electrolysis cell stack assembly according to any of the preceding claims, wherein the at least one compression force mat and the at least one fixation mat is made from one or more of the following materials: of ceramic, glass, metal or a combination of these, preferably porous calcium silicate or glass fibre reinforced calcium silicate or refractory ceramic fibre or glass fibre, preferably magnesia-silica fibre, alumina fibre with or without an amount of silica, low alkali aluminosilicate compositions containing one or more of the following oxides: zirconia, chromia or titania or vermiculite.

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AMENDED SHEET (ARTICLE 19)