

CLAIMS

1. An electrode system (1) comprising:

a plurality of first electrode plates (3; 3'; 3'') and a plurality of second electrode plates (5; 5') arranged alternately to form an electrode stack,

5 each first electrode plate (3; 3'; 3'') having a first electrode plate first busbar opening (25a; 25a'; 25a'') and a first electrode plate second busbar opening (25b; 25b'; 25b'') extending through the first electrode plate (3; 3'; 3''), the first electrode plate second busbar opening (25b; 25b'; 25b'') being larger than the first electrode plate first busbar opening (25a; 25a'; 25a''),

10 each second electrode plate (5; 5') having a second electrode plate first busbar opening (27a; 27a') extending through the second electrode plate (5; 5'), the second electrode plate first busbar opening (27a; 27a') being dimensioned larger than each of the first electrode plate first busbar openings (25a; 25a'; 25a'') and aligned with the first electrode plate first busbar
15 openings (25a; 25a'; 25a''), and a second electrode plate second busbar opening (27b; 27b') extending through the second electrode plate (5; 5'), the second electrode plate second busbar opening (27b; 27b') being dimensioned smaller than each of the first electrode plate second busbar openings (25b; 25b'; 25b'') and aligned with the first electrode plate second busbar openings
20 (25b; 25b'; 25b''),

a first busbar (17a; 18; 31; 45) extending through the first electrode plate first busbar openings (25a; 25a'; 25a'') and the second electrode plate first busbar openings (27a; 27b'), the first busbar (17a; 18; 31; 45) being configured to be in mechanical contact with an inner first busbar surface of
25 the first electrode plate first busbar openings (25a; 25a'; 25a'') only, and

a second busbar (17b) extending through the first electrode plate second busbar openings (25b; 25b'; 25b'') and the second electrode plate second busbar openings (27b; 27b'), the second busbar (17b) being configured to be

in mechanical contact with an inner second busbar surface of the second electrode plate second busbar openings (27b; 27b') only.

2. The electrode system (1) as claimed in claim 1, wherein the first busbar is an anode busbar and the second busbar is a cathode busbar.

5 3. The electrode system (1) as claimed in claim 1 or 2, wherein every first electrode plate (3; 3'; 3'') is an anode and every second electrode plate (5; 5') is a cathode.

4. The electrode system (1) as claimed in any of the preceding claims, wherein each first electrode plate (3; 3'; 3'') has a first frame (19a) which
10 delimits a first inner volume (21a), the first frame having (19a) a first oxygen gas channel (24a), a first hydrogen gas channel (24b), wherein of the first oxygen gas channel (24a) and the first hydrogen gas channel (24b) only the first oxygen gas channel (24a) is connected to the first inner volume (21a), and a water channel (22a) connected to the first inner volume (21a).

15 5. The electrode system (1) as claimed in claim 4, wherein each second electrode plate (5; 5') has a second frame (19b) which delimits a second inner volume (21b), the second frame (19b) having a second oxygen gas channel (26a) aligned with the first oxygen gas channels (24a), a second hydrogen gas channel (26b) aligned with the first hydrogen gas channels (24a), wherein of
20 the second oxygen gas channel (26a) and the second hydrogen gas channel (26b) only the second hydrogen gas channel (26b) is connected to the second inner volume (21b), and a second water channel (28a) aligned with the water channel (22a).

6. The electrode system (1) as claimed in any of the preceding claims, wherein the first busbar (17a; 18; 31; 45) is configured to engage with the
25 inner first busbar surfaces and the second busbar (17b) is configured to engage with the inner second busbar surfaces.

7. The electrode system (1) as claimed in any of the preceding claims, wherein the inner first busbar surfaces are threaded and the first busbar (17a)

is provided with external threads configured to form a threaded connection with the threads of the inner first busbar surfaces, and the inner second busbar surfaces are threaded and the second busbar (17b) is provided with external threads configured to form a threaded connection with the threads of the inner second busbar surfaces.

8. The electrode system (1) as claimed in claim 7, wherein the first busbar (17a; 18; 31) and the second busbar (17b) have a circular cross section.

9. The electrode system (1) as claimed in any of claims 1-6, wherein the first busbar (18) is provided with a plurality of radially outwards extending first fins (18a), the first fins (18a) being provided with a respective first fin locking structure (18b), and the inner first busbar surface is provided with a plurality of radially inwards extending first protrusions (29) each provided with an inner first locking structure (29a), each inner first locking structure (29a) being configured to mate with a respective first fin locking structure (18b).

10. The electrode system (1) as claimed in claim 9, wherein the first fin locking structures (18b) are tangential protrusions configured to snap-fit with a respective inner first locking structure (29a).

11. The electrode system (1) as claimed in claim 9 or 10, wherein the second busbar is provided with a plurality of radially outwards extending second fins, the second fins being provided with a respective second fin locking structure, and the inner second busbar surface is provided with a plurality of radially inwards extending second protrusions each provided with an inner second locking structure, each inner second locking structure being configured to mate with a respective second fin locking structure.

12. The electrode system (1) as claimed in claim 11, wherein the second fin locking structures are tangential protrusions configured to snap-fit with a respective inner second locking structure.

13. The electrode system (1) as claimed in any of claims 1-5, wherein the first busbar (31) comprises two separated first halves (31a, 31b) extending parallel with each other in the axial direction of the first busbar (31), and a first distance setting assembly (33a) configured to enable adjustment of a distance between the two first halves (31a, 31b) to thereby enable a tight fit with the first electrode plate first busbar openings, and wherein the second busbar comprises two separated second halves extending parallel with each other in the axial direction of the second busbar, and a second distance setting assembly configured to enable adjustment of the distance between the two second halves to thereby enable a tight fit with the second electrode plate second busbar openings.

14. The electrode system as claimed in claim 13, wherein the first distance setting assembly (33a) includes a first screw (35a, 37a) in each end region of the first busbar (31), extending radially through the two first halves (31a, 31b) and each first screw (35a, 37a) is provided with two first nuts enabling the adjustment of the distance between the two first halves (31a, 31b), and the second distance setting assembly includes a second screw in each end region of the second busbar, extending radially through the two second halves and each second screw is provided with two second nuts enabling the adjustment of the distance between the two second halves.

15. The electrode system (1) as claimed in any of the preceding claims, wherein the electrode system (1) is an electrolyser system.

16. The electrode system as claimed in any of claims 1-6, comprising a plurality of electrically conducting planar spacers (41a, 41b), each spacer (41a, 41b) having a through-opening configured to receive a first busbar or a second busbar, wherein the first electrode plates and the second electrode plates are coated with a heat conductive polymer, wherein the first electrode plates and second electrode plates have an exposed region where the underlying metal core has been exposed, the exposed region of the first electrode plates being provided with a respective one of the first electrode plate first busbar opening and the exposed region of the second electrode

plates being provided with a respective one of the second electrode plate second busbar opening, wherein for each first electrode plate one spacer is arranged on one side of the first electrode plate first busbar opening and another spacer is arranged on an opposite side of the first electrode plate first
5 busbar opening, and for each second electrode plate one spacer is arranged on one side of the second electrode plate second busbar opening and another spacer is arranged on an opposite side of the second electrode plate second busbar opening, the spacers thereby being arranged in mechanical and electrical contact with both the front and rear surfaces of the exposed regions.