

C L A I M S

CLAIMS

1. A reactor configuration comprising at least one electrically heated furnace which defines a space, with at least one reactor tube placed within the furnace space and said reactor tube having an exit and entrance outside of the reactor furnace, and wherein said furnace is further provided with
 - at least one electrical radiative heating element suitable for heating to high temperatures in the range of 400 to 1400 °C, said heating element being located inside said furnace in such a way that the heating element is in no direct contact with the at least one reactor tube; and
 - a number of inspection ports in the furnace wall such to be able to visually inspect the condition of the at least one reactor tube on all sides of said reactor tube during operation, the total number of inspection ports being sufficient to inspect all reactor tubes present in the furnace at their full length and circumference; and wherein the heating duty of the furnace is at least 3 MW.
2. A reactor configuration according to claim 1, wherein the at least one radiative heating element is a resistance based heating element.
3. A reactor configuration according to any one of the preceding claims, wherein the at least one electrical heating element comprises NiCr, SiC, MoSi₂ or FeCrAl based resistance heating elements.
4. A reactor configuration according to claim 3, wherein the electrical heating element comprises MoSi₂ or FeCrAl based resistance heating elements.

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5. A reactor configuration according to any one of the preceding claims, wherein the reactor furnace comprises ten or more reactor tubes.
6. A reactor configuration according to any one of the preceding claims, wherein the reactor furnace comprises at least two heating zones, wherein each heating zone has its own power control unit.
7. A reactor configuration according to any one of the preceding claims, comprising at least ten electrically heated furnaces, each of which defines a space, and within each space at least ten reactor tubes, each of said reactor tubes having an exit and entrance outside of the reactor furnace, each of said furnaces further being provided with
 - ten or more electrical radiative heating elements suitable for heating the reactor tubes to high temperatures in the range of 600 to 1100 °C, arranged in at least four heating zones; and
 - a number of inspection ports in the furnace wall such to be able to visually inspect the condition of the at least one reactor tube on each opposite side of said reactor tube during operation with the use of infrared radiant measurement techniques, the total number of inspection ports being sufficient to inspect all reactor tubes present in the furnace at their full length and circumference, ; andwherein the heating duty of each furnace is at least 3 MW.
8. A reactor configuration according to any one of the preceding claims, being provided with a power supply connection to a renewable source for supplying at least part of the required power for the electrical heating.
9. A method of performing a gas conversion process at high temperatures, comprising introducing at least one gaseous

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- reactant into a reactor configuration of claims 1-8,
electrically heating the at least one heating element to a
temperature in the range of 400 - 1400 °C, and performing
the high temperature gas conversion while inspecting the
5 reactor tube by means of sight on the reactor tube.
10. A method of performing a gas conversion process of claim
9, wherein the gas conversion process comprises producing
a synthesis gas by means of steam methane reforming, dry
CO₂ reforming, reverse water-gas shift or a combination
10 thereof, comprising the steps of:
- i. Providing hydrocarbons and steam and/or CO₂ to the
reactor configuration, such that the reaction
mixture enters the at least one reactor tube;
 - 15 ii. Maintaining the furnace of the reactor at a
temperature of at least 400 °C by providing
electrical energy to the at least one heating
element;
 - iii. Allowing the hydrocarbons and steam to be converted
into hydrogen and carbon monoxide; and
 - 20 iv. Obtaining from the reactor a synthesis gas stream.
11. The method of claim 9 or 10, comprising controlling the
temperatures in different sections of the reactor
furnace, and wherein the reactor furnace comprises at
least two heating zones, wherein each heating zone has
25 its own power control unit that is regulated to achieve a
heat flux profile over the surface of the at least one
reactor tube.
12. The method of any one of claims 9 to 11, further
comprising supplying at least part of the power for the
30 electrical heating from a renewable source.