PATENT CLAIMS

1. A thermally conductive composite element (10) for use in surface cooling or in surface heating, in particular, comprising at least one mould (12, 12′) containing expanded graphite and at least one textile fabric (20, 20′) arranged on at least one side of the mould (12, 12′), wherein the at least one textile fabric (20, 20′) is connected to the mould (12, 12′) by means of an inorganic adhesive (14′, 14″).

2. The thermally conductive composite element (10) according to claim 1,

characterized in that

a pipe body (16) through which a heat transfer medium can flow is embedded in the at least one mould (12, 12′) containing expanded graphite.

3. The thermally conductive composite element (10) according to claim 2,

characterized in that

the pipe body (16) is configured in a meandering or spiral shape.

4. The thermally conductive composite element (10) according to at least one of the preceding claims,

characterized in that

the at least one mould (12, 12′) containing expanded graphite is configured at least substantially in plate form and the at least one

textile fabric (20, 20’) is arranged on the upper and/or lower side of the plate-shaped mould (12, 12’).

5. The thermally conductive composite element (10) according to at least one of the aforementioned claims,

characterized in that

the at least one mould (12, 12’) contains expanded graphite with a density of 0.02 to 0.5 g/cm³, preferably of 0.04 to 0.3 g/cm³ and particularly preferably of 0.05 to 0.2 g/cm³.

6. The thermally conductive composite element (10) according to at least one of the preceding claims,

characterized in that

the at least one mould (12, 12’) contains expanded graphite with a surface weight of 100 to 4,000 g/cm², preferably of 350 to 3,500 g/cm² and particularly preferably of 500 to 2,000 g/cm².

7. The thermally conductive composite element (10) according to at least one of the preceding claims,

characterized in that

it exhibits two moulds (12, 12’) each consisting of expanded graphite which are connected to one another via an inorganic adhesive (14).

8. The thermally conductive composite element (10) according to claim 7,

characterized in that

a pipe body (16) through which a heat transfer medium can flow is embedded between the two moulds (12, 12').

9. The thermally conductive composite element (10) according to at least one of the preceding claims,

characterized in that

it exhibits edge protection.

10. The thermally conductive composite element (10) according to claim 9,

characterized in that

an L-shaped component which is preferably made of metal or plastic, a U-shaped component which is preferably made of metal or plastic or a coating is provided as the edge protection on at least one of the edge sides of the composite element (10).

11. The thermally conductive composite element (10) according to at least one of the preceding claims,

characterized in that

it is inserted or adhered into a frame made of metal and/or non-woven fabric.

12. A method for the production of a thermally conductive composite element (10) according to at least one of the preceding claims, which comprises the following steps:

i) provision of a first and a second plate-shaped premoulding (12, 12′), wherein the two premouldings (12, 12′) each contain expanded graphite,

ii) arrangement of a pipe body (16) through which a transfer medium can flow between the upper side of the first premoulding (12′) and the lower side of the second premoulding (12) and

iii) pressing of the assembly obtained in step ii),

wherein in step i) at least one textile fabric (20, 20′) is applied to at least one of the sides of the premouldings (12, 12′) lying opposite the pipe body (16) in the subsequent composite element (10) and/or following step iii) at least one textile fabric (20, 20′) is applied to the upper side and/or lower side of the embodiment obtained in step iii).

13. The method according to claim 12,

characterized in that it comprises the following steps in addition:

a) application of an inorganic adhesive (14, 14′′) to the upper side and the lower side of the first premoulding (12′),

b) application of a textile fabric (20′) to the upper side or lower side of the first premoulding provided with adhesive (14, 14′′) and arrangement of a pipe body (16) on the side of the first premoulding (12′) lying opposite the textile fabric (20′),

c) application of an inorganic adhesive (14') to the upper side or the lower side of the second premoulding (12),

d) application of a textile fabric (20) to the upper side or lower side of the second premoulding (12) provided with adhesive (14'),

e) arrangement of the second premoulding (12) obtained in step d) with its side lying opposite the textile fabric (20) downwards on the pipe body (16) of the assembly obtained in step b) and

f) pressing of the structure obtained in step e).

14. The method according to at least one of the claims 12 or 13,

characterized in that

the structure in step f) is pressed at a pressure of 0.02 to 5 MPa and preferably of 0.1 to 1 MPa.

15. Use of a thermally conductive composite element (10) according to at least one of the claims 1 to 11 in surface cooling or in surface heating and preferably in underfloor, wall or ceiling heating, for the surface cooling and heating of machinery and equipment, such as photovoltaic cells, temperature chambers, housings for power electronics, battery cells, in particular battery packs containing lithium-ion battery cells, for cooling medical equipment such as CT scanners and MRI scanners, for air-conditioning in motor

vehicles such as buses, heavy-goods vehicles and the like, for air-conditioning in ships and aircraft cabins or for temperature-control basins in swimming pools.

Claims:

1. A thermally conductive composite element for use in surface cooling or in surface heating, in particular, comprising at least one mould containing expanded graphite and at least one textile fabric arranged on at least one side of the mould, wherein the at least one textile fabric is connected to the mould by means of an inorganic adhesive.

2. The thermally conductive composite element according to claim 1, characterized in that

a pipe body through which a heat transfer medium can flow is embedded in the at least one mould containing expanded graphite.

3. The thermally conductive composite element according to claim 2, characterized in that

the pipe body is configured in a meandering or spiral shape.

4. The thermally conductive composite element according to at least one of the preceding claims,
characterized in that

the at least one mould containing expanded graphite is configured at least substantially in plate form and the at least one textile fabric is arranged on the upper and/or lower side of the plate-shaped mould.

5. The thermally conductive composite element according to at least one of the aforementioned claims,
characterized in that

the at least one mould contains expanded graphite with a density of 0.02 to 0.5 g/cm³, preferably of 0.04 to 0.3 g/cm³ and particularly preferably of 0.05 to 0.2 g/cm³.

6. The thermally conductive composite element according to at least one of the preceding claims,
characterized in that

the at least one mould contains expanded graphite with a surface weight of 100 to 4,000 g/cm², preferably of 350 to 3,500 g/cm² and particularly preferably of 500 to 2,000 g/cm².

7. The thermally conductive composite element according to at least one of the preceding claims,

characterized in that

it exhibits two moulds each consisting of expanded graphite which are connected to one another via an inorganic adhesive.

8. The thermally conductive composite element according to claim 7, characterized in that

a pipe body through which a heat transfer medium can flow is embedded between the two moulds.

9. The thermally conductive composite element according to at least one of the preceding claims, characterized in that

it exhibits edge protection.

10. The thermally conductive composite element according to claim 9, characterized in that

an L-shaped component which is preferably made of metal or plastic, a U-shaped component which is preferably made of metal or plastic or a coating is provided as the edge protection on at least one of the edge sides of the composite element.

11. The thermally conductive composite element according to at least one of the preceding claims, characterized in that

it is inserted or adhered into a frame made of metal and/or non-woven fabric.

12. A method for the production of a thermally conductive composite element according to at least one of the preceding claims, which comprises the following steps:

i) provision of a first and a second plate-shaped premoulding, wherein the two premouldings each contain expanded graphite,

ii) arrangement of a pipe body through which a transfer medium can flow between the upper side of the first premoulding and the lower side of the second premoulding and

iii) pressing of the assembly obtained in step ii),

wherein in step i) at least one textile fabric is applied to at least one of the sides of the premouldings lying opposite the pipe body in the subsequent composite element and/or following step iii) at least one textile fabric is applied to the upper side and/or lower side of the embodiment obtained in step iii).

13. The method according to claim 12,
characterized in that it comprises the following steps in addition:

a) application of an inorganic adhesive to the upper side and the lower side of the first premoulding,

b) application of a textile fabric to the upper side or lower side of the first premoulding provided with adhesive and arrangement of a pipe body on the side of the first premoulding lying opposite the textile fabric,

c) application of an inorganic adhesive to the upper side or the lower side of the second premoulding,

d) application of a textile fabric to the upper side or lower side of the second premoulding provided with adhesive,

e) arrangement of the second premoulding obtained in step d) with its side lying opposite the textile fabric downwards on the pipe body of the assembly obtained in step b) and

f) pressing of the structure obtained in step e).

14. The method according to at least one of the claims 12 or 13,
characterized in that

the structure in step f) is pressed at a pressure of 0.02 to 5 MPa and preferably of 0.1 to 1 MPa.

15. Use of a thermally conductive composite element according to at least one of the claims 1 to 11 in surface cooling or in surface heating and preferably in underfloor, wall or ceiling heating, for the surface cooling and heating of machinery and equipment, such as photovoltaic cells, temperature chambers, housings for power electronics, battery cells, in particular battery packs containing lithium-ion battery cells, for cooling medical equipment such as CT scanners and MRI scanners, for air-conditioning in motor vehicles such as buses, heavy-goods vehicles and the like, for air-conditioning in ships and aircraft cabins or for temperature-control basins in swimming pools.