An object of the present invention is to provide a vacuum insulation panel manufacturing method that makes it possible to manufacture low-cost, high-performance vacuum insulation panels, and a low-cost, high-performance vacuum insulation panel.

In accordance with an aspect of the present disclosure, there is provided a vacuum insulation panel manufacturing method comprising:

a stacking step in which a first metal plate is stacked on one side of an insulating core member, and a second metal plate having an evacuation port, and a reinforcing material having an opening are stacked on the other side of the core member sequentially from the core member, such that the evacuation port and the opening are stacked,

a first welding step for welding outwards of where the core member is arranged in the first metal plate and the second metal plate;

an evacuating step for applying a vacuum in an inner area which is held between the first metal plate and the second metal plate and in which the core member is arranged, through the evacuation port and the opening; and

a laser welding step in which, in a state in which the inner area is made into a vacuum by the evacuating step, the evacuation port and the opening are sealed by means of a sealing member, and the sealing member and the reinforcing material are laser welded, or the sealing member, the reinforcing material and the second metal plate are laser welded.

(1) An embodiment of the present disclosure related to a vacuum insulation panel manufacturing method comprising: a stacking step in which a first metal plate is stacked on one side of an insulating core member, and in which a backing member having an opening and a second metal plate having an evacuation port are stacked, with the opening and the evacuation port stacking, on the other surface of the core member in the order of the backing member and the second metal plate from the core member side; a first welding step for welding outwards of where the core member is arranged in the first metal plate and the second metal plate; an evacuating step for applying a vacuum in an inner area which is held between the first metal plate and the second metal plate and in which the core member is arranged, from the evacuation port; and a laser welding step in which, in a state in which the inner area is made into a vacuum by the evacuating step, the evacuation port is sealed by means of a sealing member and the sealing member, the second metal plate and the backing member are laser welded.

(2) The evacuating step of (1) may apply a vacuum in an inner area which is held between the first metal plate and the

second metal plate and in which the core member is arranged, from the evacuation port by evacuating a chamber by covering with the chamber a partial region including the evacuation port of the second metal plate.

(3) Other embodiments relate to a vacuum insulation panel manufacturing method comprising: a stacking step in which a first metal plate is stacked on one side of an insulating core member, and in which a second metal plate having an evacuation port and a reinforcing material having an opening are stacked, with the evacuation port and the opening stacking, on the other surface of the core member sequentially from the core member; a first welding step for welding outwards of where the core member is arranged in the first metal plate and the second metal plate; an evacuating step through the evacuation port and the opening to create a vacuum in an inner area which is held between the first metal plate and the second metal plate and in which the core member is arranged; and a laser welding step in which, in a state in which the inner area is made into a vacuum by the evacuating step, the evacuation port and the opening are sealed by means of a sealing member and the sealing member and the reinforcing material or the sealing member, the reinforcing material, and the second metal plate are laser welded.

(4) The stacking step of (3) may include a step in which the second metal plate and the reinforcing material are welded.

(5) The evacuating step of (3) or (4) may apply a vacuum in an inner area which is held between the first metal plate

and the second metal plate and in which the core member is arranged, from the evacuation port by evacuating a chamber by covering with the chamber a region including the opening of the reinforcing material.

(6) Laser irradiation may be performed from an outer side of the chamber in the laser welding step of (2) or (5).

(7) The sealing member of (1) to (6) may be made of a magnetic body, and the evacuating step includes a pressing step for holding the sealing member by using a magnetic force and pressing the sealing member against the evacuation port.

(8) The first welding step of (1) to (7) may be a seam welding step.

In accordance with an aspect, there is provided a vacuum insulation panel comprising:

an insulating core member;

a first metal plate arranged on one side of the core member;

a second metal plate arranged on the other surface of the core member sequentially from the core member and having an evacuation port

a reinforcing material having an opening at a position stacking with the evacuation port; and

a sealing member sealing the opening,

wherein outer sides of regions of the first metal plate and the second metal plate between which the core member is sandwiched are welded,

wherein the sealing member, the reinforcing material, and

the second metal plate are welded, and

wherein a vacuum state is maintained between the first metal plate and the second metal plate.

(9) Embodiments relate to a vacuum insulation panel comprising: an insulating core member; a first metal plate arranged on one side of the core member; a backing member having an opening and arranged on the other surface of the core member; a second metal plate arranged across the backing member on the other surface of the core member and having an evacuation port at a position stacking with the opening; and a sealing member sealing the opening, wherein outer sides of regions of the first metal plate and the second metal plate between which the core member is sandwiched are welded, wherein the sealing member, the second metal plate, and the backing member are welded, and wherein a vacuum state is created between the first metal plate and the second metal plate.

(10) Other aspect of the present invention related to a

CLAIMS

1. A vacuum insulation panel manufacturing method comprising:

a stacking step in which a first metal plate is stacked on one side of an insulating core member, and a second metal plate having an evacuation port, and a reinforcing material having an opening are stacked on the other side of the core member sequentially from the core member, such that the evacuation port and the opening are stacked,

a first welding step for welding outwards of where the core member is arranged in the first metal plate and the second metal plate;

an evacuating step for applying a vacuum in an inner area which is held between the first metal plate and the second metal plate and in which the core member is arranged, through the evacuation port and the opening; and

a laser welding step in which, in a state in which the inner area is made into a vacuum by the evacuating step, the evacuation port and the opening are sealed by means of a sealing member, and the sealing member and the reinforcing material are laser welded, or the sealing member, the reinforcing material and the second metal plate are laser welded.

2. The vacuum insulation panel manufacturing method according to claim 1, wherein the laser welding step is

for lowering the sealing member and blocking the evacuation port and the opening by way of the sealing member, an outer periphery of the sealing member being held by a holding plate including a hole for allowing laser light to pass through,

the sealing member is pressed toward the reinforcing material side, and

in a state in which a stacked portion between the sealing member, the reinforcing material and the second metal plate is restrained without any gap, and

the sealing member, the reinforcing material and the second metal plate are laser welded.

3. The vacuum insulation panel manufacturing method according to claim 1 or 2, wherein the stacking step includes a step of welding the second metal plate and the reinforcing material.

4. The vacuum insulation panel manufacturing method according to any one of claims 1 to 3, wherein

the evacuating step is for starting evacuating through the evacuation port to apply a vacuum in an inner area which is held between the first metal plate and the second metal plate and in which the core member is arranged, by evacuating a chamber

by covering with the chamber a region including the opening of the reinforcing material,

in a state in which the sealing member is temporarily lowered and allowed to approach the evacuation port.

5. The vacuum insulation panel manufacturing method according to claim 4,

wherein laser irradiation is performed from an outer side of the chamber in the laser welding step, and

wherein only the sealing member and the reinforcing material are joined, and laser welding is performed under a condition that the second metal plate does not melt.

6. The vacuum insulation panel manufacturing method according to any one of claims 2 to 5, wherein

the sealing member is made of a magnetic body, and

the holding plate for holding the sealing member includes a magnet and holds the sealing member by using a magnetic force.

7. The vacuum insulation panel manufacturing method according to any one of claims 1 to 5, wherein the first welding step is a seam welding step.

8. The vacuum insulation panel manufacturing method according to any one of claims 2 to 7,

wherein the holding plate for holding the sealing member is supported by way of a support rod attached in three places along an outer periphery, and

wherein an upper end of the support rod is fixed to a lifting plate, passing through an outer periphery of a portion where a window is provided to an upper middle portion of the chamber, in which quartz glass is attached to the window.

9. A vacuum insulation panel comprising:

an insulating core member;

a first metal plate arranged on one side of the core member;

a second metal plate arranged on the other surface of the core member sequentially from the core member and having an evacuation port

a reinforcing material having an opening at a position stacking with the evacuation port; and

a sealing member sealing the opening,

wherein outer sides of regions of the first metal plate and the second metal plate between which the core member is sandwiched are welded,

wherein the sealing member, the reinforcing material, and the second metal plate are welded, and

wherein a vacuum state is maintained between the first metal plate and the second metal plate.

10. The vacuum insulation panel according to claim 7, wherein the sealing member is a magnetic body.