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(54) **DESIGN METHOD OF INTEGRATED BOX-TYPE SELF-CONTAINED MACHINE ROOM**

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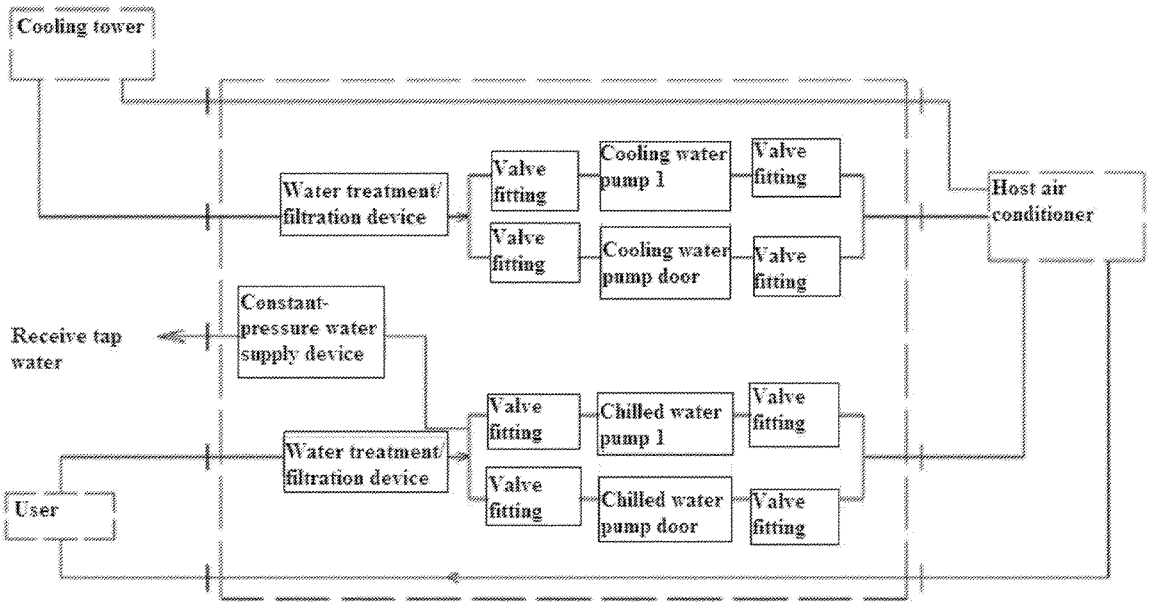
(57) **ABSTRACT**

The present invention discloses a design method of an integrated box-type self-contained machine room. The design method comprises the following steps: firstly, selecting equipment parts in line with needs according to requirements of a design drawing for an HVAC system; secondly, optimizing, assembling and connecting the equipment parts, except a host air conditioner, a boiler and a cooling tower; thirdly, integrating the optimized, assembled and connected equipment parts into a protective housing; and finally, integrally testing a water pressure of the protective housing, the equipment parts and joints after washing the protective housing, the equipment parts and the joints, and transporting the same to an installation site of the HVAC system after the water pressure test passes the inspection. The method provided by the invention can improve the installation efficiency of an HVAC machine room and shorten the installation period of the HVAC machine room.



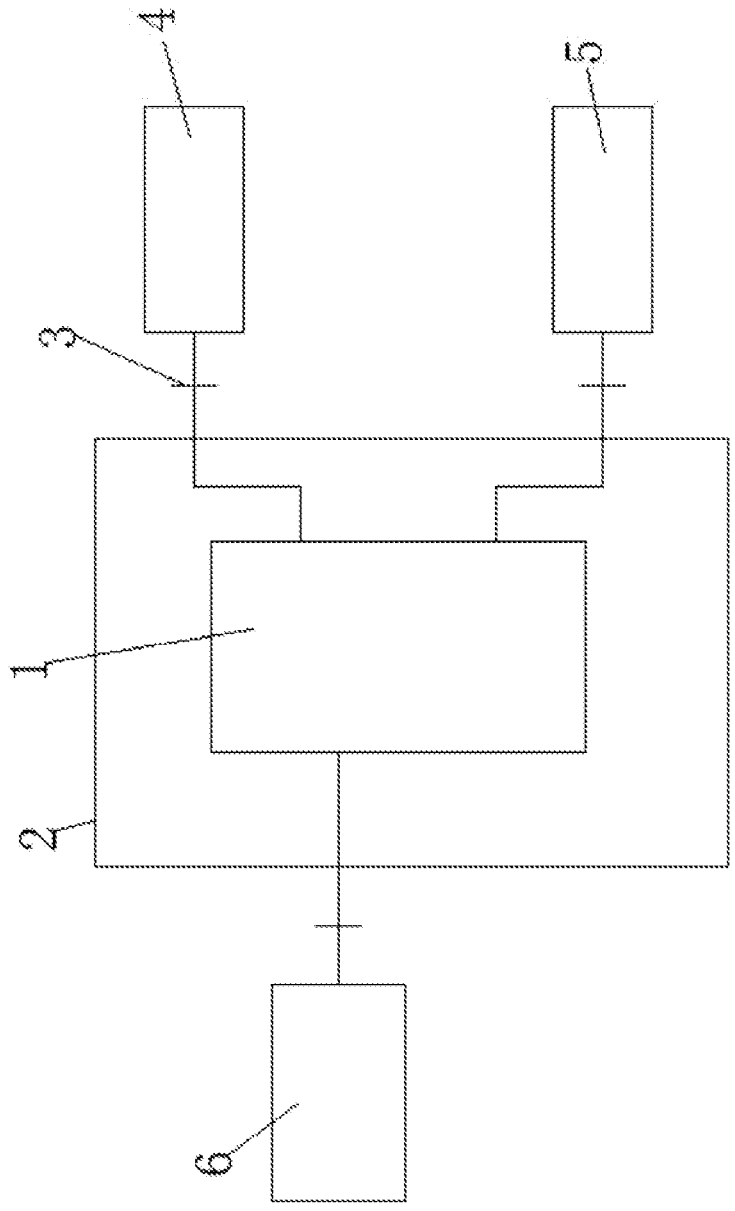


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FIG. 1

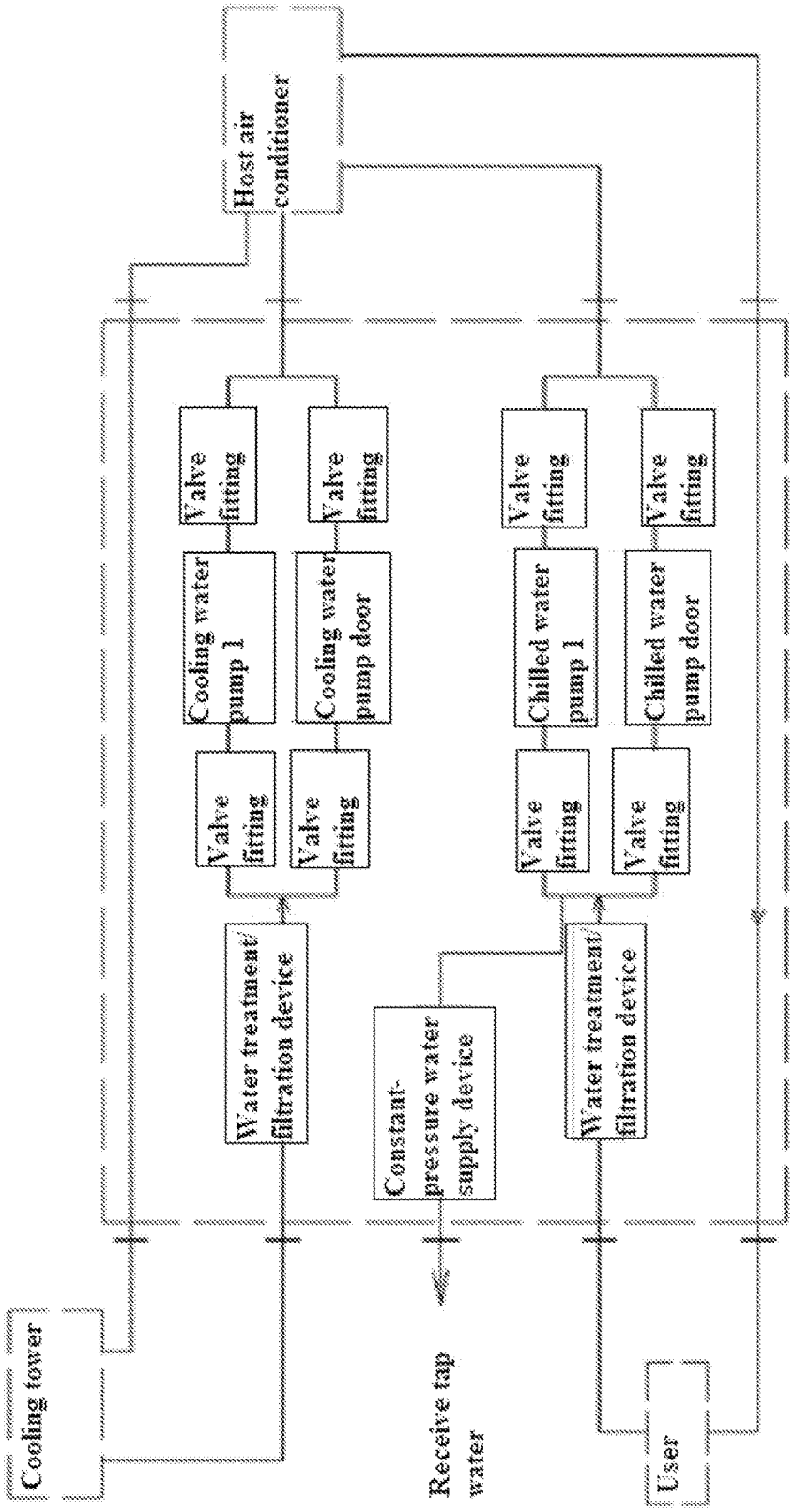
Host air conditioner
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Cooling water pump 1
Cooling water pump door
Chilled water pump 1
Chilled water pump door
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Water treatment/ filtration device
Water treatment/ filtration device
Constant-pressure water supply device
Cooling tower
Receive tap water
User

FIG. 2

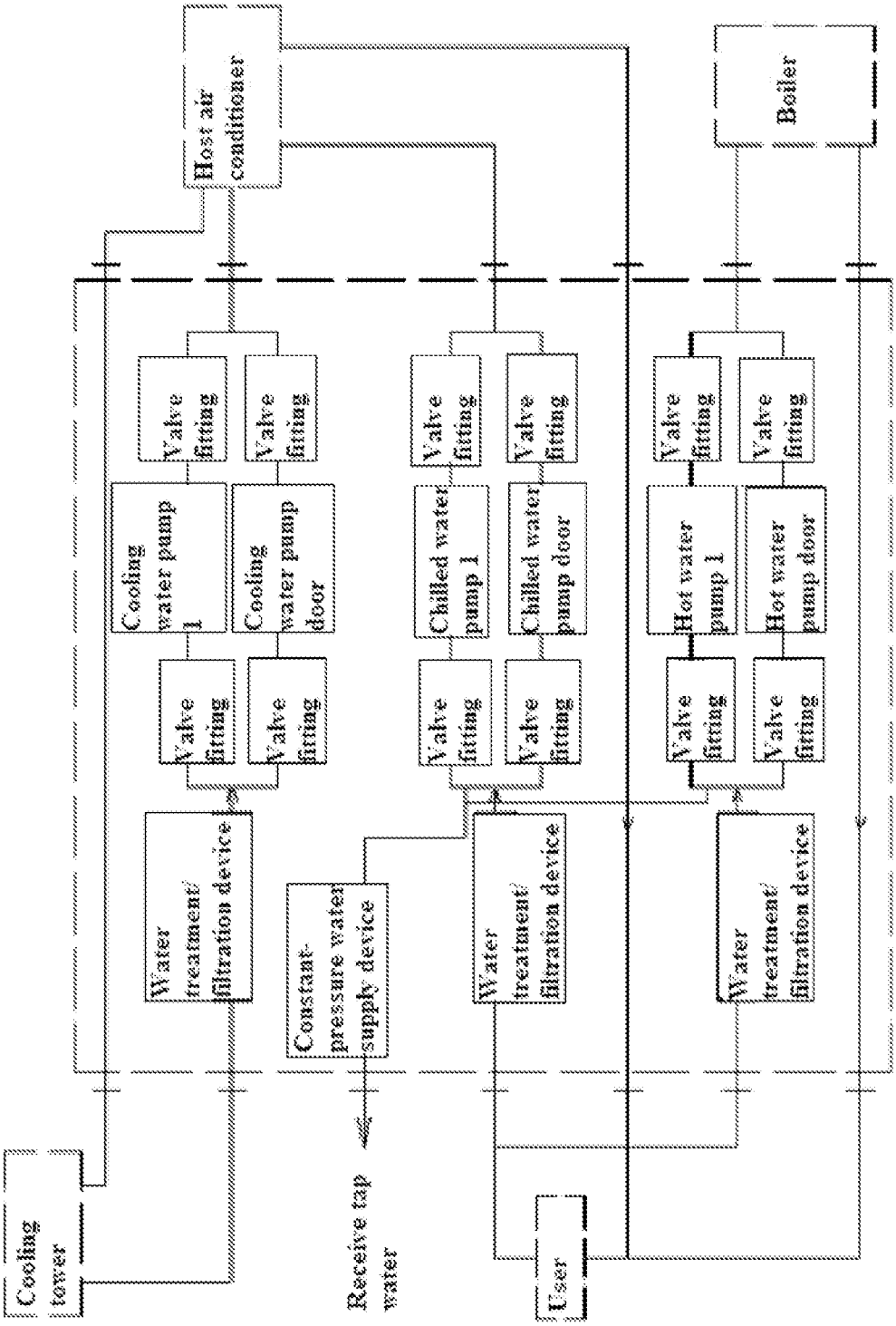
Host air conditioner
Boiler
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Cooling water pump 1
Cooling water pump door
Chilled water pump 1
Chilled water pump door
Hot water pump 1
Hot water pump door
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Valve fitting
Water treatment/ filtration device
Constant-pressure water supply device
Water treatment/ filtration device
Water treatment/ filtration device
Cooling tower
Receive tap water
User

FIG. 3

DESIGN METHOD OF INTEGRATED BOX-TYPE SELF-CONTAINED MACHINE ROOM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims foreign priority benefit of Chinese Patent Application No. 201610613298.2 with a filing date of Jul. 29, 2016. The content of the aforementioned application, including any intervening amendments thereto, are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to the field of a design method of an HVAC (Heating Ventilation Air Conditioning) machine room, in particular to a design method of an integrated box-type self-contained machine room.

BACKGROUND OF THE PRESENT INVENTION

[0003] In all current HVAC systems, during installation of a main machine room, main materials and auxiliary materials need to be transported to the site; and the measurement and setting-out, pipe cutting and welding installation need to be carried out manually on site. Concrete equipment bases need to be prefabricated for a main engine, a boiler, a cooling tower, a water pump, a water treatment device, a constant-pressure water supply device and other equipment parts. The pipe blanking and welding installation is carried out on site after specific locations are determined and the equipment is put in place. Valve members for pipes include traditional Y-type filters, buffer check valves, butterfly valves, gate valves, flexible rubber joints and the like. Steel pipes are mounted in a galvanized steel pipe threaded connection, spiral welded pipe welding or seamless steel pipe welding manner; the measurement, positioning, blanking, cutting, installation threading or welding are carried out on installation site; and all work is completed on construction site. This assembly method of the HVAC machine room is manual operation-based, is easy to lead to reworking, not only wastes materials, but also extends an installation period of a machine room system; besides large main equipment including a host air conditioner, the boiler and the cooling tower, the installation of the water pump, the water treatment device, the constant-pressure water supply device and other system engineering wastes a great deal of installation time in the machine room.

SUMMARY OF PRESENT INVENTION

[0004] The present invention aims to provide a design method of an integrated box-type self-contained machine room, to solve problems of low working efficiency, long installation period and material wasting in the assembly of the HVAC system machine room in the prior art.

[0005] To achieve the object, a technical solution employed in the present invention is as follows:

[0006] 1. The design method of the integrated box-type self-contained machine room is characterized by comprising the following steps:

[0007] (1) Determining a design drawing for an HVAC system; and then selecting equipment parts in line with needs according to requirements of the design drawing for the HVAC system;

[0008] (2) Optimizing, assembling and connecting the equipment parts, except a host air conditioner, a boiler and a cooling tower, according to the requirements of the design drawing for the HVAC system; and placing the equipment parts on one or more interconnected transportable bases;

[0009] (3) Integrating the optimized, assembled and connected equipment parts into a protective housing, while reserving a machine port in the protective housing; and assembling and connecting the integrated equipment parts, requiring connecting with the host air conditioner, the boiler and the cooling tower, with the machine port in the protective housing in advance; and

[0010] (4) Testing water pressure after integrating and assembling the integrated equipment parts in the protective housing; systematically washing the integrated equipment parts and cleaning up the protective housing after passing the acceptance; packaging and protecting a finished product of the integrated box-type self-contained machine room after inspection, and then transporting the same to the installation site of the HVAC system; and connecting the host air conditioner, the boiler and the cooling tower with an integrated box-type self-contained machine room port through the machine room on the installation site of the HVAC system.

[0011] The design method of the integrated box-type self-contained machine room is characterized in that the equipment parts include piping system parts, electrical system parts and mechanical structural parts of the HVAC system, wherein

[0012] the piping system parts include, but are not limited to a chilled water pump, a cooling water pump, a hot water pump, a filter, a water treatment device, a constant-pressure water supply device, a deoxygenation device, a valve accessory, a flexible connector, a pressure gauge and a thermometer;

[0013] the electrical system parts include, but are not limited to a control cabinet; and

[0014] the mechanical structural parts include, but are not limited to a pipe rack and a connecting member.

[0015] The design method of the integrated box-type self-contained machine room is characterized in that the equipment parts can be increased or reduced according to post-installation requirements of the HVAC system.

[0016] The design method of the integrated box-type self-contained machine room is characterized in that the optimization in step (2) means that a principle for assembling and connecting the equipment parts is to reduce an occupied area, a resistance to working medium in a piping system, and a hoisting height.

[0017] Compared with the prior art, advantages of the present invention are reflected as follows:

[0018] (1) The assembling method of an HVAC machine room system may be changed according to the present invention; equipment, a filter device, the water treatment device, the constant-pressure water supply device, the pipe rack, the connecting member, the valve accessory, the flexible connector, the pressure gauge, the thermometer and the like in the machine room are directly designed, produced, processed and inspected in an integrated box-type manner, through processing system components according to a prediction drawing, and then are transported to the machine room on site for being assembled systematically, thereby reducing the rework rate, saving the materials, improving

the working efficiency and the installation accuracy, and shortening the installation period.

[0019] (2) The integrated box-type self-contained machine room designed according to the optimization can be mounted directly without on-site measurement, cutting, welding, etc. when being mounted on the construction site, thereby not only improving the working efficiency, reducing the waste of materials, but also improving the working environment.

[0020] (3) An original drawing is improved by optimizing an original structure and replacing original parts, and then the processing, production and assembling are carried out, to not only save the resources, but also reduce the pipe resistance and reduce the hoisting height required by the system, thereby saving the energy, and creating a low-carbon environmental-protection HVAC room assembling structure.

[0021] (4) The draw is optimized by using the drawing, to not only display a designed three-dimensional structure of the HVAC machine room system clearly and intuitively, and facilitate the subsequent layout and allocation of components in the HVAC machine room system.

[0022] (5) The pressure of the finished integrated box-type self-contained machine room is detected, to ensure that the finished products of system installation parts meet requirements in the work intensity and leak tightness, and prevent pipe sections of the HVAC machine room system from breaking or leaking during work, thereby improving the reliability and security of the HVAC self-contained machine room.

DESCRIPTION OF THE DRAWINGS

[0023] FIG. **1** is a principle block diagram of the present invention.

[0024] FIG. **2** is a structural block diagram of an embodiment 1 of the present invention.

[0025] FIG. **3** is the structural block diagram of an embodiment 2 of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0026] As shown in FIG. **1**, a design method of an integrated box-type self-contained machine room comprises the following steps:

[0027] (1) Determining a design drawing for an HVAC system; and then selecting equipment parts in line with needs according to requirements of the design drawing for the HVAC system;

[0028] (2) Optimizing, assembling and connecting the equipment parts, except a host air conditioner, a boiler and a cooling tower, according to the requirements of the design drawing for the HVAC system;

[0029] (3) Integrating the optimized, assembled and connected equipment parts into a protective housing, while reserving a machine port in the protective housing; and assembling and connecting the integrated equipment parts, requiring connecting with the host air conditioner, the boiler and the cooling tower, with the machine port in the protective housing in advance; and

[0030] (4) Testing water pressure after integrating and assembling the integrated equipment parts in the protective housing; systematically washing the integrated equipment parts and cleaning up the protective housing after passing the acceptance; packaging and protecting a finished product of the integrated box-type self-contained machine room after inspection, and then transporting the same to an installation site of the HVAC system; and connecting the host air conditioner, the boiler and the cooling tower with an integrated box-type self-contained machine room port through the machine room on the installation site of the HVAC system.

[0031] The equipment parts include piping system parts, electrical system parts and mechanical structural parts of the HVAC system, wherein

[0032] the piping system parts include, but are not limited to a chilled water pump, a cooling water pump, a hot water pump, a filter, a water treatment device, a constant-pressure water supply device, a deoxygenation device, a valve accessory, a flexible connector, a pressure gauge and a thermometer;

[0033] The electrical system parts include, but are not limited to a control cabinet;

[0034] The mechanical structural parts include, but are not limited to a pipe rack and a connecting member.

[0035] The equipment parts can be increased or reduced according to post-installation requirements of the HVAC system.

[0036] The optimization in step (2) means that a principle for assembling and connecting the equipment parts is to reduce an occupied area, a resistance to working medium in a piping system, and a hoisting height.

Embodiment 1

[0037] As shown in FIG. **2**, when the HVAC system does not have the boiler, the integrated box-type self-contained machine room mainly implements the connection between the cooling tower and the host air conditioner, and the connection between the host air conditioner and a user; the cooling water pump, the chilled water pump, two groups of water treatment/filtration devices, the constant-pressure water supply device and a plurality of valve fittings; a water outlet of the cooling water is connected with one end of one of the water treatment/filtration devices through a pipe joint on the protective housing; the other end of the water treatment/filtration device is connected with one end of the cooling water pump through the valve fitting; the other end of the cooling water pump is connected with the host air conditioner through a valve assembly and the pipe joint on the protective housing; the user is connected with one end of another water treatment/filtration device through the pipe joint on the protective housing; the other end of the water treatment/filtration device is connected with one end of the chilled water pump through the valve fitting; the other end of the chilled water pump is connected with the host air conditioner through the valve assembly and the pipe joint on the protective housing; one end of the constant-pressure water supply device is connected with tap water; the other end of the constant-pressure water supply device is connected between the water treatment/filtration device in a direction from the user to the host air conditioner and the valve fitting; in addition, the protective housing is also provided with two pairs of pipe joints; two pipe joints in each pair of pipe joints are respectively connected through pipes; one pair of pipe joints are used for directly connecting the cooling tower with the host air conditioner; and the other pair of pipe joints are used for directly connecting the cooling tower with the user.

Embodiment 2

[0038] As shown in FIG. **3**, when the HVAC system is provided with the boiler, the integrated box-type self-contained machine room mainly implements the connection between the cooling tower and the host air conditioner, the connection between the host air conditioner and the user, as well as the connection between the boiler and the user, wherein the connection between the cooling tower and the host air conditioner, and the connection between the host air conditioner and the user are implemented in a way same as the embodiment 1. To implement the connection between the boiler and the user, the integrated box-type self-contained machine room further requires integrating the hot water pump, the water treatment/filtration device and the plurality of pipe fittings. The user is connected with one end of the water treatment/filtration device; the other end of the water treatment/filtration device is connected with one end of the hot water pump through the valve assembly; the other end of the hot water pump is connected with the boiler through the valve assembly and the pipe fittings; the other end of the constant-pressure water supply device is further connected between the other end of the water treatment/filtration device and the valve fitting through the pipe; in addition, the protective housing is further provided with a pair of pipe joints; and two pipe joints are respectively connected through the pipe and are used for directly connecting the user with the boiler.

We claim:

1. A design method of the integrated box-type self-contained machine room, characterized by comprising the following steps:

(1) determining a design drawing for an HVAC system; and then selecting equipment parts in line with needs according to requirements of the design drawing for the HVAC system;

(2) optimizing, assembling and connecting the equipment parts, except a host air conditioner, a boiler and a cooling tower, according to the requirements of the design drawing for the HVAC system; and placing the equipment parts on one or more interconnected transportable bases;

(3) integrating the optimized, assembled and connected equipment parts into a protective housing, while reserving a machine port in the protective housing; and assembling and connecting the integrated equipment parts, requiring connecting with the host air conditioner, the boiler and the cooling tower, with the machine port in the protective housing in advance; and

(4) Testing water pressure after integrating and assembling the integrated equipment parts in the protective housing; systematically washing the integrated equipment parts and cleaning up the protective housing after passing the acceptance; packaging and protecting a finished product of the integrated box-type self-contained machine room after inspection, and then transporting the same to the installation site of the HVAC system; and connecting the host air conditioner, the boiler and the cooling tower with an integrated box-type self-contained machine room port through the machine room on the installation site of the HVAC system.

2. The design method of the integrated box-type self-contained machine room according to claim **1**, characterized in that the equipment parts comprise piping system parts, electrical system parts and mechanical structural parts of the HVAC system, wherein

the piping system parts include, but are not limited to a chilled water pump, a cooling water pump, a hot water pump, a filter, a water treatment device, a constant-pressure water supply device, a deoxygenation device, a valve accessory, a flexible connector, a pressure gauge and a thermometer;

the electrical system parts include, but are not limited to a control cabinet; and

the mechanical structural parts include, but are not limited to a pipe rack and a connecting member.

3. The design method of the integrated box-type self-contained machine room according to claim **1**, characterized in that the equipment parts can be increased or reduced according to post-installation requirements of the HVAC system.

4. The design method of the integrated box-type self-contained machine room according to claim **1**, characterized in that the optimization in step (2) means that a principle for assembling and connecting the equipment parts is to reduce an occupied area, a resistance to working medium in a piping system, and a hoisting height.

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