

What is claimed is:

1. A thermal energy exchange system for use with an existing conduit that is in a flooded state, the system comprising:

5 a heat pump apparatus comprising an inlet and an outlet; and
a heat exchange apparatus, wherein the heat exchange apparatus comprises:

10 at least one fluid source conduit configured to replace a section of the existing conduit that is in a flooded state and further configured to permit at least a portion of a fluid in the existing conduit to flow therethrough, and

15 at least one heat transfer conduit having a fluid inlet and fluid outlet configured to be coupled to the inlet and outlet of the heat pump apparatus to form a closed loop, wherein the at least one heat transfer conduit is further configured to communicate with the fluid source conduit for providing thermal energy exchange between the fluid flowing through the fluid source conduit and a fluid flowing in the closed loop.

20 2. The system of claim 1, wherein the existing conduit that is in the flooded state comprises a conduit associated with a potable water source.

25 3. The system of claim 1, wherein the system further comprises connection conduit configured to connect the at least one heat transfer conduit of the heat exchange apparatus to the heat pump apparatus to form the closed loop.

4. The system of claim 1, wherein the heat exchange apparatus further comprises an enclosure structure configured to enclose at least the at least one fluid source conduit and the at least one heat transfer conduit.

30 5. The system of claim 4, wherein the enclosure structure comprises a lockable access portion.

6. The system of claim 4, wherein the system further comprises:

at least one monitoring device for monitoring at least one parameter associated with the thermal energy exchange system; and

a parameter controlled apparatus operable as a function of the at least one monitored parameter.

5

7. The system of claim 6, wherein the at least one monitoring device comprises at least one of a flow sensor, a fluid detection device, a temperature sensor, and a contaminant detection device.

10

8. The system of claim 6, wherein the parameter controlled apparatus comprises at least one of a display, an indicator, an alarm, a shut off switch, and a recirculation pump.

15

9. The system of claim 1, wherein the at least one fluid source conduit comprises at least a first pipe extending along an axis thereof, wherein the first pipe comprises an outer surface at a radial distance from the axis, wherein the first pipe is configured to replace the section of the existing conduit that is in the flooded state, and further wherein the at least one heat transfer conduit comprises a second pipe having a smaller diameter than the first pipe and wrapped about the outer surface of the first pipe, wherein the second pipe comprises an outer surface, and further wherein at least a portion of the outer surface of the second pipe comprises at least one flattened surface that is in direct contact with a portion of the outer surface of the first pipe for providing thermal energy exchange between the first pipe and the second pipe.

20

25

10. The system of claim 1, wherein the existing conduit that is in the flooded state comprises a predetermined diameter, wherein the at least one fluid source conduit comprises a plurality of fluid source conduits, wherein each fluid source conduit comprises a diameter that is less than the predetermined diameter of existing conduit, and further wherein each of the plurality of fluid source conduits is associated with a heat transfer conduit that is configured to communicate with the associated fluid source conduit for providing thermal

30

energy exchange between a fluid flowing through the associated fluid source conduit and a fluid flowing in the closed loop.

5 11. The system of claim 10, wherein the heat exchange apparatus further comprises one or more couplings to fluidly connect the plurality of fluid source conduits to the existing conduit.

10 12. The system of claim 1, wherein the fluid flowing in the closed loop is a refrigerant.

13. The system of claim 1, wherein the fluid flowing in the closed loop is water or a water and anti-freeze mixture.

15 14. A heat exchange apparatus for use with an existing conduit that is in a flooded state and a heat pump apparatus of a thermal energy exchange system, wherein the heat exchange apparatus comprises:

at least one fluid source conduit configured to replace a section of the existing conduit that is in the flooded state and further configured to permit at least a portion of a fluid that is in the existing conduit to flow therethrough; and

20 at least one heat transfer conduit having an inlet and outlet configured to be coupled to the heat pump apparatus to form a closed loop therewith, wherein the at least one heat transfer conduit is further configured to communicate with the fluid source conduit for providing thermal energy exchange between the fluid flowing through the fluid source conduit and a fluid flowing in the closed
25 loop.

30 15. The apparatus of claim 14, wherein the apparatus further comprises an enclosure structure configured to enclose at least the at least one fluid source conduit and the at least one heat transfer conduit.

16. The apparatus of claim 15, wherein the enclosure structure comprises a lockable access portion.

17. The apparatus of claim 14, wherein the apparatus further comprises at least one monitoring device for monitoring at least one parameter associated with the thermal energy transfer system.
- 5 18. The apparatus of claim 17, wherein the at least one monitoring device comprises at least one of a flow sensor, a fluid detection device, a temperature sensor, and a contaminant detection device.
- 10 19. The apparatus of claim 14, wherein the at least one fluid source conduit comprises at least a first pipe extending along an axis thereof, wherein the first pipe comprises an outer surface at a radial distance from the axis, wherein the first pipe is configured to replace the section of the existing conduit that is in the flooded state, and further wherein the at least one heat transfer conduit
15 wrapped about the outer surface of the first pipe, wherein the second pipe comprises an outer surface, and further wherein at least a portion of the outer surface of the second pipe comprises at least one flattened surface that is in direct contact with a portion of the outer surface of the first pipe for providing thermal energy exchange between the first pipe and the second pipe.
- 20 20. The apparatus of claim 14, wherein the existing conduit that is in the flooded state comprises a predetermined diameter, wherein the at least one fluid source conduit comprises a plurality of fluid source conduits, wherein each fluid source conduit comprises a diameter that is less than the predetermined diameter
25 of existing conduit, and further wherein each of the fluid source conduits is associated with a heat transfer conduit that is configured to communicate with the associated fluid source conduit for providing thermal energy exchange between a fluid flowing through the associated fluid source conduit and a fluid flowing in the closed loop.
- 30 21. The apparatus of claim 20, wherein the apparatus further comprises one or more couplings to fluidly connect the plurality of fluid source conduits to the existing conduit when replaced thereby.

22. A method for use in installing a thermal energy exchange system comprising a heat pump apparatus, wherein the heat pump apparatus comprises an inlet and an outlet, wherein the method comprises:

5 providing a heat exchange apparatus, wherein the heat exchange apparatus comprises:

at least one fluid source conduit configured to replace a section of the existing conduit that is in the flooded state and further configured to permit at least a portion of a fluid that is in the existing conduit to flow therethrough, and

10 at least one heat transfer conduit having a fluid inlet and fluid outlet configured to be coupled to the inlet and outlet of the heat pump apparatus to form a closed loop, wherein the at least one heat transfer conduit is further configured to communicate with the fluid source conduit for providing thermal energy exchange between the fluid flowing through the fluid source conduit and a fluid flowing in the closed loop when the thermal energy exchange system is operational;

15 evacuating the fluid that is in the section of the existing conduit to be replaced;

removing the section of the existing conduit; and

20 fluidly coupling the at least one fluid source conduit to the existing conduit that is in the flooded state.

23. The method of claim 22, wherein the existing conduit that is in the flooded state comprises a conduit associated with a potable water source.

25

24. The method of claim 22, wherein the method further comprises connecting the at least one heat transfer conduit of the heat exchange apparatus to the heat pump apparatus to form the closed loop.

30 25. The method of claim 22, wherein the method further comprises enclosing the heat exchange apparatus in an enclosure structure configured with a lockable access portion.

26. The method of claim 22, wherein the method further comprises:
installing at least one monitoring device for monitoring at least one
parameter associated with the thermal energy exchange system; and
manipulating at least one parameter controlled apparatus as a function of
the at least one monitored parameter.

5

27. The method of claim 22, wherein fluidly coupling the at least one fluid
source conduit to the existing conduit that is in the flooded state comprises:
providing a plurality of fluid source conduits, wherein each fluid source
conduit comprises a diameter that is less than a predetermined diameter of the
existing conduit, and further wherein each of the fluid source conduits is
associated with a heat transfer conduit that is configured to communicate with
the associated fluid source conduit for providing thermal energy exchange
between a fluid flowing through the associated fluid source conduit and a fluid
flowing in the closed loop; and
using one or more couplings to fluidly connect the plurality of fluid
source conduits to the existing conduit.

10

15

28. A thermal energy exchange system for use with an existing conduit that
is in a flooded state, wherein the existing conduit comprises a conduit associated
with a potable water source, the system comprising:
a heat pump apparatus comprising an inlet and an outlet; and
a heat exchange apparatus, wherein the heat exchange apparatus
comprises:

20

25

at least one fluid source conduit configured to replace a section of
the existing conduit that is in the flooded state and further configured to
permit at least a portion of a fluid that is in the existing conduit to flow
therethrough,

30

at least one heat transfer conduit having a fluid inlet and fluid
outlet configured to be coupled to the inlet and outlet of the heat pump
apparatus to form a closed loop, wherein the at least one heat transfer
conduit is further configured to communicate with the fluid source
conduit for providing thermal energy exchange between the fluid flowing

through the fluid source conduit and a fluid flowing in the closed loop when the thermal energy exchange system is operational,

5 an enclosure structure configured to enclose at least the at least one fluid source conduit and the at least one heat transfer conduit, wherein the enclosure structure comprises a lockable access portion; and at least one connection conduit configured to connect the at least one heat transfer conduit of the heat exchange apparatus to the heat pump apparatus to form the closed loop.

10 29. The system of claim 28, wherein the system further comprises: at least one monitoring device for monitoring at least one parameter associated with the thermal energy exchange system; and a parameter controlled apparatus operable as a function of the at least one monitored parameter.

15 30. The system of claim 29, wherein the at least one monitoring device comprises at least one of a flow sensor, a fluid detection device, a temperature sensor, and a contaminant detection device.

20 31. The system of claim 29, wherein the parameter controlled apparatus comprises at least one of a display, an indicator, an alarm, a shut off switch, and a recirculation pump.

25 32. The system of claim 28, wherein the at least one fluid source conduit comprises at least a first pipe extending along an axis thereof, wherein the first pipe comprises an outer surface at a radial distance from the axis, wherein the first pipe is configured to replace the section of the existing conduit that is in the flooded state, and further wherein the at least one heat transfer conduit comprises a second pipe having a smaller diameter than the first pipe and wrapped about the outer surface of the first pipe, wherein the second pipe comprises an outer surface, and further wherein at least a portion of the outer surface of the second pipe comprises at least one flattened surface that is in

30

direct contact with a portion of the outer surface of the first pipe for providing thermal energy exchange between the first pipe and the second pipe.

5 33. The system of claim 28, wherein the existing conduit that is in the flooded state comprises a predetermined diameter, wherein the at least one fluid source conduit comprises a plurality of fluid source conduits, wherein each fluid source conduit comprises a diameter that is less than the predetermined diameter of existing conduit, and further wherein each of the fluid source conduits is associated with a heat transfer conduit that is configured to communicate with
10 the associated fluid source conduit for providing thermal energy exchange between a fluid flowing through the associated fluid source conduit and a fluid flowing in the closed loop.

15 34. The system of claim 33, wherein the heat exchange apparatus further comprises one or more couplings to fluidly connect the plurality of fluid source conduits to the existing conduit.

20 35. The system of claim 28, wherein the fluid flowing in the closed loop is a refrigerant.

36. The system of claim 28, wherein the fluid flowing in the closed loop is water or a water and anti-freeze mixture.

25 37. A thermal energy exchange system for use with an existing conduit that is in a flooded state, the system comprising:
an HVAC apparatus comprising an inlet and an outlet; and
a heat exchange apparatus, wherein the heat exchange apparatus comprises:

30 at least one fluid source conduit configured to replace a section of the existing conduit that is in a flooded state and further configured to permit at least a portion of a fluid in the existing conduit to flow therethrough, and

5 at least one heat transfer conduit having a fluid inlet and fluid outlet configured to be coupled to the inlet and outlet of the heat pump apparatus to form a closed loop, wherein the at least one heat transfer conduit is further configured to communicate with the fluid source conduit for providing thermal energy exchange between the fluid flowing through the fluid source conduit and a fluid flowing in the closed loop.

10 38. The system of claim 37, wherein the fluid flowing in the closed loop is a refrigerant.

39. The system of claim 37, wherein the fluid flowing in the closed loop is water or a water and anti-freeze mixture.