

CLAIMS

The invention claimed is:

1. A method of operating, during an at least partial shutdown of a refrigerant distribution subsystem in a natural gas liquefaction facility, comprising:
 - 5 draining down at least a portion of a mixed refrigerant in one or more components of the refrigerant distribution subsystem into a high-pressure holding tank of a drain down subsystem, wherein draining down to the high-pressure holding tank is achieved by pumping the mixed refrigerant from the refrigerant distribution subsystem to the high-pressure holding tank or backfilling the refrigerant distribution subsystem with a backfill gas; and
 - 10 transferring at least a portion of the mixed refrigerant into a low-pressure drum from the high-pressure holding tank.
2. The method of claim 1, further comprising:
 - 15 returning the portion of the mixed refrigerant in the high-pressure refrigerant holding drum to the refrigerant distribution subsystem.
3. The method of claim 1 or claim 2, further comprising:
 - 20 returning the portion of the mixed refrigerant in the low-pressure refrigerant holding drum to the refrigerant distribution subsystem.
4. The method of any one of claims 1-3, wherein the mixed refrigerant in the refrigerant distribution subsystem is at a pressure of about 2 bar absolute (bara) to about 25 bara and a temperature of about -175 °C to about -25 °C.
- 25 5. The method of any one of claims 1-4, wherein the mixed refrigerant in the high-pressure holding tank is at a pressure of about 5 bara to about 25 bara and a temperature of about -175 °C to about -100 °C.
6. The method of any one of claims 1-5, wherein the mixed refrigerant in the low-pressure drum is at a pressure of atmospheric pressure to about 2 bara and a temperature of about -125
30 °C to about -25 °C.

7. The method of any one of claims 1-6, wherein draining down to the high-pressure holding tank is achieved by backfilling the refrigerant distribution subsystem with a backfill gas, wherein a pressure of the backfill gas prior to backfilling into the refrigerant distribution subsystem is higher than a pressure of the mixed refrigerant in the refrigerant distribution subsystem, and wherein the pressure of the mixed refrigerant in the refrigerant distribution subsystem is greater than a pressure of the mixed refrigerant in the high-pressure holding tank.
8. The method of any one of claims 1-7, wherein the mixed refrigerant is a mixture comprising methane, ethane, propane, butane, and optionally nitrogen.
9. The method of any one of claims 1-8, wherein the low-pressure refrigerant holding drum has a vent coupled to a condenser.
10. A method of operating, during an at least partial shutdown of a refrigerant distribution subsystem in a natural gas liquefaction facility, comprising:
- draining down at least a portion of a mixed refrigerant in one or more components of the refrigerant distribution subsystem into a low-pressure drum of a drain down subsystem; and
- backfilling the refrigerant distribution subsystem with a backfill gas from a backfill subsystem;
- wherein a pressure in the refrigerant distribution subsystem is higher than a pressure in the low-pressure drum, and
- wherein the pressure in the refrigerant distribution subsystem is lower than a pressure of the backfill gas in the backfill subsystem.
11. The method of claim 10, further comprising:
- returning the portion of the mixed refrigerant in the high-pressure refrigerant holding drum to the refrigerant distribution subsystem.
12. The method of claim 10 or claim 11, further comprising:
- returning the portion of the mixed refrigerant in the low-pressure refrigerant holding

drum to the refrigerant distribution subsystem.

13. The method of any one of claims 10-12, wherein the pressure of the backfill gas in the backfill subsystem is at about 5 bar absolute (bara) to about 35 bara and a temperature of about
5 -175 °C to about -100 °C.

14. The method of any one of claims 10-13, wherein the pressure in the refrigerant distribution subsystem is at about 2 bara to about 25 bara and a temperature of about -175 °C to about -25 °C.

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15. The method of any one of claims 10-14, wherein the pressure in the low-pressure drum is at about atmospheric pressure to about 2 bara and a temperature of about -125 °C to about -25 °C.

15 16. The method of any one of claims 10-15, wherein the low-pressure refrigerant holding drum has a vent coupled to a condenser.

17. A natural gas liquefaction facility comprising:

a refrigerant distribution subsystem that contains a mixed refrigerant;

20 a drain down subsystem that comprises a high-pressure holding tank, a low-pressure drum, and a valve separating the high-pressure holding tank from the low-pressure drum, wherein a pressure in the high-pressure holding tank is lower than the mixed refrigerant in the refrigerant distribution subsystem; and

a backfill subsystem that contains a backfill gas at a higher pressure than the mixed
25 refrigerant in the refrigerant distribution subsystem;

wherein a plurality of first valves separate the refrigerant distribution subsystem and the drain down subsystem;

wherein a plurality of second valves separate the refrigerant distribution subsystem and the backfill subsystem;

30 wherein in a drain down mode (a) at least a portion of the mixed refrigerant from the refrigerant distribution subsystem transports to the high-pressure holding tank via a pressure

drop across at least one of the plurality of first valves, (b) at least a portion of the backfill gas from the backfill subsystem transports to the refrigerant distribution subsystem via a pressure drop across at least one of the plurality of first valves, and, (c) when needed, mixed refrigerant from the high-pressure holding tank is allowed to enter the low-pressure drum via the valve.

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