【CLAIMS】

【Claim 1】

A cryogenic calibration system for liquid flowmeters, comprising:
a heat exchanger configured to cool a liquefied gas supplied from a circulation tank using liquefied gas stored in a storage tank, and to supply the liquefied gas to a measurement tank;
a vaporizer configured to vaporize the liquefied gas stored in the storage tank and to supply it to the heat exchanger;
the measurement tank configured to measure the weight of the liquefied gas supplied from the heat exchanger through a scale configured to be provided at its lower end;
the circulation tank configured to store the liquefied gas whose measurement is completed in the measurement tank;
a circulation pump configured to supply the liquefied gas stored in the circulation tank to the heat exchanger; and
a flow path switching valve configured to block the supply of liquefied gas from the measurement tank to the circulation tank, and to change the flow path of the liquefied gas so that the liquefied gas is stored in the measurement tank,
wherein the cryogenic calibration system is configured for a weight value of the liquefied gas stored in the measurement tank for a period of time to be measured by the scale, and for the flow rate value of the liquid flowmeter to be calibrated based on the measured weight value.

【Claim 2】

The cryogenic calibration system for liquid flowmeters of claim 1,
wherein the flow path switching valve is a solenoid valve.

【Claim 3】

The cryogenic calibration system for liquid flowmeters of claim 1,
wherein the measurement tank is manufactured as a double-walled vessel, and the cryogenic calibration system is configured to form a vacuum between inner and outer vessels constituting the double-walled vessel.

【Claim 4】

The cryogenic calibration system for liquid flowmeters of claim 1,
wherein the storage tank, vaporizer, heat exchanger, measurement tank, circulation tank, and circulation pump are configured to be connected to each other by pipelines, wherein the pipelines are configured as inner and outer double pipelines, and to form a vacuum between the double pipelines.

【Claim 5】

A method of operating a cryogenic calibration system for liquid flowmeters, the method comprising:
a cooling operation step of cooling a liquefied gas supplied from a storage tank through a heat exchanger, and supplying the cooled liquefied gas to a measurement tank, a circulation tank, and a circulation pump, which are sequentially connected to each other through a pipe, to cool the devices and the pipe;
a pressure control operation step of vaporizing the liquefied gas supplied from the storage tank through a vaporizer, and sequentially supplying the vaporized gas to the measurement tank and the circulation tank to pressurize the devices and the pipe;
a circulation operation step of circulating the liquefied gas through a circulation

loop in which the measurement tank, the circulation tank, the circulation pump, and the heat exchanger are sequentially connected to each other through the pipe, after the cooling operation step and the pressure control operation step, when the liquefied gas reaches a flow stabilization state under a constant temperature and pressure; and

a changing step of a flow path of the liquefied gas by controlling a flow path switching valve such that the liquefied gas supplied to the circulation tank is stored in the measurement tank.

【Claim 6】

The method of operating a cryogenic calibration system for liquid flowmeters of claim 5, further comprising:

a measuring step of a weight value of the stored liquefied gas in real time through a scale provided at a lower portion of the measurement tank, when the liquefied gas is stored in the measurement tank for a certain period of time.

【Claim 7】

The method of operating a cryogenic calibration system for liquid flowmeters of claim 6, further comprising:

a calibration operation step of calibrating a flow rate value of the liquid flowmeter based on the measured weight value.

【Claim 8】

The method of operating a cryogenic calibration system for liquid flowmeters of claim 5,

wherein in the cooling operation step, the liquefied gas is supplied from the

storage tank to the circulation tank, the liquefied gas supplied to the circulation tank is supplied to the heat exchanger through the circulation pump, and the cooled liquefied gas is supplied to the measurement tank, the circulation tank, and the circulation pump sequentially connected to each other via a pipe, thereby cooling the devices and pipes.

【Claim 9】

The method of operating a cryogenic calibration system for liquid flowmeters of claim 5,
wherein the flow path switching valve is a solenoid valve.

【Claim 10】

The method of operating a cryogenic calibration system for liquid flowmeters of claim 5,
wherein the measurement tank is manufactured as a double-walled vessel, and a vacuum is formed between outer and inner vessel constituting the double-walled vessel.

【Claim 11】

The method of operating a cryogenic calibration system for liquid flowmeters of claim 5,
wherein the pipelines connecting the storage tank, the vaporizer, the heat exchanger, the measurement tank, the circulation tank, and the circulation pump are configured as a double pipeline comprising inner and outer pipes, and a vacuum is formed between the inner and outer pipes.