【CLAIMS】

【Claim 1】

A boil-off gas (BOG) reliquefaction system for ships comprising:

a multistage compressor compressing BOG;

a heat exchanger cooling the BOG compressed by the multistage compressor through heat exchange using BOG not compressed by the multistage compressor as a refrigerant;

a pressure reducer disposed downstream of the heat exchanger and decompressing a fluid cooled by the heat exchanger; and

a bypass line through which BOG is supplied to the multistage compressor after bypassing the heat exchanger,

wherein the multistage compressor comprises at least one oil-lubrication type cylinder and, when a fluid channel of the heat exchanger is partially or completely blocked by condensed or solidified lubricant oil, the BOG is supplied to the multistage compressor after bypassing the heat exchanger along the bypass line, and

wherein it is determined that it is time to remove the condensed or solidified lubricant oil, if performance of the heat exchanger is decreased to 60% to 80% of normal performance thereof.

【Claim 2】

The BOG reliquefaction system for ships according to claim 1, wherein the compressor compresses the BOG to a pressure of 150 bar to 350 bar.

【Claim 3】

The BOG reliquefaction system for ships according to claim 1, wherein the compressor compresses the BOG to a pressure of 80 bar to 250 bar.

【Claim 4】

The BOG reliquefaction system for ships according to any one of claims 1 to 3, wherein the heat exchanger comprises a microchannel type fluid channel.

【Claim 5】

The BOG reliquefaction system for ships according to claim 4, wherein the heat exchanger is a printed circuit heat exchanger (PCHE).

【Claim 6】

A BOG reliquefaction method for ships, comprising:

1) compressing BOG by a multistage compressor;

2) cooling the BOG compressed by the multistage compressor through heat exchange by a heat exchanger using BOG not compressed by the multistage compressor as a refrigerant; and

3) decompressing a fluid cooled by the heat exchanger by a pressure reducer,

wherein the BOG is supplied to the multistage compressor after bypassing the heat exchanger along a bypass line,

wherein the multistage compressor comprises at least one oil-lubrication type cylinder, and, when a fluid channel of the heat exchanger is partially or completely blocked by condensed or solidified lubricant oil, the BOG is supplied to the multistage compressor after bypassing the heat exchanger along the bypass line, and

wherein it is determined that it is time to remove the condensed or solidified lubricant oil, if performance of the heat exchanger is decreased to 60% to 80% of normal performance thereof.

【Claim 7】

The BOG reliquefaction method for ships according to claim 6, wherein it is determined that it is time to remove the condensed or solidified lubricant oil based on at least one of a temperature difference between upstream of a cold fluid channel of the heat exchanger and downstream of a hot fluid channel of the heat exchanger (hereinafter, 'temperature difference of a cold flow'); a temperature difference between downstream of the cold fluid channel of the heat exchanger and upstream of the hot fluid channel of the heat exchanger (hereinafter, 'temperature difference of a hot flow'); and a pressure difference between upstream and downstream of the hot fluid channel (hereinafter, 'pressure difference of the hot fluid channel').

【Claim 8】

The BOG reliquefaction method for ships according to claim 7, wherein it is determined that it is time to remove the condensed or solidified lubricant oil, when a state in which a lower value between the temperature difference of the cold flow and the temperature difference of the hot flow is a first preset value or more continues for a predetermined period of time or more or when a state in which the pressure difference of the hot fluid channel is a second preset value or more continues for a predetermined period of time or more.

【Claim 9】

The BOG reliquefaction method for ships according to claim 6, wherein the BOG is circulated through the bypass line, the multistage compressor, the hot fluid channel of the heat exchanger, and the pressure reducer until the heat exchanger is normalized.

【Claim 10】

The BOG reliquefaction method for ships according to claim 9, wherein circulation of the BOG is continued until it is determined that the temperature of the hot fluid channel of the heat exchanger is increased to the temperature of the BOG compressed by the multistage compressor and sent to the hot fluid channel of the heat exchanger.

【Claim 11】

The BOG reliquefaction method for ships according to claim 6, wherein an engine is driven during removal of the condensed or solidified lubricant oil.

【Claim 12】

The BOG reliquefaction method for ships according to any one of claims 6 to 11, wherein the compressor compresses the BOG to a pressure of 150 bar to 350 bar.

【Claim 13】

The BOG reliquefaction method for ships according to any one of claims 6 to 11, wherein the compressor compresses the BOG to a pressure of 80 bar to 250 bar.

【Claim 14】

The BOG reliquefaction method for ships according to any one of claims 6 to 11, wherein the heat exchanger comprises a microchannel type fluid channel.

【Claim 15】

The BOG reliquefaction method for ships according to claim 14, wherein the heat exchanger is a printed circuit heat exchanger (PCHE).