CLAIMS

1- A cooling circuit (4) for a system for supplying and cooling a gas (1) of a gas of a floating structure comprising at least one tank (2) configured to contain gas in the liquid state, a refrigerant fluid intended to lower the temperature of the gas in the liquid state contained in the tank (2) flowing through the cooling circuit (4), the cooling circuit (4) comprising a main loop (22) comprising:

- at least one compression device (10) providing the compression of the refrigerant fluid,

- at least one heat exchanger (17) configured to make an exchange of heat between the refrigerant fluid and the gas contained in the tank (2),

- at least one internal heat exchanger (18) comprising a first passage (23) where the refrigerant fluid circulates at a first pressure and a second passage (24) where the refrigerant fluid circulates at a second pressure lower than the first pressure, the first passage (23) being arranged downstream of the compression device (10) and upstream of the heat exchanger (17), the second passage (24) being arranged downstream of the heat exchanger (17) and upstream of the compression device (10),

- at least one turbo-compressor (13) equipped with a compression member (14) arranged between the compression device (10) and the first passage (23) of the internal heat exchanger (18) and a turbine (15) arranged between the first passage (23) of the internal heat exchanger (18) and the heat-exchanger (17), the compression member (14) and the turbine (15) being linked in rotation by a shaft (16),

characterized in that the cooling circuit (4) comprises a regulation branch (25) connected to the main loop (22), said regulation branch (25) comprising at least one valve (26) configured for controlling the circulation of a refrigerant fluid within the regulation branch (25), the main loop (22) comprising at least one pressure sensor (27), the valve (26) controlling a quantity of refrigerant fluid present in the main loop (22) depending on the pressure measured by the pressure sensor (27), the shaft (16) only linking the turbine (15) to the compression member (14) of the turbo-compressor (13), the compressor device (10) being distinct from the turbo-compressor (13) and being not linked to the shaft (16).

2- The cooling circuit (4) according to claim 1, wherein the valve (26) is configured to authorize an outlet of refrigerant fluid from the main loop (22) via the regulation branch (25) when the pressure measured by the pressure sensor (27) is greater than a first pressure threshold.

3- The cooling circuit (4) according to the preceding claim, wherein the valve (26) is configured to authorize an inlet of refrigerant fluid into the main loop (22) via the regulation branch (25) when the pressure measured by the pressure sensor (27) is less than a second pressure threshold, the second pressure threshold being lower than the first pressure threshold.

4- The cooling circuit (4) according to any of the preceding claims, wherein the regulation branch (25) is connected to the main loop (22) downstream of the compression device (10) and upstream of the compression member (14) of the turbo-compressor (13), the pressure sensor (27) being configured to measure the pressure within the main loop (22) between the compression device (10) and the compression member (14) of the turbo-compressor (13).

5- The cooling circuit (4) according to any of claims 1 to 3, wherein the regulation branch (25) is connected to the main loop (22) downstream of the second passage (24) of the internal heat exchanger (18) and upstream of the compression device (10), the pressure sensor (27) being configured to measure the pressure within the main loop (22) between the second passage (24) of the internal heat exchanger (18) and the compression device (10) .

6- The cooling circuit (4) according to any of claims 1 to 3, wherein the regulation branch (25) is a first regulation branch (71) connected to the main loop (22) downstream of the compression device (10) and upstream of the compression member (14) of the turbo-compressor (13), the cooling circuit (4) comprising a second regulation branch (72) connected to the main loop (22) downstream of the second passage (24) of the internal heat exchanger (18) and upstream of the compression device (10), the main loop (22) comprising a two pressure sensors (27) of which a first pressure sensor (75) configured for measuring the pressure within the main loop (22) between the compression device (10) and the compression member (14) of the turbo-compressor (13) and a second pressure sensor (76) configured to measure the pressure within the

main loop (22) between the second passage (24) of the internal heat exchanger (18) and the compression device (10).

7- The cooling circuit (4) according to the preceding claim, wherein the first regulation branch (71) controls an outlet of the refrigerant fluid out of the main loop (22) and the second regulation branch (72) controls an inlet of the refrigerant fluid into the main loop (22).

8- The cooling circuit (4) according to claim 6, wherein the first regulation branch (71) controls an inlet of the refrigerant fluid into the main loop (22) and the second regulation branch (72) controls an outlet of the refrigerant fluid out of the main loop (22).

9- The cooling circuit (4) according to any of the preceding claims, comprising an additional exchanger (38), arranged between the compression member (14) of the turbo-compressor (13) and the first passage (23) of the internal heat exchanger (18), the additional exchanger (38) being configured for cooling the refrigerant fluid.

10- The cooling circuit (4) according to any of the preceding claims, wherein the refrigerant fluid is nitrogen.

11- A system for supplying and cooling a gas (1) of a floating structure comprising at least one tank (2) configured for containing a gas in the liquid state, a supply circuit (3) intended for gas to flow therethrough, the gas coming from the tank and configured for supplying gas to at least one gas consuming apparatus (5, 6) that equips the floating structure, characterized in that the system for supplying and cooling a gas (1) comprises a cooling circuit (4) according to any of the preceding claims.