Claims

1. A refrigerant for a cooling device (10, 23, 30, 36, 43) having a cooling circuit (11, 24, 39, 44) comprising at least one heat exchanger (12, 25, 47) in which the refrigerant undergoes a phase transition, the refrigerant being a refrigerant mixture composed of a mass fraction of carbon dioxide (CO_2), a mass fraction of pentafluoroethane (C_2HF_5), and a mass fraction of at least an other component,
characterized in that
the mass fraction of carbon dioxide in the refrigerant mixture is 28 to 51 mass percent, the mass fraction of pentafluoroethane being 8 to 65 mass percent, the other component being fluoromethane (CH_3F) and the mass fraction of fluoromethane in the refrigerant mixture is 7 to 25 mass percent.

2. The refrigerant according to claim 1,
characterized in that
the mass fraction of fluoromethane is 13 to 21 mass percent.

3. The refrigerant according to claim 2,
characterized in that
the mass fraction of fluoromethane is 15 to 19 mass percent.

4. The refrigerant according to any one of the preceding claims,
characterized in that
the mass fraction of pentafluoroethane is 49 to 57 mass percent.

5. The refrigerant according to claim 4,
characterized in that
the mass fraction of pentafluoroethane is 51 to 55 mass percent.

6. The refrigerant according to any one of the preceding claims,
characterized in that
the refrigerant has a temperature glide in a range of 4 K to 16 K.

7. The refrigerant according to any one of the preceding claims,
characterized in that
the refrigerant has a relative CO2 equivalent of < 2300 over 100 years.

8. The refrigerant according to any one of the preceding claims,
characterized in that
the refrigerant is nonflammable.

9. A test chamber for conditioning air, the test chamber comprising a test space which serves to receive test material and which can be sealed against an environment and is temperature-insulated, and a temperature control device for controlling the temperature of the test space, a temperature in a temperature range of −70 °C to +180 °C being establishable within the test space by means of the temperature control device, the temperature control device having a cooling device (10, 23, 30, 36, 43) comprising a cooling circuit (11, 24, 39, 44) with a refrigerant according to any one of the preceding claims, a heat exchanger (12, 25, 47), a compressor (13, 26), a condenser (14, 27, 38) and an expansion element (15, 28).

10. The test chamber according to claim 9,
characterized in that
the cooling circuit (11, 24, 39, 44) has an internal heat exchanger (19, 29, 46), the internal heat exchanger being connected to a high-pressure side (17) of the cooling circuit upstream of the expansion element (15, 28) and downstream of the condenser (14, 27, 38) and to a low-pressure side (18) of the cooling circuit upstream of the compressor (13, 26) and downstream of the heat exchanger (12, 25, 47).

11. The test chamber according to claim 9 or 10,
characterized in that
the heat exchanger (12, 25, 47) is dimensioned in such a manner that only part of the refrigerant can evaporate in the heat exchanger.

12. The test chamber according to any one of claims 9 to 11,
characterized in that
the condenser (14, 27, 38) is realized as a cascade heat exchanger (40) of another cooling circuit (36, 43) of the cooling device.

13. The test chamber according to any one of claims 9 to 12,
characterized in that
the temperature control device has a heating device comprising a heater and a heating heat exchanger in the test space.

14. The test chamber according to any one of claims 9 to 13,
characterized in that
a first bypass (31) having at least one controllable second expansion element (33) is realized in the cooling circuit (24, 39, 44), the first bypass being connected to the cooling circuit upstream of the internal heat exchanger (29, 46) and downstream of the condenser

(27, 38), the first bypass being realized as a controllable additional internal cooling system (34).

15. A use of a refrigerant consisting of a refrigerant mixture composed of a mass fraction of carbon dioxide (CO_2) of 20 to 74 mass percent, a mass fraction of pentafluoroethane (C_2HF_5) of 8 to 65 mass percent and a mass fraction of at least an other component, the other component being fluoromethane (CH_3F), for conditioning air in a test space of a test chamber, the test space serving to receive test material and being sealed against an environment and temperature-insulated, a cooling device (10, 23, 30, 36, 43) of a temperature control device of the test chamber, which comprises a cooling circuit (11, 24, 39, 44) with the refrigerant, a heat exchanger (12, 25, 47), a compressor (13, 26), a condenser (14, 27, 38) and an expansion element (15, 25, 28), being used to establish a temperature in a temperature of −60 °C to +180 °C, preferably −70 °C to +180 °C, particularly preferably −80 °C to +180 °C, within the test space.

16. The use according to claim 15,
characterized in that
an internal heat exchanger (19, 29, 46) of the cooling circuit (11, 24, 39, 44) connected to a high-pressure side (17) of the cooling circuit upstream of the expansion element (15, 25, 28) and downstream of the condenser (14, 27, 38) and to a low-pressure side (18) of the cooling circuit upstream of the compressor (13, 26) and downstream of the heat exchanger (12, 25, 47) is used to cool the refrigerant of the high-pressure side, the cooling of the refrigerant of the high-pressure side by means of the internal heat exchanger being exploited to lower an evaporation temperature at the expansion element.

17. The use according to claim 15 or 16,
characterized in that
the refrigerant of the high-pressure side (17) is cooled by the refrigerant of the low-pressure side (18) at constant suction pressure on the low-pressure side by means of the internal heat exchanger (19, 29, 46).