CLAIMS

1. Use as a refrigerant of a composition comprising 1,1-difluoroethylene (R-1132a) in a liquid chiller system.

2. The use according to claim 1, wherein the composition comprises a second component selected from difluoromethane (R-32), 2,3,3,3-tetrafluoropropene (R-1234yf), *trans*-1,3,3,3-tetrafluoropropene (R-1234ze(E)), 1,1-difluoroethane (R-152a) and mixtures thereof.

3. The use according to claim 1 or 2, wherein the composition comprises at least about 1 or about 1.5 weight % R-1132a, such as least 2 weight %, such as at least about 3 or about 4 weight %, for example at least about 5 weight %.

4. The use according to claims 1 to 3, wherein the composition comprises from about 1 to about 20 weight % R-1132a, such as from about 2 to about 15 weight %, for example from about 3 to about 12 weight %, optionally from about 4 to about 9 weight %

5. The use according to claims 2 to 4, wherein the composition comprises the second component in an amount from about 80 to about 99 weight %, such as from about 85 to about 98 weight %, for example from about 88 to about 97 weight %, optionally from about 91 to about 96 weight %.

6. The use according to claims 2 to 5, wherein the second component comprises R-32 and/or R-1234yf, preferably wherein the second component comprises R-32 and R-1234yf.

7. The use according to claims 2 to 6, wherein the R-32 is present in the composition in an amount of from about 1 to about 30 weight %, such as from about 2 to about 25 weight %, for example from about 3 to about 21 weight %, optionally from about 4 to about 19 weight %.

7. The use according to claims 2 to 7, wherein the composition comprises R-1234yf in an amount of about 50 to about 98 weight %, such as from about 55 to about 97 weight %, for example from about 60 to about 96 weight %, optionally from about 65 to about 95 weight % or from about 70 to about 94 or about 92 weight %.

8. The use according to any of the preceding claims, wherein the composition comprises from about 1 to about 20 weight % R-1132a, from about 1 to about 30 weight

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% R-32 and from about 50 to about 98 weight % R-1234yf, such as wherein the composition comprises from about 2 to about 15 weight % R-1132a, from about 2 to about 25 weight % R-32 and from about 60 to about 96 weight % R-1234yf, for example wherein the composition comprises from about 3 to about 12 weight % R-1132a, from about 3 to about 21 weight % R-32 and from about 67 to about 94 weight % R-1234yf, optionally wherein the composition comprises from about 4 to about 9 weight % R-1132a, from about 4 to about 19 weight % R-32 and from about 72 to about 92 weight % R-1234yf.

10. The use according to any of the preceding claims, wherein the composition is a non-azeotropic composition.

11. The use according to any of the preceding claims, wherein the composition has a Global Warming Potential (GWP) of less than about 300, such as less than about 200, for example less than about 150.

12. The use according to any of the preceding claims, wherein the composition is classified as "weakly flammable" (Class 2L) in accordance with ASHRAE Standard 34:2019 or ISO Standard 817, optionally wherein the composition as formulated has a laminar burning velocity of less than about 10 cm/s, such as less than about 7 cm/s, for example less than about 5 cm/s.

13. The use according to any of the preceding claims, wherein the composition further comprises a lubricant, wherein the lubricant is selected from of mineral oil, silicone oil, polyalkyl benzenes (PABs), polyol esters (POEs), polyalkylene glycols (PAGs), polyalkylene glycol esters (PAG esters), polyvinyl ethers (PVEs), poly (alpha-olefins) and combinations thereof, preferably the lubricant comprises a PAG and/or a POE or a mixture thereof.

14. The use according to any of the preceding claims, wherein the composition has a coefficient of performance (COP) which is higher than that of R-1234yf or R-454C.

15. The use according to any of the preceding claims, wherein the composition has a volumetric cooling capacity which is higher than that of R-1234yf or R-454C.

16. The use according to any of the preceding claims, wherein the liquid chiller system comprises at least one counter-flow heat exchanger for exchanging heat between the refrigerant and the liquid, said counter-flow heat exchanger allowing the refrigerant and the liquid to flow in a counter-current flow relative to each other when the refrigerant and the liquid pass through the counter-flow heat exchanger.

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17. The use according to any of the preceding claims, wherein the liquid chiller system utilizes a vapour compression refrigeration cycle.

18. The use according to any of the preceding claims, wherein the at least one counter-flow heat exchanger comprises at least one compact-plate type counter-flow heat exchanger.

19. The use according to any of the preceding claims, wherein the liquid chiller system comprises a water chiller system or a water/glycol chiller system.

20. The use according to any of the preceding claims, wherein the liquid chiller system comprises a secondary loop liquid chiller system.

21. The use according to any of the preceding claims, wherein the liquid chiller system is incorporated into or comprises a thermal management system (e.g. a heat pump and/or air-conditioning system) of a vehicle, preferably a thermal management system of an electric vehicle.

22. The use according to any of the preceding claims, wherein the liquid chiller system is a liquid chiller system adapted for heating and/or cooling a battery and/or a passenger cabin of a vehicle, preferably of an electric vehicle, optionally wherein the liquid chiller system is adapted for cooling power electronics, instrument displays and/or braking systems of a vehicle.

23. A liquid chiller system comprising:
at least one counter-flow heat exchanger for exchanging heat between a refrigerant composition and the liquid, said counter-flow heat exchanger allowing the refrigerant composition and the liquid to flow in a counter-current flow relative to each other when the refrigerant composition and the liquid pass through the counter-flow heat exchanger;
wherein the refrigerant composition comprises 1,1-difluoroethylene (R-1132a) and, optionally, a second component selected from difluoromethane (R-32), 2,3,3,3-tetrafluoropropene (R-1234yf), *trans*-1,3,3,3-tetrafluoropropene (R-1234ze(E)), 1,1-difluoroethane (R-152a) and mixtures thereof.

24. A liquid chiller system according to claim 23, wherein the liquid chiller system is incorporated into or comprises a thermal management system of a vehicle (e.g. a heat pump and/or air-conditioning system), preferably a thermal management system of an electric vehicle.

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25. A liquid chiller system according to claim 23 or 24, wherein the liquid chiller system comprises a liquid chiller system adapted for heating and/or cooling a battery and/or a passenger cabin of a vehicle, preferably of an electric vehicle.

26. A thermal management system of a vehicle comprising:
a liquid chiller system comprising at least one counter-flow heat exchanger for exchanging heat between a refrigerant composition and the liquid, said counter-flow heat exchanger allowing the refrigerant composition and the liquid to flow in a counter-current flow relative to each other when the refrigerant composition and the liquid pass through the counter-flow heat exchanger;
wherein the refrigerant composition comprises 1,1-difluoroethylene (R-1132a) and, optionally, a second component selected from difluoromethane (R-32), 2,3,3,3-tetrafluoropropene (R-1234yf), *trans*-1,3,3,3-tetrafluoropropene (R-1234ze(E)), 1,1-difluoroethane (R-152a) and mixtures thereof, preferably wherein the vehicle comprises an electric vehicle.

27. A thermal management system according to claim 26, wherein the liquid chiller system comprises a liquid chiller system adapted for heating and/or cooling a battery and/or a passenger cabin of a vehicle.

28. A thermal management system according to claim 26 or 27, wherein the thermal management system further comprises at least one of the following: a vapor injection system, a high side receiver and/or a low side accumulator for storing the refrigerant composition.

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