DESCRIPTION

Title of Invention: IMMERSION COOLING DEVICE, HEAT PIPE, AND COLD PLATE

Technical Field

[0001]

The present disclosure relates to an immersion cooling device.

Background Art

[0002]

A cooling system for electronic equipment using a fluorine-based cooling liquid has been known (e.g., Patent Literature 1).

Citation List

Patent Literature

[0003]

PTL 1: JP2016-46431A

Summary of Invention

Technical Problem

[0004]

Embodiments of the present disclosure seek to provide an immersion cooling device for use in the immersion cooling of electrical and electronic equipment.

Solution to Problem

[0005]

Item 1. An immersion cooling device comprising

electrical and electronic equipment,

a fluorine-based insulation refrigerant, and

a refrigerant tank for storing the fluorine-based insulation refrigerant,

wherein the refrigerant tank comprises an upper portion

and a lower portion,

wherein the refrigerant tank comprises a gas storing part in the upper portion,

wherein the gas storing part comprises a condenser and a filtration part,

wherein the electrical and electronic equipment is at

least partially immersed in the fluorine-based insulation refrigerant,

wherein the fluorine-based insulation refrigerant has a boiling point of 50 to 60°C,

wherein the fluorine-based insulation refrigerant comprises 1,1,1,3,3,3-hexafluoroisopropyl methyl ether (HFE-356 mmz) and/or 1,1,2,3,3,3-hexafluoropropyl methyl ether (HFE-356 mec), and

wherein the fluorine-based insulation refrigerant is circulated by natural convection to transfer heat without a pump.

Item 2. The immersion cooling device according to Item 1, wherein the refrigerant tank further stores methanol.

Item 3. A heat pipe comprising

a hermetic container,

an evaporation part connected to the hermetic container,and

a condensation part connected to the hermetic container

wherein the hermetic container consists of 1,1,2,3,3,3-hexafluoropropyl methyl ether (HFE-356 mec).

Item 4. A cold plate comprising

a heat-receiving part,

a heat-releasing part, and

a circulation route through which a fluorine-based insulation refrigerant circulates,

wherein the fluorine-based insulation refrigerant has a boiling point of 50 to 60°C, and

wherein the fluorine-based insulation refrigerant comprises 1,1,2,3,3,3-hexafluoropropyl methyl ether (HFE-356 mec)and 1,1,1,3,3,3-hexafluoroisopropyl methyl ether (HFE-356 mmz).

Advantageous Effects of Invention

[0006] According to the immersion cooling device of the present disclosure, electrical and electronic equipment can be efficiently cooled.

Brief Description of Drawings

[0007]

Fig. 1 schematically illustrates the schematic structure of the immersion cooling device in the present disclosure.

Fig. 2 schematically illustrates the schematic structure of the heat pipe in the present disclosure.

Description of Embodiments

[0008]

Definition of Terms

The numerical range expressed by using the term “to” in this specification indicates a range that includes numerical values shown before and after “to” as the minimum and maximum values.

[0009] In this specification, "A and/or B" means either A or B, or both A and B.

[0010] In this specification, the term “refrigerant” includes

CLAIMS

[Claim 1]

An immersion cooling device comprising

electrical and electronic equipment,

a fluorine-based insulation refrigerant, and

a refrigerant tank for storing the fluorine-based insulation refrigerant,

wherein the refrigerant tank comprises an upper portion and a lower portion,

wherein the refrigerant tank comprises a gas storing part in the upper portion,

wherein the gas storing part comprises a condenser and a filtration part,

wherein the electrical and electronic equipment is at least partially immersed in the fluorine-based insulation refrigerant,

wherein the fluorine-based insulation refrigerant has a boiling point of 50 to 60°C,

wherein the fluorine-based insulation refrigerant comprises 1,1,1,3,3,3-hexafluoroisopropyl methyl ether (HFE-356 mmz) and/or 1,1,2,3,3,3-hexafluoropropyl methyl ether (HFE-356 mec), and

wherein the fluorine-based insulation refrigerant is circulated by natural convection to transfer heat without a pump.

[Claim 2]

The immersion cooling device according to claim 1, wherein the refrigerant tank further stores methanol.

[Claim 3]

A heat pipe comprising

a hermetic container,

an evaporation part connected to the hermetic

container,and

a condensation part connected to the hermetic container wherein the hermetic container consists of 1,1,2,3,3,3-hexafluoropropyl methyl ether (HFE-356 mec).

[Claim 4]

A cold plate comprising

a heat-receiving part,

a heat-releasing part, and

a circulation route through which a fluorine-based insulation refrigerant circulates,

wherein the fluorine-based insulation refrigerant has a boiling point of 50 to 60°C, and

wherein the fluorine-based insulation refrigerant comprises 1,1,2,3,3,3-hexafluoropropyl methyl ether (HFE-356 mec) and 1,1,1,3,3,3-hexafluoroisopropyl methyl ether (HFE-356 mmz).