IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NEW YORK

VERTIV CORPORATION, Plaintiff, v. OPTICOOL TECHNOLOGIES, LLC, Defendant.	Civil Action No. 6:22-cv-6126 **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff, Vertiv Corporation ("Vertiv"), formerly known as Liebert Corporation, complains against Defendant, OptiCool Technologies, LLC ("OptiCool or Defendant"), as follows:

NATURE OF ACTION

1. This is an action for patent infringement of United States Patent No. 8,261,565 (the "'565 Patent") under the Patent Laws of the United States, 35 U.S.C. § 1, *et seq*. The patented technology relates to high density cooling systems for cooling data center racks and other high density heat-generating electronics. The patented technology provides efficient cooling, eliminates the hazards associated with using cooling water near electronic components, and prevents water condensation from forming near the heat-generating electronics that could damage the electronics. Defendant makes, uses, offers for sale, and sells cooling systems that embody the patented technology.

THE PARTIES

2. Plaintiff Vertiv is an Ohio corporation with its principal place of business located at 1050 Dearborn Dr., Columbus, Ohio, 43085. Vertiv is a global leader in the design,

manufacturing, and servicing of crucial digital infrastructure technology that powers, cools, secures, and maintains electronics that process, store, and transmit data. Vertiv's offerings include thermal management products, power management products, integrated rack systems, modular solutions, and management systems for monitoring and controlling digital infrastructure. Vertiv conducts extensive research and development to create and commercialize new technology for its products, including the technology covered by the '565 Patent. Vertiv is a continuation of the business previously operated under the name Liebert Corporation. On or about August 30, 2018, Liebert Corporation changed its formal name to Vertiv Corporation.

3. Defendant is a New York limited liability company with its principal place of business located at 855 Publishers Parkway, Webster, New York, 14580. Defendant is registered to conduct business in New York. Defendant directly competes with Vertiv in the production, marketing, and sale of high density cooling systems. Defendant conducts business in and is doing business in this District and elsewhere in the United States including, without limitation, making, using, promoting, offering to sell, importing, and/or selling high density cooling systems that embody the patented technology.

JURISDICTION AND VENUE

4. This action arises under the Patent Laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. Defendant is subject to this Court's specific and general personal jurisdiction at least because it resides in New York and maintains its principal place of business in New York.

6. Venue is proper in this Court under 28 U.S.C. § 1400(b) because Defendant is subject to personal jurisdiction in this District, resides in this District, has regularly conducted business in this District, and/or has committed acts of infringement in this District.

THE PATENT-IN-SUIT

7. On September 11, 2012, U.S. Patent No. 8,261,565, entitled "Cooling System for High Density Heat Load," a copy of which is attached hereto as Exhibit A, was duly and legally issued by the United States Patent and Trademark Office ("USPTO") to inventors Steven A. Borror, Franklin E. DiPaolo, Thomas E. Harvey, Steven M. Madara, Reasey J. Mam, and Stephen C. Sillato. The '565 Patent issued from U.S. patent application Serial Number 10/904,889 filed December 2, 2004, which claims legal priority to an earlier application filed on December 5, 2003.

8. The inventors have assigned all right, title, and interest in the '565 Patent to Liebert Corporation, which now operates under the name Vertiv Corporation, such that Vertiv is the sole owner of all right, title, and interest in and to the '565 Patent including the right to sue for and collect past, present, and future damages and to seek and obtain injunctive or any other relief for infringement of the '565 Patent.

9. The '565 Patent is presumed valid under 35 U.S.C. § 282.

10. The '565 Patent covers systems developed by Vertiv for cooling data center racks and other high density heat-generating electronics. The patented cooling systems use a first cooling cycle to remove heat from the heat load, for example the heat generating equipment in a data center rack. The first cooling cycle includes a pump that pumps a two-phase working fluid through the first cooling cycle. The two-phase working fluid is pumped to a rack heat exchanger through which heat is transferred from the heat load to the working fluid, causing the working fluid to change to a vapor or vapor-liquid mix. The working fluid then enters a second heat exchanger through which

heat is transferred from the working fluid to a second cooling cycle. The second cooling cycle may include a chilled water system. In some embodiments of the inventions in the ‘565 Patent, a system controller controls the temperature of the two-phase working fluid to prevent condensation from forming on or around the rack heat exchanger or associated working fluid piping. The inventions of the ‘565 Patent use the phase change of the working fluid to increase the cooling capacity of the system, while eliminating the need for cooling water and preventing condensation near the sensitive electronic components that generate the heat load.

VERTIV’S HIGH DENSITY COOLING SYSTEMS

11. Vertiv offers for sale and sells in the United States high density cooling systems in direct competition with Defendant. Vertiv provides an array of high density cooling systems under its Liebert® XD™ line of products. Vertiv’s Liebert® XD™ cooling systems reduce a data center’s energy consumption by, among other things, locating cooling units closer to the heat load, reducing the energy required to move air to and from the heat-generating components, improving thermal heat transfer from the components to the cooling system, and eliminating the need for over-chilling data centers to reduce hot spots. Vertiv’s Liebert® XD™ pumped refrigerant-based systems implement the technology of the ‘565 Patent to provide ideal data center thermal management solutions that are compact, efficient, and safe for the electronics equipment and personnel.

12. Vertiv’s Liebert® XD™ systems can be implemented in a variety of configurations, depending on the specific application. The systems include one or more Liebert® XD™ cooling modules that draw heated air from within data center enclosures. Vertiv offers Liebert XDO overhead cooling modules that mount to the ceiling above the data center equipment. The Liebert XDO module draws hot air from the hot aisles across a heat exchanger to remove heat. The XDO

module discharges cooled air into cold aisles where the equipment air inlets are located. Vertiv also provides Liebert XDV cooling modules that mount vertically above or on the data center enclosure, drawing hot air from inside the cabinet or from the hot aisle and discharging cooled air to the cold aisle. The Liebert XDO and XDV modules are depicted below:

Liebert XDO Overhead Cooling Module

Liebert XDV Cooling Module

13. Another type of cooling module that Vertiv provides for use as part of its Liebert® XD™ cooling systems is the Liebert XDH horizontal row cooler. The Liebert XDH units can be placed directly in line with data center enclosures. A Liebert XDH unit draws hot air from the hot aisle though the rear of the cooler, moves the hot air across a heat exchanger, and discharges the cooled air through the front of the unit into the cold aisle. The Liebert XDH horizontal row cooler is shown below:

14. Another type of cooling module that Vertiv provides as part of the Liebert® XD™ cooling systems is the Liebert XDR rack row cooling module that replaces the back door of the data center enclosure. The Liebert XDR rack row cooling module includes a heat exchanger that removes heat from the air exhausted by components in the enclosure. The Liebert XDR rack row cooling module is shown below:

15. The Liebert XDP pumping unit is suitable for installations where building chilled water is available. The XDP pumping unit circulates cooled pumped refrigerant through the rack cooling modules. The XDP pumping unit serves as an interface between the building chilled water system and the pumped refrigerant circuit so that heat removed from the enclosures by the pumped refrigerant is transferred to the building chilled water system.

16. The XDP pumping unit is shown below:

Liebert XDP Pumping Unit

17. The Liebert® XD™ cooling systems also include a network of piping and connectors for distributing the pumped refrigerant to individual rack cooling modules. A control system associated with the Liebert® XD™ cooling systems maintains the temperature of the refrigerant pumped to the equipment rack above the dew point of the room air to prevent moisture in the air from condensing on the heat exchanger in the rack enclosure.

18. The Liebert® XD™ cooling systems also include one or more flow regulators that regulate the flow of refrigerant that is pumped to cooling modules.

DEFENDANT'S INFRINGING SYSTEMS

19. Defendant makes, uses, sells, offers for sale, and/or imports into the United States data center cooling systems in direct competition with Vertiv's patented Liebert® XD™ cooling systems. Upon information and belief, Defendant sells and offers for sale its data center cooling systems direct to customers and through distributors and channel partners.

20. Defendant touts itself as a leading provider of refrigerant-based data center cooling systems for high density applications: "We specialize in refrigerant-based, close-coupled cooling solutions designed to support a wide variety of data center applications, including both low-density

to high-density."[1] Like Vertiv's patented systems, Defendant's competing data center cooling systems include multiple primary components and are offered in different configurations.

21. Defendant's cooling systems include one or more heat exchangers that remove heat exhausted by the electronic components contained in the data center enclosures (e.g., cabinets). Defendant refers to these heat exchangers as "Active Heat Extractor (AHX)" cooling units. Each Active Heat Extractor unit includes an evaporator coil and two fan units. The fan units draw heated air from the cabinet and across the evaporator coil. Heat transferred from the air causes refrigerant within the evaporator coil to undergo a phase change. Representative examples of Defendant's Active Heat Extractor cooling units are shown below:

22. Defendant's cooling systems also include one or more Cool Door Systems ("CDS"), which mount to the back of a data center cabinet. The Cool Door System houses the AHX cooling units. A representative example of Defendant's Cool Door System is shown below:

[1] https://www.opticooltechnologies.com/who-we-are/ (last visited April 21, 2021).

Cool Door System (CDS)

The CDS offers a unique modular mounting system which can accommodate up to 3 AHX units per door. The CDS is mounted on the back of the cabinet and removes heat from the exhaust air.

The CDS offers a unique modular mounting system that can accommodate up to 3 AHX units per door. The CDS is mounted on the back of the cabinet and removes heat from the exhaust air. The doors are designed to allow full and convenient access to IT equipment. The CDS is lightweight and available in standard cabinet sizes. In addition, many cabinet manufacturers offer "OptiCool Ready" products that use existing mounting points.

For retrofits, OptiCool's door transition kits provide convenient and seamless integration of the Cool Door System on to all major manufacturer's cabinets. Doors can be configured to handle heat removal from 3kW up to 45kW per rack.

23. In horizontal cooling applications in which mounting a Cool Door System is not possible or desired, Defendant's cooling systems may include a Cool Row System ("CRS") to house the Active Heat Extractor cooling units. A representative example of Defendant's Cool Row System is shown below:

Cool Row System (CRS)

For Horizontal Heat Capture Applications

Use CRS for Horizontal Cooling Applications such as UPS, Cabinet Top Exhaust, Mechanical Rooms, and Hot Aisle Requiring Heat Capture

Features
- 24" or 30" Plenum Width
- Supports 2 or 3 AHX
- Top or Bottom Inlet
- Top of Cabinet or Ceiling mount
- Single or Dual Power

24. Defendant’s data center cooling systems are configurable with one or more Refrigerant Pump Systems (“RPS”) that circulate refrigerant through a distribution network to the Active Heat Extractors. Representative examples of Defendant’s Refrigerant Pump Systems are shown below:

Refrigerant Pump Systems (RPS)

The RPS circulates refrigerant to the Active Heat Extractors. The pump includes a chilled-water heat exchanger to remove heat from the refrigerant. When chilled water is not available, we use outdoor condensers to reject heat. Virgin R-134a refrigerant is circulated at low pressure with no compression so no oils are used. Refrigerant temperature is strictly maintained to prevent condensation. There are multiple pump models to support various power input arrangements and outdoor environmental conditions.

Download Pump Comparison Sheet

High Capacity Pump Spec Sheets

Chilled Water Heat Rejection
- Model RPW-210

DX Heat Rejection
- Model RPC-230

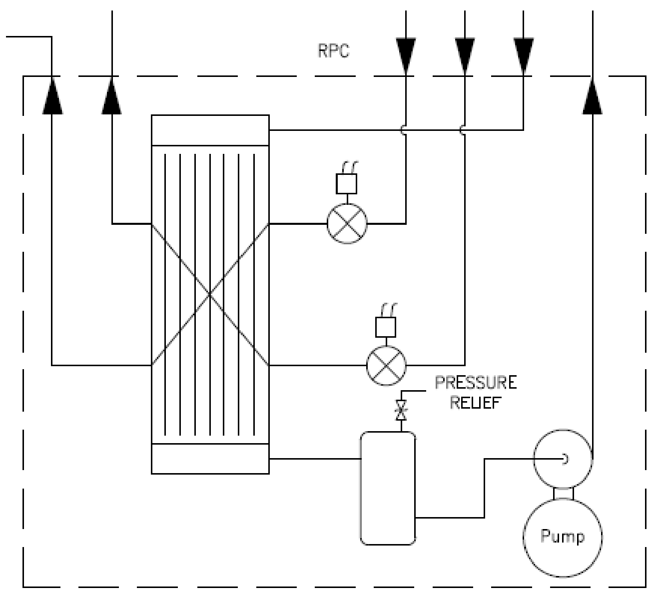
Compact MiniPump Spec Sheets

Chilled Water Heat Rejection
- Model RPW-020
- Model RPW-115

DX Heat Rejection
- Model RPC-020
- Model RPC-115

25. Defendant's Refrigerant Pump Water ("RPW") units, which include at least the RPW-210, RPW-020, and RPW-115 models, work in conjunction with the components discussed above to reject heat to the building cooling water system. As used herein, the term "chilled water" is intended to refer to both water and water/glycol mixtures that are used as a coolant fluid in building cooling water systems. Defendant's RPW units are designed to be compatible with building cooling water systems that use water and water/glycol mixtures as a coolant fluid. The RPW units include one or more fluid-to-fluid heat exchangers configured to remove heat from the refrigerant returned from the Active Heat Extractors. The building's chilled water system then rejects the removed heat to the environment.

26. Refrigerant returning from the Active Heat Extractors flows through piping to the fluid-to-fluid heat exchanger in the RPW unit, where heat is transferred from the refrigerant flowing through one portion of the fluid-to-fluid heat exchanger to chilled water flowing through another part of the fluid-to-fluid heat exchanger. The refrigerant condenses in the fluid-to-fluid heat exchanger and flows into a receiver tank. The receiver tank accumulates liquid refrigerant, maintaining a level of liquid refrigerant. A refrigerant pump in the RPW unit pumps liquid refrigerant accumulated in the receiver tank through a piping distribution network to the Active Heat Extractors. A representative schematic of Defendant's refrigerant pump and receiver tank and a representative example of Defendant's receiver tank are shown below:



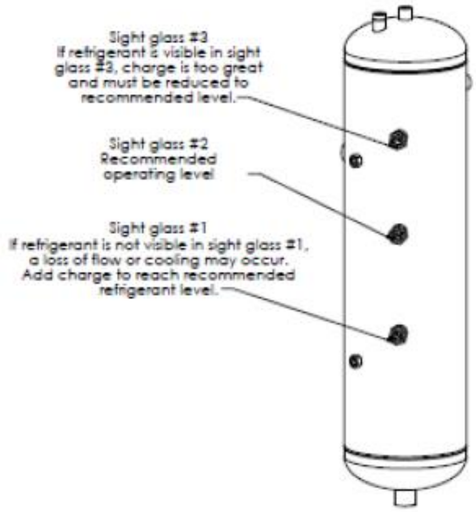


Figure 11: Sight-glass liquid level

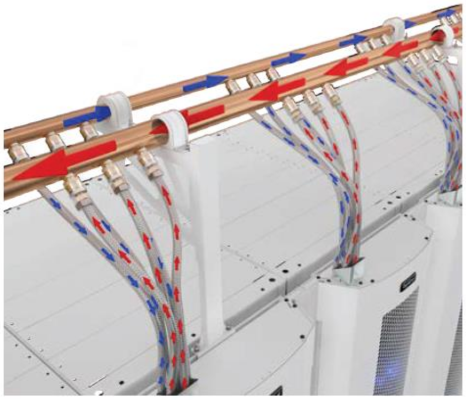
27. Defendant's cooling systems circulate R-134a, which is a two-phase volatile refrigerant, to and from the AHX modules:

R134a Refrigerant

The Lifeblood of the OptiCool Solution

Fundamentally, cooling the computer equipment in a data center is about moving heat energy most efficiently. Some data centers use air and some use water, but the OptiCool system uses R134a, a non-toxic, synthetic refrigerant. R134a has superb thermodynamic properties, which make it an ideal medium for moving heat. For a given volume, water can absorb 3,400 times more heat than air. In comparison, R134a can absorb nine times more heat than water making it the lifeblood of OptiCool's cooling solution.

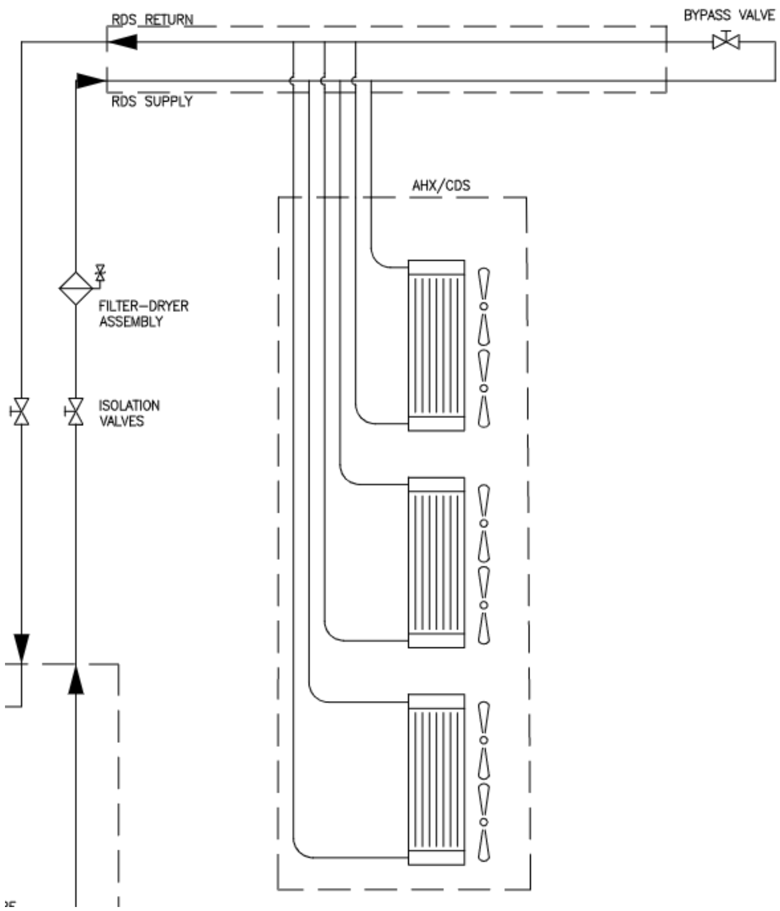
28. Defendant's cooling systems further include piping, valves, connections, and tubing that connect the Refrigerant Pump Systems to the Active Heat Extractors for circulating R-134a refrigerant through the system. An example of this Refrigerant Distribution Network is shown below:



Refrigerant Distribution Network (RDN)

The RDN is composed of refrigerant-grade copper piping, factory-built refrigerant distribution segments, and flexible stainless-steel hose pairs. Self-sealing quick-connect couplers join the AHX cooling units with the supply and return lines. The quick-connect feature allows for modularity, flexibility, and reduced on-site installation times.

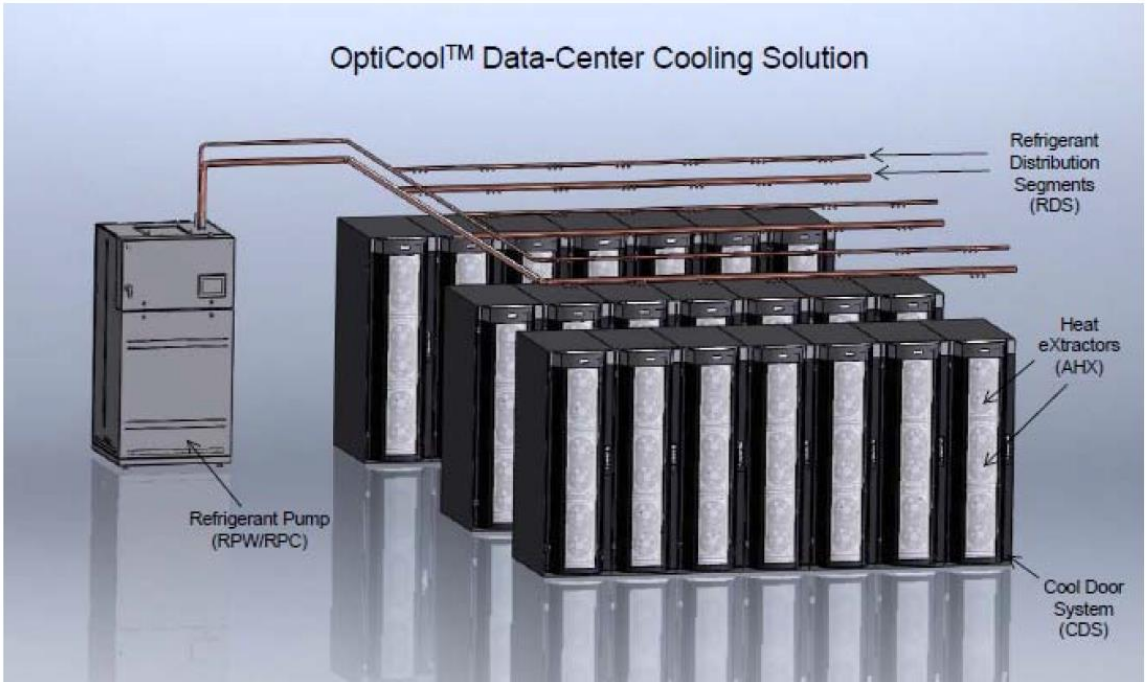
29. Defendant's RDN includes refrigerant supply piping to, and return piping from, the AHX cooling units. The RDN further includes refrigerant supply-to-return bypass valves. A bypass assembly including a bypass valve connects the refrigerant supply and return manifolds for the AHX cooling units. The bypass valve diverts flow away from the AHX cooling units and through the bypass assembly and, accordingly, controls the amount of refrigerant flow through the AHX cooling units. The bypass valve acts as a balancing valve to balance the system based on the number of AHX cooling units and the heat load.



30. Defendant's cooling systems include control systems to prevent condensation from forming on the Refrigeration Distribution System and the Active Heat Extractors. The system controls the R134a refrigerant temperature and maintains it above the room dew point temperature plus a safety margin to prevent condensation formation.

31. The control systems include room sensors that monitor room temperature and dew point temperature of the air around the Active Heat Extractor. As referenced above, the control systems are configured, for example via a PID control algorithm, to maintain the temperature of refrigerant above the room dew point temperature. In this manner, the RPW units are designed to supply refrigerant to the Active Heat Extractors at a temperature that is above the dew point temperature of the air around the Active Heat Extractor.

32. A depiction of Defendant's cooling system with Active Heat Extractors, Cool Door Systems, a Refrigerant Distribution Network, and a Refrigerant Pump System is shown below:



33. For purposes of this Complaint and the allegations herein, Defendant's OptiCool pumped refrigerant high density cooling systems, and all components thereof including but not limited to two-phase refrigerant, Refrigerant Distribution Networks, Active Heat Extractors, Cool Door Systems, Cool Row Systems, and RPW units, are referred to as the "RPW-Based Systems." Despite not having a license to the '565 Patent, the RPW-Based Systems embody the patented technology.

FIRST CAUSE OF ACTION—INFRINGEMENT OF THE '565 PATENT

34. Vertiv hereby repeats and re-alleges the allegations contained in paragraphs 1 to 33, as if fully set forth herein.

35. Defendant, directly and/or through its subsidiaries, affiliates, agents, and/or business partners, has in the past and continues to directly infringe the '565 Patent pursuant to 35

U.S.C. § 271(a), either literally or under the doctrine of equivalents, by making, using, offering for sale, selling, and/or importing cooling systems that are covered by one or more claims of the ’565 Patent, including at least claims 1, 3, 4, 5, 7, 8, 11, 12, 14, 15, 17, 19, and 21, without authority or license within the United States and within this District. Defendant has been and is engaged in one or more of these direct infringing activities at least with respect to the RPW-Based Systems. The full extent of Defendant’s infringement of the ’565 Patent will be confirmed during discovery.

36. Notice of the factual basis of Vertiv’s allegations of infringement of the ’565 Patent is provided below.

37. Independent claim 1 of the ’565 Patent recites:

1. A cooling system for transferring heat from a heat load, the cooling system comprising:

a two-phase working fluid;

a pump configured to increase the pressure of the working fluid without substantially increasing the enthalpy of the working fluid;

an air-to-fluid heat exchanger in fluid communication with the pump and in thermal communication with the heat load;

a fluid-to-fluid heat exchanger having a first fluid path in fluid communication with the air-to-fluid heat exchanger and the pump, and a second fluid path, the first and second fluid paths being in thermal communication with one another;

a second heat transfer system in fluid communication with the second fluid path and comprising:

a second portion of the fluid-to-fluid heat exchanger;

a single phase working fluid; and

a pump;

wherein air passing through the air-to-fluid heat exchanger causes at least a portion of the two-phase working fluid to change phase from a liquid to a gas within the air-to-fluid heat exchanger; and

a controller operatively coupled to at least the second fluid path and configured to prevent condensation on the air-to-fluid heat exchanger by controlling the amount of heat transferred to the second fluid path so that a temperature of the two-phase working fluid *within the air-to-fluid heat exchanger is above a dew point temperature of the air passing through the air-to-fluid heat exchanger.*

38. Defendant's RPW-Based Systems include each and every limitation of claim 1 of the '565 Patent as alleged in the following paragraphs.

39. The RPW-Based Systems are cooling systems for transferring heat from a heat load. Specifically, they are made, used, sold, and offered for sale for the purpose of cooling heat-generating electronics components within enclosures (e.g., cabinets) of data centers.

40. The RPW-Based Systems include a two-phase working fluid, such as R-134a refrigerant. R-134a is a commercially available two-phase hydrofluorocarbon.

41. The RPW-Based Systems include at least one RPW pump unit configured to increase the pressure of the working fluid without substantially increasing the enthalpy of the working fluid. Liquid-phase refrigerant is supplied at the inlet of the RPW pump unit. The pump increases the pressure of the liquid refrigerant such that the refrigerant is circulated to the Active Heat Extractors and does so without substantially adding heat to the liquid refrigerant and without substantially changing the volume of the refrigerant. Therefore, each RPW pump increases the pressure of the working fluid refrigerant without substantially increasing the enthalpy of the working fluid refrigerant.

42. On information and belief, Defendant's RPW-Based Systems include at least one Active Heat Extractor, which includes an air-to-fluid heat exchanger in fluid communication with the RPW pump and in thermal communication with the heat load. Each of the Active Heat Extractors includes a heat exchanger that removes heat exhausted by the electronics equipment and transfers the heat to refrigerant circulated through the heat exchangers. The heat exchangers in the Active Heat Extractors are in fluid communication with an RPW pump, which pumps the refrigerant to the Active Heat Extractors through the Refrigerant Distribution Network. Further,

the Active Heat Extractors include fan units that draw heated air across the heat exchangers such that the heat exchangers are in thermal communication with the heat load. The heat removed from the air drawn across the heat exchangers causes at least a portion of the R-134a or other pumped refrigerant to undergo a phase change.

43. The RPW-Based Systems include at least one fluid-to-fluid heat exchanger having a first fluid path in fluid communication with the air-to-fluid heat exchanger and the RPW pump, and a second fluid path, the first and second fluid paths being in thermal communication with one another. The RPW unit includes a fluid-to-fluid heat exchanger, which on information and belief, is a plate and frame heat exchanger. The fluid-to-fluid heat exchanger defines a first fluid path through which the working fluid refrigerant flows, and a second fluid path through which chilled water flows. The first fluid path is in fluid communication with the air-to-fluid heat exchangers of the Active Heat Extractors. In particular, refrigerant returning from the Active Heat Extractors enters the first fluid path of the fluid-to-fluid heat exchanger as a mixture of liquid and vapor. The refrigerant is condensed to a liquid state in the fluid-to-fluid heat exchanger. The refrigerant exits the first fluid path of the fluid-to-fluid heat exchanger and flows into a receiver tank and then to the inlet of the RPW pump of the RPW unit. Therefore, the first fluid path is in fluid communication with the air-to-fluid heat exchanger and the RPW pump.

44. The fluid-to-fluid heat exchanger of the RPW unit also defines a second fluid path that receives chilled water from the building chilled water system. The fluid-to-fluid heat exchanger transfers heat from the refrigerant returning from the Active Heat Extractors flowing through the first fluid path to the chilled water flowing through the second fluid path. The RPW pump provides the pressure needed to circulate the liquified refrigerant back to the Active Heat Extractors. The first and second fluid paths are in thermal communication with one another, as

heat is transferred between the fluids flowing through the first and second fluid paths in the fluid-to-fluid heat exchanger.

45. The RPW-Based Systems include a second heat transfer system in fluid communication with the second fluid path comprising a second portion of the fluid-to-fluid heat exchanger, a single phase working fluid, and a pump. As discussed above, chilled water or other single phase working fluid pumped through the building chilled water system flows through the second fluid path of a heat exchanger. The fluid-to-fluid heat exchanger in the RPW unit has a second portion, for example an outlet portion, inlet portion, section of plates, tubes, or other structure that form a part of the second fluid path through which the working fluid flows. On information and belief, the single phase working fluid is water or a water and glycol mixture.

46. Heat transferred from air passing through the air-to-fluid heat exchangers of the Active Heat Extractors causes at least a portion of the two-phase working fluid to change phase from a liquid to a gas within the air-to-fluid heat exchanger.

47. On information and belief, the RPW-Based Systems include at least a dew point sensor and a controller that maintains the refrigerant delivered to the heat exchangers of the Active Heat Extractors above the dew point temperature of the air passing through the heat exchangers. Upon information and belief, the controller is coupled to the second fluid path through which the second refrigerant circulates and controls the amount of heat transferred to the second fluid path. By controlling the amount of heat transferred to the second fluid path, the RPW-Based Systems can maintain the temperature of the refrigerant delivered to the air-to-fluid heat exchangers to remain above the dew point temperature of the air passing through the air-to-fluid heat exchangers in the Active Heat Extractors. This prevents condensation on the air-to-fluid heat exchangers.

48. The scope and subject matter of independent claim 3 is substantially similar to that of claim 1. The preamble of claim 3 recites a cooling system for transferring heat from a heat load to an environment. The RPW-Based Systems transfer heat exhausted from electronics components in data center enclosures to the building chilled water system and then to the environment.

49. Further with respect to claim 3, the second cooling cycle of the RPW-Based Systems is a chilled water system in thermal communication with the environment. The building's chilled water system is in thermal communication with the environment because it rejects heat to the environment.

50. Further claim 3 recites a second heat exchanger instead of a fluid-to-fluid heat exchanger. The RPW-Based Systems include a second heat exchanger having a first fluid path for the working fluid in fluid communication with the air-to-fluid heat exchanger and the pump, and a second fluid path comprising a portion of the second cooling cycle.

51. The RPW units include a second heat exchanger, such as a plate and frame heat exchanger. The second heat exchanger defines a first fluid path, for example the portion of the heat exchanger defined by the frame of the heat exchanger, and a second fluid path, for example the portion of the heat exchanger defined by the plates of the heat exchanger. The refrigerant in the air-to-fluid heat exchangers in the Active Heat Extractors leaves the Active Heat Extractors and enters the first fluid path of the second heat exchanger. The refrigerant exits the first fluid path of the second heat exchanger and flows into a receiver tank. From the receiver tank, the refrigerant flows to the RPW pump of the Refrigerant Pump System. The first fluid path is configured to provide fluid communication from the air-to-fluid heat exchanger to the pump because the refrigerant returning from the air-to-fluid heat exchanger passes through the first fluid path before

it reaches the pump. Therefore, the first fluid path is configured to provide fluid communication from the air-to-fluid heat exchanger to the RPW pump.

52. The second heat exchanger of the RPW unit also defines a second fluid path that receives chilled water from the building chilled water system. The second heat exchanger transfers heat from the refrigerant returning from the Active Heat Extractors flowing through the first fluid path to the chilled water flowing through the second fluid path. The RPW pump provides the pressure needed to circulate the liquified refrigerant back to the Active Heat Extractors. The first and second fluid paths of the second heat exchanger are in thermal communication with one another, as heat is transferred between the fluids flowing through the first and second fluid paths in the fluid-to-fluid heat exchanger

53. Further with respect to claim 3, on information and belief, the second cooling cycle is configured to control the amount of heat transferred from the refrigerant to the chilled water. By controlling the amount of heat transferred from the refrigerant to the chilled water, the temperature of the refrigerant entering the air-to-fluid heat exchanger in the Active Heat Extractors is maintained above the dew point of the air flowing through the air-to-fluid heat exchanger in the Active Heat Extractors.

54. The other limitations of claim 3 are substantially similar to corresponding limitations in claim 1 and are met for essentially the same reasons as set forth above with respect to claim 1.

55. Claim 4 recites a second heat exchanger having first and second fluid paths like claim 3, and wherein the second fluid path is adapted to thermally connect the air-to-fluid heat exchanger in the first fluid path to a chilled water cooling system that is in thermal communication with the environment.

56. The RPW units include a second heat exchanger having a second fluid path. The second fluid path receives chilled water from the building's chilled water system. The second heat exchanger allows heat from the refrigerant from the Active Heat Extractors passing through the first fluid path to be transferred to the chilled water passing through the second fluid path. Heat transferred to the refrigerant in the air-to-fluid heat exchangers is carried by the refrigerant back to the second heat exchanger. That heat is then transferred at the second heat exchanger to the second refrigerant in the second fluid path of the second heat exchanger that is part of the chilled water system. Therefore, the first and second fluid paths of the second heat exchanger are in thermal communication with one another, as heat is transferred via the heat exchanger between the refrigerants passing through the first and second fluid paths. The building's chilled water system is a cooling system that is in thermal communication with the environment because it rejects heat to the environment using, for example, an outside air-cooled condenser or cooling tower. In this manner, the second fluid path of the second heat exchanger thermally connects the air-to-fluid heat exchanger to a chilled water cooling system that is in thermal communication with the environment.

57. Claim 4 recites a controller operatively coupled to the chilled water cooling system and configured to maintain a temperature of the working fluid between the second heat exchanger and the air-to-fluid heat exchanger above a dew point temperature of the air passing through the air-to-fluid heat exchanger so that the cooling system removes only sensible heat from the air and thereby prevents condensation on the air-to-fluid heat exchanger. RPW-Based Systems include at least a dew point sensor and a controller that maintains the refrigerant delivered to the heat exchangers of the Active Heat Extractors above the dew point temperature of the air passing through the heat exchangers to remove only sensible heat from the air thereby preventing

condensation on the air-to-fluid heat exchanger of the Active Heat Extractors. Upon information and belief, the controller is coupled to the second fluid path through which the second refrigerant circulates and controls the amount of heat transferred to the second fluid path. By controlling the amount of heat transferred to the second fluid path, the RPW-Based Systems can maintain the temperature of the refrigerant delivered to the air-to-fluid heat exchangers to remain above the dew point temperature of the air passing through the air-to-fluid heat exchangers in the Active Heat Extractors thereby removing only sensible heat from the air. This prevents condensation on the air-to-fluid heat exchangers.

58. The other limitations of claim 4 are substantially similar to corresponding limitations in claims 1 and 3, and are met for essentially the same reasons as discussed above with respect to those claims.

59. Independent claim 5 is directed to a heat transfer system. This claim is similar to independent claims 1, 3, and 4 except that it recites a first heat transfer subsystem adapted to circulate there through a first working fluid, wherein the first working fluid is selected from the group consisting of chlorofluorocarbons, hydrofluorocarbons and hydrochlorofluorocarbons. The RPW-Based Systems include a first heat transfer subsystem that includes air-to-fluid heat exchangers in the Active Heat Extractors that are configured to be in thermal contact with the air exhausted by the electronics in the data center enclosures, an RPW pump, and a portion of a second heat exchanger. On information and belief, the working fluid circulated through the Active Heat Extractors, pump, and portion of the second heat exchanger is R-134a, which is a hydrofluorocarbon.

60. Claim 5 further recites a second heat transfer subsystem comprising at least a portion of the second heat exchanger and a third heat exchanger. Claim 5 further recites that the

second heat transfer subsystem is adapted to circulate a second working fluid there through, wherein the second working fluid is selected from the group consisting of water, water-ethylene glycol, and water-propylene glycol. The RPW-Based Systems each include a second heat transfer subsystem comprising at least a second portion of the second heat exchanger and a third heat exchanger, and adapted to circulate a second working fluid there through, wherein the second working fluid is selected from the group consisting of water, water-ethylene glycol and water-propylene glycol. The fluid-to-fluid heat exchanger in the RPW-Based Systems uses chilled water or a water and glycol solution to condense the refrigerant returning from the Active Heat Extractors. The building's chilled water system forms a second heat transfer system. Chilled water is circulated as a working fluid through the chilled water system. On information and belief, the building chilled water system includes a third heat exchanger in the building chiller that exchanges heat from the chilled water to air or another fluid, such as a refrigerant, so that the chilled water is cooled before it enters the supply line side of the building's chilled water system.

61. The other limitations of claim 5 are substantially similar to corresponding limitations in claims 1, 3, and 4, and are met for substantially the same reasons as discussed above with respect to those claims.

62. With respect to dependent claim 7, the heat load in the RPW-Based Systems is an electronics cabinet that contains electronics equipment that exhausts heated air into and around the cabinet.

63. With respect to dependent claim 8, the RPW-Based Systems include a bypass valve associated with multiple Active Heat Extractors adapted to control an amount of first working fluid flowing through the associated Active Heat Extractors. The bypass valve is in a bypass assembly that connects the refrigerant supply and return manifolds for the Active Heat Extractors. By

controlling the amount of refrigerant that is diverted through the bypass assembly, the bypass value controls the amount of refrigerant flowing through the Active Heat Extractors.

64. With respect to dependent claim 11, the RPW-Based systems include a receiver tank in fluid communication with the first heat transfer subsystem for accumulating a portion of the first working fluid. The RPW units include a receiver tank that accumulates R-134 liquid refrigerant working fluid and provides the liquid refrigerant to the RPW pump.

65. With respect to dependent claim 12, the receiver tank of the RPW unit is adapted to accumulate a portion of the first working fluid based upon temperature and/or heat load. Under normal operating conditions, the R-134a refrigerant circulates in a closed loop having a fixed total volume for refrigerant flow. The heat load and the temperature of the R-134a refrigerant affects the distribution between vapor phase and liquid phase of the refrigerant returned from the Active Heat Extractors. Because liquid refrigerant occupies less volume than the vapor phase, the circulating refrigerant occupies less volume as the amount of liquid in the return line increases, such that less liquid refrigerant accumulates in the receiver tank. At higher temperatures or heat loads, more returning refrigerant is in the vapor phase and more liquid accumulates in the receiver tank. Therefore, at any given time, the amount of refrigerant accumulated by the receiver tank may vary based on the heat load or temperature of the refrigerant.

66. With respect to dependent claim 14, the RPW-Based Systems include a second heat exchanger in the RPW unit that is a tube-in-tube, shell and tube, or a plate and frame heat exchanger.

67. With respect to dependent claim 15, the RPW-Based Systems include a receiver tank between the RPW pump of the RPW unit and the fluid-to-fluid heat exchangers. As the R-134a or other refrigerant working fluid is condensed in the fluid-to-fluid heat exchanger of the

RPW unit, it accumulates in the receiver tank. The receiver tank helps maintain a relatively stable pressure at the pump inlet and ensures that the RPW pump draws liquid refrigerant rather than vaporized refrigerant to prevent cavitation of the pump.

68. With respect to dependent claim 17, the RPW-Based Systems include a working fluid receiver in the first cooling cycle between the second heat exchanger and the pump of the RPW unit as alleged above with respect to claim 15 of the ’565 Patent.

69. With respect to dependent claim 19, the RPW-Based Systems include a working fluid receiver in fluid communication between the second exchanger and the pump of the RPW unit as alleged above with respect to claim 15 of the ’565 Patent. .

70. With respect to dependent claim 21, the RPW-Based Systems include a working fluid receiver in the first heat transfer subsystem between the second heat exchanger and the pump as discussed above with respect to claim 15 of the ’565 Patent.

71. Defendant, directly and/or through its subsidiaries, affiliates, agents, and/or business partners, also has in the past and continues to indirectly infringe the ’565 Patent, including at least claims 1, 3, 4, 5, 7, 8, 11, 12, 14, 15, 17, 19, and 21 of the ’565 Patent, pursuant to 35 U.S.C. § 271(b) by actively inducing acts of direct infringement performed by others. Defendant’s customers directly infringe at least by making and using these systems, and Defendant’s authorized distributors and channel partners directly infringe at least by selling and offering for sale such systems.

72. On information and belief, Defendant has had actual notice of the ’565 Patent as early as February of 2013, when it received written notice of the ’565 Patent. Defendant filed a first declaratory judgment action alleging non-infringement of the ’565 Patent in July of 2013. Defendant later filed a second action seeking a declaration of non-infringement, invalidity, and

unenforceability of the ’565 Patent. Defendant failed to pursue either action, the first action being voluntarily dismissed by Defendant and the second action dismissed by the Court with prejudice against Defendant.

73. Upon gaining knowledge of the ’565 Patent and abandoning its legal challenges to the ‘565 Patent, it was, or became, apparent to Defendant that the making, sale, importation, offer for sale, and use of its RPW-Based Systems resulted in infringement of the ’565 Patent. Defendant has indirectly infringed by inducing third parties, including customers and/or third-party contractors, to assemble and install Defendant’s RPW-Based Systems in the customers’ data centers, and by inducing customers to use such systems in their normal and customary way and for their intended purpose. On information and belief, Defendant has also induced its authorized distributors and channel partners to engage in infringing acts of selling and offering for sale such systems. For example, Defendant actively induces such third parties to infringe the ’565 Patent by, among other things: (i) designing, manufacturing, offering for sale, selling, or otherwise providing the components of its RPW-Based Systems to such third parties with the knowledge and intent that the sale, offer for sale, assembly, installation, and/or use of such systems by such third parties infringes the ’565 Patent; (ii) enabling third parties to assemble, install, and use the systems when such making and using infringes the ’565 Patent; (iii) providing technical support, specifications, user guides, manuals and other documentation and instructions for assembling, installing, and operating the systems in their customary way; (iv) advertising and promoting the systems, including on its website, through various printed promotional materials, and through its sales force, distributors and channel partners; and (v) providing ongoing support and maintenance to such third parties relating to RPW-Based Systems.

74. Defendant has known that its distributors, channel partners, and customers have followed such instructions, user guides, and technical specifications and have made, used, offered to sell, sold, or imported them into the United States to directly infringe one or more claims of the '565 Patent. Defendant has directly benefitted from and has actively and knowingly encouraged distributors, channel partners, and customers to sell, offer for sale, make, and/or use the RPW-Based Systems in the United States, including through advertising, marketing, and sales activities. Defendant's marketing efforts show that it has specifically intended to induce and have induced direct infringement in the United States.

75. Defendant encourages such third parties to infringe with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. Upon information and belief, Defendant has continued and will continue to engage in activities constituting inducement of such acts of direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in direct infringement of the '565 Patent.

76. Plaintiff additionally pleads that, to the extent that one or more components of the asserted claims of the '565 patent are not provided by or on behalf of Defendant, Defendant is nevertheless liable pursuant to 35 U.S.C. § 271(c) because Defendant, directly and/or through its subsidiaries, affiliates, agents, and/or business partners, has contributed to and/or will continue to contribute to the direct infringement by third parties, including customers who install or have installed and use the RPW-Based Systems. The RPW-Based Systems provided by or on behalf of Defendant constitute material components of the claimed systems, and Defendant supplies these components knowing that they are especially adapted for use in the making and using of the infringing systems and not staple articles or commodities of commerce suitable for substantial

non-infringing use. As alleged above, on information and belief, Defendant has had actual knowledge of the ’565 Patent prior to the commencement of this lawsuit.

77. Defendant’s direct infringement, inducement to infringe, and/or contributory infringement of the ’565 Patent has injured Vertiv, and Vertiv is entitled to recover damages adequate to compensate for such infringement pursuant to 35 U.S.C. § 284. Unless it ceases its infringing activities, Defendant will continue to injure Vertiv by infringing the ’565 Patent.

78. On information and belief, Defendant has acted egregiously and with willful misconduct in that its actions constitute direct and indirect infringement of a valid patent, and this was either known or so obvious that Defendant should have known about it.

79. Having knowledge of the ’565 Patent as early as February of 2013, Defendant knows or it has become apparent to Defendant that the manufacture, sale, importing, offer for sale, and use of its RPW-Based Systems results in infringement of the ’565 Patent. On information and belief, Defendant nevertheless has been and will continue to provide and make these systems in the United States and has been and will continue to offer for sale and sell the systems despite not having a license and without a good faith basis to believe that its activities do not infringe any valid claim of the ’565 Patent. Defendant derives significant revenue by selling the accused systems, and Defendant knows that the patented technology is necessary for Defendant to compete effectively with Vertiv’s patented Liebert® XD™ systems. Defendant’s continued infringement of the ’565 Patent by making, using, selling, offering for sale, and/or importing in the United States the RPW-Based Systems and by inducing and contributing to the direct infringement by others is in reckless disregard of Vertiv’s patent rights.

80. All infringement of the ’565 Patent following Defendant’s knowledge of the ’565 Patent is willful, and Vertiv is entitled to treble damages and attorneys’ fees and costs incurred in this action under 35 U.S.C. §§ 284 and 285.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for:

1. Judgment that the ’565 Patent is valid and enforceable;

2. Judgment that the ’565 Patent is infringed by Defendant;

3. Judgment that Defendant’s acts of patent infringement relating to the ‘565 Patent are willful;

4. An award of damages arising out of Defendant’s acts of patent infringement, together with pre-judgment and post-judgment interest;

5. Judgment that the damages so adjudged be trebled in accordance with 35 U.S.C. § 284;

6. An award of Vertiv’s attorneys’ fees, costs and expenses incurred in this action in accordance with 35 U.S.C. § 285; and

7. Such other and further relief as the Court may deem just and proper.

JURY DEMAND

Vertiv demands trial by jury of all issues triable of right by a jury.

RESERVATION OF RIGHTS

Vertiv’s investigation is ongoing, and certain material information remains in the sole possession of Defendant or third parties, which will be obtained via discovery herein. Vertiv expressly reserves the right to amend or supplement the causes of action set forth herein in accordance with Rule 15 of the Federal Rules of Civil Procedure.

March 17, 2022

Respectfully submitted,

s/Tony R. Sears

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