

CLAIMS

1. A fire suppression system for a computer cabinet positioned in an enclosed environment having a subfloor with a cooling airflow, comprising:
 - a discharge system responsive to a detection signal comprising a dispersal device disposed proximate to a vent in the subfloor, wherein:
 - the dispersal device is configured to release a fire suppressant into an area proximate to the vent; and
 - the released fire suppressant is delivered to an intake side of the computer cabinet by the cooling airflow flowing upward from the vent towards the intake side of the computer cabinet.
2. A fire suppression system according to claim 1, further comprising a detection system configured to couple to an exhaust side of the computer cabinet, wherein the detection system is:
 - exposed to a heated airflow exiting from the exhaust side the computer cabinet; and
 - adapted to generate the detection signal in response to a detected fire condition.
3. A fire suppression system according to claim 2, further comprising a control system communicatively linked to the detection system and the discharge system, wherein the control system is responsive to the detection signal and configured to activate the discharge system in response to the detection signal.
4. A fire suppression system according to claim 3, wherein the control system is adapted to control the release of the fire suppressant by the discharge system.

5. A fire suppression system according to claim 4, wherein:
- the detection system is further adapted to generate a second detection signal in response to at least one of a continued fire condition and a reignition condition;
 - and
 - the control system is responsive to the second detection signal and further adapted to activate the discharge system to release an additional amount of the fire suppressant.
6. A fire suppression system according to claim 3, wherein:
- the discharge system further comprises a second dispersal device disposed proximate to a second vent in the subfloor, wherein:
 - the second vent is disposed proximate to a second computer cabinet in the enclosed environment;
 - the second dispersal device is configured to release a fire suppressant into an area proximate to the second vent, and
 - the released fire suppressant is delivered to an intake side of the second computer cabinet by the cooling airflow flowing upward from the second vent towards the intake side of the second computer cabinet; and wherein:
 - the first dispersal device, the first vent, and the first computer cabinet define a first zone within the enclosed environment;
 - the second dispersal device, the second vent, and a second computer cabinet define a second zone within the enclosed environment;
 - the detection system is further exposed to a heated airflow exiting from an exhaust side the second computer cabinet and adapted to:
 - generate the first detection signal in response to a detected fire condition within the first zone; and
 - generate a second detection signal in response to a detected fire condition within the second zone; and
 - the control system is responsive to the first and second detection signal and configured to cause the discharge system to:

release the fire suppressant through the first dispersal device in response to the first detection signal; and
release the fire suppressant through the second dispersal device in response to the second detection signal.

7. A fire suppression system according to claim 1, wherein the discharge system further comprises:
 - a container configured to contain the fire suppressant; and
 - a delivery system coupled between the container and the dispersal device, wherein the delivery system is configured to provide a conduit for the fire suppressant from the container to the dispersal device.
8. A fire suppression system according to claim 7, wherein the container comprises:
 - a pressure vessel configured to contain the fire suppressant at a predetermined pressure; and
 - a deployment valve coupled between the pressure vessel and the delivery system, wherein the deployment valve is adapted to control a rate of release of the fire suppressant to the delivery system.
9. A fire suppression system according to claim 1, wherein the dispersal device comprises a nozzle disposed in the subfloor and proximate to the vent.
10. A fire suppression system for a computer cabinet positioned in an enclosed environment having a cooling airflow directed into the enclosed environment through a vent, comprising:
 - a discharge system responsive to a detection signal comprising a dispersal device disposed proximate to the vent, wherein:
 - the dispersal device is configured to release a fire suppressant into an area proximate to the vent; and
 - the released fire suppressant is delivered to an intake side of the computer cabinet by the cooling airflow flowing through the vent towards the intake side of the computer cabinet.

11. A fire suppression system according to claim 10, further comprising a detection system configured to couple to an exhaust side of the computer cabinet, wherein the detection system is:
 - exposed to a heated airflow exiting from the exhaust side the computer cabinet, and
 - adapted to generate the detection signal in response to a detected fire condition.
12. A fire suppression system according to claim 11, wherein the discharge system further comprises:
 - a container configured to contain the fire suppressant; and
 - a delivery system coupled between the container and the dispersal device, wherein the delivery system is configured to provide a conduit for the fire suppressant from the container to the dispersal device.
13. A fire suppression system according to claim 12 wherein the container comprises:
 - a pressure vessel configured to contain the fire suppressant at a predetermined pressure; and
 - a deployment valve coupled to the pressure vessel, wherein the deployment valve is adapted to control a rate of release of the fire suppressant to the delivery system.
14. A fire suppression system according to claim 11, further comprising a control system communicatively linked to the detection system and the discharge system, wherein the control system is responsive to the detection signal and configured to activate the discharge system in response to the detection signal.
15. A fire suppression system according to claim 10, wherein the dispersal device comprises a nozzle proximate to the vent.

16. A method of providing fire suppression to a computer cabinet positioned in an enclosed environment having a subfloor with a cooling airflow, comprising:
positioning a dispersing device adjacent to a vent in the subfloor proximate the computer cabinet, wherein:
the dispersing device is configured to release a fire suppressant into an area proximate to the vent; and
the released fire suppressant is delivered to an intake side of the computer cabinet by the cooling airflow flowing upward from the subfloor through the vent towards the intake side of the computer cabinet.
17. A method of providing fire suppression to a computer cabinet according to claim 16, further comprising positioning a sensing device adjacent to an exhaust side of the computer cabinet, wherein the sensing device is adapted to generate a detection signal in response to a sensed fire condition within the computer cabinet.
18. A method of providing fire suppression to a computer cabinet according to claim 17, further comprising processing the detection signal with a control system coupled to the sensing device and the dispersing device, wherein the control system is adapted to activate the dispersing device in response to the processed detection signal.
19. A method of providing fire suppression to a computer cabinet according to claim 18, further comprising controlling an amount of fire suppressant released from the dispersing device with the control system.
20. A method of providing fire suppression to a computer cabinet according to claim 16, wherein releasing the fire suppressant into the area proximate to the vent comprises:
routing the fire suppressant from a storage container through a delivery system disposed within the subfloor to the dispersing device; and
dispersing the fire suppressant into the airflow in the area proximate to the vent.

CLAIMS

1. A fire suppression system for a plurality of computer cabinets configured for disposal in an enclosed environment (120) having a subfloor (122) and configured for arrangement so that a cooling airflow (106) can flow up from the subfloor through a plurality of vents (110) and into a cold aisle disposed on an intake side (124) of the computer cabinet (102), the fire suppression system comprising:
 - a discharge system (114) responsive to a detection signal comprising:
 - a first dispersal device (406) configured to be disposed at a first vent (310) in the subfloor (122), wherein the first dispersal device (406) is configured to release a fire suppressant through the first vent (310) to deliver the released fire suppressant to the intake side (124) of a first computer cabinet (304); and
 - a second dispersal device (416) configured to be disposed at a second vent (320) in the subfloor (122), wherein the second dispersal device (416) is configured to release a fire suppressant through the second vent (320) to deliver the released fire suppressant to the intake side (124) of a second computer cabinet (314).
2. A fire suppression system (100) according to claim 1, further comprising a detection system (116) configured to couple to an exhaust side (126) of the computer cabinet (102), wherein the detection system (116) is:
 - configured to be exposed to a heated airflow exiting from the exhaust side (126) the computer cabinet (102); and
 - adapted to generate the detection signal in response to a detected fire condition.
3. A fire suppression system (100) according to claim 2, further comprising a control system (202) configured to be communicatively linked to the detection system (116) and the discharge system (114), wherein the control system (202) is responsive to the detection signal and configured to activate the discharge system (114) in response to the detection signal.
4. A fire suppression system (100) according to claim 3, wherein the control system (202) is adapted to control the release of the fire suppressant by the discharge system (114).

5. A fire suppression system (100) according to claim 4, wherein:
 - the detection system (116) is further adapted to generate a second detection signal in response to at least one of a continued fire condition and a reignition condition; and
 - the control system (202) is responsive to the second detection signal and further adapted to activate the discharge system (114) to release an additional amount of the fire suppressant.
6. A fire suppression system (100) according to claim 3, arranged for:
 - the first dispersal device (406), the first vent (310), and the first computer cabinet (304) to define a first zone (402) within the enclosed environment (120);
 - the second dispersal device (416), the second vent (320), and a second computer cabinet (314) to define a second zone (412) within the enclosed environment (120);
 - the detection system (116) is arranged for further exposure to a heated airflow exiting from an exhaust side (126) the second computer cabinet (102) and adapted to:
 - generate the first detection signal in response to a detected fire condition within the first zone (402); and
 - generate a second detection signal in response to a detected fire condition within the second zone (412); and
 - the control system (202) is responsive to the first and second detection signal and configured to cause the discharge system (114) to:
 - release the fire suppressant through the first dispersal device (406) in response to the first detection signal; and
 - release the fire suppressant through the second dispersal device (416) in response to the second detection signal.
7. A fire suppression system (100) according to claim 1, wherein the discharge system (114) further comprises:
 - a container (204) configured to contain the fire suppressant; and
 - a delivery system (208) for coupling between the container (204) and the dispersal device (206), wherein the delivery system (208) is configured to provide a

conduit for the fire suppressant from the container (204) to the dispersal device (206).

8. A fire suppression system (100) according to claim 7, wherein the container (204) comprises:
 - a pressure vessel configured to contain the fire suppressant at a predetermined pressure; and
 - a deployment valve for coupling between the pressure vessel and the delivery system (208), wherein the deployment valve is adapted to control a rate of release of the fire suppressant to the delivery system (208).
9. A fire suppression system (100) according to claim 1, wherein each dispersal device (206) comprises a nozzle for disposal in the subfloor (122) and below its respective vent (110).
10. A fire suppression system for a plurality of computer cabinets configured for disposal in an enclosed environment having a cooling airflow directed into the enclosed environment through a plurality of vents, the fire suppression system comprising:
 - a discharge system responsive to a detection signal comprising a first and second group of dispersal devices, wherein:
 - the first group of dispersal devices is configured to be disposed just below a first vent from the plurality of vents and configured to release a fire suppressant into the first vent;
 - the second group of dispersal devices is configured to be disposed just below a second vent from the plurality of vents and configured to release the fire suppressant into the second vent; and
 - the released fire suppressant is arranged to be delivered to an intake side of the plurality of computer cabinets by the cooling airflow flowing through the plurality of vents towards the intake side of the plurality of computer cabinets.
11. A fire suppression system according to claim 10, further comprising a detection system configured to couple to an exhaust side of the plurality of computer cabinets, wherein the detection system is:

exposed to a heated airflow exiting from the exhaust side of the plurality of computer cabinets; and
adapted to generate the detection signal in response to a detected fire condition.

12. A fire suppression system according to claim 11, wherein the discharge system further comprises:
 - a container configured to contain the fire suppressant; and
 - a delivery system coupled between the container and the first and second group of dispersal devices, wherein the delivery system is configured to provide a conduit for the fire suppressant from the container to the first and second group of dispersal devices.
13. A fire suppression system according to claim 12 wherein the container comprises:
 - a pressure vessel configured to contain the fire suppressant at a predetermined pressure; and
 - a deployment valve coupled to the pressure vessel, wherein the deployment valve is adapted to control a rate of release of the fire suppressant to the delivery system.
14. A fire suppression system according to claim 11, further comprising a control system communicatively linked to the detection system and the discharge system, wherein the control system is responsive to the detection signal and configured to activate the discharge system in response to the detection signal.
15. A method of providing fire suppression to a plurality of computer cabinets (102) positioned in an enclosed environment (120) having a subfloor (122) with a cooling airflow (106) flowing up from the subfloor through a vent (110) and into a cold aisle disposed on an intake side (124) of the computer cabinet (102), comprising:
 - positioning a first dispersing device (406) at a first vent (310) in the subfloor (122) on an intake side (124) of a first computer cabinet (304), wherein:
 - the first dispersing device (406) is configured to release a fire suppressant through the first vent (310); and
 - the released fire suppressant is delivered to the intake side (124) of the first computer cabinet (304) by the cooling airflow (106)

positioning a second dispersing device (416) at a second vent (320) in the subfloor (122) on an intake side (124) of a second computer cabinet (314), wherein:

the second dispersing device (416) is configured to release a fire suppressant through the second vent (320); and

the released fire suppressant is delivered to the intake side (124) of the second computer cabinet (314) by the cooling airflow (106).

16. A method of providing fire suppression to a computer cabinet (102) according to claim 16, further comprising positioning a sensing device adjacent to an exhaust side (126) of the computer cabinet (102), wherein the sensing device (206) is adapted to generate a detection signal in response to a sensed fire condition within the computer cabinet (102).

17. A method of providing fire suppression to a computer cabinet (102) according to claim 16, further comprising processing the detection signal with a control system (202) coupled to the sensing device and the dispersing device (206), wherein the control system (202) is adapted to activate the dispersing device (206) in response to the processed detection signal.

18. A method of providing fire suppression to a computer cabinet (102) according to claim 17, further comprising controlling an amount of fire suppressant released from the dispersing device (206) with the control system (202).

19. A method of providing fire suppression to a computer cabinet (102) according to claim 15, wherein releasing the fire suppressant into the area proximate to the vent (110) comprises:

routing the fire suppressant from a storage container (204) through a delivery system (208) disposed within the subfloor (122) to the dispersing device (206); and

dispersing the fire suppressant into the airflow in the area proximate to the vent (110).