Patent Application No. 12/878,657. However, grated access floor panels cannot be used in every access floor system application.

[0006] U.S. Patent No. 6,019,677 discloses an under-floor modular terminal for an HVAC system that can include multiple grills. Each grill of a particular terminal has the same pattern of openings, and openings of different sizes, shapes and directions are segregated in different areas of the grills. U.S. Patent No. 6,256,952 discloses floor panels having different patterns of openings, none of which are disclosed as being directional. U.S. Patent No. 5,192,348 discloses directional air diffuser panels for a clean room ceiling diffuser. The panels include openings of different sizes and shapes and at different angles that are segregated in separate areas of the panels.

SUMMARY OF THE INVENTION

[0007] In view of the above, there is a need for a directional air access floor panel that directs cooling air to the entire height of adjacent structure and/or equipment, such as IT racks in a data center, which is not a grated panel. ~~This invention addresses that and other needs.~~

[0007a] According to a first aspect of the present invention, there is provided an access floor panel comprising:

supporting substructure; and

a top plate overlaying the supporting substructure;

wherein the top plate includes a plurality of non-directional air passageways that are intermingled with a plurality of directional air passageways and wherein each of the plurality of directional air passageways is configured to direct airflow through the top plate at an angle to the top plate of other than 90°.

[0007b] According to a second aspect of the present invention, there is provided an access floor panel comprising:

supporting substructure; and

a top plate overlaying the supporting structure;

wherein the panel includes a plurality of non-directional air passageways and a plurality of directional air passageways, the directional air passageways being configured to direct airflow through the top plate at an angle of other than 90°.

[0008] A directional air access floor panel according to one embodiment of this invention may include a top plate overlaying supporting substructure. The top plate may include a plurality of non-directional air passageways that are intermingled with a plurality of directional air passageways. Each of the plurality of directional air passageways may be configured to direct air through the top plate at an angle of other than 90° to the top plate.

[0009] In some embodiments, the directional air passageways may include holes in the top plate and tabs that are adjacent to the holes and extend downwardly. There may be a tab adjacent to each hole. The tabs are at an angle to the top surface of the top plate of other than 90°.

[0010] In further embodiments, the angle of the tabs to the top surface may be approximately 65°.

[0011] In yet other embodiments, each of the tabs is comprised of material of the top plate that is moved to define the holes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Figure 1 is a top perspective view of an access floor panel according to one embodiment of this invention.

[0013] Figure 2 is a top view of the access floor panel of Figure 1.

[0014] Figure 3A is a cross-sectional view taken along line 3--3 in Figure 2.

WHAT IS CLAIMED IS:

1. An access floor panel comprising:

supporting substructure; and

a top plate overlaying the supporting substructure;

wherein the top plate includes a plurality of non-directional air passageways that are intermingled with a plurality of directional air passageways and wherein each of the plurality of directional air passageways is configured to direct airflow through the top plate at an angle to the top plate of other than 90°.

2. An access floor panel comprising:

supporting substructure; and

a top plate overlaying the supporting structure;

wherein the panel includes a plurality of non-directional air passageways and a plurality of directional air passageways, the directional air passageways being configured to direct airflow through the top plate at an angle of other than 90°.

~~2~~3. The access floor panel according to claim 1 or 2, wherein the plurality of non-directional air passageways are holes in the top plate.

~~3~~4. The access floor panel according to claim 1 or 2, wherein the top plate includes a top surface and the directional air passageways include openings in the top plate and tabs that extend downwardly, such that at least one of the tabs is adjacent to each of the openings, and wherein the tabs are at an angle with the top surface of other than 90°.

45. The access floor panel according to claim ~~3~~4, wherein at least one of the tabs is immediately adjacent to each of the openings.

~~5~~6. The access floor panel according to claim ~~3~~4, wherein

the angle of the plurality of tabs to the top surface is approximately 65°.

~~6~~7. The access floor panel according to claim ~~3~~4, wherein the tabs are comprised of material of the top plate that is moved to form the openings.

~~7~~8. The access floor panel according to claim ~~6~~7, wherein the supporting substructure has passageways through which air is intended to pass to enter at least some of the non-directional air passageways and the directional air passageways.

~~8~~9. The access floor panel according to claim ~~3~~4, wherein

the angle of the tabs and the ratio of the plurality of non-directional air passageways to the plurality of directional air passageways results in a combined airflow direction through the access floor panel at an angle of substantially 65° to the top surface of the top plate.

~~9~~10. An access floor panel according to claim 1 or 2, wherein the supporting substructure includes a grid of cross supports.

~~10~~11. An access floor panel according to claim 1 or 2, wherein the plurality of directional air passageways and the plurality of non-directional air passageways are arranged in columns and rows.

~~11~~12. An access floor panel according to claim 1 or 2, wherein the top plate and the supporting substructure are different members and the top plate is attached to the supporting substructure.

~~12~~13. An access floor panel according to claim ~~11~~12, wherein the supporting substructure is a unitary piece of material that has lower portions spaced from the top plate and portions extending from the lower portions to the underside of the top plate.

~~13~~14. An access floor panel according to claim ~~12~~13, wherein the portions extending from the lower portions to the underside of the top plate are spaced fingers.

~~14~~15. An access floor panel accordingly to claim ~~13~~14, wherein the spaced fingers are attached to the underside of the top plate.

~~15~~16. An access floor panel according to claim ~~14~~15, wherein the spaced fingers form partial side walls of wells that extend from the lower portions to the top plate.

~~16~~17. An access floor panel according to claim ~~15~~16, wherein the wells form openings, in the lower portions.

~~17~~18. An access floor panel according to claim 1 or 2, wherein there is at least one of the non-directional air passageways located between any two of the directional air passageways.

~~18~~19. An access floor panel according to claim 1 or 2, wherein the directional air passageways are openings in the top plate and tabs that extend downwardly adjacent the openings.

~~19~~20. An access floor panel according to claim ~~18~~19, wherein at least one of the tabs is immediately adjacent each of the openings.

~~20~~21. An access floor panel according to claim ~~19~~20, wherein the tabs are at an angle to a top surface of the top plate of other than 90°.