

CLAIMS

What is claimed is:

1. ~~A porous tower diffuser assembly for use in a front opening wafer container, the diffuser assembly comprising:~~

~~an inlet fitting with a base portion, a unitary offset portion, and a unitary upwardly facing nipple;~~

~~a porous tower configured as a sintered polymer tubular portion and a flared lower portion, the flared lower portion engageable or engaged on the upwardly facing nipple.~~

2. ~~The porous tower diffuser assembly of claim 1 further comprising an elastomeric grommet for engaging a purge nozzle and a check valve sized for fitting in a through hole in the grommet.~~

3. ~~The porous tower diffuser assembly of claim 1 configured as a retrofit kit and further comprising packaging containing the inlet fitting and the porous tower.~~

4. ~~The porous tower diffuser assembly of claim 3 further comprising written instruction.~~

5. ~~The porous tower diffuser assembly of any one of claim 1, 2, 3, or 4 further comprising a means for increasing purge towards the flared lower portion compared to a portion distal from the flared lower portion.~~

6. ~~The porous tower diffuser assembly of any one of claim 1, 2, 3, or 4 wherein the tower has at least two different portions with different porosities.~~

7. ~~The porous tower diffuser assembly of claim 6 wherein a higher porosity portion is positioned closer to a fitting end of the tower than a lower porosity portion.~~

8. ~~The porous tower diffuser assembly of any one of claim 1, 2, 3, or 4 wherein the tower has at least two different portions with resistances to radial outflow.~~

~~9. The porous tower diffuser assembly of any one of claim 1, 2, 3, or 4 wherein the upwardly facing nipple has a plurality of barbs.~~

~~10. The porous tower diffuser assembly of claim 7 wherein the upwardly facing nipple has an aperture and wherein an annular space is defined at the aperture when the porous tower is seated on the fitting and wherein the aperture is at the annular space whereby purge gas may be dispersed from the flared portion.~~

~~11. The porous tower diffuser assembly of any one of claim 1, 2, 3, or 4 wherein the upwardly facing nipple has a plurality of barbs or a thread sized for an interference fit with the porous tower.~~

~~12. The porous tower diffuser assembly of claim 11 comprising a radial aperture in the nipple and the nipple is sized to extend upwardly only about to a first wafer in a front opening wafer container.~~

~~13. The porous tower diffuser assembly of 1, 2, 3, or 4 in combination with a front opening wafer container.~~

~~14. The porous tower diffuser assembly of any one claim of claims 5-13 in combination with a front opening wafer container.~~

151. A porous tower diffuser assembly for use in a front opening wafer container, the diffuser assembly comprising:

an inlet fitting with a base portion, a unitary offset portion, and a unitary upwardly facing nipple, the inlet fitting configured to be seated in an aperture in a bottom wall of the front opening container;

a porous tower configured as a sintered polymer tubular portion and including a lower portion, the lower portion having a larger diameter portion and engageable or engaged on the upwardly facing nipple;

the porous tower portion having at least two different portions of different resistances to radial outflow of purge gases.

162. The porous tower diffuser assembly of claim 151 wherein the upwardly facing nipple has a plurality of barbs or a thread sized for an interference fit with the porous tower.

173. The porous tower diffuser assembly of claim 162 comprising a radial aperture in the nipple.

184. The porous tower diffuser assembly of claim 15, 16, 17, or 181, in combination with a front opening wafer container and a second identical porous tower diffuser assembly.

195. A front opening wafer container comprising a container portion with a front opening and a door to sealingly close the front opening, the container portion having a bottom wall, the front opening wafer container further comprising:

an inlet fitting with a base portion, a unitary offset portion, and a unitary upwardly facing nipple, the fitting seated at an aperture in the bottom wall;

a porous tower configured as a sintered polymer tubular portion ~~and~~ including a lower portion having a larger diameter portion, the lower portion engaged on the upwardly facing nipple.

206. The front opening wafer container of claim 195 wherein the nipple has one of barbs or a thread, a radial aperture, and wherein an annularly extending space is defined between the nipple and the porous tower at the radial aperture.

217. ~~The porous tower diffuser assembly~~ front opening wafer container of claim 65 further comprising a means for increasing purge towards the flared lower portion compared to a portion distal from the flared lower portion.

228. The front opening wafer container of claim 195 further comprising another inlet fitting with a base portion, a unitary offset portion, and a unitary upwardly facing nipple, the fitting seated at another aperture in the bottom wall;

another porous tower configured as a sintered polymer tubular portion and a flared lower portion, the flared lower portion engaged on the upwardly facing nipple.

23. ~~A purge retrofit kit for front opening wafer containers, the kit comprising:~~

~~a porous media diffuser with a flared end;~~

~~a inlet fitting with a nipple to receive the flared end;~~

~~packaging container the porous media diffuser and the inlet fitting.~~

24. ~~The kit of claim 23 further comprising an elastomeric grommet and check valve.~~

25. ~~The kit of claim 23 or 24 wherein the inlet fitting has an offset portion.~~

26. ~~The kit of claim 23 wherein the fitting and the nipple is sized to extend upwardly only about to a first wafer in the front opening wafer container~~

27. — ~~An inlet fitting for a porous tower diffuser assembly for use in a substrate container, the inlet fitting comprising:~~

~~a base portion defining an axial aperture that passes therethrough;~~

~~a nipple that extends from a first face of said base portion and defines a central passageway that is in fluid communication with said axial aperture of said base portion, said nipple including a wall portion and structure defining a lateral aperture that passes through said wall portion;~~

~~a porous media diffuser operatively coupled with said nipple, said porous media diffuser including an openly porous sidewall portion and defining a diffuser passageway that extends into said porous media diffuser along a diffuser axis, said diffuser passageway defining an opening at a proximal end of said porous media diffuser and being concentric with said central passageway of said nipple,~~

~~wherein said nipple extends into said opening of said diffuser passageway so that said porous media diffuser subtends said lateral aperture.~~

28. — ~~The inlet fitting of claim 27, further comprising a tubular portion that depends from a second face of said base portion, said second face being opposite said first face of said base portion.~~

29. — ~~The inlet fitting of claim 27, wherein:~~

~~said base portion is centered about a first axis normal to said first face of said base portion;~~

~~said central passageway of said nipple defines a second axis that is substantially parallel to said first axis; and~~

~~said second axis is radially offset from said first axis.~~

30. — ~~The inlet fitting of claim 29, wherein:~~

~~said axial aperture of said base portion defines a third axis that is substantially parallel to said first axis; and~~

~~said third axis is radially offset from said first axis and said second axis.~~

31. — ~~The inlet fitting of claim 27, wherein:~~

~~said nipple is a barbed nipple including a barbed portion and a tapered portion of said wall portion, said barbed portion defining a major outer diameter of said barbed nipple, said tapered portion defining a reduced outer diameter adjacent said barbed portion;~~

~~said lateral aperture passes through said tapered portion of said wall portion; and~~

~~an annular plenum is defined between said tapered portion of said barbed portion and a boundary of said diffuser passageway of said of said porous media diffuser, said annular plenum being in fluid communication with said central passageway of said barbed nipple via said lateral aperture.~~

~~32.—The inlet fitting of claim 27, wherein said wall portion of said nipple includes external threads formed on an external surface thereof.~~

~~33.—The inlet fitting of claim 32, wherein said proximal end of said porous media diffuser includes internal threads formed on an internal surface thereof, said internal threads being compatible with said external threads of said nipple.~~

~~34.—The inlet fitting of claim 27, wherein said porous media diffuser includes a flared portion at said proximal end.~~

~~35.—An inlet fitting for a porous tower diffuser assembly for use in a substrate container, the inlet fitting comprising:~~

~~a purge module for installation in a floor of said substrate container, said purge module including a housing having a tubular portion and a top portion, said top portion including structure defining an aperture that passes therethrough, said aperture defining and being concentric about a central axis;~~

~~a coupling disposed in said housing, said coupling defining a through passage that is substantially concentric with said central axis of said aperture of said top portion; and~~

~~a porous media diffuser having a proximal end that is operatively coupled with said coupling and extends through said aperture of said top portion of said purge module, said porous media diffuser including an openly porous sidewall portion and defining a diffuser passageway that extends into said porous media diffuser, said diffuser passageway defining an opening at the proximal end of said porous media diffuser, said opening being substantially concentric about said central axis of said aperture,~~

~~wherein a portion of said porous media diffuser that is flush with and extends immediately above said aperture is of a porous material.~~

~~36.—The inlet fitting of claim 35, wherein said coupling is a female coupling.~~

37. — The inlet fitting of claim 36, wherein said female coupling is a threaded female coupling.

38. — The inlet fitting of claim 37, wherein said proximal end of said porous media diffuser includes external threads on an external surface thereof, said external threads being compatible with said threaded female coupling.

39. — A system for transporting substrates, comprising:

a substrate container including an opening for insertion/removal of substrates and a door adapted to sealably cover said opening, said opening being on a plane that is substantially parallel to a vertical direction;

a diffuser assembly disposed within said substrate container and adapted to admit a gaseous working fluid to the interior of the container, said diffuser being oriented to direct said gaseous working fluid toward said opening for purging the substrate container with the gaseous working fluid, said diffuser assembly being configured to direct said gaseous working fluid at a higher velocity towards a lower half of said opening than towards an upper half of said opening.

40. — The system of claim 39, wherein said diffuser is disposed proximate a back portion of said substrate container, said back portion being opposite said opening.

41. — The system of claim 39, wherein said diffuser includes an inlet tower adapted to be mounted to said substrate container for admitting said gaseous working fluid to the interior of the container, said inlet tower including a first end that defines a flow inlet and a blind end opposite said first end, said inlet tower defining an interior flow passage that extends from said flow inlet to said blind end and including a porous outer sleeve in fluid communication with said interior flow passage.

42. — The system of claim 39, wherein said inlet tower includes at least one flow obstruction disposed along said interior flow passage between said flow inlet and said blind end.

43. — The porous tower diffuser assembly of any one of claim 39, 40, 41, or 42 wherein the tower has at least two different portions each with a different resistance to radial outflow with respect to the other portion.

44. — The porous tower diffuser assembly of any one of claim 39, 40, 41, or 42 wherein the tower has at least two different portions each with a different porosity with respect to the other portion.

45. — The porous tower diffuser assembly of any of the above claims wherein the fitting and nipple are sized to extend about to a lowermost wafer in a front opening wafer container.

46. — ~~A porous tower diffuser assembly in a front opening wafer container, the diffuser assembly comprising:~~

~~an inlet fitting with a base portion, a unitary offset portion, and a unitary upwardly facing nipple;~~

~~a porous tower configured as a sintered polymer tubular portion and a flared lower portion, the flared lower portion engageable or engaged on the upwardly facing nipple.~~

47. — ~~The porous tower diffuser assembly in a front opening wafer container of claim 46 further comprising an elastomeric grommet for engaging a purge nozzle and a check valve sized for fitting in a through hole in the grommet.~~

48. — ~~The porous tower diffuser assembly in a front opening wafer container of claim 46 further comprising an additional inlet fitting and porous tower.~~

49. — ~~The porous tower diffuser assembly in a front opening wafer container of any one of claim 46, 47, or 48 further comprising a means for increasing purge towards the flared lower portion compared to a portion distal from the flared lower portion.~~

50. — ~~The porous tower diffuser assembly in a front opening wafer container of any one of claim 46, 47, or 48 wherein the tower has at least two different portions with different porosities.~~

51. — ~~The porous tower diffuser assembly in a front opening wafer container of claim 6 wherein a higher porosity portion is positioned closer to a fitting end of the tower than a lower porosity portion.~~

52. — ~~The porous tower diffuser assembly in a front opening wafer container of any one of claim 46, 47, or 48 wherein the tower has at least two different portions with resistances to radial outflow.~~

53. — ~~The porous tower diffuser assembly in a front opening wafer container of any one of claim 46, 47, or 48 wherein the upwardly facing nipple has a plurality of barbs.~~

54. — ~~The porous tower diffuser assembly in a front opening wafer container of claim 53 wherein the upwardly facing nipple has an aperture and wherein an annular space is defined at the aperture when the porous tower is seated on the fitting and wherein the aperture is at the annular space whereby purge gas may be dispersed from the flared portion.~~

55. — ~~The porous tower diffuser assembly in a front opening wafer container of any one of claim 46, 47, or 48 wherein the upwardly facing nipple has a plurality of barbs or a thread sized for an interference fit with the porous tower.~~

56. — ~~The porous tower diffuser assembly in a front opening wafer container of claim 55 comprising a radial aperture in the nipple and the nipple is sized to extend upwardly only about to a first, lowermost, wafer in the front opening wafer container.~~