CLAIMS

1. A flammable gas diluter for diluting a flow of flammable gas to a concentration below the flammability limit of said flammable gas, said diluter comprising:

a dilution vessel comprising an outer envelope defining a longitudinal flow passage from an inlet to an outlet;

at least one air inlet assembly for directing a flow of air into said inlet of said dilution vessel;

a flammable gas inlet arrangement comprising a plurality of apertures at least some being arranged at different distances from said outer envelope of said dilution vessel across a cross section of said dilution vessel towards said inlet end of said dilution vessel;

a plurality of gas flow directing formations arranged between said flammable gas inlet arrangement and said outlet, each being at a different position along a length of said dilution vessel; wherein

at least one of said plurality of gas flow formations is an inwardly directing gas flow formation for directing gas flow away from said outer envelope and at least one of said gas flow formations is an outwardly directing gas flow formation for directing gas flow towards said outer envelope; and

wherein said dilution vessel comprises a constricted portion, said flammable gas inlet arrangement being located within said constricted portion such that said air is accelerated prior to passing said flammable gas inlet arrangement.

2. A flammable gas diluter according to claim 1, comprising at least one gas flow generator for pumping a flow of air into said air inlet assembly, said at least one gas flow generator being located upstream of said flammable gas inlet arrangement.

3. A flammable gas diluter according to claim 2, comprising two gas flow generators configured to operate as operational and backup gas flow generators.

4. A flammable gas diluter according to claim 2 or 3, wherein said at least one gas flow generator and dilution vessel are configured such that a speed of flow of said air at said flammable gas inlet arrangement is greater than a flame speed of flammable gas.

5. A flammable gas diluter according to any preceding claim, wherein said flammable gas inlet arrangement is configured such that said apertures are facing away from said gas outlet.

6. A flammable gas diluter according to claim 5, wherein said apertures of said flammable gas inlet arrangement are between 2 and 5mm in diameter.

7. A flammable gas diluter according to any preceding claim, wherein said flammable gas inlet arrangement comprises an outer ring channel and radial channels running from said outer ring channel towards a centre of said ring, said radial channels comprising said apertures.

8. A flammable gas diluter according to any preceding claim, wherein said flammable gas comprises hydrogen.

9. A flammable gas diluter according to any preceding claim, wherein said dilution vessel, flammable gas inlet arrangement and gas flow directing formations are formed from metal and are earthed.

10. A flammable gas diluter according to any preceding claim, wherein said inwardly directing gas flow formation comprises a ring-like baffle projecting in from said outer envelope and said outwardly directing gas flow formation comprising a centrally located cone shaped baffle an apex of said cone facing said inlet of said dilution vessel.

11. A flammable gas diluter according to any preceding claim, said dilution vessel comprising a volume of less than 70 litres, said flammable gas diluter being configured to dilute a flow of flammable gas of up to 1,000 SLM.

12. A flammable gas diluter according to any preceding claim, said flammable gas diluter comprising a flammable gas sampler adjacent to said outlet, said flammable gas sampler being in fluid communication with a flammable gas sensor, said flammable gas diluter further comprising control circuitry for inhibiting a flow of flammable gas to said diluter in response to said flammable gas sensor indicating a concentration of flammable gas above a predetermined level.

13. A vacuum pumping system for evacuating at least one vacuum chamber in a semiconductor processing tool, said vacuum pumping system comprising:

a plurality of vacuum pumps for evacuating said at least one vacuum chamber; and

an abatement system for receiving an exhaust from at least one of said at least one vacuum chamber, wherein said abatement system comprises a flammable gas diluter according to any preceding claim.

14. A vacuum pumping system according to claim 13, wherein said semiconductor processing tool comprises an extreme ultraviolet lithography tool and said flammable gas comprises hydrogen.

15. A vacuum pumping system according to any one of claims 13 to 14, further comprising a housing for housing said plurality of vacuum pumps; and

a vacuum system air flow generator configured to cause an air flow to flow through said housing to an air flow duct;

said air flow duct being in fluid communication with said at least one air inlet assembly for supplying said air to said flammable gas diluter.