Diborane Filling Procedure for Remote Cylinder

Pressure Units

* Diborane regulator
  + High pressure gauge
    - Two sets of units (bar and psi)
  + Low pressure gauge
    - Reads positive and negative pressures with respect to

atmospheric pressure

* + - Positive pressure: two sets of units (bar and psi)
    - Negative pressure: two sets of units (bar and o)
* Hydrogen regulator
  + High pressure gauge
    - Two sets of units (bar and lb/in2)
  + Low pressure gauge
    - Two sets of units (bar and lb/in2)
* Chamber pressure gauge
* Torr
* Conversion factor
  + 1 standard (earth) atmosphere (1 atm) = 1.01325 bar
  + 1 atm = 760 Torr
  + 1 atm = 760 millimetres of mercury (760 mmHg)
  + 1 atm = 30 inches of mercury (30 in Hg or 30o)
  + 1 pound per square inch (1 psi or 1 lb/in2)  0.069 Bar

*See schematic diagram of diborane gas system at end of this document for details of valves names, etc.*

#### Section 1: Preparing the System

Ensure CVD chamber is up and running

* Check pump is working and both wide and narrow bore pipes are fully open
* Check exhaust line plumbed in
* Check vent valve is closed
* Check that pressure gauge is open and reading zero (ignoring any offset)

Check D1 is closed

Attach detachable cylinder via the Quick-fit adaptor Q1. Pump down system including cylinder.

Open M1, MFC3 (fully) and D8, MFC by-pass M3, D7, R3, R2, R4, R6, R7, D3, D5 and D6

Keep valves R1, R2 and R5 closed.

When p is at base pressure (which may take overnight), close MFC3 and D8, MFC by-pass, M3, D3, D5, D6 and R4

Section 2: Adding 5 % Diborane Premix to Detachable Cylinder

Check D3 is closed.

Open valve D1

# Check pressure on gauge D2

bar (e.g. 73 bar)

psi (e.g. 1100 bar)

# Check pressure on gauge D4

bar (e.g. 1 atm – 0.5 bar)

o (e.g. 1 atm – 15o) 1o = 1 in Hg (inch of mercury)

Check that valve D7 and R5 are closed.

Open D3 steadily until D4 reads required value, or until fully open.

# Read gauge D4

bar (e.g. 1 atm – 0.5 bar)

o (e.g. 1 atm – 15o) 1o = 1 in Hg (inch of mercury)

Gently open D5 (audible gas flow) and temporary pressure drop seen in D4

### Close valve R7

### Close valve D1

1. Section 3: Pump out excess diborane from lines

# Open valve D7

# Open valve D3 fully

(Open valve D7 first to keep gas pressure down in the section of gas line from D5 to MFC3/valve D7)

Diborane will discharge through chamber, expect a peak pressure  100 Torr through the chamber

Pump down to vacuum: check gauges D2, D4 and the chamber pressure gauge

(expect pump down to take  2 minutes)

1. Section 3: Remove cylinder

Close valve R6.

Detach cylinder from Quick-fit Q1.

Close D7, D8, M3 and MFC3.

