

**Ultimate Process Gas Load Calculations - AIR**  
**2.75" Conflat High Vacuum System**  
**Design Iteration #4**

**1.) Maximum Gas Loads for Air for Processes in Molecular Flow (Leak Condition)**

$$S_e = (Q_{total})/P_w$$

$$S_e = \text{Effective Speed} = 13.522 \text{ L/s (Air @ 20C)}$$

$$Q_{total} = \text{Total Gas Load (Torr} \cdot \text{L/s)} = Q_{\text{water\_vapor}} + Q_{\text{process\_gas}}$$

$$P_w = \text{Working Pressure (Torr)}$$

$$Q_{\text{process\_gas}} = (S_e \times P_w) - Q_{\text{water\_vapor}}$$

$$1 \text{ Torr} \cdot \text{L/s} = 80 \text{ SCCM}$$

**a.) Unbaked, Pumped 1 hr**

$S_e$ (L/s)	$P_w$ (Torr)	$Q_{\text{water\_vapor}}$ (Torr-L/s)	$Q_{\text{process\_gas}}$ (Torr-L/s)	Gas Flow Rate (SCCM)
13.522	1.000E-07	2.903E-05	-2.768E-05	-2.214E-03
13.522	1.000E-06	2.903E-05	-1.551E-05	-1.241E-03
13.522	1.000E-05	2.903E-05	1.062E-04	8.495E-03
13.522	1.000E-04	2.903E-05	1.323E-03	1.059E-01

**b.) Unbaked, Pumped > 24 hr**

$S_e$ (L/s)	$P_w$ (Torr)	$Q_{\text{water\_vapor}}$ (Torr-L/s)	$Q_{\text{process\_gas}}$ (Torr-L/s)	Gas Flow Rate (SCCM)
13.522	1.000E-07	1.428E-05	-1.293E-05	-1.034E-03
13.522	1.000E-06	1.428E-05	-7.580E-07	-6.064E-05
13.522	1.000E-05	1.428E-05	1.209E-04	9.675E-03
13.522	1.000E-04	1.428E-05	1.338E-03	1.070E-01

**c.) Baked, Pumped > 24 hr**

$S_e$ (L/s)	$P_w$ (Torr)	$Q_{\text{water\_vapor}}$ (Torr-L/s)	$Q_{\text{process\_gas}}$ (Torr-L/s)	Gas Flow Rate (SCCM)
13.522	1.000E-07	9.589E-06	-8.237E-06	-6.589E-04
13.522	1.000E-06	9.589E-06	3.933E-06	3.146E-04
13.522	1.000E-05	9.589E-06	1.256E-04	1.005E-02
13.522	1.000E-04	9.589E-06	1.343E-03	1.074E-01

**2.) Maximum Gas Loads for Air for Processes in Transitional Flow (Leak Condition)**

$$S_e = (Q_{total})/P_w$$

$$S_e = \text{Effective Speed} = 15.698 \text{ L/s (Air @ 20C)}$$

$$Q_{total} = \text{Total Gas Load (Torr} \cdot \text{L/s)} = Q_{\text{water\_vapor}} + Q_{\text{process\_gas}}$$

$$P_w = \text{Working Pressure (Torr)}$$

$$Q_{\text{process\_gas}} = (S_e \times P_w) - Q_{\text{water\_vapor}}$$

$$1 \text{ Torr} \cdot \text{L/s} = 80 \text{ SCCM}$$

**a.) Unbaked, Pumped 1 hr**

$S_e$ (L/s)	$P_w$ (Torr)	$Q_{\text{water\_vapor}}$ (Torr-L/s)	$Q_{\text{process\_gas}}$ (Torr-L/s)	Gas Flow Rate (SCCM)
15.698	1.000E-03	2.903E-05	1.567E-02	1.254E+00
15.698	1.000E-02	2.903E-05	1.570E-01	1.256E+01

**b.) Unbaked, Pumped > 24 hr**

$S_e$ (L/s)	$P_w$ (Torr)	$Q_{\text{water\_vapor}}$ (Torr-L/s)	$Q_{\text{process\_gas}}$ (Torr-L/s)	Gas Flow Rate (SCCM)
15.698	1.000E-03	1.428E-05	1.568E-02	1.255E+00
15.698	1.000E-02	1.428E-05	1.570E-01	1.256E+01

**c.) Baked, Pumped > 24 hr**

$S_e$ (L/s)	$P_w$ (Torr)	$Q_{\text{water\_vapor}}$ (Torr-L/s)	$Q_{\text{process\_gas}}$ (Torr-L/s)	Gas Flow Rate (SCCM)
15.698	1.000E-03	9.589E-06	1.569E-02	1.255E+00
15.698	1.000E-02	9.589E-06	1.570E-01	1.256E+01