

VACUUM DATA AND UNIT CONVERSION

Division of Vacuum Region

Vacuum Region	Torr	Pa
Low Vacuum	760 - 10	101325 - 1333
Middle Vacuum	$10 - 10^{-3}$	$1333 - 1.33 \times 10^{-1}$
High Vacuum	$10^{-3} - 10^{-8}$	$1.33 \times 10^{-1} - 10^{-6}$
Ultra-High Vacuum	$10^{-8} - 10^{-12}$	$10^{-6} - 10^{-10}$
Sky-High Vacuum	$<10^{-12}$	$<10^{-10}$

Length

Unit	Meter	Foot	Inch
Meter (mtr)	1	3.28	39.37
Foot (feet)	0.305	1	8.33
Inch (in)	0.0254	12	1

Weight

Unit	Kilogram	Pound	Ounce
Kilogram (kg)	1	2.2	35.27
Pound (lb)	0.45	1	16
Ounce (oz)	0.03	0.06	1

Temperature

Unit	K	°C	°F
Absolute Temperature (K)	1	$^{\circ}\text{C}+273.15$	$5/9 (^{\circ}\text{F}+459.67)$
Celsius (°C)	$\text{K}-273.15$	1	$5/9 (^{\circ}\text{F}-32)$
Fahrenheit (°F)	$9/5 (\text{K}-459.67)$	$9/5 (^{\circ}\text{C}+32)$	1

Force

Dyne (Dyn)	Newton (N)	Stan	Kilogram Force (kgf)
1	10^{-5}	10^{-8}	1.02×10^{-6}

Power

Unit	PS	Kw	W
Horse Power (PS)	1	0.735	735
Kilowatt (Kw)	1.36	1	1000
Watt (W)	1.36	0.001	1

Area

M ²	cm ²	mm ²	sc ²	ft ²	in ²
1	10000	1000000	9	10.7639	1550

Volume

M ³	L	sc ³	ft ³
1	1000	27	35.3147

Suction Capacity

Unit	(M ³ /s)	(L/s)	(M ³ /h)	(cft/min.)
(M ³ /s)	1	1000	3600	2118.88
(L/s)	10^{-3}	1	3.6	2.119
(M ³ /h)	2.78×10^{-4}	0.278	1	0.59
(cft/min.)	4.72×10^{-4}	0.47	1.69	1

Molecular Average Free Distance at 20 deg cel

P (Torr)	1	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-9}
λ (cm)	4.72×10^{-3}	4.72	47.2	472	4720	4.72×10^6

Pressure Unit - Conversion

	Pa	torr	μmHg	μbar	mbar	atm	am	inHg	lb/in ²
Pa	1	7.5×10^{-3}	7.5	10	10^{-2}	9.86923×10^{-6}	1.0197×10^5	2.953×10^{-4}	1.45×10^{-4}
Torr	1.3332	1	10^3	1333.2	1.3332	1.31579×10^{-3}	1.3595×10^{-3}	3.937×10^{-2}	1.934×10^{-2}
μmHg	0.13332	10^{-3}	1	1.3332	1.3332×10^{-3}	1.31579×10^{-6}	1.3595×10^{-6}	3.937×10^{-5}	1.934×10^{-5}
μbar	10^{-1}	7.5×10^{-4}	7.5×10^{-1}	1	10^{-3}	9.86923×10^{-7}	1.0197×10^{-6}	2.953×10^{-5}	1.45×10^{-5}
mbar	10^2	7.5×10^{-1}	7.5×10^2	10^3	1	9.86923×10^{-4}	1.0197×10^{-3}	2.953×10^{-2}	1.45×10^{-2}
atm	101325	760	760×10^3	1013.25×10^3	1013.25	1	1.0333	29.921	14.696
am	98066.3	735.56	735.56×10^3	980663	980663×10^{-3}	0.967839	1	28.959	14.223
inHg	3386	25.4	25.4×10^3	3.386×10^4	33.86	3.342×10^{-2}	3.453×10^{-2}	1	4.912×10^{-1}
lb/in ²	6895	51.715	51.715×10^3	6.895×10^4	68.95	6.805×10^{-2}	7.031×10^{-2}	2.086	1

Category and Work Scope of Vacuum Pumps

Vacuum Pump	
Rotary	$760 - 5 \times 10^{-4}$
Rotary Piston	$760 - 5 \times 10^{-3}$
Oil Supercharger	$10^{-1} - 10^{-4}$
Roots	$10^{-1} - 10^{-4}$
Oil Diffusion	$10^{-3} - 5 \times 10^{-7}$
Water Ring	760 - 25
Reciprocating	$760 - 10^{-2}$
Adsorbent	$760 - 10^{-4}$
Sputter Ion	$10^{-4} - 10^{-10}$
Ti Ionization	$10^{-3} - 10^{-10}$
Molecular	$10^{-3} - 10^{-10}$
Low Temperature	$10^{-3} - 10^{-10}$

Various Rubber characteristics

Rubber Category	Natural Rubber	Butyl Rubber	NBR	Fluoro Rubber
Characteristic-1	Fine performance of water-fast, acid-proof, alkalescence-resistant	Pervasion rate is small	Oil-proof nicer	23 type strong acid proof
Characteristic-2	Higher suction capacity	Sublimation severity	Flexibility nicer	26 type infiltration rate is low, small degassing
Vacuum Range, Torr	1×10^{-5}	10^{-7}	10^{-8}	10^{-8}
Temperature, °C	-30 to 80	-30 to 150	-30 to 120	-20 to 200