

VACUUM SOLUTIONS

FOR PROCESS INDUSTRIES



WWW.EDWARDSVACUUM.COM

INNOVATIVE PRODUCTS

GLOBAL STRENGTH

LOCAL SUPPORT

VACUUM EXPERTISE



VACUUM EXPERTISE AND COMPLETE SOLUTIONS

***SOLUTIONS YOU CAN RELY ON,
FROM A COMPANY YOU CAN TRUST***

Edwards is a world leader in the design, technology and manufacture of vacuum products for process applications in the chemical, pharmaceutical and energy industries. Our application expertise allows us to provide you with reliable solutions and to support you all the way, from the choice of your standard or customized system to long-term service agreements to give you complete peace-of-mind.



APPLICATIONS GUIDE

Edwards has a unique combination of applications expertise, product portfolio, engineering strength and global presence.

We pride ourselves on the experience and flexibility of our applications specialists, who will work with you to design the correct solution for your process. Our application specialists have unrivalled knowledge and can advise on pump selection, configuration and operation to suit your requirements.

Our proven and rugged non contacting dry pump designs, both screw and reverse claw mechanisms, include the ability to control pump body and internal gas temperatures allowing a comprehensive range of solvents, flammables and corrosives to be pumped. Systemized variants address the EU's explosive atmospheres (ATEX) directive for Category 1 (Zone 0) T4 operation, the most stringent worldwide. The mechanisms can tolerate both liquids and particles in the gas stream and are suitable for many applications.

MARKET	CDX	EDP	CPH	LRP
Bulk Chemical	✓ ✓	✓ ✓	✓	✓ ✓
Pharmaceutical	✓	✓ ✓	✓ ✓	✓
Oil & Gas	✓ ✓	✓ ✓	✓	✓ ✓
Speciality Chemical	✓ ✓	✓ ✓	✓ ✓	✓
Petrochemicals	✓ ✓	✓ ✓	✓	✓ ✓
Biofuels	✓ ✓	✓ ✓	✓	✓ ✓

APPLICATIONS

Distillation	House and central vacuum
Reactor service	Evaporation
Drying	Freeze drying
Dehydration	Sterilization
Pervaporation	

Edwards are world leaders in designing pumps and pumping systems for safe pumping of hazardous inflammable material. We comply with all global legislation, including ATEX.



VACUUM PRODUCTS

Our range of vacuum solutions and technologies is unique, allowing us to tailor the right solution to your needs: from steam ejectors and liquid ring pumps, to dry pumps and mechanical boosters.

Edwards is market leader in dry pump technology and the pioneer of dry vacuum for the chemical process, pharmaceutical and fine chemical industries. We offer a wide range of proven and innovative technologies: from our range of reverse claw mechanisms, proven for over 10 years in more than 100,000 installations, to our benchmark screw pumping technology. Edwards can provide the clean and robust vacuum solution you need for your process.

Our liquid ring vacuum pumps also provide the optimum solution for many process vacuum applications, due to their reliability, low maintenance requirements, low vibration and noise levels and ability to handle wet gases.

Our products are available with pumping capacities up to 30,000 m³/hr and an ultimate pressure of better than 10⁻² mbar when using combinations of mechanical vacuum boosters.

APPLICATIONS ENGINEERING

One of our core competences, it allows us to offer a comprehensive package of solutions including:

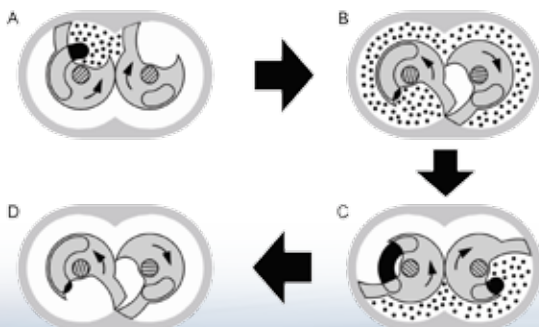
- Process design
- Equipment specification and selection
- Safety and operating procedures
- Vacuum system and control integration
- Commissioning and installation

TECHNOLOGY

Edwards can offer pumps and systems with the best available technology to suit your needs, from traditional reliable steam ejectors, liquid ring pumps and EH boosters to dry pumps, where Edwards is the market leader. Dry running pumps have no oil, steam or water in the process volume, eliminating at source all possible pollution and decreasing down time and consumables cost.

Specifically designed for all chemical environments, the CDX and EDP range can be customized within a system to be used from the lightest to the harshest duty.

All pumps have a 20 year design life and are easy to maintain in situ.



Edwards Claw mechanism



SAFETY

Edwards has always led the field in safety and pioneered the use of flame arrestors on dry pumps well before the implementation of related legislation.

Our global engineering standards ensure that safety is guaranteed while maintaining performance.

Edwards dry pumps, with their unique design that creates turbulence, ensuring that no gas or solvent is in contact with the internal surfaces long enough to cause a hazard.

The European ATEX (Atmospheres Explosive) legislation is the most stringent in the field, requiring pump manufacturers to consider "malfunctions" and "rare malfunctions", and products to be tested by external test houses. Edwards offers a wide range of ATEX certified pumps.

SYSTEMIZATION

Edwards comprehensive design service is based on in-depth knowledge of your industry and applications. The expertise is held in our highly focused applications team: a central applications group and a regional network of applications specialists.

Our solutions can cover:

- Process design
- Equipment selection
- Safety and operating parameters (including assistance with ATEX)
- Installation and commissioning

Once an application has been reviewed, the system is assembled in CAD and a drawing of your final system is made available to you.

CONFIGURED PACKAGES

Where possible, we will design your individual system from standard modules and accessories: this will typically include a dry pump system with a series of accessory modules including:

- Mechanical boosters - for increased pumping speed and improved ultimate vacuum.
- Gas purges - to dilute flammables and extend seal life. Options include:
 - Inlet purge, shaft seal purge, pressurized gearbox
- Safety devices
 - Flame arrestors, solvent flush, inlet isolation valves
- Recovery vessels - for solvents or other fluids
 - Knock-out pot, condenser, receiver
- Acoustic devices - to reduce pulsation in the exhaust and hence noise.
 - Silencers (drainable), full system enclosures (reduce system noise by >5 dBA)
- Monitors and controls - from gauges and 4-20 mA transmitters to fully enclosed bespoke control units
 - Temperature and pressure transmitters, pressure gauges, rotation sensors, inverter drives, control box

Edwards have a range of pre-engineered standard solutions for major applications

- Liquid ring pump packages for condenser evacuation in the power industry
- Single stage LRP packages for filter and other high capacity applications.

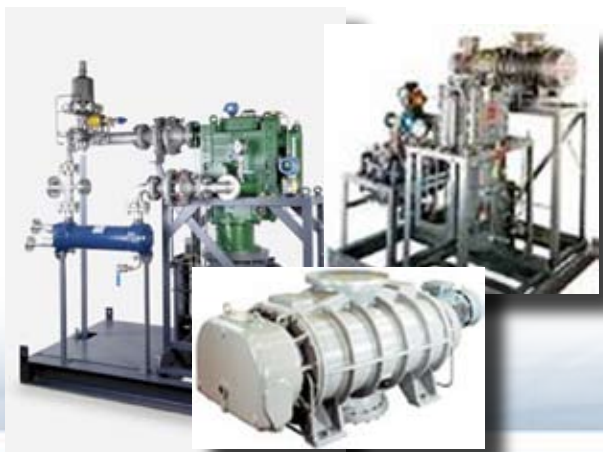


CUSTOM PACKAGES

We can develop a customized solution in-house, from a simple change to a solenoid specification, to a custom filtration or control module.

This combination of pre-engineered and tailored engineering allows full flexibility without compromising quality or leadtimes.

Regardless of the size or scope of a delivered system; it will be safe, fully engineered and matched to your process.



EDP PUMPS



- Dry vacuum pump
- Vertical orientation
 - for improved liquid handling
- Torque limiting clutch
 - to protect pump mechanism
- Indirect cooling circuit
 - for improved temperature control
 - shortest gas paths prevent local condensation and particulate build up
- Capacities from 80 to 4200 m³/hr



CPH PUMPS

- Horizontal dry vacuum pump
- Affordable, compact and reliable
- Capacities from 250 to 4200 m³/hr
- Oil-free



CDX PUMPS



- Dry vacuum pumps with capacities up to 1000 m³/hr
- Horizontal double ended screw design orientation
 - Allows condensates to drain from pump
- Can handle large liquid slugs
- Indirect cooling circuit
- Allows variable and controllable stator or body temperatures and internal gas temperature

CD PUMPS*

- Dry three stage pump
- Capacities from 75 to 750 cfm
- Built-in backflow cooling arrangement
- Flat horsepower curve
- Rugged, gear-driven pumping lobes
- No spring-loaded vanes or oil metering pumps, giving reduced failure modes
- No effluent, low standard maintenance, good liquids handling
- Solvent recovery

* North America only



LIQUID RING PUMPS

- Reliable, low maintenance, low vibration and noise
- Ability to handle wet gases
- Several options for materials of construction including: aluminum, bronze, duplex stainless steel and hastelloy.
- Single and two stage pumps with capacities up to 30,000 m³/hr



MECHANICAL BOOSTER PUMPS

- Our large range of mechanical booster pumps are based on the roots principle and are ideal for use with chemical dry pumps
- EH and HV series
 - Available in temperature classes T3, T160 & T4
 - From 250 m³/hr to 30,000 m³/hr



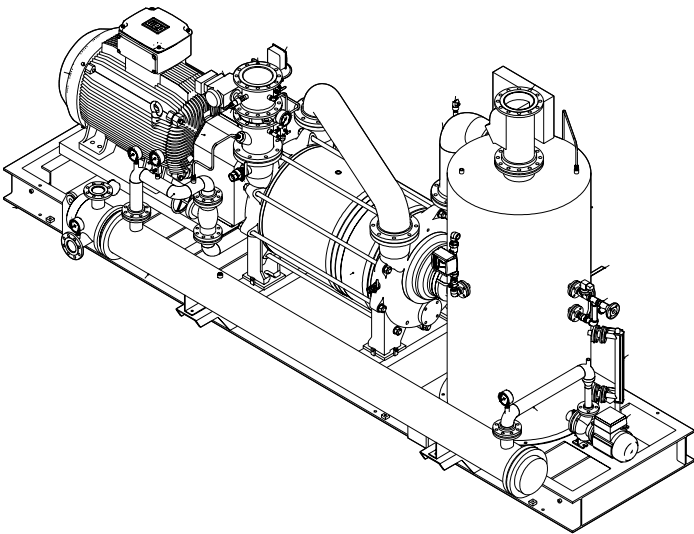
VAPOR BOOSTER PUMPS



- Very large pumping speed at low operating pressures
- High throughput
- Early crossover for excellent pumpdown times
- Excellent reliability

CONDENSER EVACUATION PACKAGES

- Two-stage vacuum pump for optimum performance supporting the steam condenser outlet pressure
- Automatic inlet isolating valve controlled by differential pressure switch - for effective transmission from hogging to holding
- Inlet water spray nozzle - to reduce condensable load at pump suction
- Low maintenance requirements, low vibration and noise levels
- Unique capability to handle wet gases



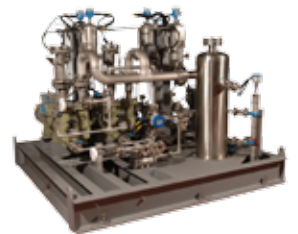
SHELF DRYERS

- Rapid drying of heat sensitive, air sensitive, pyrophoric materials requiring drying without agitation.
- Heated shelves sealed by an O-ring contained in a machined groove in the chamber door.
- With over 90 years experience in the design of dryers, Edwards has pioneered the design of heated shelves for vacuum shelf dryers.



STEAM EJECTORS

- Over 90 years of experience in the design and supply of steam ejector systems
- Portfolio includes multi-stage systems with interstage condensers
- Low capital cost
- No moving parts
- Low maintenance
- No size limitation



FILTRATION PUMP SETS

- Single stage pump packages for filtration applications
- Single stage liquid ring pumps up to 30000 m³/hr
- Available in a range of materials
- Range of standard solutions
- Belt drive and gearbox driven options





SERVICE AND SUPPORT

Local Support from a Global Company

With over 70 service facilities worldwide, a team of over 1000 service engineers and technicians, and a growing network of service agents, Edwards is never far away from you. We can offer you a flexible choice of responsive and reliable support options, enabling you to select those best suited to your needs, from simple spare parts and service training to comprehensive long term service agreements.

- Operation, maintenance and service training
- Service spares, kits and tooling
- On-site support
- Product repair and overhaul
- Product exchange
- Refurbished product sales
- Service agreement and contracts

FAST

ROUND THE CLOCK... AROUND THE WORLD

When you need the confidence of an OEM guarantee, you can choose from a range of product repair and overhaul services. If uptime is critical we can offer a service exchange product dispatched to you within hours from our local stock. The options are unlimited: from Edwards training to your own service technicians, to tailored contracts.



FLEXIBLE SERVICE PACKAGES

We can work together and tailor your service contract to your specific needs, from a one-off plant relocation to a longer term equipment maintenance and management.

For small installations, we can offer standard fixed price contracts to give you peace of mind and ease of budgeting and cost management.



Saturated vapor pressures of some common chemicals as a function of temperature

		Temperature (°C)										Boiling Point (°C)	Melting Point (°C)		
Chemical	0	5	10	15	20	25	30	35	40	45	50				
1	Acetaldehyde	444.3	549.3	674.6	822.9	997.5	1201.9	1440.0	1715.8	2033.7	2398.6	2815.5	Vapor Pressure (mbar)	20.4	-123.5
2	Acetic acid	4.4	6.2	8.6	11.7	15.8	21.1	27.9	36.5	47.2	60.5	76.9		118.1	16.6
3	Acetic anhydride	1.1	1.6	2.4	3.5	5.0	7.0	9.7	13.2	17.7	23.6	30.9		139.0	-73.1
4	Acetone	93.9	121.3	155.0	196.1	246.0	306.0	377.5	462.2	561.9	678.3	813.7		56.5	-94.8
5	Acetonitrile	33.0	43.5	56.7	73.1	93.3	118.0	147.9	183.8	226.7	277.5	337.3		81.9	-45.0
6	Acrylic acid	1.1	1.6	2.2	3.1	4.3	5.8	7.9	10.5	14.0	18.4	24.0		141.0	14.0
7	Benzaldehyde	0.1	0.2	0.3	0.5	0.8	1.2	1.8	2.5	3.5	4.9	6.7		178.5	-56.0
8	Benzene	35.0	46.3	60.6	78.3	100.1	126.8	159.0	197.6	243.6	297.9	361.6		80.1	5.5
9	Bromine	80.5	107.1	140.0	180.3	228.9	286.9	355.2	434.9	527.1	632.8	753.1		59.1	-7.3
10	Butylbenzene	0.2	0.3	0.4	0.7	1.0	1.4	2.0	2.7	3.8	5.1	6.8		183.3	-87.9
11	Butyric acid	0.1	0.2	0.3	0.5	0.7	1.1	1.6	2.3	3.3	4.6	6.4		163.5	-7.9
12	Carbon disulfide	169.2	212.1	263.5	324.6	396.7	481.2	579.5	693.2	824.0	973.6	1143.7		46.5	-111.5
13	Carbon tetrachloride	44.7	58.3	75.3	96.1	121.5	152.2	189.0	232.8	284.4	345.0	415.6		76.7	-22.9
14	Chloroform	75.1	98.6	127.7	163.5	206.8	258.9	320.8	393.8	479.2	578.4	692.8		61.2	-63.6
15	m-Cresol	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.5	0.7	1.0	1.5		202.1	11.8
16	Cyclohexane	29.2	40.0	54.0	71.6	93.6	120.5	153.3	192.7	239.4	294.5	358.8		80.8	6.4
17	n-Decane	0.2	0.4	0.6	0.8	1.2	1.7	2.5	3.5	4.8	6.5	8.7		174.1	-29.7
18	Dichloromethane	192.8	243.8	305.5	379.6	468.0	572.7	695.7	839.5	1006.5	1199.5	1421.1		40.2	-96.0
19	Diethyl ether	247.8	311.7	388.5	479.9	587.8	714.3	861.7	1032.3	1228.4	1452.6	1707.7		34.5	-116.4
20	n-n Dimethyl formamide	1.4	1.8	2.3	3.0	3.8	4.9	6.3	8.1	10.2	13.0	16.4		153.0	-61.0
21	1,4 Dioxane	12.3	16.6	22.2	29.4	38.5	49.8	63.9	81.3	102.5	128.2	159.1		101.3	11.8
22	Ethanol	15.9	22.5	31.4	43.2	58.7	78.9	104.7	137.6	178.9	230.5	294.4		78.4	-114.2
23	Ethyl acetate	32.6	43.8	58.0	76.0	98.4	126.2	160.1	201.2	250.6	309.7	379.6		77.1	-83.6
24	Ethylene glycol	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.4	0.6	0.8		197.2	-12.6
25	Formic acid	14.1	19.5	26.2	34.6	44.8	57.1	71.8	89.0	108.9	131.8	157.9		100.7	8.4
26	Furfural	0.3	0.5	0.8	1.2	1.7	2.5	3.6	5.0	6.9	9.4	12.7		161.8	-36.5
27	Glycerol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		290.0	18.0
28	n-Heptane	15.1	20.5	27.4	36.2	47.2	60.9	77.8	98.4	123.3	153.2	188.7		98.4	-90.5
29	Hexane	60.5	78.6	101.0	128.4	161.7	201.7	249.5	306.0	372.5	450.2	540.4		68.7	-93.5
30	Isobutyl alcohol	1.7	2.7	4.2	6.4	9.5	13.8	19.8	27.8	38.5	52.6	70.8		108.0	-108.0
31	Isopropanol	9.6	14.2	20.6	29.4	41.2	57.0	77.6	104.3	138.5	181.8	235.9		82.2	-85.8
32	Lactic Acid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		165.5	16.8
33	Methanol	40.3	55.0	74.1	98.7	130.0	169.4	218.6	279.5	354.3	445.4	555.4		64.7	-97.6
34	Methyl acrylic acid	0.2	0.3	0.4	0.6	0.9	1.3	1.9	2.7	3.8	5.2	7.2		161.5	16.0
35	Methyl isobutyl ketone	5.4	7.6	10.6	14.6	19.7	26.2	34.5	45.0	57.9	73.7	93.1		118.0	-80.2
36	2-Pentanone	10.9	15.0	20.3	27.2	36.0	47.1	60.9	77.9	98.8	124.1	154.6		102.3	-76.9
37	Phenol	0.0	0.1	0.1	0.2	0.3	0.5	0.7	1.1	1.6	2.3	3.3		181.9	40.6
38	Phosphorous oxychloride	11.9	16.1	21.5	28.3	36.9	47.6	60.9	77.1	96.8	120.5	148.9		105.1	1.3
39	Phosphorous trichloride	47.0	61.2	78.8	100.4	126.8	158.7	197.0	242.5	296.4	359.6	433.4		76.0	-111.8
40	Propionic Acid	0.7	1.1	1.7	2.4	3.5	5.0	6.9	9.6	13.0	17.5	23.2		141.1	-20.8
41	Styrene	1.5	2.2	3.1	4.4	6.0	8.2	11.0	14.5	19.1	24.7	31.8		145.2	-30.6
42	Tetrachloroethylene	5.6	7.7	10.5	14.2	18.8	24.8	32.2	41.4	52.8	66.7	83.5		121.1	-22.3
43	Tetrachloromethane	44.7	58.3	75.3	96.1	121.5	152.2	189.0	232.8	284.4	345.0	415.6		76.7	-22.9
44	Tetrahydrofuran	64.0	83.4	107.4	137.0	172.9	216.2	268.1	329.7	402.2	487.2	586.0		66.0	-108.5
45	Thionyl chloride	47.3	61.3	78.7	99.9	125.8	157.1	194.6	239.2	292.0	353.9	426.2		75.7	-105.0
46	Toluene	9.0	12.3	16.6	22.1	29.1	38.0	48.9	62.4	78.9	98.8	122.8		110.6	-95.0
47	Trichloromethane	80.1	103.6	132.7	168.1	210.9	262.2	323.3	395.4	480.0	578.5	692.6		61.1	-63.6
48	Undecane	0.1	0.1	0.2	0.3	0.4	0.6	0.9	1.3	1.8	2.5	3.5		195.9	-26.0
49	Water	6.1	8.7	12.3	17.0	23.4	31.7	42.4	56.2	73.7	95.8	123.3		100.0	0.0
50	m-Xylene	2.2	3.1	4.3	6.0	8.2	11.1	14.7	19.4	25.2	32.5	41.5		139.1	-47.9
51	o-Xylene	1.7	2.4	3.4	4.7	6.5	8.8	11.8	15.6	20.5	26.5	34.0		144.4	-25.3
52	p-Xylene	2.4	3.4	4.7	6.5	8.8	11.8	15.7	20.5	26.7	34.2	43.6		138.4	13.3

Group 1 IA 18 VIIIA

Atomic Number 8 Symbol O Name Oxygen Atomic Weight* 15.9994

Period 1 2 3 4 5 6 7

1 H Hydrogen 1.00794 2 He Helium 4.002602

2 Li Lithium 6.941 3 B Boron 10.811 4 Be Beryllium 9.012182 5 C Carbon 12.0107 6 N Nitrogen 14.0067 7 O Oxygen 15.9994 8 F Fluorine 18.9984032 9 Ne Neon 20.1797

3 Na Sodium 22.989770 10 Al Aluminium 26.981538 11 Mg Magnesium 24.3050 12 Si Silicon 28.0855 13 P Phosphorus 30.973761 14 S Sulfur 32.065 15 Cl Chlorine 35.453 16 Ar Argon 39.948

4 K Potassium 39.0983 17 Ca Calcium 40.078 18 Sc Scandium 44.955910 19 Ti Titanium 47.867 20 V Vanadium 50.9415 21 Cr Chromium 51.9961 22 Mn Manganese 54.938049 23 Fe Iron 55.845 24 Co Cobalt 58.933200 25 Ni Nickel 58.6934 26 Cu Copper 63.546 27 Zn Zinc 65.409 28 Ga Gallium 69.723 29 Ge Germanium 72.64 30 As Arsenic 74.92160 31 Se Selenium 78.96 32 Br Bromine 79.904 33 Kr Krypton 83.798

5 Rb Rubidium 85.4678 34 Sr Strontium 87.62 35 Y Yttrium 88.90585 36 Zr Zirconium 91.224 37 Nb Niobium 92.90638 38 Mo Molybdenum 95.94 39 Tc Technetium (98) 40 Ru Ruthenium 101.07 41 Rh Rhodium 102.90550 42 Pd Palladium 106.42 43 Ag Silver 107.8682 44 Cd Cadmium 112.411 45 In Indium 114.818 46 Sn Tin 118.710 47 Sb Antimony 121.760 48 Te Tellurium 127.60 49 I Iodine 126.90447 50 Xe Xenon 131.293

6 Cs Cesium 132.90545 51 Ba Barium 137.327 52 Hf Hafnium 178.49 53 Ta Tantalum 180.9479 54 W Tungsten 183.84 55 Re Rhenium 186.207 56 Os Osmium 190.23 57 Ir Iridium 192.217 58 Pt Platinum 195.078 59 Au Gold 196.96655 60 Hg Mercury 200.59 61 Tl Thallium 204.3833 62 Pb Lead 207.2 63 Bi Bismuth 208.98038 64 Po Polonium (209) 65 At Astatine (210) 66 Rn Radon (222)

7 Fr Francium (223) 67 Ra Radium (226) 68 Rf Rutherfordium (261) 69 Sg Seaborgium (266) 70 Hs Hassium (277) 71 Bh Bohrium (264) 72 Hs Hassium (277) 73 Mt Meitnerium (268) 74 Uun Ununilium (281) 75 Uuu Ununium (272) 76 Uub Unbibium (285) 77 Uuq Ununquadium (289) 78 Uuh Ununhexium (292)

79 La Lanthanum 138.9055 80 Ce Cerium 140.116 81 Pr Praseodymium 140.90765 82 Nd Neodymium 144.24 83 Pm Promethium (145) 84 Sm Samarium 150.36 85 Eu Europium 151.964 86 Gd Gadolinium 157.25 87 Tb Terbium 158.92534 88 Dy Dysprosium 162.500 89 Ho Holmium 164.93032 90 Er Erbium 167.259 91 Tm Thulium 168.93421 92 Yb Ytterbium 173.04 93 Lu Lutetium 174.967

94 Ac Actinium (227) 95 Th Thorium 232.0381 96 Pa Protactinium 231.03588 97 U Uranium 238.02891 98 Np Neptunium (237) 99 Pu Plutonium (244) 100 Am Americium (243) 101 Cm Curium (247) 102 Bk Berkelium (247) 103 Cf Californium (251) 104 Es Einsteinium (252) 105 Fm Fermium (257) 106 Md Mendelevium (258) 107 No Nobelium (259) 108 Lr Lawrencium (262)

Legend: Solids (white), Liquids (blue), Gases (pink), Artificial (yellow)

* based on ¹²C

Pressure Conversion Table

	mbar	bar	Torr	Pa	atm	in Hg	mm Hg	in H ₂ O	psi
1 mbar	= 1	1x10 ⁻³	0.75	1x10 ²	9.87x10 ⁻⁴	2.95x10 ⁻²	0.75	0.40	1.45 x 10 ⁻²
1 bar	= 1x10 ³	1	7.5x10 ²	1x10 ³	0.987	29.53	7.5x10 ²	4.02x10 ²	14.5
1 Torr	= 1.33	1.33x10 ³	1	1.33x10 ²	1.32x10 ⁻³	1.36x10 ⁻²	1	0.54	1.93 x 10 ⁻²
1 Pa	= 0.01	1x10 ⁻⁵	7.5x10 ⁻³	1.01x10 ⁵	1	2.95x10 ⁻⁴	7.6x10 ⁻³	4.02x10 ⁻³	1.45 x 10 ⁻⁴
1 atm	= 1.01x10 ³	1.013	7.6x10 ²	1.013x10 ⁵	1	29.92	7.6x10 ²	4.07x10 ²	14.7
1 in Hg	= 33.86	3.39x10 ⁻²	25.4	3.39x10 ³	3.34x10 ⁻²	1	25.4	13.6	0.4912
1 mm Hg	= 1.33	1.33x10 ⁻³	1	1.33x10 ³	1.32x10 ⁻³	3.94x10 ⁻²	1	0.535	0.93 x 10 ⁻²
1 in H ₂ O	= 2.49	2.49x10 ⁻³	1.868	2.49x10 ²	2.46x10 ⁻³	7.36x10 ⁻²	1.87	1	3.61 x 10 ⁻²
1 mm H ₂ O	= 9.81x10 ⁻²	9.81x10 ⁻⁵	7.35x10 ⁻²	9.81	9.68x10 ⁻⁵	2.90x10 ⁻³	7.35x10 ⁻²	3.39x10 ⁻²	

Leak Rate Conversion Table

	mbar l s ⁻¹	Torr l s ⁻¹	atm cm ³ s ⁻¹	atm ft ³ min ⁻¹	kg h ⁻¹ air (20 °C)
1 mbar l s ⁻¹	= 1	0.75	0.987	2.097 x 10 ⁻³	4.3 x 10 ⁻³
1 Torr l s ⁻¹	= 1.333	1	1.316	2.795 x 10 ⁻³	5.7 x 10 ⁻³
1 atm cm ³ s ⁻¹	= 1.013	0.76	1	2.12 x 10 ⁻³	4.3 x 10 ⁻³
1 atm ft ³ min ⁻¹	= 4.78 x 10 ²	3.58 x 10 ²	4.72 x 10 ²	1	-
1 kg h ⁻¹ air (20 °C)	230	175	230	-	1

Pumping Speed Units

	l s ⁻¹	l min ⁻¹	ft ³ min ⁻¹	m ³ h ⁻¹
1 l s ⁻¹	= 1	60	2.12	3.60
1 l min ⁻¹	= 0.0167	1	0.0353	0.06
1 ft ³ min ⁻¹	= 0.472	28.32	1	1.70
1 l m ³ h ⁻¹	= 0.278	16.67	0.5890	1

Edwards – the company you have known and trusted for nearly 100 years - continues to deliver innovative vacuum pumps and related systems. We strive to lower your cost of ownership, increase your productivity and enhance your final product quality. Edwards products are based on a solid foundation of manufacturing excellence, field-proven technologies and are supported by a renowned global services network.

Edwards stands behind each product with exceptional integrity and strength, supporting our customers beyond standard expectations. Edwards is essential to your process.

PRODUCTS:

- Dry Vacuum Pumps
- Oil-sealed Vacuum Pumps
- Turbomolecular Pumps
- Exhaust Management
- Integrated Vacuum and Abatement
- Liquid Abatement
- Chemical Management
- Chillers
- Coating Systems
- Vacuum System Components

SERVICES:

- Equipment Service and Repair
- Product Exchange
- Refurbished Equipment
- Field and On-site Services
- Remote e-Diagnostics
- Product Training

GLOBAL CONTACTS:

BELGIUM

Brussels +32 2 363 0030

BRAZIL

Sao Paulo +55 11 3952 5000

CHINA

Shanghai +86 21 5866 9618

FRANCE

Paris +33 1 47 98 24 01

GERMANY

Munich 0800 000 1456

INDIA

Mumbai +91 22 2565 1177

ISRAEL

Qiryat-Gat +972 8 681 0633

ITALY

Milan +39 02 48 4471

JAPAN

Yachiyo +81 47 458 8831

KOREA

Bundang +82 31 716 7070

SINGAPORE

Singapore +65 6546 8408

TAIWAN R.O.C.

Toufen Town +886 37 611422

UNITED KINGDOM

Crawley +44 1293 528844

UK Local Rate (UK Only) 08459 212223

UNITED STATES

MA +1 978 658 5410

Toll Free (US Only) +1 800 848 9800



WWW.EDWARDSVACUUM.COM