

A T M I



VAC™ PACKAGE

User Guide for Ion Implantation

*The alternative low pressure delivery package
for pyrophorics, flammables, and corrosives*



**MATHESON
TRI•GAS**

ask. . .The Gas Professionals™

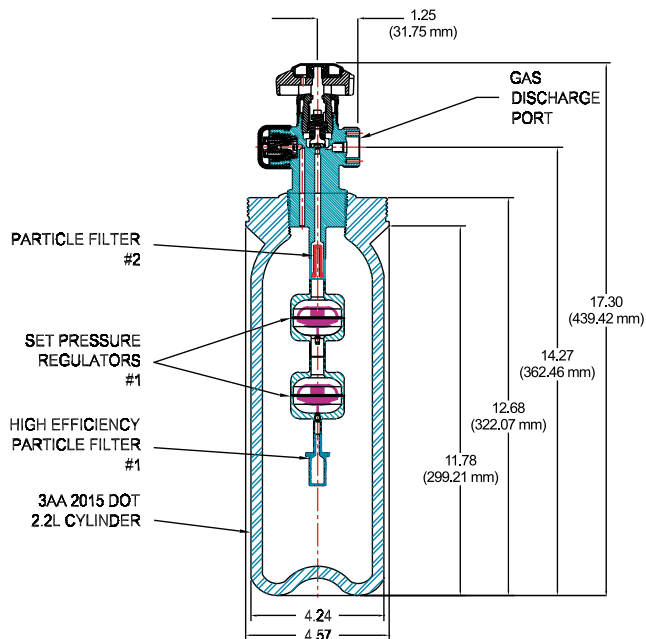


What is the VAC® package?

The VAC package is a standard, steel alloy compressed gas cylinder which utilizes internal set pressure regulators to dispense gas at sub-atmospheric pressures from the cylinder valve outlet connection. The gas is stored at high pressure just like standard compressed gas cylinder packages and fully compliant with USDOT regulations.

Process	Gases	Process Details
Ion Implant	Boron Trifluoride	Delivery set @500 Torr
Ion Implant	Enr. 72 Germanium Tetrafluoride	Delivery set @500 Torr

Gas Source	Cylinder Size	Cylinder Dimensions	Deliverable Capacity	Shipping Weight
BF ₃	2.2 L	4" D x 17.3" H	1000g (357 L)	11.5 kg (25 lbs)
⁷² GeF ₄	2.2 L	4" D x 17.3" H	500g (81 L)	11.5 kg (25 lbs)



How safe is the VAC package?

At first glance, the VAC package is equivalent in safety to standard high pressure cylinders. However, due to the internally reduced, cylinder outlet pressure, the risk reduction in operating this package has been shown to be approximately 900 times less likely to have an incident/failure than a standard high pressure package, (see the independent 'Fault Tree Analysis' report by Omicron Safety and Risk Technologies, Inc.).

Does the VAC package utilize a restrictive flow orifice (RFO)?

Yes, the VAC package utilizes a 0.25mm (0.010") RFO for the implant gases.

How is the VAC package connected and used on our system?

This package was designed to be installed on a high pressure gas stick. It gets connected like normal gas cylinders, but utilizes a special pin indexed cylinder outlet connector which must be properly oriented when welded to your system (see installation details).

It utilizes a 'one time use' metal gasket (nickel 200) connection for high integrity and must be tightened with a torque wrench to 35 ft-lbs. Standard purge/vacuum cycling should be used for installation and removal of cylinders. The connectors and torque wrenches are available from ATMI (see installation details).

How do we measure pressure in the VAC package?

Currently, cylinder pressure cannot be directly measured by the user. However, there are provisions for ATMI to do this.

How do we know when the VAC package is empty?

The VAC package delivers a dynamic pressure of approx. 450 torr, with an equilibrium set point, or closure point of 500 torr. Once the contents are used, you will see the pressure start to decrease from this point. We recommend the installation (or rescaling) of a pressure measuring device to signal the empty condition at 400 torr (7.7 psia). At this point, there is still approx. 800 cc's of usable gas left in the cylinder so a timely change-out can be scheduled.

How long will the VAC package last?

The standard 1000 gram VAC BF₃ package contains 357 liters of gas. At a process flow of 2 sccm's, lifetime is expected to be approximately 2975 running hours.



Valve Cylinder Connections

Surrounding the Ion Implant Process

Will the high pressure regulator and standard flow controllers be a problem?

No, since the VAC package delivers a constant 500 torr, the pressure drop associated with the high pressure regulator and standard flow controller/metering valve won't inhibit full use of gas in the cylinder. The high pressure gas stick capability is necessary in the event of a VAC package failure. The existing high pressure regulator should be left, preset to its' normal delivery pressure which is typically 5-15 psig.

What happens in the event of a VAC package failure?

The most probable failure mode for the VAC package is that the set pressure regulators will 'creep' or allow gas to pass through instead of closing shut. This result will be full cylinder pressure exiting the cylinder and entering the gas stick. In essence, the VAC package would act like a standard high pressure cylinder.

Why does the VAC package valve look different?

Like standard cylinder valves, there is a primary hand-wheel for operation and a well labeled outlet connection for the special pin indexed outlet connector. Additionally, there is a safety device mandated by USDOT, a manufacturers tamper proof access/fill port and the associated tamper proof handwheel for use by the manufacturer.

Pressure Measurement

The VAC package delivers a dynamic pressure of approximately 450 torr. This pressure will remain fairly constant throughout the cylinder life. As the overall pressure reaches the set delivery point, it will continue to drop as the gas is used. It is recommended to establish an 'empty point signal' at 400 torr. Once this point is reached, there is still approximately 800 cc's of gas remaining in the cylinder.

The challenge is to provide a 0 - 1000 torr measuring device, which can also withstand potential high pressure exposure. We have found one such device which is listed below (1).

The preferred scheme is to place the pressure measuring device downstream of the existing high pressure regulator on the implant gas stick. This offers yet another layer of protection from potential high pressure.

(1) United Electric - Staset® model EA15. This device incorporates pressure sensing (4 - 770 torr) and a single point contact switch.

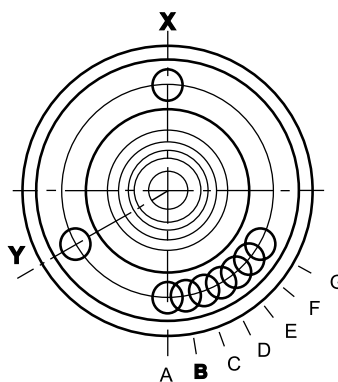


2.2 L VAC Cylinder

Installation Details

The VAC valve outlet drawing shows the specific orientation of the outlet connection. For BF₃ it is SA-B. Pin X should be oriented to the 12 o'clock position for welding to system tubing. This assumes the cylinders stand vertically in the gas box.

Note: Pin B is 170° from top dead center (or 10° to the right of six o'clock)



GAS SERVICE	HOLES POS.	MARKINGS	CGA DISS CORRESPONDING
HYDRIDES	X+Y+A	SA-A	CGA 632
ACID GASES	X+Y+B	SA-B	CGA 642
	X+Y+C	SA-C	
	X+Y+D	SA-D	
	X+Y+E	SA-E	
	X+Y+F	SA-F	
	X+Y+G	SA-G	

Valve Outlet Connections

ATMI Part Number	Description
53-000008	UHIS pin indexed SA-B connector assembly, nut, nipple, plug, and gasket
53-000017	UHIS Torque Wrench (35 ft-lbs)

For VAC information contact Kavita Murthi, Product Marketing Manager, Ion Implant Group
 tel: 408.971.6500 ext. 264 • cell: 510.919.0107
 email: kmurthi@matheson-trigas.com

Worldwide Offices



ATMI

NORTH AMERICA

Arizona

Epitaxial Services - Silicon
550 W. Juanita Avenue
Mesa, AZ 85210
Tel: 480.668.4000
Fax: 480.464.7421

Epitaxial Services - III-V

3832 East Watkins Street
Phoenix, AZ 85034
Tel: 602.659.2500
Fax: 602.438.2277

California

Customer Sales and Service
617 River Oaks Parkway
San Jose, CA 95134
Tel: 408.526.9400
Fax: 408.526.1651

Systems Assembly

830 Latour Court
Napa, CA 94558
Tel: 707.257.1690
Fax: 707.257.1964

Connecticut

Corporate Headquarters
Research & Development
7 Commerce Drive
Danbury, CT 06810
Tel: 203.794.1100
Fax: 203.792.8040

Minnesota

Packaging - Liquids
10779 Hampshire Ave. S
Minneapolis, MN 55438
Tel: 952.942.0855
Fax: 952.942.8474

New Mexico

Fab Services
320 Gold Avenue SW
Suite 1111
Albuquerque, NM 87102
Tel: 505.924.1873
Fax: 505.924.1911

Fab Services

1501 12th Street NW
Albuquerque, NM 87104
Tel: 505.244.3722
Fax: 505.244.1764

VAC-01 R01/05

Oregon

Fab Services
410 NE 219th Avenue
Gresham, Oregon 97030
Tel: 503.492.0100
Fax: 503.492.2747

Texas

Liquid Operations
304 Industrial Blvd.
Burnet, TX 78611
Tel: 512.756.7314
Fax: 512.756.7307

Materials Manufacturing

1200 West Jackson Road
Carrollton, TX 75006
Tel: 972.245.5541
Fax: 972.245.5548

Fab Services

1711 Briercroft Court,
Suite 100
Carrollton, TX 75006
Tel: 972.466.4619
Fax: 972.242.2764

EUROPE

Belgium

Packaging - Solids
Reuglestraat 2, B-3320
Hoeggarden, Belgium
Tel: 32.16.76.6159
Fax: 32.16.76.7625

Germany

Life Safety Systems
Benedikstrasse 1, D-82069
Hohenschäftlarn, Germany
Tel: 49.8178.869.0
Fax: 49.8178.822.0

Sensor Manufacturing

Justus-von-Liebig-Strasse 22
D-53121
Bonn, Germany
Tel: 49.228.52.66.40
Fax: 49.228.62.40.76

IRELAND

Fab Services

44 Portersgate Heights
Clonsilla, Dublin, Ireland 15
Tel: 35.31.606.5397
Fax: 35.31.820.0555

ASIA

Japan

Hama Building, 6F
3-17-14 Shiba
Minato-ku, Tokyo 105-0014
Japan
Tel: 81.03.5765.6323
Fax: 81.03.5444.3182

Korea

269-7 Geruk-Ri, Miyang-Myon
Anseung-si
Kyonggi-do, Korea 456-840
Tel: 82.31.677.5533
Fax: 82.31.677.5537

Singapore

25 International Business Park
04-75 German Centre
Singapore 609916
Tel: 65.562.8200
Fax: 65.562.8201

Taiwan

4F-7, No. 81, Shui-lee Road
Hsin-chu 300, Taiwan, ROC
Tel: 886.3.5169.248
Fax: 886.3.5169.236

Epitaxial Services

8 Floor, No. 117, Section 3
Min-Sheng East Road
Taipei 105, Taiwan, ROC
Tel: 886.2.8770.7757
Fax: 886.2.2545.2263

ISO 14001

ISO 9002

ISO 9001

QS 9000

www.atmi.com

info@atmi.com

A T M I



Matheson Tri-Gas

NORTH AMERICA

Manufacturing

6775 Central Avenue
Newark, CA 94660
Tel: 510.793.2559
Fax: 510.790.6241

Massachusetts

Manufacturing

61 Grove Street
P.O. Box 1147
Gloucester, MA 01930
Tel: 978.283.7700
Fax: 978.283.6177

New Jersey

Corporate Headquarters

959 Route 46 East
P.O. Box 624
Parsippany, NJ 07054-0624
Tel: 973.257.1100
Fax: 073.257.9393

Texas

Manufacturing

2550 Dry Hole Drive
Kyle, TX 78640
Tel: 512.262.2129
Fax: 512.262.4011

ASIA

Japan

Headquarters

1-16-7, Nishi-Shinbashi
Minato-Ku, Tokyo 105
Japan
Tel: 011-81-03-3581
Fax: 011-03-3582-2263

www.matheson-trigas.com



MATHESON TRI-GAS

ask...The Gas Professionals™