Arsine SDS®2 Safe Delivery Source

Features and Benefits

- The dopant pressure is kept below one atmosphere, minimizing the chance of accidental release
- Delivers 10-14 times the amount of dopant of conventional high pressure implant mixtures
- Rapid species change times for improved productivity
- Cleaner operation reduces chamber wall deposition and extends maintenance intervals
- Beam energy purity of a solid source for enhanced performance
- Unique cylinder outlet connections prevent inadvertent substitution of a pressurized gas cylinder
- Shelf life of two years

Overview

Ion implantation places dopant atoms at the precise location and at the proper depth within the silicon to achieve the optimal electrical performance of the device. In the case of Arsine, the dopant atoms are traditionally supplied from either solid arsenic vaporized within the implanter or from a high pressure mixture of arsine and hydrogen. Each method has substantial drawbacks.

In solid source applications, low pressures of arsenic atoms are maintained in the source region of the implanter by controlled heating of the pure solid material. Changes in the desired ion current or dopant species can require up to 60 minutes to retune the implanter.

Gas sources permit process engineers to change implant currents and species in less than five minutes. However, this flexibility does come at a price. The arsine used in ion implantation is typically supplied as a 15% mixture in hydrogen. A lecture bottle of this mixture contains only six grams of dopant. These small quantities force frequent cylinder changes, as often as every three days in high use situations.

Description

The SDS® Safe Delivery Source technology, introduced by Matheson Tri-Gas and ATMI, Inc. in 1994, uses an adsorbent material to store pure arsine gas at a pressure below one atmosphere. The dopant gas is extracted from the SDS® Safe Delivery Source by the pressure differential between the cylinder and the ion implant chamber. The potential for an accidental release of gas, a concern with compressed mixtures, is minimized. The SDS® Safe Delivery Source also compares favorably to solid sources by reducing the time required for species changes, resulting in improved productivity and maintaining process quality.

The SDS®2 Arsine Safe Delivery Source is available in three standard cylinder sizes which deliver 10-14 times the dopant of conventional gas mixtures for longer run times. Most existing implant equipment can be easily adapted to use SDS® Brand products. In addition, ion implant manufactures are now offering SDS® compatible equipment configurations as options on all new implanters.

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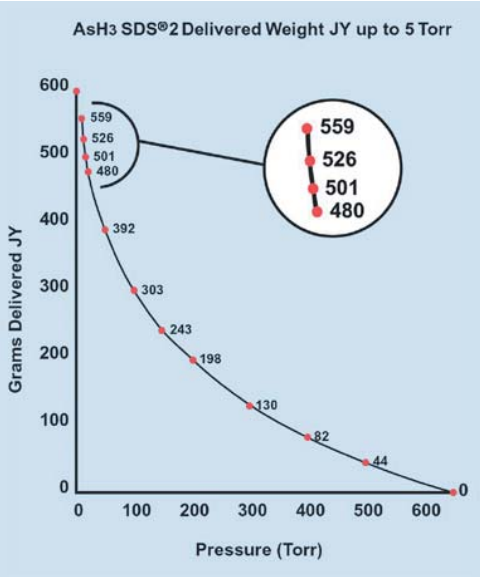
Arsine SDS®2 Safe Delivery Source (AsH_3)



Gas Purity (ppmv)	
Arsine	≥99.9995%
Carbon Dioxide	< 0.5
Carbon Monoxide	< 0.1
Methane	< 0.5
Nitrogen	< 2.0
Oxygen	< 1.0
Water	< 2.0

Shelf life: 2 years

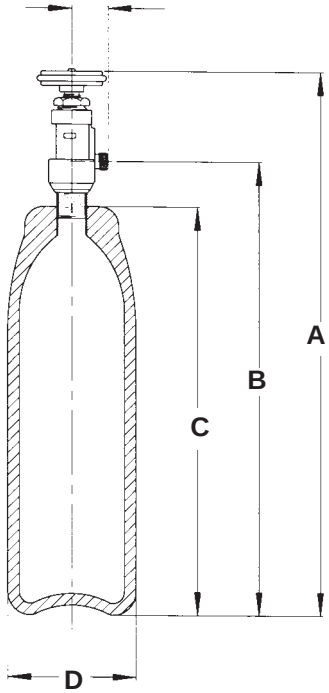
Purity specifications based on source gas

Cylinder Size	Grams Deliverable to 20 Torr	Liters Deliverable to 20 Torr
UY (6.6L)	1320	408.8
JY (2.2L)	440	136.3
WY (0.44L)	88	27.3

Note: Delivery capacity (grams) at 20 torr.
Actual capacity is a function of final cylinder pressure.

Cylinder Specifications

- D.O.T. (3AA2015) approved
- Carbon steel cylinder
- 1/2" VCR® type cylinder connection
- Stainless steel diaphragm valve
- Cylinders filled to 650 torr at 70° F (21°C) and not to exceed 700 torr at 70° F (21°C).
- Adsorbant material in SDS®2 is carbon



Cylinder Dimensions

Size	A	B	C	D
UY (in)	22.60	19.66	18.20	6.20
(mm)	574.04	499.36	462.28	157.48
JY (in)	17.55	14.62	13.16	4.15
(mm)	445.78	371.35	334.26	105.41
WY (in)	15.75	13.50	11.75	2.00
(mm)	400.10	342.90	298.50	50.50

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