

Hydrogen Selenide SDS[®]2 Safe Delivery Source

Features and Benefits

- Dopant pressure maintained below one atmosphere minimizing the chance of accidental release
- Delivers more than 3 to 20 times the dopant compared to conventional 25 gram vaporizer charges
- Rapid species change time or cylinder replacement for improved productivity
- Significant beam current improvement (10 times) over vaporized selenium
- Cleaner operation with gas source resulting in minimized deposits and extends maintenance intervals
- Shelf life of 18 months

Overview

Ion implantation places dopant atoms at the precise location and at the proper depth within the silicon, or substrate to achieve the optimal electrical performance of the device. In the case of selenium, the dopant atoms are typically supplied by utilizing the standard vaporizer system within the ion implanters using solid selenium. This method although successful, has several drawbacks.

The SDS[®]2 Hydrogen Selenide gas source offers an improved alternate to vaporized selenium and provides several significant benefits. Solid source vaporized materials, such as selenium, result in high maintenance in cleaning up all the deposited dopant in the ion source from the overall vaporization process. Cleanup is further complicated by the fact that selenium is a highly toxic element. Implanter availability also suffers from this required maintenance. The SDS[®] sub-atmospheric gas sources have well proven both their safety and productivity benefits for ion implantation. Production use of the SDS[®]2 Hydrogen Selenide gas source has been proven to produce a ten-fold increase in beam current capabilities.

Description

The SDS[®] Safe Delivery Source technology introduced in 1994 by Matheson Tri-Gas, and ATMI, Inc., uses an adsorbent material to store pure hydrogen selenide gas at sub-atmospheric pressure levels. The dopant gas is extracted by the pressure differential between the SDS[®] cylinder and the ion implant chamber, eliminating the risk of an uncontrolled gas release. The SDS[®] Safe Delivery Source also compares favorably to solid sources by reducing the time required for species change or reloading the vaporizer, resulting in improved productivity while maintaining consistent process quality. Most existing implant equipment can be easily adapted to use SDS[®] Brand products. In addition, ion implant manufacturers are now offering SDS[®] compatible equipment configurations as options on all new implanters.

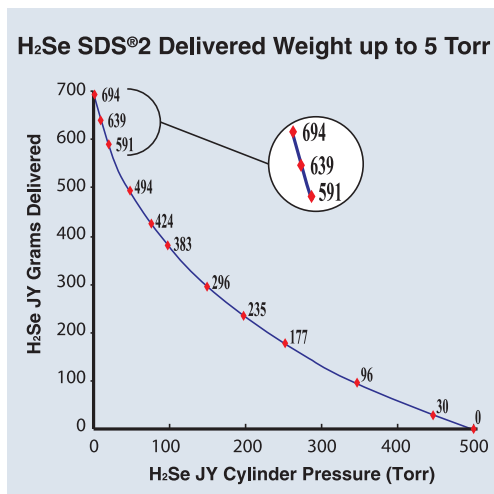
The SDS[®]2 Hydrogen Selenide Safe Delivery Source is available in two standard cylinder sizes which will deliver from 3 to 20 times more selenium than a typical 25 gram vaporizer charge.



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Hydrogen Selenide SDS®2 Safe Delivery Source (H₂Se)



Gas Purity (ppmv)

Hydrogen Selenide	≥ 99.99%
Hydrogen Sulfide	< 10.0
Nitrogen	< 5.0
Oxygen	< 5.0
THC (as methane)	< 1.0
Water	< 100.0

Shelf life: 18 months

Purity specification based on source gas

Cylinder Size	Grams Deliverable to 20 Torr	Liters Deliverable to 20 Torr
JY (2.2L)	550	164
WY (0.44L)	105	31.3

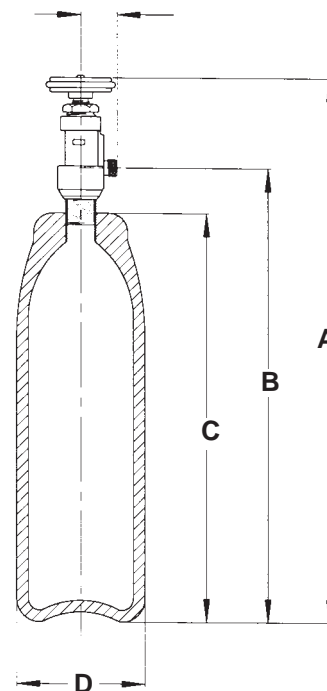
Note: Delivery capacity (grams) at 20 torr.
Actual capacity is a function of final cylinder pressure.

Cylinder Specifications

- D.O.T. (3AA2015) approved
- Carbon steel cylinder
- 1/2" VCR® type cylinder connection
- Stainless steel diaphragm valve
- Cylinders filled to 500 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
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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