

SEMI C3.18-1102

SPECIFICATION FOR DICHLOROSILANE (SiH_2Cl_2) IN CYLINDERS, 97% QUALITY

This Standard was technically approved by the Gases Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on July 21, 2002. Available at www.semi.org in November 2002; originally published in 1982; previously published in 1994.

NOTICE: This Document is no longer supported by the global technical committee. It has been replaced by SEMI C56.

1 Purpose

1.1 The purpose of this Document is to provide a specification for dichlorosilane (SiH_2Cl_2) used in the semiconductor industry.

2 Scope

2.1 This Document covers requirements for dichlorosilane (SiH_2Cl_2) used in the semiconductor industry.

2.2 If analytical methods are not complete, the requirements are presented as a guideline.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Description

3.1 Dichlorosilane is a flammable, corrosive, colorless liquid which hydrolyzes in the presence of moisture. It oxidizes readily and rapidly to release hydrogen chloride. It is easily ignited in the presence of air.

4 Referenced Standards and Documents

4.1 *SEMI Standards and Safety Guidelines*

SEMI C1 —Guide for the Analysis of Liquid Chemicals

SEMI C3 — Specification for Gases

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 Terminology appropriate to this Standard is defined in SEMI C3.

6 Specifications

QUALITY: 97% (liquid)

<i>Impurities</i>	<i>Maximum Acceptable Levels^{#1}</i>
All Other Chlorosilanes (Monochlorosilane, Silicon Tetrachloride, Trichlorosilane)	3% (liquid phase)
Aluminum	1 ppbw (vapor phase derived)
Arsenic	0.5 ppbw (vapor phase derived)
Boron	0.3 ppbw (vapor phase derived)
Carbon	10 ppmw (vapor phase derived)
Iron	50 ppbw (liquid phase)
Phosphorus	0.3 ppbw (vapor phase derived)

<i>Impurities</i>	<i>Maximum Acceptable Levels^{#1}</i>
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#1 An analysis of significant figures has not been considered. The number of significant figures will be based on analytical accuracy and the precision of the provided procedure.

NOTE 1: This specification applies to the appropriate phase of the cylinder as delivered.

NOTE 2: The liquid phase purity is to be based on the chlorosilane determination. In addition, argon + helium are to be controlled in the vapor phase to less than 0.5%. This argon + helium determination will not affect the percent purity determination.

NOTE 3: Initial purging of the vapor phase is recommended to reduce inert gas content used in the cylinder fill procedure.

NOTE 4: Analytical procedures for the doping elements, metals and selected impurities are to be determined between the user and supplier at the present time.

7 Electrical Specification

<i>Resistivity^{#1}</i>	<i>greater than 50 ohm-cm (n-type)^{#2}</i>
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#1 The resistivity measurement technique is to be determined between supplier and user.

#2 Monocrystalline silicon formed from this material, not the material itself.

8 Physical Constants (for information only)

	<i>Metric Units</i>	<i>US Units</i>
Molecular weight	100.99	100.99
Boiling point at 1 atm	8.2°C	46.8°F
Density of gas at 25°C (77°F) and 1 atm	4.168 kg/m ³	0.260 lb/ft ³
Specific gravity of gas at 21.1°C (70°F) and 1 atm (air = 1)	3.48	3.48
Density of liquid at 25°C (77°F)	122 kg/m ³	7.62 lb/ft ³

9 Analytical Procedures (See Note 5)

9.1 *Other Chlorosilanes* — This procedure is for the determination of other chlorosilanes (monochlorosilane, trichlorosilane and silicon tetrachloride) in dichlorosilane using a gas chromatograph with a thermal conductivity detector.

NOTE 5: The sample is extremely flammable and corrosive. Test for leaks before sampling. Ensure good electrical grounding.

9.1.1 *Detection Limit* — 10 ppm.

9.1.2 *Instrument Parameters*

9.1.2.1 *Column* — 3.05 m (10 ft.) by 3.2 mm (1/8 in.) stainless steel tubing packed with 20% OV-101 on 80/100 Chromosorb W-HP or equivalent.

9.1.2.2 *Carrier Flow* — 20 mL/min helium.

9.1.2.3 *Sample Volume* — 0.5 to 1.0 mL.

9.1.2.4 *Temperatures*

- *Detector* — 350°C.
- *Column* — 60°C ramped to 325°C at 10°C/min.