

SEMI PV37-0912 (Reapproved 1018) GUIDE FOR FLUORINE (F₂), USED IN PHOTOVOLTAIC APPLICATIONS

This Standard was technically approved by the Photovoltaic – Materials Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on August 17, 2018. Available at www.semiviews.org and www.semi.org in October 2018; originally published September 2012.

1 Purpose

1.1 This Document provides suggested maximum impurity level for fluorine (F₂) that is used in the photovoltaic industry.

2 Scope

2.1 This Document provides suggested values for grades of fluorine (F₂) used in the photovoltaic industry.

2.2 This Document refers to an ‘as supplied’ product; not point of use. Its quality is determined in a gaseous phase, at a delivery point agreed between the supplier and user.

2.3 This Document is a guide and complete analytical methods are not contained within.

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 Fluorine is a pale yellow gas with a pungent odor.

4 Referenced Standards and Documents

4.1 *SEMI Standards and Safety Guidelines*

SEMI C10 — Guide for Determination of Method Detection Limits

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

5 Terminology

5.1 *Abbreviations and Acronyms*

5.1.1 FTIR — Fourier transform infrared spectroscopy

6 Properties of Fluorine

Table 1 Properties of Fluorine

Molecular Formula	F ₂
CAS Number	7782-41-4
Molecular weight	18.998
Boiling point at 1 atm.	−188.12°C
Density of gas at 0°C and 1 atm.	1.696 kg/m ³

7 Suggested Values for Fluorine

7.1 Suggested values for fluorine for ‘on-site’ production and cylinders delivery for PV Grade 1 are listed in Table 2

Table 2 Suggested Values for Fluorine

<i>Grade</i>		<i>PV Grade 1</i>	<i>PV Grade 1</i>
		<i>'On-Site' Production</i>	<i>Cylinders Delivery</i>
		99.9%	99.9%
<i>Impurities</i>	<i>Suggested Technique^{#1}</i>	<i>Maximum Level (ppm-v)</i>	<i>Maximum Level (ppm-v)</i>
Carbon Dioxide (CO ₂)	FTIR	10	10
Carbon Tetrafluoride (CF ₄)	FTIR	100	100
Hydrofluoric Acid (HF)	FTIR	20	100

#1 Unless otherwise indicated, the method detection limits will be determined using SEMI C10, resulting in value that will be less than or equal to the Maximum Level for each impurity. Analytical methods should be selected accordingly. Known analytical interferences should be considered.

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