

# ESD Fluid Handling Solutions

*Mitigate electrostatic risks with a complete pathway from tubing to ground*

In response to the industry's drive toward smaller line widths and increased purity requirements, Entegris continues to develop new solutions that reduce our customers' operating costs, improve the value of their chemical product, and help maintain safe, clean chemical delivery from chemical manufacture to point of use. Our latest innovations, electrostatic dissipative (ESD) fittings and tubing, prevent harmful and costly electrostatic charge accumulation and discharges on the wafer and in semiconductor chemical delivery systems.

For advanced-node manufacturers, the risk posed by electrostatic discharge has become amplified with the use of flammable solvents and other nonconductive semiconductor chemistries in fluoropolymer systems. Applying our deep knowledge of advanced materials science and microcontamination control, we have developed a conductive PFA system of tubing and fittings that reduces electrical charge accumulation in process chemicals that can directly damage semiconductor devices on the wafers. In addition to helping achieve optimum wafer yield, by reducing the risk of electrostatic charge accumulation, these conductive PFA components can help improve the safety of the entire fluid system by reducing electronic failures in other products in the flow path like flowmeters and pressure transducers.

## Fully Conductive PFA System

To address the industry's need to remove charge from the process chemicals and control contamination, we introduce a fully conductive system to overcome the many challenges presented by electrostatic hazards including reduced safety and financial risk. FluoroLine® Plus ESD tubing and PrimeLock® ESD fittings are designed from a conductive PFA material that combines high conductivity with high purity and meets the stringent safety and chemical cleanliness requirements semiconductor manufacturers demand.

The tubing has conductive PFA stripes on the tube inside diameter (ID). The fittings use a conductive PFA material to create a path to ground when the fitting sealing area contacts the tubing



*Fluid solutions continuously protected from electrostatic discharge*

conductive stripe. This new approach removes charge from the media, reduces required ground wiring, maintains tubing strength, and allows an uninterrupted dissipation path to ground throughout the entire fluid circuit.

## FluoroLine Plus ESD Tubing

The conductive PFA stripes on the tube ID are made with proprietary manufacturing equipment and processes. This innovative solution reduces the accumulated electrostatic charge from both the media flowing through the tubing as well as charge that might build up inside the tube, mitigating safety risks.

Our cutting-edge manufacturing process of co-extruding ultrapure, conductive PFA and virgin PFA materials creates a smooth, internal surface. Co-extruding also eliminates the risk of the conductive stripes delaminating, which ensures process chemical integrity.

## PrimeLock ESD tube fittings

We have supplied innovative connection technology into the high-purity chemical handling markets for more than three decades. Leveraging our premier PrimeLock tube fitting platform of clean, robust, very easy to assemble fittings, we now bring ESD protection closer to the wafer. These ultrapure, conductive PFA fittings direct charge buildup from the media and more effectively remove electrostatic charge from the entire flow path.

## PrimeLock ESD Valves

Our ESD valves offer reliable performance that mitigates catastrophic electrostatic events. Combined with our ESD tubing and ESD tube fittings, these valves create a complete path to ground, safely discharging electrostatic potential without any possibility of damage to components, wafers, or equipment. Each valve is made from ultra-pure conductive PFA, which mitigates contamination risks from particulates or extractables. ESD valves have the same seal-ability and reliability that is expected with the virgin PFA versions.

## PrimeLock ESD Fitting Grounding Straps

Specially designed straps provide a secure grounding connection point to the ESD fittings, ensuring an effective charge dissipation path from the tube ID to equipment or facility ground. Made from durable, corrosion-resistant stainless steel, the grounding straps are designed for use with our PrimeLock ESD fittings, sizes ¼" to 1¼". A hex configuration is available for use with the PrimeLock ESD straight unions, and a round configuration is available for use with PrimeLock ESD elbow and tee unions.



*Safely grounds electrostatic charge that accumulates in the fluid delivery system*

## Complete Solution ESD Valves, Fittings, and Tubing

FluoroLine Plus ESD Tubing, PrimeLock ESD tube fittings, PrimeLock ESD Valves, and corresponding ESD grounding straps all combine to form a complete solution for risk mitigation related to electrostatic discharge. This system eliminates the contamination risks inherent to stainless steel fittings, tubing, and valves while also preventing ESD buildup. With unchecked ESD responsible for lower wafer yields, equipment damage, and hazards to personnel, semiconductor foundries need a reliable and user-friendly system to minimize this source of risk.

## APPLICATIONS

- Flammable chemistries such as solvents and other nonconductive semiconductor chemistries
- High-purity, corrosive chemical handling
- Semiconductor applications including photolithography, bulk chemical delivery, wet etch and clean
- Solar, LED, flat panel display

## FEATURES & BENEFITS

---

### ESD Solution

---

<b>Conductive, PFA construction</b>	Reduces ESD build up in the media and potential for catastrophic failures in flammable solvent applications  Provides a cleaner alternative to stainless steel systems, helping to maintain clean chemical delivery
<b>Valve, fitting, and tubing system</b>	Minimizes electrical breaks in the fluid system and eliminates the need for cumbersome ESD grounding jumper straps to maintain electrical continuity around nonconductive components, simplifying system design and installation  The addition of ESD valves provides complete continuity throughout the fluid handling system, reducing the need for multiple ground points

---

### PrimeLock Tube Fittings

---

<b>Fully conductive PFA fitting body with attached grounding strap</b>	Conveniently directs the electrical potential safely to ground and maintains complete electrical continuity
<b>PrimeLock fitting connection technology</b>	Provides superior pressure and temperature performance while maintaining clean chemical delivery
<b>Elbow, straight, tee, and minimum tube union configurations in ¼" to 1¼" sizes</b>	Enables ease and flexibility in the system makeup  Allows versatility in the fluid handling system design

---

### FluoroLine Plus Tubing

---

<b>Conductive PFA stripes on the tube ID</b>	Dissipates charge from the media, reducing critical wafer defects and mitigating safety risks
<b>Co-extruded, conductive PFA and virgin-grade PFA materials</b>	Results in minimal metallic contamination that negatively impacts process yields  Eliminates delamination risk and potential entrapment areas, maintaining chemical purity
<b>Translucent PFA construction</b>	Allows visual inspection of the chemical flowing through the system

---

## ORDERING INFORMATION

### FluoroLine Plus ESD Tubing: part number

ESDT - - - - -

		<b>Wall thickness</b>
	<b>Tube size</b>	047 = 0.047" (1.194 mm) – for 1/4" tubing only
	250 = 1/4"	062 = 0.062" (1.575 mm)
	375 = 3/8"	075 = 0.075" (1.905 mm) – for 1 1/4" tubing only
	500 = 1/2"	
	750 = 3/4"	
	1000 = 1"	
	1250 = 1 1/4"	

### PrimeLock ESD Fittings: part number

P - - - - - K - 3E

		<b>Material</b>
		3E = Conductive PFA
		<b>Connection*</b>
		K = PrimeLock
	<b>Fitting size</b>	
	4 = 1/4"	12 = 3/4"
	6 = 3/8"	16 = 1"
	8 = 1/2"	20 = 1 1/4"
<b>Configuration</b>		
E = Elbow		
S = Straight		
T = Tee		
SMT = Straight minimum tube		

\*Not applicable for straight, minimum tube connections (PSMT).

### PrimeLock ESD Fitting Grounding Strap: part number

PGS - - - - -

		<b>Configuration</b>
		H = Hex – for use with PrimeLock ESD straight unions only
		R = Round – for use with PrimeLock ESD elbow and tee unions only
	<b>Fitting size</b>	
	4 = 1/4"	12 = 3/4"
	6 = 3/8"	16 = 1"
	8 = 1/2"	20 = 1 1/4"

Note: Order "PGS-8H" hex configuration for both 3/8" and 1/2" PrimeLock ESD straight union fittings.

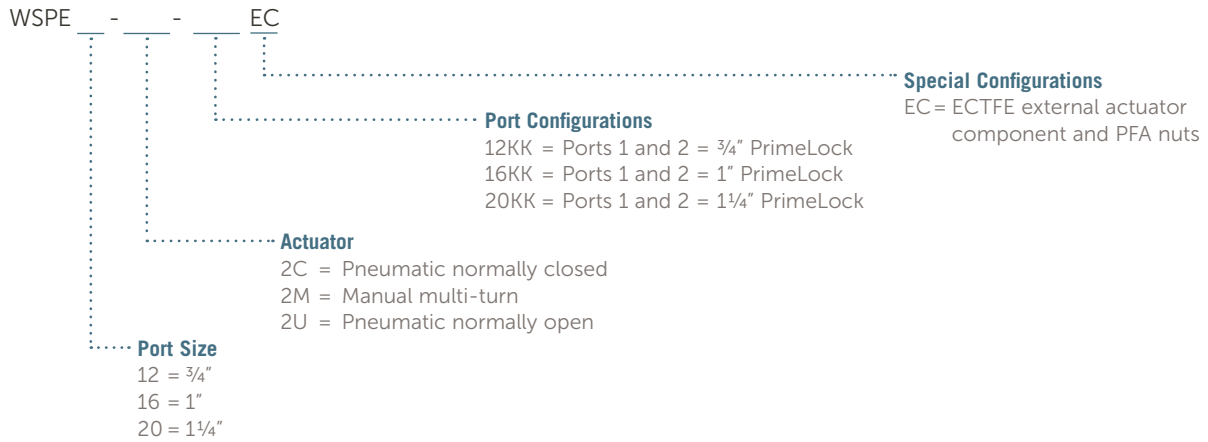
### PrimeLock ESD Valve Assembly: part number

Not all configurations are possible. Contact your Entegris sales representative if specific features are required.

CRE - - - - -

		<b>Port Configurations</b>
		4KK = Port 1 (inlet), Port 2 (outlet) 1/4" PrimeLock
		6KK = Port 1 (inlet), Port 2 (outlet) 3/8" PrimeLock
		8KK = Port 1 (inlet), Port 2 (outlet) 1/2" PrimeLock
		12KK = Port 1 (inlet), Port 2 (outlet) 3/4" PrimeLock
	<b>Actuator</b>	
	2C = 2-way normally closed tube	
	2CL = 2-way normally closed Luer pilot port	
	2CT = 2-way normally closed tube pilot port	
	2M = 2-way manual multi-turn	
	2MTL = 2-way manual toggle	
	2PM = 2-way manual multi-turn panel mount	
	2PMTL = 2-way manual toggle panel mount	
	2T = 2-way manual toggle	
	2U = 2-way normally open tube	
	2UL = 2-way normally open Luer pilot port	
	2UT = 2-way normally open tube pilot port	
	<b>Size</b>	
	4 = 1/4"	
	8 = 1/2"	

## Weir Style Plus ESD Assembly: part number



### FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit [entegris.com](https://www.entegris.com) and select the [Contact Us](#) link to find the customer service center nearest you.

### TERMS AND CONDITIONS OF SALE

All purchases are subject to Entegris' Terms and Conditions of Sale. To view and print this information, visit [entegris.com](https://www.entegris.com) and select the [Terms & Conditions](#) link in the footer.



#### Corporate Headquarters

129 Concord Road  
Billerica, MA 01821  
USA

#### Customer Service

Tel +1 952 556 4181  
Fax +1 952 556 8022  
Toll Free 800 394 4083

Entegris®, the Entegris Rings Design®, and other product names are trademarks of Entegris, Inc. as listed on [entegris.com/trademarks](https://www.entegris.com/trademarks). All third-party product names, logos, and company names are trademarks or registered trademarks of their respective owners. Use of them does not imply any affiliation, sponsorship, or endorsement by the trademark owner.

©2019-2026 Entegris, Inc. | All rights reserved. | Printed in the USA | 9000-10344ENT-0626