

## Technical Data Sheet

### Cri-plastMP™ PFA Electrically Conductive Compounds

Cri-plastMP™ PFA Electrically Conductive Compounds are formulated to meet your static dissipative/conductive, ATEX requirements in multiple applications. Specific grades can be processed by injection, extrusion, transfer molding, and compression molding. *Superior static dissipative compounds for real world applications.*

#### Special Features

- Improved electrical conductivity.
- Capable of ultra-high MIT Flex performance.
- Retains electrical conductivity even at 150% elongation.
- Retains stable conductivity over the entire PFA service temperature range (260 C).
- Non-marking/sloughing due to lower filler loading.
- Retains conductivity after regrinding.
- Drying not required.

#### Typical applications

- Tubing
- Linings
- Injection/Transfer Molding
- Sheet/film

#### Typical Property Data

	Test Method	Unit	Cri-plastMP™ PFA Compounds		
			PFA-1301 EC Extrusion / Injection	PFA-1201 EC Tubing/Film	PFA-1101 EC Tubing/Pipe/ Lining
<b>Melt Flow Rate</b>	ASTM D-3307	g/10 min	4.5-5.5	~2-3	~1-2
<b>Melting Point (DSC)</b>	ASTM D-3307	°C	300 ~ 310	300 ~ 310	300 ~ 310
<b>Tensile strength</b>	ASTM D-3307	MPa	3200	3200	3400
<b>Tensile elongation</b>	ASTM D-3307	%	~280	~280	~280
<b>Specific gravity</b>	ASTM D-3307	-	~2.14	~2.14	~2.14
<b>Electrical Conductivity</b>	ANSI/ESD STM11.11	ohm/sq.	~1000	~1500	~4500
<b>MIT Flex</b>	**		TBD	Up to 180,000	Up to 250,000

\*\* 2.5lb load. Sample thickness ~.2mm

#### Mechanical properties

Cri-plastMP™ PFA Electrically Conductive Compounds are capable of achieving higher MIT Flex performance than conventional carbon black compounds.

Compound	MFI 372 C, g/10 min	MIT Flex 2.5lb load. Sample thickness ~.2mm
Carbon black filled conductive PFA	1 to 2.5	< 85,000
Cri-plastMP™ PFA conductive compound	1 to 2.5	<b>120 to 420,000</b>

## Electrical properties

Cri-plastMP™ PFA Electrically Conductive Compounds are designed for real application use, not just datasheet properties.

### Elongation:

Do your electrically conductive products have an elongation specification? Do the raw materials used retain their conductivity at these elongation values ... probably not. Cri-plastMP™ compounds retain their conductivity even at 150% elongation. Conventional carbon filled products do not.

Compound	ohm @ 0% elongation	ohm @ 100% elongation	ohm @ 150% elongation
Carbon black filled conductive PFA	3.30E+04	> 1.0E11	> 1.0E11
Cri-plastMP™ PFA conductive compound	4.80E+02		3.60E+03

**\*CB product loses conductivity**

### Elevated Temperatures:

Changes in Temperature are a fact of life. You design you materials to operate at elevated temperature, why wouldn't you do the same for your static dissipative performance?

Cri-plastMP™ compounds retain their conductivity even at 150 C. Conventional carbon filled products do not.

Temperature	CB filled	Cri-plastMP blend*
(°C)	(ohm)	(ohm)
50	518000	28000
100	556000	29000
125	666000	30000
150	1700000	39000

\*Note: The Cri-plastMP was used as a masterbatch and letdown at low levels with carbon black. Cri-plastMP compounds exhibit very little change in resistivity, even at elevated temperatures.

## Processing Guidance

### Molding

PFA can generate traces of highly corrosive gas when it decomposes at the molding temperature, requiring materials of construction with outstanding corrosion and heat resistance for extrusion and injection-molding equipment used for molding.

### Extrusion molding

In extrusion, covered electrical wire, pipe, tubing, monofilament, film, etc. can be formed by extrusion. Extruders with a cylinder diameter from 30 to 65 mm are most commonly used. A rapid compression type screw with an L/D ratio of 20 to 25 and compression ratio of 2.5 to 3.0 is also used.

#### Tubing Extrusion Molding Conditions

Grade	Cri-plastMP™
<b><i>Final product</i></b>	
Tubing I.D.	8.5
Tubing O.D.	10.5
Tubing thickness	0.1
<b><i>Extruder</i></b>	
barrel diameter	25
screw L/D	20
compression ratio	2.8
screw type	Gradual transition
<b><i>Die die I.D./tip O.D.</i></b>	8.5/4.5
Temperature (°C)	
rear	350
middle	-
front	380
Die head	400
tip	420
<b><i>Screw speed (rpm)</i></b>	14
<b><i>Draw-down ratio</i></b>	1.36*
<b><i>Insulating speed (m/min.)</i></b>	0.5

\*Note: drawdown can negatively affect tube conductivity

### Injection molding

Higher flow grades of Cri-plastMP™ PFA compounds can be injection molded. A screw-type molding machine is generally used, and the spool, runner, and gate must be made slightly thicker than normal, as short as possible, and have the cross section nearly circular to reduce molding strain. Hard chromium plated dies are generally used.

### Transfer molding

Pipe, valves, joints, and other linings for the chemical industry, etc. can be formed by transfer molding PFA. Components subject to lining processing, such as pipes and valves, are used for the outer die or inner die, and are heated to temperatures that exceed the melting point. PFA resin that has been separately melted inside the cylinder is pressure-fed into the components and cooled while under pressure. Components can be molded at die temperatures of 350 to 370 °C and resin temperatures of 350 to 390 °C.

**Safety:**

When PFA resins are heated to temperatures above 300 °C, some decomposition products may be given off. These decomposition products may be harmful, and inhalation of these fumes must be avoided. Ovens, process equipment and working area must be adequately ventilated. For further information, please refer to the material safety data sheet for these products and the Guide to the Safe Handling of Fluoropolymer Resins published by SPI Inc., The Society of Plastics Industry, Inc., 1801 K Street, NW, Suite 600K, Washington, DC, 20006-1301 (202-972-5200).

**Caution:**

Studies have indicated that Fluoropolymers begins to degrade at 420°C and liberate HF, which is corrosive to metal surfaces. Therefore, the resident time in extruders or other molding machines should be held to the minimum. Care should be taken not to overheat molding pellets during processing. In addition, adequate mechanical ventilation should be provided and personnel should be cautioned against inhaling the fumes liberated during processing. All surfaces of the molding machine that come in contact with melting this resin should be made of corrosion resistant materials.

## Important Notice

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The information contained herein is based on technical data and tests we believe to be reliable and is intended for use by persons having technical knowledge and skill, solely at their own discretion and risk. Since conditions of use are outside of our control, we assume no responsibility for results obtained or damages incurred through application of the data given. The publication of the information herein shall not be understood as permission or recommendation for the use of our fluorocarbon compounds in violation of any patent or otherwise. We only warrant that the product conforms to description and specification, and our only obligation shall be to replace goods shown to be defective or refund the original purchase price thereof.

**MEDICAL USE:** These products are not specifically designed or manufactured for use in implantable medical and/or dental devices. They have not been tested for such applications and will only be sold for such use pursuant to contract containing specific terms and conditions required by us

## Packaging

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Cri-plastMP™ PFA Electrically Conductive Compounds are provided in pellet form and packaged in 25 and 50kg packages.

**For more information, visit [www.critechinc.com](http://www.critechinc.com)**

**For sales and technical support contact us at:**

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