

# Product Update Memo

SENSORS & CONTROLS PRODUCTS

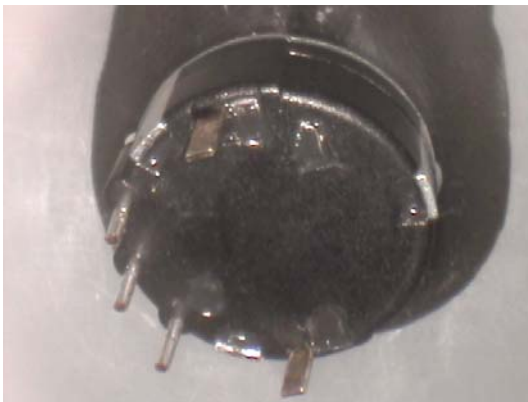
May, 2006

Bourns Manufacturers Representatives  
Corporate Distributor Product Managers  
Americas Sales Team  
Asia Sales Team  
Europe Sales Team  
Bourns Internal  
Bourns Plant Managers

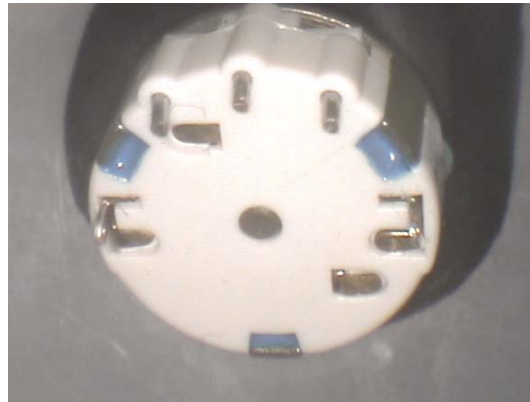
## Bourns® Sensors & Controls Division Announces Model 39 Material Change

Sensors and Controls Division will be changing the plastic material used in molding the housing of our [Model 39](#). A change will be made from Fortron 6165A4 to Thermocomp® OF-1008 due to phase out of Fortron material at our current supplier and lack of availability from other suppliers.

Traditionally, the rotary switch and non-switch versions were made with natural colored Fortron, while the push switch version has been made with black colored Fortron. Please see the photos below.



*Fortron Black*



*Fortron Natural*

In transitioning to the Thermocomp® material, we will discontinue the use of natural color material. The housings for both switch and non-switch versions will be black in color. There is no change to fit, form, or function.

The transition to Thermocomp® material will begin the week of May 8, 2006. Thermocomp® is a UL rated (V-0) engineering material. Attached you will find data sheets for both Fortron and Thermocomp® plastics. The UL certification for Thermocomp is QMFZ2.E45195 and is available on the UL website at [www.ul.com](http://www.ul.com).


**FORTRON 6165A4 | PPS-X65 | Mineral / Glass Reinforced**
**Description**

Fortron 6165A4 offers a unique balance of properties based on a high mineral and glass reinforced composition. The heat resistance under load bearing conditions is excellent for this product. As with all Fortron grades this product is inherently flame-retardant. Applications include electronic components (i.e. lamp houses, connection parts and sockets) and components in industry (i.e. pumps and pistons).

**Physical properties**

	<b>Value Unit</b>	<b>Test Standard</b>
Density	<b>1950</b> kg/m <sup>3</sup>	ISO 1183
Molding shrinkage (parallel)	<b>0.2 - 0.6</b> %	ISO 294-4
Molding shrinkage (normal)	<b>0.3 - 0.7</b> %	ISO 294-4
Water absorption	<b>0.02</b> %	ISO 62

**Mechanical properties**

	<b>Value Unit</b>	<b>Test Standard</b>
Tensile modulus	<b>19000</b> MPa	ISO 527-2/1A
Stress at break (5mm/min)	<b>130</b> MPa	ISO 527-2/1A
Strain at break (5mm/min)	<b>1.2</b> %	ISO 527-2/1A
Flexural modulus (23 °C)	<b>18800</b> MPa	ISO 178
Flexural stress @ break	<b>210</b> MPa	ISO 178
Charpy impact strength (+23 °C)	<b>20</b> kJ/m <sup>2</sup>	ISO 179/1eU
Charpy impact strength (-30 °C)	<b>20</b> kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength (+23 °C)	<b>7</b> kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength (-30 °C)	<b>7</b> kJ/m <sup>2</sup>	ISO 179/1eA
Unnotched impact str (Izod) @ 23 °C	<b>20</b> kJ/m <sup>2</sup>	ISO 180/1U
Notched impact strength (Izod) @ 23 °C	<b>6</b> kJ/m <sup>2</sup>	ISO 180/1A
Notched impact strength (Izod) @-30 °C	<b>6</b> kJ/m <sup>2</sup>	ISO 180/1A
Rockwell hardness	<b>100</b> M-Scale	ISO 2039-2

**Thermal properties**

	<b>Value Unit</b>	<b>Test Standard</b>
Melting temperature (10 °C/min)	<b>280</b> °C	ISO 11357-1,-2,-3
Glass transition temperature (10 °C/min)	<b>90</b> °C	ISO 11357-1,-2,-3
Temp. of deflection under load (1.80 MPa)	<b>270</b> °C	ISO 75-1/-2
Temp. of deflection under load (8.00 MPa)	<b>215</b> °C	ISO 75-1/-2
Coeff.of linear therm. expansion (parallel)	<b>0.19</b> E-4/°C	ISO 11359-2
Coeff.of linear therm. expansion (normal)	<b>0.24</b> E-4/°C	ISO 11359-2
Oxygen index	<b>53</b> %	ISO 4589
Burning Behav. at 1.6mm nom. thickn.(ISO 1210)	<b>V-0</b> class	UL94
Thickness tested	<b>1.5</b> mm	UL94
Burning Behav. at thickness h (ISO 1210)	<b>V-0</b> class	UL94
Thickness tested	<b>0.75</b> mm	UL94
Burning Behav. 5V at thickn. H (ISO 10351)	<b>5VA</b> class	UL94
Thickness tested	<b>3</b> mm	UL94

**Electrical properties**

	<b>Value Unit</b>	<b>Test Standard</b>
Relative permittivity - 10kHz	<b>5.4</b> -	IEC 60250
Relative permittivity (1 MHz)	<b>5.6</b> -	IEC 60250
Dissipation factor - 10kHz	<b>10</b> E-4	IEC 60250
Dissipation factor (1 MHz)	<b>20</b> E-4	IEC 60250
Volume resistivity	<b>&gt;1E15</b> Ohm*m	IEC 60093
Surface resistivity	<b>&gt;1E15</b> Ohm	IEC 60093
Electric strength	<b>25</b> kV/mm	IEC 60243-1
Comparative tracking index	<b>175</b> -	IEC 60112

**Test specimen production**

	<b>Value Unit</b>	<b>Test Standard</b>
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Injection Molding, melt temperature	<b>310 - 340 °C</b>	ISO 294
Injection Molding, mold temperature	<b>135 - 160 °C</b>	ISO 294

Rheological Calculation properties	Value Unit	Test Standard
Spec. heat capacity of melt	<b>1600 J/(kg K)</b>	Internal

### Other Processing

#### Injection Molding

On injection molding machines with 15-25 D long three-section screws, are usual in the trade, the unreinforced FORTRON is processable. A shut-off nozzle is preferred to a free-flow nozzle.

Melt temperature	320-340	degC
Mold wall temperature	at least 140	degC

A medium injection rate is normally preferred. All mold cavities must be effectively vented.

#### Disclaimer

NOTICE TO USERS: Values shown are based on testing of laboratory test specimens and represent data that fall within the standard range of properties for natural material. These values alone do not represent a sufficient basis for any part design and are not intended for use in establishing maximum, minimum, or ranges of values for specification purposes. Colorants or other additives may cause significant variations in data values. Properties of molded parts can be influenced by a wide variety of factors including, but not limited to, material selection, additives, part design, processing conditions and environmental exposure. Any determination of the suitability of a particular material and part design for any use contemplated by the users and the manner of such use is the sole responsibility of the users, who must assure themselves that the material as subsequently processed meets the needs of their particular product or use. To the best of our knowledge, the information contained in this publication is accurate; however, we do not assume any liability whatsoever for the accuracy and completeness of such information. The information contained in this publication should not be construed as a promise or guarantee of specific properties of our products. It is the sole responsibility of the users to investigate whether any existing patents are infringed by the use of the materials mentioned in this publication. Moreover, there is a need to reduce human exposure to many materials to the lowest practical limits in view of possible adverse effects. To the extent that any hazards may have been mentioned in this publication, we neither suggest nor guarantee that such hazards are the only ones that exist. We recommend that persons intending to rely on any recommendation or to use any equipment, processing technique or material mentioned in this publication should satisfy themselves that they can meet all applicable safety and health standards. We strongly recommend that users seek and adhere to the manufacturer's current instructions for handling each material they use, and entrust the handling of such material to adequately trained personnel only. Please call the telephone numbers listed listed (+49 (0) 69 30516299 for Europe and +1 908 598-4169 for the Americas) for additional technical information. Call Customer Services for the appropriate Materials Safety Data Sheets (MSDS) before attempting to process our products. The products mentioned herein are not intended for use in medical or dental implants.



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Thursday

## Thermocomp® OF-1008

LNP Engineering Plastics Inc. - Polyphenylene Sulfide

### Actions

-- - ISO Data Sheet

### Product Characteristics

Material Status	● <b>Commercial: Active</b>
Availability	● North America
Test Standards Available	● ASTM
Filler/Reinforcement	● Glass fiber reinforcement
Forms	● Pellets
Processing Method	● Injection Molding

### Properties <sup>1</sup>

Physical	Nominal Values (English)	Test Method
Density -Specific Gravity (Method A)	1.70 sp gr 23/23 °C	ASTM D792
Mold Shrink, Linear-Flow	0.0030 in/in	ASTM D955
Mold Shrink, Linear-Trans	0.010 in/in	ASTM D955

Mechanical	Nominal Values (English)	Test Method
Tensile Strength @ Break	23300 psi	ASTM D638
Tensile Elongation @ Brk	1.5 %	ASTM D638
Flexural Modulus	2060000 psi	ASTM D790
Flexural Strength	34000 psi	ASTM D790
Coef. of Friction		ASTM D1894
(vs. Steel - Dynamic)	0.41	
(vs. Steel - Static)	0.50	
Wear Factor (10 <sup>-10</sup> ) (40 psi, 50 ft/min)	373 in <sup>5</sup> -min/ft-lb-h	

Impact	Nominal Values (English)	Test Method
Notched Izod Impact (0.125 in)	1.80 ft-lb/in	ASTM D256
Unnotched Izod Impact (0.125 in)	9.82 ft-lb/in	ASTM D256

Thermal	Nominal Values (English)	Test Method
DTUL @264psi - Unannealed	508 °F	ASTM D648

### Additional Properties

The values displayed above as Coef. of Friction and Wear Factor were tested in accordance with LNP WI-0687.

COEFFICIENT OF FRICTION vs. Steel, Dynamic @ 40 psi, 50 ft/min, LNP WI-0687: 0.41

COEFFICIENT OF FRICTION vs. Steel, Static @ 40 psi, LNP WI-0687: 0.5

WEAR FACTOR @ 40 psi, 50 ft/min, LNP WI-0687: 373 10<sup>-10</sup> in<sup>5</sup>-min/ft-lb-hr

### Processing Information

Injection Molding Parameters	Nominal Values (English)	Test Method
Drying Temperature	250 to 300 °F	
Drying Time	4.0 hr	
Processing (Melt) Temp	600 to 610 °F	
Mold Temperature	275 to 325 °F	
Back Pressure	25.0 to 50.0 psi	

### Notes

<sup>1</sup> Typical properties; not to be construed as specifications.

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