



# Power Supply Cord Research Update

June 13, 2006





# Research Details

- **Physical Examination**
- **Abrasion**
- **Flat or Twist Crushing**
- **Rod Crushing**
- **Mandrel Crushing (Max. Force)**
- **Mandrel Crush (7 hr.)**





# Abrasion

- **Five Samples Tested**
- **Grade ½ Emery Cloth Used**
- **Cord Examined Every 50 Cycles**
- **Emery Cloth Changed Every 800 Cycles.**
- **Number of Cycles to Abrade Through Outer Jacket and to Copper Conductors is Recorded**



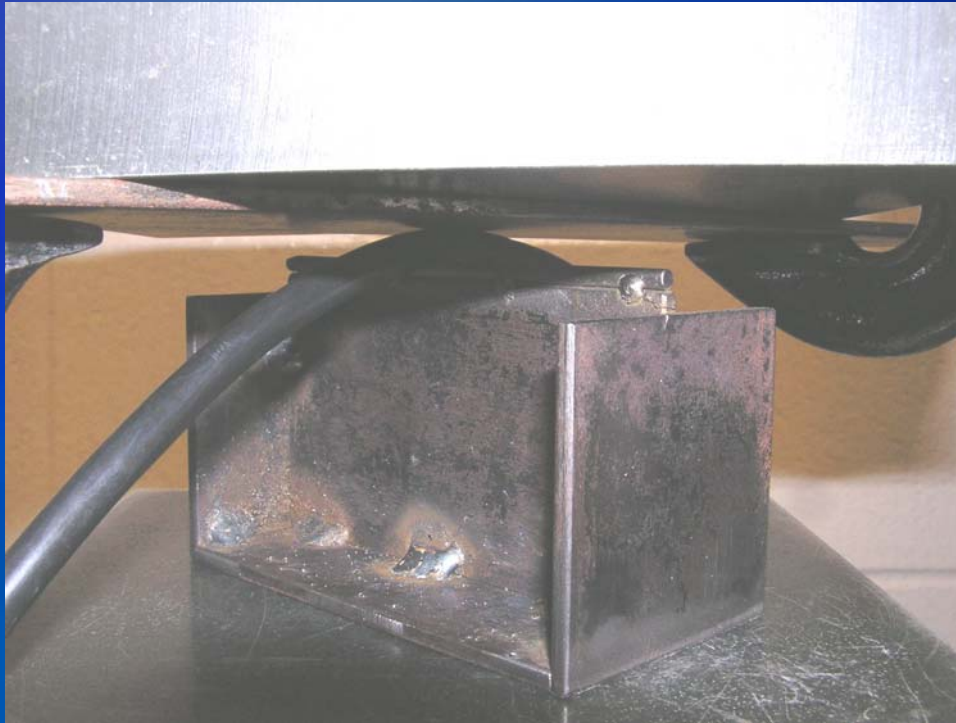
# Rod Crushing

- **Ten Samples Tested**
- **Cord Crushed between a Flat Plate and Cylindrical Rod**
- **Time to Conductor Short-Circuit is Recorded**





# Rod Crushing





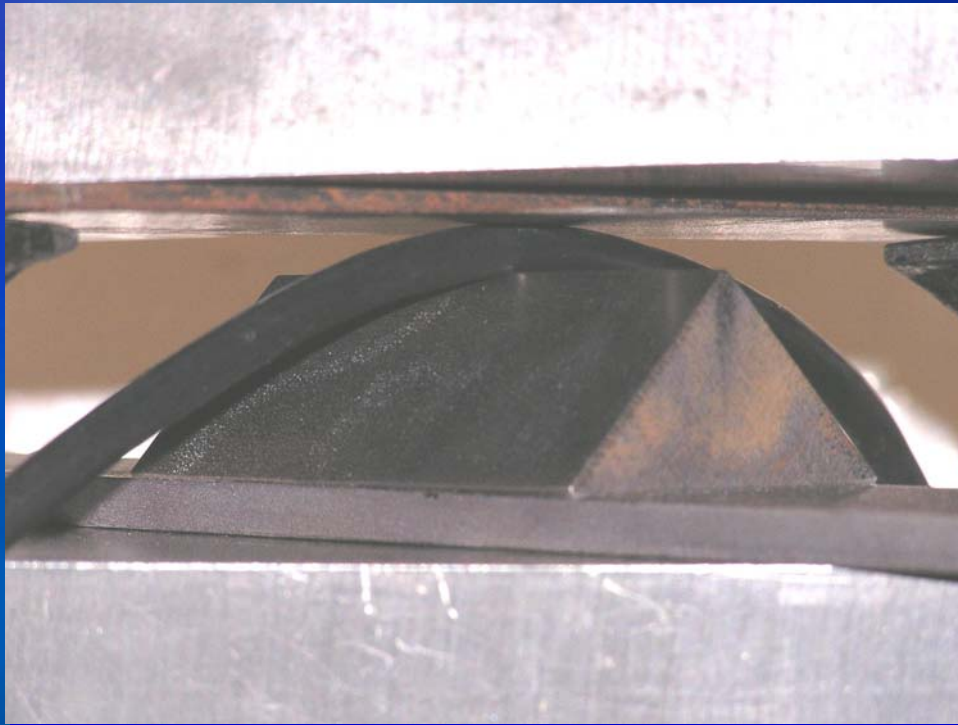
# Mandrel Crushing

- **Ten Samples Tested**
- **Cord Crushed between a Flat Plate and Mandrel**
- **Mandrel Possesses 1/16 in. Radius Tip**
- **Time to Conductor Short-Circuit is Recorded**





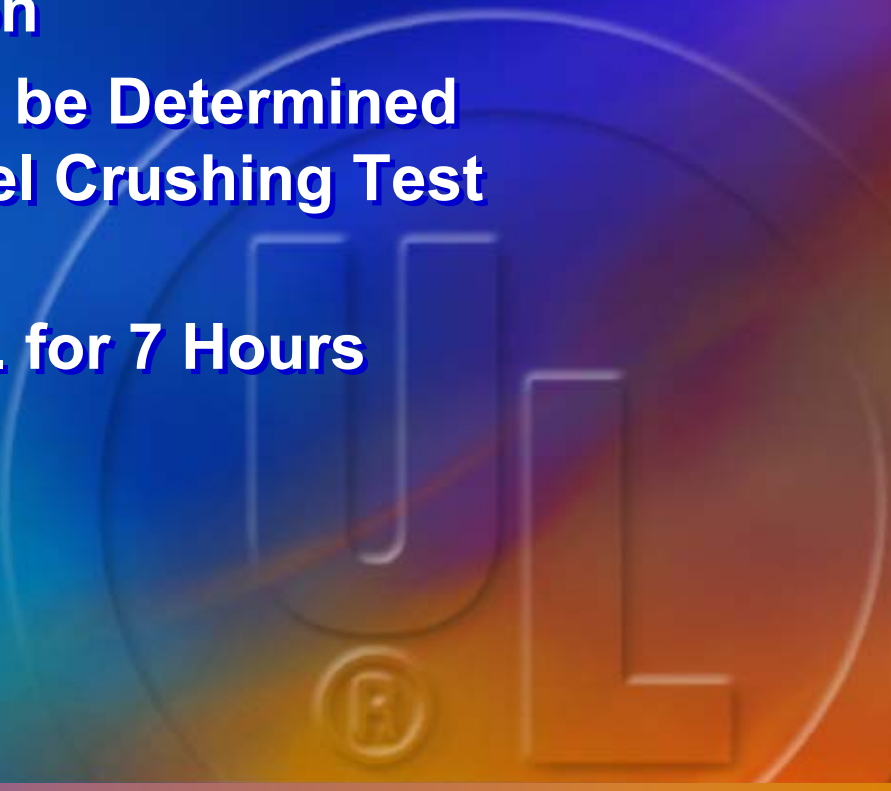
# Mandrel Crushing





# Flow

- **Five Samples Tested**
- **Proposed Original Value will Require Modification**
- **New Test Value will be Determined based Upon Mandrel Crushing Test Results**
- **Anticipated 200 lbs. for 7 Hours**





# Flat/Twist Crushing

- **Ten Samples Tested**
- **Cord Crushed between Two Flat Plates**
- **Round Cord Crushed “As Is”**
- **Flat Cord Crushed With  $\frac{1}{2}$  Turn So That Conductors Cross**



# Samples Received

	Samples Received
<b>SPT</b>	12
16	5
18	7
<b>HPN</b>	17
16	13
18	4
<b>SJT</b>	12
16	4
18	8
<b>SVT</b>	19
17	10
18	9
<b>TOTAL</b>	120





# Abrasion Results – HPN

<b>Sample 1</b>	<b>888</b>
<b>Sample 2</b>	<b>1103</b>
<b>Sample 3</b>	<b>1715</b>
<b>Sample 4</b>	<b>1220</b>
<b>Sample 5</b>	<b>1170</b>
<b>Sample 6</b>	<b>3123</b>
<b>Sample 7</b>	<b>1486</b>
<b>Sample 8</b>	<b>1325</b>
<b>Sample 9</b>	<b>1560</b>
<b>Avg.</b>	<b>1510</b>



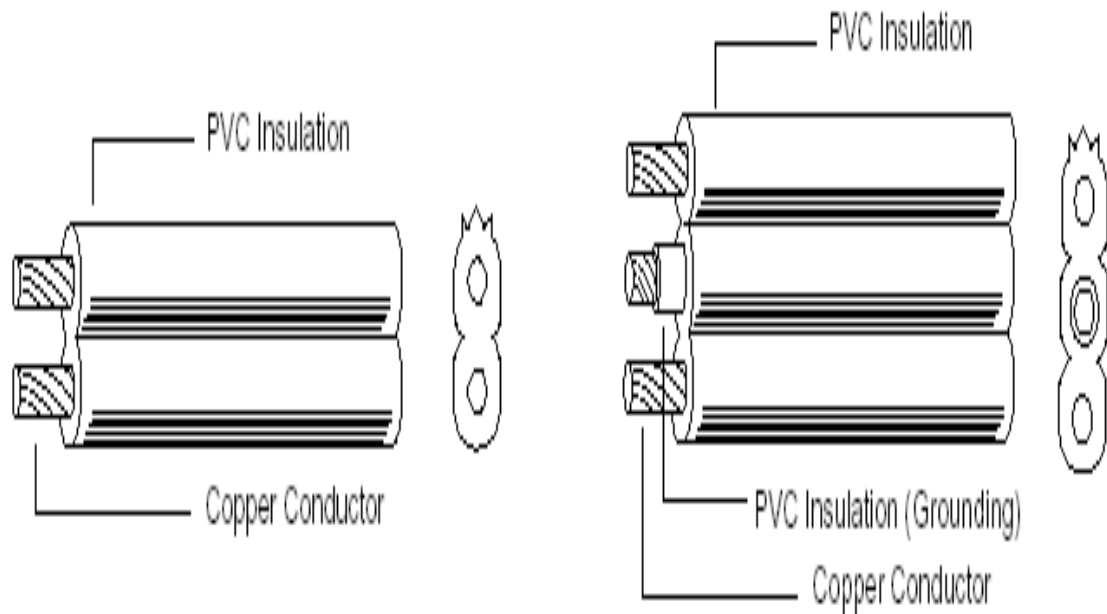



# Abrasion Results – SPT-2

<b>Sample 1 (16)</b>	<b>2365</b>
<b>Sample 2</b>	<b>2430</b>
<b>Sample 3</b>	<b>3392</b>
<b>Sample 4</b>	<b>5260</b>
<b>Sample 5</b>	<b>2617</b>
<b>Sample 6 (18)</b>	<b>2955</b>
<b>Sample 7</b>	<b>4864</b>
<b>Sample 8</b>	<b>6438</b>
<b>Sample 9</b>	<b>4391</b>
<b>Avg.</b>	<b>3857</b>



# SPT-2 Cross Sectional Diagram





# Physical Examination - Abrasion

		Av. Thickness	Min. Thickness
<b>HPN (16)</b>			
Manufacturer A	888	48	32
Manufacturer A	1103	48	41
Manufacturer B	1715	46	44
Manufacturer C	3123	47	43
<b>SPT-2 (16)</b>			
Manufacturer A	2365	46	42
Manufacturer D	5260	45	39
<b>SPT-2 (18)</b>			
Manufacturer A	2955	41	39
Manufacturer D	6438	46	43



# Crushing Results - HPN

	Rod Crushing	Mandrel Crushing
Sample 1 (16)	273	183
Sample 2	282	217
Sample 3 (18)	371	252
Sample 4	157	141
Sample 5	364	287
Avg.	289	216



# Crushing Results - SJT

	Rod Crushing	Mandrel Crushing
Sample 1 (16)	428	281
Sample 2	472	550
Sample 3 (18)	470	422
Avg.	457	418



# Crushing Results - SVT

	Rod Crushing	Mandrel Crushing
Sample 1 (17)	347	295
Sample 2	557	434
Sample 3	406	332
Sample 4	341	262
Sample 5	551	419
Sample 6 (18)	176	248
Sample 7	286	238
Sample 8	377	309
Sample 9	469	457
Sample 10	620	365
Avg.	413	336



# Observations

- **There Appears to be Significant Variance from One Manufacturer's Sample Set to Another within a given Cord Type**
- **Mandrel Crushing Appears to be More Severe than Rod Crushing – Results Lower by Approximately 25%**
- **SPT-2 Appears to Give Stronger Abrasion Resistance Than HPN**