## TTF3 Coupler Metrology Report

### Inspection of Cold Part 3964328/A.000

<table>
<thead>
<tr>
<th>Item</th>
<th>Inspection Criteria</th>
<th>DESY Print Number</th>
<th>LAL Print Number</th>
<th>Findings</th>
<th>Pass</th>
<th>Fail</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visual: Nicks, scratches, proper edge chamfers</td>
<td>3964328/A.003</td>
<td>I5-3D-1250</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Visual: Weld form, size, and porosity</td>
<td>3964328/A.000</td>
<td>I5-2E-1200</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Visual: Brazing: irregularities, centering of groove, buildup Ceramic: metallization borderline, coverage, chamfer</td>
<td>3964328/A.200</td>
<td>I5-3S-1260 &amp; 3964328/A.201</td>
<td>X</td>
<td></td>
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<tr>
<td>4</td>
<td>Visual: Ceramic: discoloring, lines, sheen</td>
<td>3964328/A.200</td>
<td>I5-3S-1260 &amp; 3964328/A.201</td>
<td>X</td>
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<tr>
<td>6</td>
<td>Visual: Copper sleeves: screw mark orientation</td>
<td>3964328/A.000</td>
<td>I5-2E-1200</td>
<td>X</td>
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<tr>
<td>7</td>
<td>Visual: Weldment: internal form, irregularities, mating point concentricity</td>
<td>3964328/A.000</td>
<td>I5-2E-1200</td>
<td>X</td>
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<tr>
<td>8</td>
<td>Visual: Brazing: irregularities, braze buildup</td>
<td>3964328/A.300</td>
<td>I5-2S-1220</td>
<td>X</td>
<td></td>
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<tr>
<td>9</td>
<td>Visual: Copper sleeves: screw mark orientation</td>
<td>3964328/A.301</td>
<td>I5-2D-1221</td>
<td>X</td>
<td></td>
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<tr>
<td>10</td>
<td>Visual: DN2S: scratches, damaged knife edge, proper chamfer</td>
<td>3964328/A.000</td>
<td>I5-2E-1200</td>
<td>X</td>
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<td></td>
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<tr>
<td>11</td>
<td>Visual: Bellows: uniformity, black lines, weldments</td>
<td>3964328/A.400</td>
<td>I5-3D-1241</td>
<td>X</td>
<td></td>
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<tr>
<td>12</td>
<td>Visual/Borescope: 2 split-rings; brazing, threaded helicoll</td>
<td>4964328/A.501</td>
<td>I5-4D-1234</td>
<td>X</td>
<td></td>
<td></td>
<td>Depth 3.6 ± 0.05 is undersized &lt;3.501</td>
</tr>
<tr>
<td>13</td>
<td>Visual/Borescope: Joint surface: scratches, round off, adequate copper plating</td>
<td>3964328/A.001</td>
<td>I5-3D-1233</td>
<td>Inspection Report for CP3C42</td>
<td>X</td>
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<tr>
<td>14</td>
<td>CM: 16 threaded holes on the large flange perimeter</td>
<td>3964328/A.301</td>
<td>I5-2D-1221</td>
<td>Inspection Report for CP3C42</td>
<td>X</td>
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<tr>
<td>15</td>
<td>Borescope: Edge ceramic: irregularities, lines, sheen</td>
<td>3964328/A.200</td>
<td>I5-3S-1260</td>
<td>Clean</td>
<td>X</td>
<td></td>
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<tr>
<td>16</td>
<td>Borescope: Weldment: internal form, irregularities, penetration</td>
<td>3964328/A.000</td>
<td>I5-2E-1200</td>
<td>Videoscope Inspection</td>
<td>X</td>
<td>The usual scratches</td>
<td></td>
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<tr>
<td>17</td>
<td>Borescope: Ridge chamfer of DN16</td>
<td>3964328/A.000</td>
<td>I5-2E-1200</td>
<td>Videoscope Inspection</td>
<td>X</td>
<td>Clean port</td>
<td></td>
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<tr>
<td>18</td>
<td>Borescope: Form of external conductor copper, lines, scratches, discoloration</td>
<td>3964328/A.000</td>
<td>I5-2S-1230</td>
<td>Videoscope Inspection</td>
<td>X</td>
<td>Slight Discolorations</td>
<td></td>
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<tr>
<td>19</td>
<td>Borescope: Form of internal conductor copper, lines, scratches, color</td>
<td>3964328/A.003</td>
<td>I5-3D-1250</td>
<td>Videoscope Inspection</td>
<td>X</td>
<td>Usual Brush Marks</td>
<td></td>
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<tr>
<td>20</td>
<td>Borescope: Internal and external, scratches, form surface finish</td>
<td>3964328/A.003</td>
<td>I5-3D-1250</td>
<td>Videoscope Inspection</td>
<td>X</td>
<td>Usual Brush Marks</td>
<td></td>
</tr>
</tbody>
</table>
### Angular Alignment of Cold Part Large Flange to Small Flange

**Serial Number:** CP3C42  
**Inspector:** Keith Caban (CMM)  
**Date:** 11/12/2007

<table>
<thead>
<tr>
<th>Item</th>
<th>az (degrees)</th>
<th>Circumferential Shift (mm) on Radius 76mm of Large Flange</th>
<th>Findings</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>179.86</td>
<td></td>
<td>E-Pickup Flange is on -Y side along w/ #1</td>
<td></td>
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<tr>
<td>2</td>
<td>279.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.01</td>
<td></td>
<td>Start Angle @ 0'</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>90.21</td>
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**Inspection of Warm Part 2988356/A.000**

<table>
<thead>
<tr>
<th>Item</th>
<th>Inspection Criteria</th>
<th>DESY Print Number</th>
<th>LAL Print Number</th>
<th>Findings</th>
<th>Pass</th>
<th>Fail</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visual: Scratches, flange knife edge damage, chamfer</td>
<td>2988356/B.001</td>
<td>65-2D-131</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Visual: Edge profiles broken/smooth</td>
<td>2988356/B.001</td>
<td>65-2D-131</td>
<td>X</td>
<td></td>
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<tr>
<td>3</td>
<td>Visual: Copper Sleeves: screw mark locations</td>
<td>3988356/D.002</td>
<td>65-4D-1122</td>
<td>X</td>
<td></td>
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<tr>
<td>5</td>
<td>Visual: Brazing: traces ceramic: metallization borderline, chamfer, lines</td>
<td>3988356/D.000</td>
<td>65-3S-1120</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Visual: Traces ceramic: discoloring, lines, sheen</td>
<td>3988356/D.000</td>
<td>65-3S-1120</td>
<td>X</td>
<td></td>
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<tr>
<td>9</td>
<td>CMM: O.D. of ring</td>
<td>2088356/A.000</td>
<td>65-1E-1100 Inspection Report for CP3C42</td>
<td>X</td>
<td></td>
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<td></td>
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<tr>
<td>10</td>
<td>Visual: Scratches, knife edge damage, chamfer</td>
<td>1988356/C.002</td>
<td>65-1S-1110</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>11</td>
<td>Visual: Scratches, knife edge damage, chamfer</td>
<td>1988356/C.002</td>
<td>65-1S-1110</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>12</td>
<td>Borescope: Brazed tips of main body rounded off</td>
<td>2988356/B.000</td>
<td>65-05-1130 Slight Steel Brush Marks</td>
<td>X</td>
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<tr>
<td>13</td>
<td>CMM: O.D. &amp; depth of o-ring and gland</td>
<td>3964328/C.005</td>
<td>65-3D-1115 Inspection Report for CP3C42</td>
<td>X</td>
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<tr>
<td>14</td>
<td>Borescope: Bellow: shocks, black lines, welding residues</td>
<td>3964328/C.100</td>
<td>65-3S-1116 CLEAN</td>
<td>X</td>
<td></td>
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<tr>
<td>15</td>
<td>Visual: Scratches, ridge damaged, chamfer</td>
<td>2988356/A.000</td>
<td>65-1E-1100</td>
<td>X</td>
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<tr>
<td>17</td>
<td>Borescope: Control of ridge</td>
<td>3964328/C.100</td>
<td>65-3D-1138 CLEAN</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>Other</td>
<td>2088356/A.000</td>
<td>65-1E-1100</td>
<td>X</td>
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<tr>
<td>19</td>
<td>Borescope: Internal surface of ceramic: irregularities, lines, sheen</td>
<td>3988356/D.000</td>
<td>65-3S-1120 CLEAN</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>20</td>
<td>Borescope: Weldment: internal form, irregularities, penetration</td>
<td>4988356/C.003</td>
<td>65-4D-1122 Rough but no defects</td>
<td>X</td>
<td></td>
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</tr>
</tbody>
</table>
21. Borescope: Round off of the internal ridge DN25
   2088356/C.100  85-2D-1111  CLEAN  X

22. Borescope: Round off of the internal ridge DN35
   2088356/C.100  85-2D-1111  CLEAN  X

23. Borescope: Round off of the internal ridge DN25
   3988356/B.002  85-3D-1132  Videoscope Inspection  X

24. Borescope: Round off of the internal ridge DN35
   3988356/C.100  85-2D-1111  CLEAN  X

25. Borescope: Round off of the internal ridge DN25
   3964328/B.100  85-3D-1138  Slight Steel Brush Marks  X

26. Borescope: Round off of the internal ridge DN35
   3964328/B.100  85-3D-1134  CLEAN  X

27. Borescope: Form of the internal conductor cavities
   2964328/C.001  85-3D-1113  Slight Steel Brush Marks  X

28. Borescope: Form of the internal conductor cavities
   2964328/B.100  85-3D-1138  Slight Steel Brush Marks  X

Angular Alignment of Pumping Port in Warm Part

Serial Number: CP3H41  Inspector: Keith Caban (CMM)  Date: 11/8/2007

<table>
<thead>
<tr>
<th>Item</th>
<th>Warm part</th>
<th>Measured Angle ( \phi ) (degrees)</th>
<th>Findings</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CMM: Hole # 1</td>
<td>Not measured at this stage due to bellows bow and no repeatability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CMM: Hole # 2</td>
<td>Not measured at this stage due to bellows bow and no repeatability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>CMM: Axis of Vacuum port to Big Flange orientation</td>
<td>Not measured at this stage due to bellows bow and no repeatability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>