Table of Contents

Chapter 1: Long Term Chemical Vapor Exposure Test ..........1
  Test Procedure ........................................................................................................ 1
  ChipCap 2 Chemical Resistivity ............................................................................ 2
    ChipCap 2 Chemical Resistivity ........................................................................... 2
  Chemical Exposure Test After Recondtion ............................................................ 3
    Acetone ((CH3)2CO) ............................................................................................ 3
    Ethanol (C2H5OH) .............................................................................................. 4
    Methanol (CH2OH) .............................................................................................. 4
    Ethanol + Methanol ............................................................................................. 4
    Formaldehyde (CH2O) ......................................................................................... 5
    Benzene (C6H6) .................................................................................................. 5
    Toluene (C7H8) .................................................................................................. 5
    Xylene (C8H10) .................................................................................................. 6
    Benzene + Toluene + Xylene ................................................................................. 6

Chapter 2: Saturation and Recovery Test .........................................................7
  Test Procedure ........................................................................................................ 7
  Saturation and Recovery Test at Ambient Condition ........................................... 7
  Saturation and Recovery Test with Recondtion Process ...................................... 8
    Di-isopropyl Ether ............................................................................................... 9
    Isopropyl Alcohol .............................................................................................. 10
    Ethylene Glycol ................................................................................................. 11
    Ethanol .............................................................................................................. 12
    Methanol .......................................................................................................... 13
    Butyl Acetate .................................................................................................... 14
    Ethyl Acetate .................................................................................................... 15
Chapter 1: Long Term Chemical Vapor Exposure Test

1.1 Test Procedure

1. For each test, 16 samples of HCPD-5V-U3 are measured at 25°C (77°F) 20, 50, 80% RH.

2. Measured samples are put into the test vessel contained with each liquid chemical. Distance between the chemical and test samples: under 4.0 cm (1.57 in.)

3. 4 samples are taken out respectively after 128 (7 days), 336 (14 days), 672 (28 days), 1008 (42 days) hrs for measurement.

4. The samples are stabilized for 24 hrs at ambient condition (25±3°C, 50±10% RH) for measurement at 25°C 20,50,80% RH, and then stabilized for an additional 48 hrs for final measurement.

5. After final measurement, samples go through recondition process as below:
   - Baking: 80°C (176°F) 24 hrs
   - Hydration: 30°C (86°F) 80% RH 45~50 hrs

6. After recondition, measure again at 25°C, 20, 50, 80% RH
1.2 ChipCap 2 Chemical Resistivity

1.2.1 ChipCap 2 Chemical Resistivity

1. Test time: 1008 hrs
2. Test condition: ambient condition (25±3°C, 50±10% RH)
3. Sample: HCPD-5V-U3
4. Sample size: 16EA (Each test condition)  
   4 samples were taken out of test condition each test time (168, 336, 672, 1008 hrs)
5. Measurement equipment: PDR-3KP (Temp. & humidity chamber, ESPEC)
7. Test result: after test 72 hrs.

Table 1: Chemical Exposure Test After 1008 Hours

<table>
<thead>
<tr>
<th></th>
<th>168 hrs</th>
<th>336 hrs</th>
<th>672 hrs</th>
<th>1008 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20% RH</td>
<td>80% RH</td>
<td>20% RH</td>
<td>80% RH</td>
</tr>
<tr>
<td>Ammonia hydroxide (NH4OH)</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Acetone ((CH3)2CO)</td>
<td>12.88</td>
<td>21.00</td>
<td>12.90</td>
<td>20.79</td>
</tr>
<tr>
<td>Ethanol (C2H5OH)</td>
<td>1.59</td>
<td>7.35</td>
<td>1.81</td>
<td>9.93</td>
</tr>
<tr>
<td>Methanol (CH3OH)</td>
<td>2.00</td>
<td>9.36</td>
<td>2.19</td>
<td>13.10</td>
</tr>
<tr>
<td>Ethanol + Methanol</td>
<td>1.85</td>
<td>11.02</td>
<td>2.41</td>
<td>13.34</td>
</tr>
<tr>
<td>Formaldehyde (CH2O)</td>
<td>-0.48</td>
<td>0.39</td>
<td>-0.12</td>
<td>1.77</td>
</tr>
<tr>
<td>Benzene (C6H6)</td>
<td>-3.81</td>
<td>-16.37</td>
<td>-5.68</td>
<td>-23.30</td>
</tr>
<tr>
<td>Toluene (C7H8)</td>
<td>-1.35</td>
<td>-6.86</td>
<td>-2.27</td>
<td>-10.73</td>
</tr>
<tr>
<td>Xylene (C8H10)</td>
<td>0.27</td>
<td>-0.37</td>
<td>0.56</td>
<td>0.47</td>
</tr>
<tr>
<td>Benzene + Toluene + Xylene</td>
<td>-1.08</td>
<td>-4.44</td>
<td>-1.43</td>
<td>-7.35</td>
</tr>
</tbody>
</table>

“F” indicates sensor failure.
All data is calculated average value of each test sample.
1.2.2 Chemical Exposure Test After Recondition

8. Test result: After test 72 hrs and recondition
   Sample recondition:
   Baking: 80°C 24 hrs.
   Hydration: 30°C 80% RH 45–50 hrs.

<table>
<thead>
<tr>
<th></th>
<th>168 hrs</th>
<th>336 hrs</th>
<th>672 hrs</th>
<th>1008 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20% RH</td>
<td>80% RH</td>
<td>20% RH</td>
<td>80% RH</td>
</tr>
<tr>
<td>1. Ammonia hydroxide (NH₄OH)</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>2. Acetone ((CH₃)₂CO)</td>
<td>2.70</td>
<td>13.47</td>
<td>2.69</td>
<td>13.97</td>
</tr>
<tr>
<td>3. Ethanol (C₂H₅OH)</td>
<td>0.04</td>
<td>1.56</td>
<td>-0.02</td>
<td>1.38</td>
</tr>
<tr>
<td>4. Methanol (CH₃OH)</td>
<td>0.44</td>
<td>2.15</td>
<td>0.63</td>
<td>2.90</td>
</tr>
<tr>
<td>5. Ethanol + Methanol</td>
<td>0.05</td>
<td>3.30</td>
<td>0.35</td>
<td>2.78</td>
</tr>
<tr>
<td>6. Formaldehyde (CH₂O)</td>
<td>-0.97</td>
<td>-1.89</td>
<td>-0.73</td>
<td>-2.44</td>
</tr>
<tr>
<td>8. Toluene (C₇H₈)</td>
<td>-2.06</td>
<td>-6.23</td>
<td>-3.32</td>
<td>-11.40</td>
</tr>
<tr>
<td>9. Xylene (C₈H₁₀)</td>
<td>-0.46</td>
<td>0.73</td>
<td>-0.82</td>
<td>-0.09</td>
</tr>
</tbody>
</table>

1.2.2a Acetone ((CH₃)₂CO)

**Figure 2: TO2 Exposure Acetone Humidity Error at 20% and 80% RH**
1.2.2b Ethanol (C2H5OH)

![Figure 3: TO3 Exposure Ethanol Humidity Error at 20% and 80% RH](image)

1.2.2c Methanol (CH2OH)

![Figure 4: TO4 Exposure Methanol Humidity Error at 20% and 80% RH](image)

1.2.2d Ethanol + Methanol

![Figure 5: TO5 Exposure Ethanol + Methanol Humidity Error at 20% and 80% RH](image)
1.2.2e Formaldehyde (CH2O)

Figure 6: TO6 Exposure Formaldehyde Humidity Error at 20% and 80% RH

1.2.2f Benzene (C6H6)

Figure 7: TO7 Exposure Benzene Humidity Error at 20% and 80% RH

1.2.2g Toluene (C7H8)

Figure 8: TO8 Exposure Toluene Humidity Error at 20% and 80% RH
1.2.2h Xylene (C8H10)

Figure 9: TO9 Exposure Xylene Humidity Error at 20% and 80% RH

1.2.2i Benzene + Toluene + Xylene

Figure 10: TO10 Exposure Benzene + Toluene + Xylene Humidity Error at 20% and 80% RH
Chapter 2: Saturation and Recovery Test

2.1 Test Procedure

1. 12 samples of HCPD-5V-U3 for each test are measured for initial value at 25°C (77°F) 20, 50, 80% RH.
2. Measured samples are dipped into the liquid chemical material for 1 hour.
3. The samples are stabilized for 24 hrs at ambient condition (25±3°C, 50±10% RH) for measurement at 25°C 20, 50, 80% RH.
4. 6 samples are stored and monitored in ambient condition (25±3°C, 50±10% RH) continuously for 120 hrs (5 days) to see the natural recovery.
5. The other 6 samples go through recondition process as below:
   • Baking: 80°C (176°F) 24 hrs
   • Hydration: 30°C (86°F) 80% RH 45–50 hrs
6. After recondition, measure again at 25°C 20, 50, 80% RH.

2.2 Saturation and Recovery Test at Ambient Condition

1. Test time: 1 hr
2. Test condition: ambient condition (25±3°C, 50±10% RH)
3. Sample: HCPD-5V-U3
4. Sample size: 12EA (Each test condition)
5. Measurement equipment: PDR-3KP (Temp. & humidity chamber, ESPEC)
7. Test result: After test 120 hrs.

Table 3: Saturation and Recovery Test @ Ambient Condition

<table>
<thead>
<tr>
<th>Recovery Time (@ ambient condition)</th>
<th>24 hrs</th>
<th>48 hrs</th>
<th>120 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20% RH</td>
<td>80% RH</td>
<td>20% RH</td>
</tr>
<tr>
<td>1. Di-isopropyl ether</td>
<td>0.95</td>
<td>0.05</td>
<td>0.72</td>
</tr>
<tr>
<td>2. Isopropyl alcohol</td>
<td>0.24</td>
<td>-0.88</td>
<td>0.33</td>
</tr>
<tr>
<td>3. Ethylene glycol</td>
<td>1.27</td>
<td>-1.65</td>
<td>0.83</td>
</tr>
<tr>
<td>4. Ethanol</td>
<td>-0.08</td>
<td>-0.42</td>
<td>0.41</td>
</tr>
<tr>
<td>5. Methanol</td>
<td>0.70</td>
<td>8.22</td>
<td>1.20</td>
</tr>
<tr>
<td>6. Butyl acetate</td>
<td>-0.02</td>
<td>-0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>7. Ethyl acetate</td>
<td>0.01</td>
<td>-0.08</td>
<td>0.11</td>
</tr>
</tbody>
</table>
2.3 Saturation and Recovery Test with Recondition Process

1. Test result: After test 24hrs and recondition process Sample recondition
   • Baking: 80°C 24 hrs
   • Hydration: 30°C 80% RH 45~50 hrs.

Table 4: Saturation and Recovery Test with Recondition Process

<table>
<thead>
<tr>
<th>Recovery Time and recondition process</th>
<th>24 hrs</th>
<th>After Baking</th>
<th>After Hydration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20% RH</td>
<td>80% RH</td>
<td>20% RH 80% RH</td>
</tr>
<tr>
<td>1. Di-isopropyl ether</td>
<td>1.19</td>
<td>0.39</td>
<td>-2.03 -2.57</td>
</tr>
<tr>
<td>2. Isopropyl alcohol</td>
<td>0.17</td>
<td>-0.98</td>
<td>-2.79 -3.81</td>
</tr>
<tr>
<td>3. Ethylene glycol</td>
<td>0.64</td>
<td>-1.87</td>
<td>-2.66 -5.38</td>
</tr>
<tr>
<td>4. Ethanol</td>
<td>0.05</td>
<td>-0.16</td>
<td>-3.70 -5.07</td>
</tr>
<tr>
<td>5. Methanol</td>
<td>0.66</td>
<td>8.01</td>
<td>-2.43 -3.87</td>
</tr>
<tr>
<td>6. Butyl acetate</td>
<td>-0.01</td>
<td>-0.33</td>
<td>-3.38 -5.22</td>
</tr>
<tr>
<td>7. Ethyl acetate</td>
<td>0.07</td>
<td>0.02</td>
<td>-3.61 -5.49</td>
</tr>
</tbody>
</table>
2.3.1 Di-isopropyl Ether

2.3.1.a

![Figure 11: Test of Dip Di-isopropyl Ether @ Norman Condition](image)

2.3.1.b

![Figure 12: Test of Dip Di-isopropyl Ether After Reconditioning](image)
2.3.2 Isopropyl Alcohol

2.3.2.a Normal Condition

![Graph of Dip Isopropyl Alcohol - normal condition](image1)

Figure 13: Test of Dip Isopropyl Alcohol @ Normal Condition

2.3.2.b After Reconditioning

![Graph of Dip Isopropyl Alcohol - Recondition](image2)

Figure 14: Test of Dip Isopropyl Alcohol After Reconditioning
2.3.3 Ethylene Glycol

2.3.3.a Normal Condition

Figure 15: Test of Dip Ethylene Glycol @ Normal Condition

2.3.3.b After Reconditioning

Figure 16: Test of Dip Ethylene Glycol After Reconditioning
2.3.4 Ethanol

2.3.4.a Normal Condition

![Graph showing humidity error for dip ethanol under normal condition](image)

Figure 17: Test of Dip Ethanol @ Normal Condition

2.3.4.b After Reconditioning

![Graph showing humidity error for dip ethanol after reconditioning](image)

Figure 18: Test of Dip Ethanol After Reconditioning
2.3.5 Methanol

2.3.5.a Normal Condition

![Diagram showing humidity error for normal condition](image1)

**Figure 19: Test of Dip Methanol @ Normal Condition**

2.3.5.b After Reconditioning

![Diagram showing humidity error after reconditioning](image2)

**Figure 20: Test of Dip Methanol After Reconditioning**
2.3.6 Butyl Acetate

2.3.6.a Normal Condition

![Figure 21: Test of Dip Butyl Acetate @ Normal Condition](image)

2.3.6.b After Reconditioning

![Figure 22: Test of Dip Butyl Acetate After Reconditioning](image)
2.3.7 Ethyl Acetate

2.3.7.a Normal Condition

Figure 23: Test of Dip Ethyl Acetate @ Normal Condition

2.3.7.b After Reconditioning

Figure 24: Test of Dip Ethyl Acetate After Reconditioning
# Customer Support Centers

## North and South America
Amphenol Thermometrics, Inc.  
St. Marys Center  
967 Windfall Road  
St Marys, Pennsylvania 15857, U.S.A.  

T: +1 814-834-9140  
F: +1 814-781-7969

## Europe, Middle East and Asia
Amphenol Thermometrics (U.K.) Limited  
Crown Industrial Estate  
Priorswood Road  
Taunton, TA2 8QY, UK  

T: +44 1823 335 200