Test Report

No. : CE/2020/11781  Date : 2020/01/14

HITACHI CHEMICAL CO., LTD.
1500 OGAWA, CHIKUSEI-SHI IBARAKI, 308-8521, JAPAN

The following samples was/were submitted and identified by/on behalf of the applicant as:

Sample Submitted By : HITACHI CHEMICAL CO., LTD.
Sample Description : COPPER CLAD LAMINATES WITHOUT COPPER (PLASTIC PART OF MCL) / GLASS EPOXY PREPREG
Sample Receiving Date : 2020/01/07
Testing Period : 2020/01/07 to 2020/01/14

Test Result(s) : Please refer to following pages.

Troy Chang / Manager - Vet
Signed for and behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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**Test Result(s)**

**PART NAME No.1 : BLACK SHEET**

<table>
<thead>
<tr>
<th>Test Item(s)</th>
<th>Unit</th>
<th>Method</th>
<th>MDL</th>
<th>Result No.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony (Sb)</td>
<td>mg/kg</td>
<td>With reference to US EPA 3052 (1996). Analysis was performed by ICP-OES.</td>
<td>2</td>
<td>n.d.</td>
</tr>
<tr>
<td>Halogen-Fluorine (F)</td>
<td>mg/kg</td>
<td></td>
<td>50</td>
<td>1430</td>
</tr>
<tr>
<td>(CAS No.: 14762-94-8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogen-Chlorine (Cl)</td>
<td>mg/kg</td>
<td>With reference to BS EN 14582 (2016). Analysis was performed by IC.</td>
<td>50</td>
<td>174</td>
</tr>
<tr>
<td>(CAS No.: 22537-15-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogen-Bromine (Br)</td>
<td>mg/kg</td>
<td></td>
<td>50</td>
<td>n.d.</td>
</tr>
<tr>
<td>(CAS No.: 10097-32-2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogen-Iodine (I)</td>
<td>mg/kg</td>
<td></td>
<td>50</td>
<td>n.d.</td>
</tr>
<tr>
<td>(CAS No.: 14362-44-8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
1. mg/kg = ppm; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected = less than MDL
These samples were dissolved totally by pre-conditioning method according to below flow chart.

- Technician: Rita Chen
- Supervisor: Troy Chang

**Flow Chart of digestion for the elements analysis performed by ICP-OES**

```
Cutting / Preparation
↓
Sample Measurement
↓
Acid digestion by suitable acid depended on different sample material (as below table)
↓
Filtration
↓
Solution
↓
Residue
↓
1) Alkali Fusion
   2) HCl to dissolve
↓
ICP-OES
```

<table>
<thead>
<tr>
<th>Sample Material</th>
<th>Acid Reagents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, copper, aluminum, solder</td>
<td>Aqua regia, HNO₃, HCl, HF, H₂O₂</td>
</tr>
<tr>
<td>Glass</td>
<td>HNO₃/HF</td>
</tr>
<tr>
<td>Gold, platinum, palladium, ceramic</td>
<td>Aqua regia</td>
</tr>
<tr>
<td>Silver</td>
<td>HNO₃</td>
</tr>
<tr>
<td>Plastic</td>
<td>H₂SO₄, H₂O₃, HNO₃, HCl</td>
</tr>
<tr>
<td>Others</td>
<td>Added appropriate reagent to total digestion</td>
</tr>
</tbody>
</table>

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Analytical flow chart - Halogen

- Technician: Rita Chen
- Supervisor: Troy Chang

1. Sample pretreatment / Separation
2. Weighting and putting sample in cell
3. Oxygen Bomb Combustion / Absorption
4. Dilution to fixed volume
5. Analysis was performed by IC
* The tested sample / part is marked by an arrow if it's shown on the photo. *

** End of Report **