RESULTS OF MATERIALS COMPATIBILITY STUDIES WITH BIOCIDE CLEANER

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Abstract

In the frame of the ROVER EXOMARS environmental tests campaign at AIRBUS EVT Toulouse, we have to be compliant with the planetary protection requirements.

The purpose of Planetary Protection in this case is two-fold:

• To protect the Life-Science experiments and instruments on board from registering “false positives” for life as a result of hardware contamination - of concern are both biological entities (microbes, spores) and also certain organic contaminants (chemical “species”).

• To prevent or minimise to internationally agreed levels any adverse biological and organic contamination risk to any solar system body explored

These principles and requirements are defined by COSPAR, a scientific advisory body to the UN. They are both the required response and the means of achieving compliance to: the Outer Space Treaty (1967). The requirement for the ROVER EXOMARS Environmental Tests campaign is to provide test facilities compliant with the bioburden level as per pharmaceutical requirements: “EU GMP Grade B”.

EU GMP recommended limits are:

<table>
<thead>
<tr>
<th>GRADE</th>
<th>Air sample cfu/m³</th>
<th>Settle plates (dia.90mm), cfu/4hours</th>
<th>Contact plates (diam.55mm), cfu/plate</th>
<th>Glove print 5 fingers, cfu/glove</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&lt;1</td>
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<td>B</td>
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<td>5</td>
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<tr>
<td>C</td>
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<tr>
<td>D</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>-</td>
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</tbody>
</table>

Notes:
(a) These are average values
(b) Individual settle plates may be exposed for less than 4 hours

In order to reach such requirements, we have to clean with biocides some of the AIRBUS EVT tests facilities: Pascal D cleanroom, SIMLES thermal chamber, Acoustic Chamber, Coulomb EMC chamber and all the garments facilities.

A lot of different materials should be cleaned with biocides, so the compatibility between biocides and materials should be studied.

The study includes:
- a bibliography review on existing compatibility tests and applicable standards
- the inventory of all materials constituting the tests facilities and the garments facilities
- the results of the material / biocide compatibility tests on the identified substrates:
  o compatibility study with immersion tests
  o Stress corrosion tests
  o Swelling values with a specific focus on rubbers
- The impact on cleaning procedure