Test Report

Determination of resistance to root penetration according to CEN/TS 14416

Product name:
QuickSeal PP 350

Principal/Manufacturer:
Voelkel Industrie Produkte GmbH
Lohenstr. 11
D-82166 Gräfelfing

Date: 20-03-2014
The report comprises 6 pages.

The product was tested under number 12/11.
1 Problem task

In order to prevent damage, root protection systems are required to perform permanent resistance against penetration and perforation by plant roots.

In the test described here the resistance to roots of the coating QuickSeal PP 350 manufactured by Voelkel Industrie Produkte GmbH, Lohenstraße 11, 82166 Gräfelfing, Germany was determined.

2 Test facility and procedure

The 8 weeks lasting test was performed in accordance with CEN/TS 14416.

The test was carried out between 7th of February 2011 and 7th of April 2011 comprising 3 containers equipped with the coating QuickSeal PP 350. Another 3 containers with a non-root-resistant bitumen sheet were serving as control that allows to compare the plant development in the different containers.

The containers were filled with growing substrate and installed in a climate-controlled glass house.

35 seeds of the test plant (*Lupinus alba*) per container were sowed.

The final inspection included the noting of any root penetration and perforation of the non-root-resistant bitumen sheet and the tested coating QuickSeal PP 350.

A check sample of the coating QuickSeal PP 350 was taken and stored at the testing institute.

3 Results

3.1 Plant development

The plants performed well during the whole test period. Growth of the test plants in the control containers (with a non-root-resistant bitumen sheet) was only slightly differing from plant growth in the test containers with the coating QuickSeal PP 350 (see table 1 and 2).
Table 1: Number and weight of plants in the containers with the non-root-resistant bitumen sheet after the testing period of 8 weeks

<table>
<thead>
<tr>
<th>Cont. No.</th>
<th>quantity of plants</th>
<th>weight of the plants (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33</td>
<td>412</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
<td>400</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>387</td>
</tr>
</tbody>
</table>

Table 2: Number and weight of plants in the containers with the coating QuickSeal PP 350 after the testing period of 8 weeks

<table>
<thead>
<tr>
<th>Cont. No.</th>
<th>quantity of plants</th>
<th>weight of the plants (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>395</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>422</td>
</tr>
<tr>
<td>3</td>
<td>33</td>
<td>411</td>
</tr>
</tbody>
</table>

3.2 Penetration and perforation of roots

At the end of the test period the containers were emptied for a detailed check of the non-root-resistant bitumen sheet and the coating QuickSeal PP 350 for root penetration and perforation.

The non-root-resistant bitumen sheet showed some perforations and many penetrations caused by roots after the 8 weeks period (see table 3, figure 1). So the required vigorous growing of the roots was achieved.

The tested coating QuickSeal PP 350 showed no root penetrations or perforations (see table 4, figure 2 and 3).

Table 3: Number of root penetrations and root perforations into the non-root-resistant bitumen sheet after the testing period of 8 weeks

<table>
<thead>
<tr>
<th>Cont. No.</th>
<th>perforations caused by roots</th>
<th>penetrations caused by roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 4: Number of root penetrations and root perforations into the coating QuickSeal PP 350 after the testing period of 8 weeks

<table>
<thead>
<tr>
<th>Cont. No.</th>
<th>perforations caused by roots</th>
<th>penetrations caused by roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>
4 Summary

In accordance with CEN/TS 14416 a 8 weeks lasting test was carried out to determine the root resistance of the coating QuickSeal PP 350 manufactured by Voelkel Industrie Produkte GmbH, Lohenstraße 11, 82166 Gräfelfing, Germany.

The tested coating QuickSeal PP 350 showed no root penetrations or perforations. The tested coating QuickSeal PP 350 is therefore considered to be root resistant according to CEN/TS 14416.

Reference samples of the tested coating QuickSeal PP 350 were taken and are stored at the Institute for Horticulture / University of Applied Sciences Weihenstephan-Triesdorf.

The test report was compiled in April 2011.

The report comprises 6 pages.

Person responsible for the test and the report:
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20-03-2014

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Figure 1: Root penetrations into the control sheet (detail)

Figure 2: Surface of the tested coating QuickSeal PP 350
Figure 3: Surface of the tested coating QuickSeal PP 350 (detail)