Earthing Grid Analysis - Number of Meshes Versus Grid Resistance

OVERVIEW

A summary of some of the results of an extensive study conducted using SafeGrid a computer program designed for determining grounding performance are presented.

- Effects of total length of conductor and number of meshes on earth grid resistance.
- The calculated earth grid impedances, surface, step and touch potentials are summarised in several 3D and 2D charts below.
- The results from SafeGrid earthing software have been verified and compared with those given by similar CDEGS earthing software package [3].

<table>
<thead>
<tr>
<th>Case</th>
<th>Grid dimensions</th>
<th>Total length of conductor (m)</th>
<th>Depth of burial (m)</th>
<th>Grid impedance (Ω)</th>
<th>Grid Potential Rise, GPR (V)</th>
<th>Surface Potential Max. (V)</th>
<th>Touch Potential Max. (V)</th>
<th>Step Potential Max. (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 x 20</td>
<td>60</td>
<td>0.8</td>
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<td>2.76</td>
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<td>1310</td>
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<td>1139</td>
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<td>2286</td>
<td>2050</td>
<td>928</td>
</tr>
</tbody>
</table>

NOTES:

1. Common inputs:
   - Soil resistivity = 100 Ω.m, uniform soil
   - Depth of grid conductor burial = 0.8 m
   - Earth fault current which flows into the grid = 1000 A
   - Grid conductor type & material = Copper, annealed soft-drawn (100% conductivity)
   - Grid conductor radius = 0.01 m
   - Frequency for conductor impedance calculation = 50 Hz

2. Colour scales:
   - Scales indicate the colours used by the earthing software to represent high to low values (relative) in the plots.

[2] IEC 60479, Effects of current on human beings and livestock