LIGHTNING RISK ASSESSMENT

SAMPLE FOR HEALTHCARE FACILITIES

Based on National Fire Protection Assoc.

NFPA Standard # 780 Annex L
Sample Building Dimensions
(For a rectangular structure)
Length = 100 ft. (30.4m)
Width = 40 ft. (12.2m)
Height = 30 ft. (9.1m)

Equivalent Collective area for rectangular structure (Sample)
\[ Ae = (LW) + 6H(L+W) + \pi 9H^2 \]
\[ Ae = 5076.86 \text{ square meters or} \]
\[ Ae = 0.00508 \text{ square km} \]

Yearly average Flash Density (Ng)
(average per National Lightning Detection Network data map)
\[ Ng = 4 \]

Table C1 – Environmental Coefficient (Relative structure location for Sample where 3 * height = 90 ft.)
Structure located in area containing structures of the same height or taller within a distance of 3h = 0.25
Structure surrounded by smaller structures within a distance of 3h = 0.5
Isolated structures, no other structures located within a distance of 3h = 1.0
Isolated structure on a hilltop = 2.0
\[ C1 = 1.0 \]

Expected lightning stroke frequency to the structure (Sample)
\[ Nd = (Ng) (Ae)(C1) \]
\[ Nd = 0.02031 \]
**Table C2 – Structural Materials Coefficient**

<table>
<thead>
<tr>
<th>Structural Framing</th>
<th>Roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal</td>
<td>Non-metallic</td>
</tr>
<tr>
<td>Metal</td>
<td>0.5</td>
</tr>
<tr>
<td>Nonmetallic</td>
<td>1.0</td>
</tr>
<tr>
<td>Flammable</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Table C3 – Structure Contents Coefficient**

- Low value and nonflammable = 0.5
- Standard value and nonflammable = 1.0
- High value, moderate flammability = 2.0
- Exceptional value, flammable, computers, electronics = 3.0
- Exceptional value, irreplaceable cultural items = 4.0

**Table C4 – Structure Occupancy Coefficient**

- Unoccupied = 0.5
- Normally occupied = 1.0
- Difficult to evacuate or risk of panic = 3.0

**Table C5 – Lightning Consequence Coefficient**

- Continuity of facility services not required, no environmental impact = 1.0
- Continuity of facility services required, no environmental impact = 5.0
- Consequences to the environment = 10.0

**Tolerable lightning frequency to the structure (Sample)**

\[ C = (C2) \times (C3) \times (C4) \times (C5) \]

\[ C = 45 \]

\[ Nc = 1.5 \times (0.001) / C \]

\[ Nc = 0.000033 \]
Risk evaluation for Healthcare structure (Sample)

If \( Nd \leq Nc \), Lightning Protection may be **optional**

If \( Nd > Nc \), Lightning Protection **should be installed**

\[ Nd = 0.02031 \quad Nc = 0.000033 \]

**Nd > Nc**

A Lightning Protection System **should be installed**