Singapore Standard CP 33 : 1996

CODE OF PRACTICE FOR LIGHTNING PROTECTION

AMENDMENT NO. 1

February 1999

1. **Page 85**

Add the following new subclause.

A.5.7 Protection In Open Spaces

A.5.7.1 Although nobody should remain in an open space during a thunderstorm, there are situations where people may happen to be in the open. If there are lightning strikes and they are unable to take shelter in time they will be exposed to the risk of direct strikes and/or be subject to the effect of potential difference developed in the ground which may cause injury or fatality. Such areas may need to be provided with additional protection.

A.5.7.2 Designated protected zone

When identifying the open areas for lightning protection, the size of the open spaces, the number of people using these spaces and the frequency of usage will be considered. Based on these considerations, two types of designated areas have been identified.

Type A: Small defined open spaces where full protection can be provided. Some examples of these are the playgrounds and hard courts in residential estates.

Type B: Large open spaces where full protection is not practicable. Some examples of these are:

a) school fields;
b) public parks;
c) beaches;
d) golf courses;
e) vacant lands used for ad-hoc activities such as fun fairs, trade fairs, etc.

A.5.7.3 Type A open spaces are usually small defined areas which are surrounded by tall buildings and are inherently protected from direct strikes. However, because of the proximity of such areas to the lightning conductors of the surrounding buildings, the risks of step potentials caused by lightning striking a nearby building is probable. To minimise the danger of step potentials to people, an effective solution is to provide equipotential netting in the designated area. This equipotential netting comes in the form of a network of ground conductors electrically bonded together to provide a common ground.

A.5.7.4 In some situations, a Type A area may be far from any building and is hence exposed to the risk of direct strikes. For example, a children playground may be located amidst an open ground away from the residential blocks in a housing estate. In such a case, it is necessary for the playground to be provided with overhead protection as well as underground equipotential netting to protect its users from both direct strikes and step potentials.

A.5.7.5 For Type B areas such as parks, beaches, golf courses, etc. which are frequented by large numbers of people, it is recommended that protected shelters be erected at suitable locations and intervals to provide protection for users/visitors during and pending thunderstorms. In conjunction, a localised lightning detection and warning device should also be provided to alert users of approaching storms.

A.5.7.6 For those Type B areas where ad-hoc activities such as fun fairs, trade fairs and outdoor events are organised occasionally, the provision of a lightning detection and warning device would suffice. On being alerted of an approaching storm, the visitors or participants could be advised through the public address system to disperse and to take shelter in nearby building or structure.

A.5.7.7 The required mesh size for equipotential netting depends principally on the magnitude of lightning stroke current and resistivity of the soil. In the absence of information on soil resistivity, a reasonable mesh size could be 1 m by 1 m and with cross sectional area of conductor of not less than 20 mm^2. Some guidance on the design of earth meshes for safety is given in IEEE Std 80 entitled IEEE Guide for Safety in AC Substation Grounding. In many cases, floorings are already provided with reinforced steel meshes embedded in concrete. In such situations, it is necessary only to ensure that these meshes are electrically continuous.

Where such equipotential netting is directly buried in soil, the issue of corrosion should be adequately addressed.

A.5.7.8 For school fields, a lightning detection and warning device would be sufficient as the fields are invariably next to the school buildings.

2. **Page 116, Figure D.3**

Insert at the bottom of the figure,