

LIGHTNING RISK ASSESSMENT FOR STRUCTURE

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ABSTRACT

This paper presents the method of lightning risk assessment for the structure by using the Malaysian Standard. The aim of this study is to determine the risk for the structure located at rural area from lightning activity and to provide the suitable lightning protection measures in order to reduce the risk for the structure lower than tolerable risk. To achieve this aim, the following objectives have been identified: to evaluate the risk analysis for the structure using Malaysian Standard and to determine the suitable protection for the structure. In order to evaluate whether or not lightning protection of an object is needed, risk assessment in accordance with the procedures contained in IEC MS 62305. This method allows more precise selection of lightning protection devices. Based on the assessment, the risk R_1 shall be determined and compared with the tolerable value $R_T = 10^{-3}$ and $R_T = 10^{-5}$. The protection is required if the risk R_1 is higher than tolerable risk R_T . Based on the calculation, the $R_x = 5.238 \times 10^{-3}$ for case (a), 5.4×10^{-5} for case (b) and 6.2355×10^{-5} for case (c) are higher than the tolerable value $R_T = 10^{-3}$ and $R_T = 10^{-5}$, the lightning protection is required for the structure. To reduce the risk R_x , the best solutions are to install coordinated SPD at the service entrance to protect both power and telecom lines.

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CHAPTER 1

INTRODUCTION

1.1 PREFACE

Lightning is an atmospheric discharge of electricity accompanied by thunder which typically occurs during thunderstorm and sometimes during volcanic eruption or dust storms [1]. Naturally, the formation of lightning is related to the enormous electrical discharge which is caused by an imbalance between positive and negative charges [3]. In general, lightning may produce surge currents and overvoltage causing isolation breakdown in equipment. Lightning strikes affecting a structure can cause damage to structure itself, to its occupant and contents including failure of the internal systems.

The idea begins when there are structures which are located at high lightning activity without any lightning protection device. For information, Malaysia has high lightning activities especially in Peninsular Malaysia. So, the risk for the structure being strikes higher compared to other countries like Europe countries. The structures to be protected are Environmental Monitoring System (EMS) structure, a bungalow and a hostel. EMS structure is a structure that can monitor and measure the air temperature, humidity, rainfall, wind speed and solar radiation.