

Uten Prominkam 2007: Design and Analysis of Suitable Fire Suppression System: Case Study in Switchgear Room 22 kV. Master of Engineering (Safety Engineering), Major Field: Safety Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Assistant Professor Thumrongrut Mungcharoen, Ph.D. 140 pages.

Switch gear room 22 kV is one of the significant distribution room of Provincial Electricity Authority's substation. In case of fire occurrence, the damage to PEA and customer is estimated to be 1,883,878 baht for the least case and 18,274,273 baht for the worst case. This research has studied the design of three types of total flooding fire suppression system, according to NFPA standards, namely halocarbon clean agent system: HFC-125, inert gas clean agent system: IG-541 and high pressure carbon dioxide system. Those 3 systems are appropriated for fire occurrence in switch gear room 22 kV which is the deep seat fire type. It is found that the design of halocarbon clean agent system: HFC-125 with 8 % concentration, requires HFC-125 agent 267 kg with the discharge time of 10 seconds and flow rate of 26.7 kg/s. For the design of inert gas clean agent system: IG-541 with 34.2 % concentration, the quantity of IG-541 of 264 m<sup>3</sup> with the discharge time of 1 minute and flow rate of 234.68 m<sup>3</sup>/min are required. While the design of high pressure carbon dioxide system with 50 % concentration, the quantity of CO<sub>2</sub> 810 kg with the discharge time of 7 minutes and flow rate of 115.71 kg/min are required.

The suitable fire suppression system is selected by comparing the performance of each system according to the reliability and the cost effectiveness. It is found that the reliability of the halocarbon clean agent system: HFC-125, the inert gas clean agent system: IG-541 and the high pressure carbon dioxide system are 0.298, 0.181, 0.149 respectively. The benefit to cost ratio for the least case and the worst case damage of HFC-125 system are 0.59, 5.76 , of IG-541 system are 0.20, 1.90 and of CO<sub>2</sub> system are 0.23, 2.21. It can be concluded that the HFC-125 system is the most suitable system for the switch gear room 22 kV due to the highest reliability and highest benefit to cost ratio.



Student's signature



Thesis Advisor's signature

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