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Thesis

Fire Safety Evaluation of Special Care Facilities

Abstract

Safe evacuation routes is one of the most important life safety design features in all building designs, and is especially important in health care facilities because of the often frail characteristics and dependency of the building occupants on others to assist them or relocate them to another safe zone/fire compartment in the event of an emergency situation. Although the National Building Codes require building designs to incorporate active and passive fire protection features, evacuation is the chief tool used for protecting the occupants in the event of a fire. In order for an evacuation process to be successful the conditions within the egress routes must remain tenable/safe for the occupants for the duration of the evacuation.

This report defines a method that can be used to evaluate expected fire conditions in health care facilities and the effects these conditions have on the life safety of the occupants during the evacuation process. The fire conditions evaluated in this report are based on selected fire scenarios (i.e. mattress fire) and the hazards posed by these fires were examined using the two zone model "Branzfire".

Fire is a transient process and the associated hazards such as energy, temperature and toxic gases emitted increase as a function of time from the start of the fire. Therefore time is one of the most critical design parameters used to quantify the safety of the occupants during an evacuation. The main emphasis for using time is to ensure the occupants can reach a safe zone before untenable conditions occur in the fire zone.

The quantitative analysis is based on a representative Nova Scotia health care facility. Results from the scenarios evaluated indicate the sprinkler activation may control the fire, but smoke detector activation provides the earliest notification to staff of the fire situation in all cases. Early detection and location of a fire through a reliable and effective addressable fire alarm system is a key factor in safely evacuating the occupants from the room of fire origin however the patient to staff ratio and evacuation training is the key for a safe evacuation of all the occupants in a compartment.

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