

Bushfire applications for metal fusible links activation of shutters.

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Fusible links used as a method for activating fire protection system such as sprinklers and fire dampers to combat internal building fires are a cheap and reliable. A metallic fusible link is comprised of two pieces of metal held together by a eutectic solder resulting in an affordable fire detection element. These links are now being used externally in potential bushfire situations as a method of closing window protection systems and the like, however the links are designed to be activated by convective heating. Various systems are being proposed as part of performance based solutions to construction in areas rated as high to flame zone. Will the links activate in time considering the potentially fast rate of rise of radiant heat in a bushfire and the potential for convective cooling?

To investigate this issue a computer based thermal response model was developed for fusible link activation in bushfire conditions. Heat transfer parameters for this model were determined through experimental testing using several apparatus. Various fusible links were tested in a laboratory simulated bushfire conditions at the in order to validate the developed model. The model included convective cooling or heating, radiant heating and losses, conductive losses and the eutectic phase change energy required to melt the solder. This model was used to determine the potential use of fusible links for automatic actuation of bushfire doors and shutters. A range of wind speeds, ambient temperature and bushfire radiant heating profiles were investigated. It appears that the links may be used to activate shutters to protect 5mm toughened glass where protection over 40kW/m² is required.

Improvements to the typical fusible links were investigated along with alternatives systems. Aspects of this work are also applicable to the activation sprinkler frangible bulbs for sprinkler protection systems.

Key Words

Wildfire, bushfire, fusible link, window protection.