

Assessing smoke and heat release during combustion of electric cables using cone calorimeter

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Cables are designed for transportation of electric power for long distances. In the construction of Cables different materials like PVC, FRPVC, XLPE, ZHFR etc are used as insulating and sheathing / jacketing materials. However, the polymeric materials used in cable construction may pose a great threat and can act as a medium of fuel with liberation of heat, smoke and toxic gases in the event of fire. Though Electric cables rarely cause fire, they act as pathway in the event of fire, along which fire can travel and spread. The fire behavior of cable depends on a number of factors, including their construction and constituent materials. In recent years, increasing attention has been given to fire risks relative to electrical cables, with the examination of their behavior under fire conditions not only in terms of their participation in the fire and its propagation, but also in terms of the danger of fumes emitted during combustion. Apart from smoke and toxic gases, the heat release is an important parameter which characterizes the total available energy in the material in a possible fire situation. Thus the measurement of heat release rate of burning cables is believed to be an important for quantifying the growth and spread of fire. Cone Calorimeter has become one of the most widely used apparatus for heat release measurement on cables and materials.

This paper presents and discusses the data obtained on smoke and heat release measurements obtained on cables and cable materials using cone calorimeter. Power cables, communication cables, data cables and wires used for various applications in Power plant, Refineries, automobiles and other applications have been evaluated for heat release measurement. The behavior of cables has been studied at various thermal irradiances. Power cable Individual components have been evaluated at different heat fluxes in horizontal and vertical orientation. Parameters like time to ignition, mass loss rate, total heat release, heat of combustion, specific extinction area of smoke, rate of production of yields CO/CO₂ ratios are also measured and discussed. Char analysis has been carried using Fourier Infra Red Spectrometer.

The key parameters were obtained using cone calorimeter which enabled to ascertain the fire behavior of material under different thermal fluxes. From this study burning cables can propagate flames from one area to another or they can add to the amount of fuel available for combustion and can liberate smoke and containing toxic and corrosive gases.

Key words

Fire Hazards. cone calorimeter, Toxicity. Heat Release, Smoke, flammability