

## **FIRE BURNS, SMOKE KILLS –** **SMOKE MANAGEMENT SAVES LIVES**



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This year's theme for the **National Fire Services Day** in India is “**Smoke Management Saves Lives**”. It is very important to remember that most deaths in Fire related incidents occur from inhaling smoke or poor visibility in smoke conditions preventing or delaying the escape to safety.

Every fire is a Chemical and Physical process producing energy- mainly heat - and smoky gases. Therefore every fire protection concept must have the same main objectives.

- To avoid ignition and the outbreak of fire.
- To protect human beings, goods, the buildings and the environment from the hazardous effects of the products of fire.
- To control and finally to stop the production of heat and smoke.

Smoke consists of the airborne solid and liquid particulate and gases evolved when a material undergoes combustion, together with the quantity of air entrained or otherwise mixed into the mass. The products of combustion usually include particulates, unburned fuel, water vapour, carbon dioxide, carbon monoxide, and smoke toxic and corrosive gases.

Inhaling smoke has the risk of absorbing poisonous gases like Carbon Monoxide, Halides or Cyanides. Smoke may also contain hot moist particles from any combustible liquids caught in the fire. Traditional homes have chimneys to push out the smoke generated during cooking. The sigri and furnace using coal, and bukhari using Kerosene Oil generate lot of Carbon Monoxide and cause death if proper care is not taken. The generator sets using Petrol, K.Oil and Diesel produce Carbon Monoxide and particularly using them in closed rooms is an invitation to death.

Use of smokeless chulhas needs to be encouraged in the rural areas. Modern Houses and Offices have the option of designs with built in smoke detection and control equipment. But the common Man's safety lies in better awareness about the risks from smoke and the effective means of avoiding or reducing the impacts of smoke. Tall buildings with Atriums run a higher risk of Fire and smoke rising higher to levels above where the fire starts. Hence Special features are to be built into the Fire Safety design for such Buildings.

Physical separation of smoke and people is achieved using walls & doors. This form of smoke control is known as containment. Smoke containment allows smoke to pass through small leakage paths i.e. cracks around doors and so usually serves to delay the spread of smoke rather than to prevent it. Such delays can allow safe evacuation in many circumstances.

## **Air-conditioned Buildings**

The risk of smoke spread presented by increasing use of air conditioned buildings has been a matter of great concern to fire professionals. Air conditioning system should be designed in such a manner that risk of smoke spread could be minimized from one location to another. Whenever the ducts are passed through walls or floors, the opening around the ducts must be sealed with non-combustible material. The material used for insulating or lagging inside or outside the duct must be non-combustible type. The automatic fire dampers are provided in the air-conditioned duct, as this will restrict the smoke spread from one compartment to another. Each damper should be held open by a fusible link and should close automatically upon the operation of the device. If dampers could not be operated by due to certain reasons, therefore air filter are also recommended in ducts.

Smoke movement in buildings is a very complex process. No two fires are similar and hence approach toward effective smoke management in the building needs careful consideration while selecting the material for construction and smoke management measures. Effective smoke management in building not only helps the speedy evacuation but it also reduces secondary losses due to smoke and hot gases.

Smoke extraction systems can limit property damage, both directly by reducing the spread of smoke, and indirectly by providing better visibility and thus easier access to the site of fire for the fire fighters. Smoke extraction can be used to ensure the height of smoke layering is sufficiently adequate to allow people to safely exit the building.

The amount of smoke produced by a fire depends on its position and the path through which the smoke flows. Smoke Management systems are required for high rise buildings, covered shopping malls, atria, and other unique occupancies. In general these systems are intended to confine smoke to the Zone of fire origin or exhaust smoke from large spaces to allow evacuation.

In a fire which is a self sustaining, Oxidation process is accompanied by the evolution of heat, smoke and light. The hot, toxic and dangerous gases are generated in the form of smoke in the upper zone of fire. The Carbon-di-Oxide, Carbon Monoxide, Water vapour and un-burnt carbon particles form the main constituents of smoke. When plastics, specially Polyurethane Foam are involved in fire, Hydrogen Cyanide and Hydrogen Chloride gases are evolved. If a person is exposed to lethal concentrations of Carbon Monoxide and Hydrogen cyanide, the chances of survival are almost negligible.

The plastics like PVC, Polyurethane Foam, Acrylics etc. have found an unavoidable place in our society and they are used for upholstery and decoration purposes and also as main building construction materials. Under fire conditions the dangerous gases produced from the above materials travel from one part of the building to the other part in no time and lay a death trap.

Wild fires in forests and backyard bushes were generally presumed to be less dangerous to human habitats. But current research shows that burning of biomass (grass, trees etc.) results in release of Isocyanic acid into the atmosphere. Lack of awareness about this hazard in open bush Fires and Forest Blazes can thus be dangerous, since this acid when absorbed in to the human body can cause several health problems. Do not allow wild growth in your backyard and discourage the burning of wild bush anywhere, unless extremely unavoidable. Besides being cause of chemical pollution, the wild growth fires are prone to spread to neighborhood and pose threat to life and property.

### **IN THE LINE OF DUTY**

In the year 2011-2012 the department handled various fire and emergency cases which included serious Petroleum fires, road accidents involving petroleum tankers, River rescue and urban fires. Two serious fires involving petroleum chemical Naptha occurred in South Goa which called for major deployment of resources of the department and lasted several days.

During the year 2011-12, the Directorate of Fire & Emergency Services have collectively attended **2444 fire calls and 2794 emergency calls, during which 134 human lives and 255 animal lives were saved.** Property worth Rs.93.17 crores was saved/salvaged due to timely action of the Fire Personnel.

The lesson learnt from these incidents include the need for making a comprehensive assessment of Fire and other hazards in the Mormugao Port area where large Petroleum and other Solvent above ground tanks are installed. The study also needs to assess the hazards along the conveying pipeline from these terminals to the storage tanks at various facilities, in view of the likely impact of the habitats nearby. The Mormugao Port needs to take up this assessment and prepare mitigation plan on priority. The in-house first responder team needs to be appropriately equipped and trained in line with the assessment of the hazard so that effective and timely response can occur in the event of any mishap. The District Disaster Management Authority also needs to ensure that the Major Accident Hazard units in the jurisdiction also prepare a Risk Assessment and Hazard Response and Mitigation Plan.

Prevention is always better than cure. To be forewarned is to be forearmed. Let us take adequate care to safeguard our lives and property through preventive care and proper response in case of accidental fires and smoke conditions.

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