

Fire Accidents in Buildings cases

Fire or combustion is the process of burning. It is a chemical reaction initiated by presence of heat energy in which a substance combines with oxygen in the air and the process is accompanied by emission of energy in the form of heat, light and sound. **We know that the continuation of fire needs continuous supply of heat, fuel and oxygen in the buildings.** Therefore we must concentrate about these three factors. The supply of **oxygen** is common and continuous from the atmosphere; Fire Accident is an unplanned or unexpected event in the building environment. The second factor of, **fire causes, or sources of ignition** in buildings are of two types, **the first one** is human error type fire, and **the second one** is appliances type fire. The human error type's fires are children playing with matches, rubbish burning, smoking and intentional fire. The appliances types' fires are electrical appliances, gas appliances, other fuel appliances, acetylene and liquefied gas, solid fuel appliances and other specified causes fire. The survey and study reveals that human error types fire are the main causes of fire in the buildings. The modern materialized society all activities depends on fuel consumption and energy utilization based, most of the energy utilization processes are fire based. This fire based activities has become the main source of fire accident in buildings for most of the time. The third factor of **fuel supply** based on the nature, quantity and the arrangement of fire load or the combustible materials, which is stored in side of the building. .The type of fire and its severity, spread depends on the thermal behaviour of the combust materials and the way it is burning. The quantity of fuel expressed in terms of fire load The fire load is calculated by the sum of

Case study

The area at Krishna school building fire accidents. Date: 16 July 2004. **Place:** Kumbakonam. State: Tamil Nadu a South Indian state. Lives losses = **94**

The building plan explains the different room positions and the accommodations, door and stair case location. It explains where the fire started, speeded, the way it was blocked the routes and arrest the movement of the children and caused the lives losses.

Ignition source: Spark from midday meal kitchen open stove.

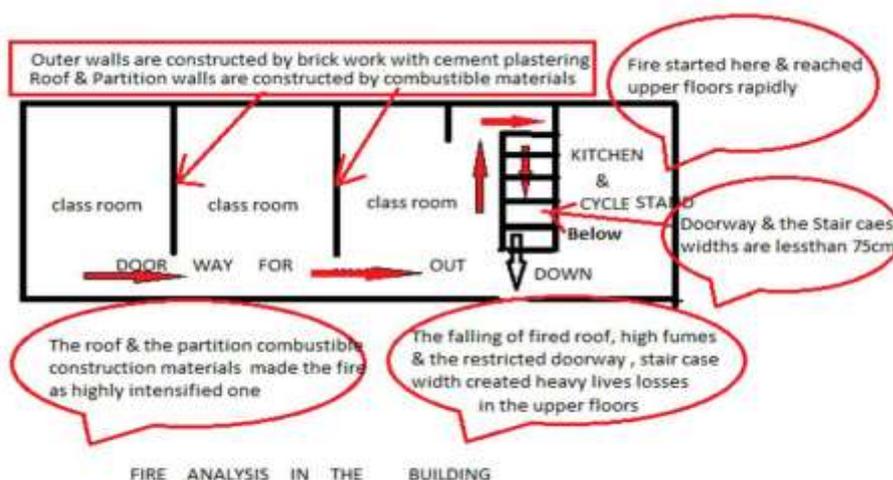
Kitchen location: The midday meal kitchen, cycle parking is at the ground floor and the only one stair case is also located nearer to the kitchen.

The first floor and the second floor accommodated with class room for the primary school students. The class rooms are separated by thatched material. **The second floor pitched roof is also covered with thatched material and is continued to cover the kitchen top in the same level.**

Fire spread: Fire Started from midday meals kitchen stove through bamboo pole support to thatched roof and reached upper level of the class rooms rapidly.

Fire feeding materials: Thatched roof, bamboo with coconut coir support, wooden chair table, books, & cloths.

Reasons for large lives losses: The fired thatched roof, class room partition thatched materials with supporting bamboo support fell on the children and blocked their movement, the smoke and consequent scramble blocked the exit routes and the stair case. The children could not make their way out, lot of suffocation children could not breathe out, within few minutes the blaze engulfed the entire floor area. The wooden materials and the note books, and dress materials play an important role for making the fire as a rapid and high intensified one.





This photo shows the top floor of the building. After consuming the fire the class room partition and the roof. Here there is no door, window, proper ventilation or escape route for each class room.



This photo shows the unshaped openings in the walls, which were created to take out the corps of the children.

Failure aspects: Provision of minimum requirements of firefighting appurtenances, water facility, preparedness, knowledge about fire, the passive provision of site set back, escape routes, and disaster management by the staff.

Solution: The building shape is long and linear the school capacity is 900 + staffs. If the buildings might have been provided with another one stair case with adequate number of doors all the children might have been escaped from the building. If the roofs and the class room partitions are constructed with non-combustibles materials with permanent construction the children might not have been arrested in side of the floor and made their way out quickly without any

obstruction. **Non-combustible materials will have the property that, it will not produce smoke and fumes during fire.**

NUMBER OF DOORS NEEDED; (DESIGN)

The number of doors needed for any building will follow this formula:

$$U = N / (40 \times T)$$

Where **N** = number of persons
(Floor area / density factor).

T = Time factor in minutes,

U = Number of units required,

Number of exits = $(U / 4) + 1$

Rate of flow should be 40 persons per minutes for door width.

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Caralton tower office building fire accidents.

Date: 28 February 2010. **Place:** Bangalore. **State:** Karnataka.

Live losses = 12

Ignition sources: The fire was started from basement of the building by an electric short circuit

Fires spread: From basement floor to top floors reached rapidly.

Fire feeding materials: Through the wiring and the electrical fixtures, computers and other furniture materials.

Passive and active measures: Both passive and active provisions are provided properly, but Escape routes are blocked by waste materials, the firefighting appurtenances are not in working condition.

Reasons for lives losses: Three people jumped from the higher floors. Nine people lost their lives by breathing problem, due to smoke with toxic substances inhale ration.



Photo shows the engulfing smoke and toxic substances from basement to top floor.

Failure aspects: The firefighting appurtenances are not working, blocking of escape routes and evacuation procedure.

Solution: If fire-retardant material was used in wiring, computers, partitions and other furniture might have avoided the fire ignition. Or if the wiring had replaced by fire resistant wires, even though fire was ignited by short circuit the high fire spread, smoke and the toxic substance might have been avoided.

Blocking of escape routes by the waste materials, closing of fire escape routes and jumping of the staffs from the building failure of precaution for breathing problem`s patients, the causes of lives losses, failure of working condition of firefighting appurtenances shows that lack of fire knowledge and evacuation procedure