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ADVANCE FIRE PREVENTION TECHNIQUES FOR ITER-INDIA LABORATORY BUILDING at IPR

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Introduction

ITER (International Thermonuclear Experimental Reactor) is a major scientific and technological endeavour involving seven partners. India is one of them. China, European Union, Japan, Russia, South Korea and USA are the other partners.

ITER is being built at Cadarache, France. ITER-India, IPR is the Domestic Agency (DA) responsible to deliver the India's share of the In-Kind contributions to ITER.

Introduction

A total of 09 different systems are to be fabricated and delivered by ITER-India with active participation of Indian Industries. Some of these systems need extensive R&D before the designs are finalized. For this purpose, a laboratory building (ITER-India laboratory) was constructed in the main campus of IPR. Dimensions for this building are 41 mtr. length * 45 mtr. width * 30 mtr. height.

Codes & Standards

National Building Code of India (NBC) – Part 4, Fire and Life Safety. (As per NBC, laboratories and research establishments are classified into subdivision of E-2.)

Atomic Energy Factory Rules, 1996,

IS:2190-2005 for first-aid fire extinguisher,

IS:2189:2008 for fire alarm & detection system,

Common Causes of Fire

- Sources of ignition includes hot surface, switchgear sparking, busbar splashing, short circuit, faulty wiring, static electricity, etc.

- A range of combustible materials, such as paper, cardboard, plastics, other packaging materials, etc. are often found in laboratories. In the event of a fire, materials along with furniture and other materials will contribute significantly to the spread of fire.

Advance Fire Prevention Techniques

Fire Resistant Materials:

Fire resistant materials are used wherever possible.

FRLS Cables:

Fire resistant low smoke cables are used for entire laboratory building. This helps in the generation of dense smoke when they are exposed to fire from external source.

Advance Fire Prevention Techniques

Fire Doors:

Fire doors of 2 hours rating installed in each of the laboratory work areas. This factor restricts the spread of fire from one area to another.

Advance Fire Prevention Techniques

Fire Resistant Coatings:

This coating is done on each cable (one meter) which comes out from an electric panel. In case of fire , this helps in avoiding spread of fire further.

Advance Fire Prevention Techniques

Fire Resistant Penetration Seal:

This fire resistant penetration seal is provided to restrict the spreading of fire from one floor to other floor.

Advance Fire Prevention Techniques

Fire Suppression System:

Fire suppression system is provided for electrical panels to extinguish the fire in its incipient stage.

Advance Fire Prevention Techniques

Sub Station Building separation:

Laboratory building and a separate substation building is to avoid disturbance due to any trouble inside the substation building and vice versa.

Fire Alarm and Detection System

A key aspect of fire alarm and detection system is to identify a developing fire emergency in a timely manner and alert the building occupants as well as security personnel.

Portable Fire Extinguishers

First aid fire extinguishers are installed and maintained as per IS 2190:2010. All fire extinguisher points are clearly labelled and information on the use of each type of extinguisher is given. Clean agent fire extinguishers have been installed at critical places like control room, server room, critical equipment area, etc.

Employees as well as security personnel are trained regularly to react promptly to any fires that might break out in the laboratory.

Fire Fighting System

The ITER-India Laboratory Building comes under the storage capacity of 1,00,000 liters. In addition to this, a 20,000 liters capacity tank is installed on the terrace. Electric pump is connected with dedicated power supply which is not connected with the regular power supply of the building.

Testing and maintenance is done as per NFPA 25 requirements.

Emergency Provisions

Following equipment are provided with emergency power supply arrangements:

- One Fire Lift
- One electric motor driven firefighting pump set,
- All staircase lighting
- 50% of the corridor lighting
- Power for fire alarm system
- Area lighting

Emergency escape routes and emergency exits are clearly marked by auto glow signage.

Emergency Evacuation Plan is displayed on each floor.

Emergency Evacuation Procedure

In case of fire in a high rise building, safe evacuation of its occupants may present serious problems unless a plan for orderly and systematic evacuation is prepared in advance and all occupants are well drilled in the operation of such plan.

Plan & Training:

Besides having a separate fire staff specialized in firefighting, we have trained every individual working in the building, what action one should take, in case of fire emergency. A written brief plan is displayed at each work area prominently.

Emergency Evacuation Procedure

Every employee must know:

- Nearest Fire Call Point
- Nearest Fire Extinguishers
- Nearest “Means of Escape”
- How to operate Fire Call Point
- How to operate Fire Extinguishers
- How to use “Means of Escape”

In addition to this, every work area in the laboratory building one person is nominated as safety coordinator and one as a deputy. In case of fire emergency, safety coordinator will take lead to control the situation.

Emergency Evacuation Procedure

Drills:

- Fire drills are conducted once in a six month period.
- All occupants of the building are to participate in the fire drill.
- A written record of such drills is being made and further improvement, if needed, will be considered.

Emergency Evacuation Procedure

Basic Guidelines for Fire Emergency:

- Don’t panic. Act cautiously.
- Inform other people working in the affected area and evacuate affected area by public address system or by any means.
- Turn off electrical equipment in the immediate area, if it is safe to do so.
- Select right type of fire extinguisher to fight the fire.
- Keep an exit to your back for easy escape.

Emergency Evacuation Procedure

Basic Guidelines for Fire Emergency:

- Inform work in charge, safety and administration section.
- Call external fire services help for major fire.
- Don’t make affected area crowded.
- Assemble at Assembly Point.

Conclusion

Advance fire prevention techniques are implemented for laboratory building where critical and important experiments are conducted. Applicable fire safety norms are implemented at ITER-India laboratory building.

Thank You