FIRE & EMERGENCY PREPAREDNESS IN METRO RAIL

Rajesh Agrawal
Sr.DGM/E&M
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http://www.delhimetrorail.com
DMRC at a Glance

Registered: May 1995

Construction Commenced: Oct 1997

Operation Commenced: Dec 2002

Operates 213 RKM in 7 lines, 158 Stations

Underground: 52 RKM (35 Stations)
Elevated: 154 RKM (117 Stations)
At Grade: 7 RKM (6 Stations)

Highest ridership: 3.29 Millions (17 Aug 16)

No accident involving passenger life in last 14 year of operation

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Applicable Codes & Standards

- NBC 2005, Part IV (Fire & Life Safety)
  Clause number 6.4.8 (D7 – Assembly Building)

- NFPA 130 - Standard for fixed guide way transit & Passenger Rail System
  Chapter 5 Means of Egress and Fire Protection
  Chapter 7 Emergency Ventilation (station and tunnel)
  Chapter 9 for Emergency Management
  *Referred for fire safety design of Underground stations.*

- Main IS Codes:
  IS 15105 – For Automatic Fire Sprinklers
  IS 3844 – For Internal Hydrants
  IS 2190 – For Portable Fire Extinguishers
  IS 15501 – For Inert Gas System Installations
Fire & Emergency Management

- Prevention
- Containment (Passive)
- Detection & Suppression (Active)
- Education
1. Active System (Detection & Suppression)

• Fire Detection & Alarm system

• Hydrants, Sprinklers and Tunnel Hydrants

• Fire Extinguishers & Gas Suppression Systems (Total & Panel specific)

• Medium Velocity Water spray system

• Smoke Extraction System
Active System : Smoke Extraction

- SMOKE IS THE REAL THREAT THEN HEAT
- Majority of casualties are due to suffocation by SMOKE
- SMOKE spreads faster and travel to places far away from the location of fire
- SMOKE effects visibility and hindering evacuation and fire fighting operation.

To mitigate above and to extract heat rejected by Trains TVS is provided in underground MRTS.
Smoke Extraction : Salient Features

• TVS provides safe evacuation path to passenger & maintain the tenable environment inside the tunnel in emergency.

• TVS is designed to handle 20 MW fire load (one car of train); it have bi-directional operation and capable to start within **180 Seconds**.

• During emergency TVS works in conjunction with station ECS system. Smoke from station is extracted through UPE & OTE.

• It consists of Various fans, pneumatic dampers, ducts & nozzles and control system.
1 - Nozzle, 2 - Nozzle damper, 3 - TVD, 4 - Duct, 5 - Attenuator, 6 - TVF, 7 - FID, 8 - DRD, 9 - SD above
TVS Operation – Congestion Mode

(occur when delays cause disruption to the movement of trains).

- PUSH – PULL VENTILATION

LOW TEMPERATURE - HIGH TEMPERATURE
TVS Operation – Emergency Mode

*(when smoke is generated in the tunnel or station trackway)*
TVS Operation – Emergency Mode

*(when smoke is generated in the tunnel or station track way)*
TVS Operation – Emergency Mode (Fire in front of train)
TVS Operation – Emergency Mode (Fire in rear of train)
Tunnel Booster Fans: On link section, Track length exceeds
If the fire is in front coaches (up to first five of 8-car train / up to first four coaches of 6-car train) of first train:

- 2nd train

- DN LINE

- Direction of detrainment

- Cross Psg: Passenger of Incident Train

- Reversed to just clear Cross Passage

- FRESH AIR

- UP LINE

- DFS Assistance

- 4/5
Active System: Smoke Extraction: Station
Emergency Mode Operation

- Hot Smoke
- Damper Closed
- Damper Open
2. Passive System

- Construction
  - Hazard Zonation
  - Selective use of low fire hazard materials
  - Train coach: Under floor of the Coach is rated for 30 Minutes fire rating.

- Fire Doors
- Compartmentation
  - Smoke Curtains
  - Smoke Screen for Vertical opening
  - Pressurization (Escape Routes)
3. Prevention

• Plans and Policies
  • Disaster Management Plan
  • Contingency Plan
  • Station Working Order (SWO) for individual station
  • Standard Operating Procedures (SOPs) 14 Chapters
  • Safety Circulars 36 Nos.
  • Special Policies

• Preparedness
  • Fire NOC from local fire authorities
  • Inspections & Audits
  • Technical Mock Drills
  • Operational Mock Drills
Special Policies

• Electricity policy
  • Outside electricity not allowed
  • Penalty for non-compliance of fire safety measures.

• LPG Policy
  • Cap on Storage capacity <500 Kg.
  • Safe distance >3 meters
  • Sprinklers System

• DG Set Policy
  • Allowed in special circumstances only for banks etc.
  • Compliance to CPCB norms

• Hot work permit
  • Only in non-revenue hours
  • Permit by EPIC
  • Fire Watch
Mock Drills

• Technical Mock Drills
  • Fire Pumps Operation
  • TVS Operation
  • Gas Flooding System
  • Fire Detection & Alarm System

• Operational Mock Drills
  • OHE Failure
  • Detrainment
  • Fire on Platform/concourse
  • Fire inside Train
  • Terrorist Attack
4. Education

• Training
  • Induction Training
  • Refresher Training
  • Classroom Training & Wet Drills

• Fire Service Week
  • Fire Service Demonstrations at Station premises
  • Public Awareness Programs
If you talk to a man in a language he understands that goes to his head

If you talk to him in his language that goes to his heart

_Nelson Mandela_
Thank You