



Special-Hazard Fire Suppression Design

Course: Clean Agent, CO2, Foam, Water Mist and Deluge



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Introduction:

Special-hazard fire suppression design, covering clean agent, CO2, foam, water mist and deluge systems, is a 5-day course for fire protection designers, MEP consultants and facilities engineers that ends with a special-hazard suppression design basis for a case organisation. Data halls, control rooms, tank farms and hangars are protected by systems chosen by habit, with enclosures that leak agent, foam stocks that run short and mist or deluge flows never checked against demand. Nominees already design, install or maintain fixed suppression and learn by modelling build on quantity sheets and flow workbooks. CoreConcept Training Center delivers this special-hazard suppression course.

Course Objectives:

- Classify special hazards by fuel, enclosure and occupancy and select a clean agent, CO2, foam, water mist or deluge solution for each
- Calculate halocarbon, inert gas and CO2 quantities, nozzle layout and overpressure venting for total flooding enclosures
- Size low and high expansion foam systems, foam chambers and proportioners for storage tanks, bunds and hangars using NFPA 11
- Specify water mist and deluge water spray arrangements, densities and flow demand for machinery spaces, transformers and pressure vessels
- Plan enclosure integrity testing, acceptance discharge tests and inspection and maintenance routines for each system family
- Compile a special-hazard suppression design basis for a case organisation ready for engineering review

Target Audience:

- Fire protection design teams responsible for gaseous, foam and water mist calculations on building and plant projects
 - MEP consultancy staff who specify suppression for data centres, telecom rooms and switchgear rooms
 - Special-hazard installation contractors who prepare shop drawings, flow calculations and commissioning tests
 - Facilities and data centre engineers accountable for keeping clean agent and CO2 systems in service
 - Terminal and tank storage engineers responsible for fixed foam and cooling water protection
 - Hangar and aviation maintenance facility engineers who look after high expansion foam and deluge systems
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Course Outline:

Day 1: Special-Hazard Landscape, Agent Families and Hazard Assessment

- Special-Hazard Occupancy Survey for Data Halls and Control Rooms
- Fire Class and Fuel Mapping for Agent Selection
- Extinguishing Mechanisms of Halocarbon, Inert Gas and CO₂ Agents
- Total Flooding Versus Local Application Decision Criteria
- Agent Selection Matrix for Occupied and Unoccupied Enclosures

Day 2: Gaseous Total Flooding Design to ISO 14520 and NFPA 12

- ISO 14520 Design Concentration and Safety Factor Settings
- Halocarbon and Inert Gas Agent Quantity Calculation Sheet
- NFPA 12 Carbon Dioxide Flooding and Local Application Quantities
- Nozzle Placement, Discharge Time and Pipe Flow Estimation
- Overpressure Venting Area Calculation for Enclosure Walls

Day 3: Foam, Water Mist and Deluge Engineering Calculations

- NFPA 11 Low Expansion Foam Application Rate and Duration
- Foam Chamber, Subsurface Injection and Proportioner Sizing for Tanks
- NFPA 409 High Expansion Foam Submergence for Aircraft Hangars
- NFPA 750 Water Mist Pressure Class and Nozzle Spacing
- NFPA 15 Deluge Water Spray Density for Transformers and Vessels

Day 4: Room Integrity, Discharge Testing and Lifecycle Failure Modes

- Door Fan Enclosure Integrity Test and Hold Time Prediction
- Leakage Sealing Plan for Raised Floors and Cable Penetrations
- Release Panel, Abort Switch and Pre-Discharge Alarm Logic
- Acceptance Discharge Test and ISO 7203 Foam Concentrate Sampling
- Inspection and Maintenance Regime for Cylinders, Proportioners and Mist Pumps

Day 5: Modelling Build of a Special-Hazard Suppression Design Basis

- Case Organisation Hazard Register and Agent Selection Rationale
 - Case Data Hall Clean Agent Quantity and Venting Workbook
 - Case Tank Farm Foam and Deluge Demand Calculation
 - Case Commissioning Test and Maintenance Schedule Draft
 - Special-Hazard Suppression Design Basis Completion and Peer Review
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Skills You Will Gain:

- Hazard-Based Agent Selection
- Clean Agent Quantity Calculation
- CO2 Flooding Design
- Foam Proportioning Design
- Water Mist Specification
- Deluge Water Spray Sizing
- Enclosure Integrity Testing
- Special-Hazard Maintenance Planning

Why Attend This Course:

- Deliver a special-hazard suppression design basis that the project fire engineer and facilities manager can issue for review and tender
- Choose between gaseous, foam, mist and deluge protection for a given enclosure or tank using quantity and integrity evidence
- Avoid failed door fan tests, walls damaged by unvented discharge and foam supplies that run out before the required duration
- Coach junior designers and technicians on agent calculation sheets, discharge test records and maintenance checklists

Conclusion:

Back at work, the participant hands the special-hazard suppression design basis to the project fire engineer, the facilities manager and the reviewing consultant, who use it to approve agent choices, size cylinder banks and foam stock and set up testing routines. Data centre and terminal maintenance teams adopt its inspection schedule for cylinders, proportioners and mist pumps. After the first enclosure integrity test or acceptance discharge, the team should compare measured hold time and flow results with the calculations and update the design basis for later projects.

Frequently Asked Questions FAQ:

What should participants know before a special-hazard fire suppression design course?

Participants should read building and plant drawings, understand basic fluid flow and have worked on or maintained fixed suppression. Bringing a laptop with a spreadsheet tool and sample room dimensions or tank data helps during the agent quantity and foam calculation work.

How does special-hazard fire suppression design differ from a sprinkler design or industrial firefighting course?

It designs gaseous, foam, water mist and deluge systems for defined hazards, including quantities, venting and integrity testing. Sprinkler design courses cover water-based building protection and fire pumps, while industrial firefighting courses cover how fire teams use foam and water during an incident.

Why does special-hazard fire suppression design depend on enclosure integrity?

A clean agent or CO₂ system only extinguishes if the enclosure keeps the design concentration for the required hold time. Leaks through raised floors, ducts and cable penetrations let agent drain away, so a door fan test predicts retention and guides sealing before acceptance.

What do participants take back from the special-hazard fire suppression design course?

Participants take back a special-hazard suppression design basis for a case organisation, with a hazard register, agent selection rationale, clean agent quantity and venting workbook, foam and deluge demand calculation and a commissioning test and maintenance schedule.