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Fire Water Hydraulic Calculation Using PIPENET Training Course

4 – 8 January 2027
Barcelona (Spain)



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Ref: 31_1082147 **Date:** 4 – 8 January 2027 **Location:** Barcelona (Spain) **Fees:** 6200 Euro

The Fire Water Hydraulic Calculation Using PIPENET Training Course is a one-week professional course for loss prevention engineers, piping designers, and safety system specialists managing pressurized deluge and fire suppression networks. Working through pipe sizing calculations, deluge ring-main simulations, and nozzle demand verifications, you complete a Fire Water Hydraulic Calculation Package. Mercury Training Center delivers this course to establish rigorous fire water hydraulic calculation models across critical industrial facilities.

About This Course

Inaccurate pipe sizing, poor pressure distribution, and undersized fire pumps lead to inadequate water delivery during process plant emergencies. To follow this course, you must already understand basic fluid mechanics, read piping and instrumentation diagrams, and evaluate fire system layouts at work. Through hands-on exercises, you practice modeling complex loop networks, balancing deluge nozzles, and verifying hydraulic adequacy.

Who It Is For

- Professionals responsible for sizing fire water ring mains, deluge skids, and fire pump delivery networks across process facilities
- Professionals responsible for conducting hydraulic verification and nozzle discharge calculations for fixed spray systems
- Professionals responsible for reviewing safety design packages, piping layouts, and vendor hydraulic submittals
- Professionals responsible for troubleshooting operational pressure drops and flow imbalances in aging industrial fire protection networks

This course is not for structural draftsmen seeking basic computer-aided drafting instruction, nor is it for industrial firefighters who operate portable fire suppression equipment rather than design fixed hydraulic piping networks.

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Competencies You Will Build

- Hydraulic Network Modeling: Constructing looped ring mains, branch lines, and spray nozzle arrays in specialized simulation software.
- Pressure Drop Calculation: Applying Darcy-Weisbach and Hazen-Williams friction formulations to determine pipe head losses.
- Deluge System Balancing: Setting orifice plates and nozzle discharge coefficients to ensure uniform water density.
- Fire Pump Sizing: Evaluating system demand curves against pump head-capacity performance characteristics under multiple operating scenarios.
- Velocity and Pressure Verification: Checking network flow rates, maximum permissible pipe velocities, and minimum nozzle pressures against design codes.
- Network Fault Diagnostics: Identifying bottlenecks, excessive pipe friction, and pressure starvation points across existing fire water systems.

What You Will Be Able to Do

By the end of the course you will be able to:

- From facility plot plans and fire water demand schedules, construct closed-loop pipe network models in PIPENET.
- Given fixed water spray coverage requirements, calculate appropriate discharge coefficients and nozzle pressures conforming to NFPA 15.
- Using fire pump flow-head test curves, plot system demand versus supply to verify pump sizing against NFPA 20 criteria.
- From piping isometric drawings and elevation schedules, determine static head losses and friction factors using Darcy-Weisbach equations.
- Using simulation output reports, size balancing orifice plates to prevent over-discharge in hydraulically favored deluge zones.
- From network pressure diagnostic data, identify undersized headers, excessive flow velocities, and stagnant dead legs in existing distribution mains.

Course Content

Day 1: Fluid Mechanics and Network Fundamentals

- Fluid Dynamics Principles, Conservation Equations, and Friction Factor Derivations
- Hazen-Williams and Darcy-Weisbach Hydraulic Formulations in Process Piping
- PIPENET User Interface, Grid Configuration, and Library Component Setup
- Network Connectivity Rules, Elevation Changes, and Directional Flow Conventions
- Pipeline Roughness Values, Equivalent Length Methods, and Component Head Losses

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Day 2: Fixed Spray Systems and Deluge Network Design

- NFPA 15 Water Spray Fixed System Design Standards and Density Calculations
- Modeling Nozzles, Spray Angles, and Discharge Coefficients in Deluge Subsystems
- Pressure Balancing Techniques and Minimum Operating Pressure Requirements
- Orifice Plate Calculation and Restriction Sizing for Balanced Ring Mains
- Over-Discharge Evaluation and System Flow Rate Optimization

Day 3: Ring Main Distribution and Pump Sizing

- Closed-Loop Fire Water Ring Main Modeling and Sectional Isolation Philosophy
- NFPA 20 Fire Pump Performance Curves, Net Positive Suction Head, and Churn Pressure
- Peak Water Demand Aggregation for Multiple Simultaneous Process Fire Scenarios
- Supply-Demand Curves Intersection and Operating Point Hydraulic Analysis
- Surge, Static Pressure Heads, and Backpressure Constraints in Distribution Networks

Day 4: Network Diagnostics, Code Compliance, and Special Components

- Maximum Velocity Constraints and Pipe Erosion Prevention in Fire Mains
- Pressure Regulating Valves, Deluge Valves, and Non-Return Valve Modeling
- NFPA 13 Sprinkler System Hydraulic Calculation and Spacing Parameters
- Investigating Bottlenecks, Air Pockets, and Cavitation Risks in Distribution Headers
- Generation and Interpretation of Tabular Output Reports and Hydraulic Profiles

Day 5: Integrated Hydraulic Verification and Package Finalization

- Exercise on Hydraulic Modeling of an Offshore Hydrocarbon Production Skid
- Exercise on Storage Tank Deluge Cooling and Foam-Water Injection Network Sizing
- Exercise on Fire Water Ring Main Upgrades for an Industrial Chemical Complex
- Exercise on Resolving Low-Pressure Starvation in Remote Deluge Systems
- Finalization of the Fire Water Hydraulic Calculation Package

Case Studies and Exercises

These suggested activities provide practical application of fire protection hydraulic workflows across diverse industrial sectors:

- Case study: A liquefied natural gas processing facility where you model a multi-zone deluge system to verify minimum nozzle pressure during gas turbine enclosure fires.
- Case study: An offshore oil and gas production platform where you balance open deluge spray rings on a high-pressure separator vessel using calibrated restriction orifices.
- Exercise: A coastal petroleum storage terminal where you calculate hydraulic demands for tank shell cooling and foam monitor delivery under worst-case simultaneous fire scenarios.
- Exercise: A chemical processing plant where you diagnose severe pressure losses along an expanded fire water loop and resize distribution headers to restore required flow.

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What You Take Back

The Fire Water Hydraulic Calculation Package provides engineering calculation templates and validation workflows for your first month back on the job. You will use it to structure simulation models, document design assumptions, verify pump selections, and review contractor submittals against recognized fire protection standards.

- PIPENET model construction and component data validation checklist
- Fire water hydraulic calculation report template including pump curve and demand graphs
- Orifice plate sizing and nozzle pressure balancing calculation worksheet
- System velocity, pressure drop, and pipe sizing verification matrix

Quick Answers FAQ

What background is required before attending the Fire Water Hydraulic Calculation Using PIPENET Training Course?

You need a working knowledge of basic fluid mechanics, familiarity with piping schematics, and prior exposure to plant layout drawings. Experience in evaluating fire protection concepts or process piping networks ensures you can follow software simulations and technical calculations without delay.

How does the Fire Water Hydraulic Calculation Using PIPENET Training Course differ from general process piping hydraulics courses?

General piping hydraulics courses focus on steady-state continuous process fluid transfer, line sizing, and chemical property changes. The Fire Water Hydraulic Calculation Using PIPENET Training Course concentrates specifically on emergency fire water networks, open-nozzle deluge balancing, fire pump compliance standards, and regulatory water density requirements.

Why are specialized software models preferred over manual spreadsheets for fire water hydraulic calculations?

Manual spreadsheets cannot accurately resolve complex looped networks with multiple flow splits, elevation shifts, and simultaneous discharging nozzles. Specialized software solves non-linear network equations simultaneously, providing exact flow distribution, velocity profiles, and pressure drops that verify safety compliance.

What does the completed Fire Water Hydraulic Calculation Package contain when you finish the course?

It contains a documented calculation dossier featuring network schematics, pipe sizing data, nozzle discharge schedules, pump operating point charts, and orifice sizing sheets. You apply this package directly to validate engineering designs and regulatory submissions at work.

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For Your Manager

This course equips your team member to build, simulate, and verify plant fire water networks using recognized industrial software. They return with a verified Fire Water Hydraulic Calculation Package, enabling them to validate pump capacities, balance deluge pressures, and review piping submittals internally, reducing reliance on third-party engineering consultants and preventing costly pipe redesigns during project execution.