



Gas Distribution Network Design

4 – 8 April 2027
Manama (Bahrain)



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Ref: 121794_1047938 **Date:** 4 – 8 April 2027 **Location:** Manama (Bahrain) **Fees:** 5500 Euro

Introduction

The Gas Distribution Network Design course focuses on the principles, methodologies, and engineering considerations for developing efficient gas distribution systems. It explores the planning, design, and optimization of gas networks to ensure safe, reliable, and cost-effective energy delivery. Participants will gain knowledge of network configurations, pipeline design principles, hydraulic analysis, pressure management, and operational requirements. The program addresses essential factors influencing gas distribution infrastructure, including demand forecasting, load assessment, safety standards, and system performance evaluation. It provides an understanding of modern approaches used in designing distribution networks for residential, commercial, and industrial applications. Professionals will develop effective solutions for complex gas distribution challenges.

Targeted Groups

This Gas Distribution Network Design training targets professionals seeking knowledge and skills:

- Gas engineers are involved in distribution system planning.
- Pipeline engineers managing gas network projects.
- Energy professionals developing gas infrastructure solutions.
- Mechanical engineers work with pipeline systems.
- Design engineers improve gas network efficiency.
- Project managers overseeing gas distribution developments.
- Technical specialists are analyzing network performance.
- Operations teams supporting gas supply reliability.
- Engineering consultants designing energy systems.

Course Objectives

Participants will achieve the following objectives by completing the Gas Distribution Network Design course:

- Understand fundamental concepts of gas distribution network design and planning.
- Identify key components used in modern gas distribution systems.
- Analyze pipeline layouts and network configurations for efficient gas delivery.
- Apply hydraulic principles to evaluate gas flow performance.
- Develop knowledge of pressure regulation and control strategies.
- Examine methods for estimating gas demand and forecasting load.
- Evaluate design factors affecting safety and operational reliability.
- Understand pipeline sizing techniques and material selection principles.
- Analyze network challenges related to capacity and expansion requirements.
- Interpret technical data used in distribution system development.
- Apply engineering approaches for optimizing gas network performance.
- Recognize safety considerations in gas distribution infrastructure.
- Improve decision-making skills for gas network design projects.

Targeted Competencies

Participants will gain the following competencies during the Gas Distribution Network Design program:

- Ability to analyze gas distribution network structures.
- Understanding of pipeline design and hydraulic principles.
- Skills in evaluating gas flow requirements.
- Knowledge of pressure management techniques.
- Capability to assess network performance factors.
- Ability to support gas infrastructure planning.
- Understanding of safety-focused design practices.
- Skills in optimizing distribution system reliability.
- Ability to interpret engineering design information.

Studying Scenarios

In this Gas Distribution Network Design training, participants develop skills through the following scenarios:

- Designing gas networks for expanding urban areas.
- Evaluating pipeline capacity for increasing customer demand.
- Analyzing pressure losses within distribution systems.
- Reviewing network modifications for improved reliability.
- Assessing design alternatives for industrial gas supply projects.
- Developing solutions for operational distribution challenges.

Course Content

Unit 1: Fundamentals of Gas Distribution Network Design

- Introduction to gas distribution systems and their role in energy delivery.
- Overview of differences in natural gas transmission and distribution networks.
- Understanding the structure of urban and industrial gas networks.
- Exploring key components including pipelines, regulators, meters, and valves.
- Reviewing principles of gas network planning and infrastructure development.
- Examining factors influencing gas distribution system design decisions.
- Understanding the relationship between network capacity and customer demand.

Unit 2: Gas Network Planning and Design Principles

- Studying methods for developing effective gas distribution network layouts.
- Understanding demand analysis and gas consumption forecasting techniques.
- Evaluating residential, commercial, and industrial load requirements.
- Exploring pipeline routing considerations and geographical limitations.
- Understanding design criteria for medium- and low-pressure gas networks.
- Reviewing pipeline diameter selection and capacity calculation methods.
- Analyzing material selection factors for gas distribution pipelines.
- Examining design considerations for future network expansion and flexibility.

Unit 3: Hydraulic Analysis and Pressure Management

- Understanding gas flow behavior within distribution pipelines.
- Studying hydraulic calculations used in gas network design.
- Evaluating pressure-drop analysis and flow-optimization methods.
- Exploring techniques to maintain stable gas pressure.
- Understanding pressure regulators and control station functions.
- Analyzing network performance under different operating conditions.
- Reviewing methods for improving gas distribution efficiency.
- Examining the impact of demand variations on network pressure stability.

Unit 4: Safety, Reliability, and Operational Considerations

- Understanding safety principles applied in gas distribution network design.
- Studying risk factors affecting pipeline operation and reliability.
- Exploring leak prevention strategies and monitoring approaches.
- Reviewing emergency planning requirements for gas distribution systems.
- Understanding the importance of isolation valves and protection systems.
- Analyzing reliability factors influencing continuous gas supply.
- Examining maintenance considerations during the design phase.
- Reviewing regulatory and technical requirements affecting network development.

Unit 5: Advanced Gas Distribution Network Optimization

- Exploring modern approaches for improving gas network performance.
- Understanding network simulation concepts for design evaluation.
- Studying optimization techniques for reducing operational limitations.
- Analyzing strategies for improving energy efficiency in distribution systems.
- Reviewing smart monitoring concepts for gas infrastructure management.
- Evaluating network upgrades and expansion planning approaches.
- Understanding challenges associated with future gas distribution developments.
- Applying integrated engineering principles for sustainable gas network design.

Final Insights & Key Takeaways

The course provides professionals with essential knowledge to develop safe, efficient, and reliable gas distribution systems through effective planning, analysis, and optimization practices. It enhances understanding of pipeline design, hydraulic performance, pressure control, and strategic infrastructure development for modern energy networks.