



PIPING AND INSTRUMENTATION DIAGRAM (P&ID) DEVELOPMENT TRAINING COURSE

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KUALA LUMPUR

5200 € (PER PERSON)

REF: #ACE3499_255742



COURSE INTRODUCTION / OVERVIEW:

This course provides a comprehensive exploration of Piping and Instrumentation Diagrams (P&IDs), the foundational documents for any process plant. A P&ID is more than just a drawing; it is the primary communication tool between all engineering disciplines, operations, and maintenance teams. Mastering the ability to read, interpret, and develop these diagrams is a critical skill for ensuring operational efficiency, safety, and regulatory compliance. This program delves into the complete lifecycle of a P&ID, from its initial development based on a Process Flow Diagram (PFD) to its final as-built status and management of change. Drawing upon industry standards, particularly ISA-5.1, and the practical principles outlined in works like "Piping and Instrumentation Diagram Development" by Moe Toghraei, the course builds a robust understanding of symbology, control loops, and layout conventions. BIG BEN Training Center has designed this curriculum to bridge the gap between theoretical knowledge and practical application, empowering participants to confidently navigate and contribute to complex engineering projects by understanding the language of process engineering documentation.

TARGET AUDIENCE / THIS TRAINING COURSE IS SUITABLE FOR:

- Process Engineers.
- Instrumentation and Control Engineers.
- Piping Designers and Engineers.
- Mechanical and Chemical Engineers.
- Project Engineers and Managers.
- Plant Operators and Operations Supervisors.
- Maintenance Technicians and Planners.
- Safety and HAZOP Engineers.
- CAD Drafters and Designers.
- Junior Engineers and recent graduates in technical fields.

TARGET SECTORS AND INDUSTRIES:

- Oil and Gas (Upstream, Midstream, and Downstream).
- Petrochemical and Chemical Manufacturing.
- Power Generation (Conventional and Renewable).
- Pharmaceuticals and Biotechnology.
- Water and Wastewater Treatment.

- Food and Beverage Processing.
- Pulp and Paper Manufacturing.
- Mining and Metals Processing.
- Governmental bodies and regulatory agencies.
- Engineering, Procurement, and Construction (EPC).



TARGET ORGANIZATIONS DEPARTMENTS:

- Engineering and Design.
- Operations and Production.
- Maintenance and Reliability.
- Project Management and Execution.
- Health, Safety, and Environment (HSE).
- Process Safety Management (PSM).
- Quality Assurance and Control.
- Technical Services.
- Commissioning and Start-up Teams.
- Asset Integrity.

COURSE OFFERINGS:

By the end of this course, the participants will have able to:

- Interpret all symbols and notations on complex P&IDs according to ISA standards.
- Differentiate clearly between PFDs, P&IDs, and other process diagrams.
- Trace and understand process flow, control loops, and interlocking systems.
- Develop a basic P&ID from a given process flow diagram and design basis.
- Participate effectively in P&ID review meetings and HAZOP studies.
- Identify key information required for equipment design, operation, and maintenance from a P&ID.
- Understand the role of P&IDs in the project lifecycle, from conception to decommissioning.
- Recognize the importance of P&ID management, including revisions and as-building processes.
- Apply best practices for P&ID layout, clarity, and information density.

COURSE METHODOLOGY:

The training methodology at BIG BEN Training Center is designed to be highly interactive and participant-centered, ensuring a deep and practical understanding of P&ID development. We move beyond traditional lecture-based learning by integrating a dynamic blend of instructional techniques. The course is built upon a foundation of expert-led presentations that break down complex standards and concepts into digestible modules. These sessions are heavily supplemented with real-world case studies, where participants analyze actual P&IDs from various industries to identify best practices and common errors. A significant portion of the training is dedicated to hands-on workshops and group exercises, where teams collaborate to develop, review, and mark up P&IDs, simulating a genuine project environment. This practical

application solidifies theoretical knowledge and builds tangible skills. Continuous feedback is provided by the instructor, and open discussions are encouraged to foster a collaborative learning atmosphere, allowing participants to share experiences and solve problems collectively. This interactive approach ensures that attendees leave not just with knowledge, but with the confidence to apply it directly in their professional roles.



COURSE AGENDA (COURSE UNITS)

UNIT ONE: INTRODUCTION TO PROCESS DIAGRAMS AND P&ID FUNDAMENTALS

- The Role of Process Diagrams in Engineering Projects.
- Distinguishing Between Block Flow Diagrams (BFDs), Process Flow Diagrams (PFDs), and P&IDs.
- Key Information Conveyed by a P&ID.
- Introduction to Industry Standards (ISA, ISO, PIP).
- Understanding the P&ID Layout, Title Block, and Legend Sheet.
- Basic Symbolology for Major Process Equipment (Vessels, Pumps, Heat Exchangers).
- Introduction to Piping Representation and Line Numbering Conventions.

UNIT TWO: INSTRUMENTATION, CONTROL LOOPS, AND SYMBOLOGY

- Deep Dive into ISA S5.1 Instrumentation Symbols.
- Instrument Identification and Tag Numbering Philosophy.
- Representation of Field-Mounted vs. Control Room Instruments.
- Understanding and Tracing Basic Control Loops (Flow, Pressure, Level, Temperature).
- Introduction to Safety Instrumented Systems (SIS) and Alarms.
- Symbolology for Control Valves, Actuators, and Failure Modes.
- Representation of Analyzers and Online Monitoring Instruments.

UNIT THREE: ADVANCED PIPING AND EQUIPMENT REPRESENTATION

- Detailed Piping Symbolology (Fittings, Flanges, Reducers).
- Representing Vents, Drains, and Sample Connections.
- Understanding Utility Systems (Steam, Air, Water, Nitrogen) on P&IDs.
- Specialty Piping Items and their Symbols (Strainers, Steam Traps, Expansion Joints).
- Advanced Equipment Symbolology (Reactors, Columns, Fired Heaters).
- Package Equipment Representation and Interfaces.
- Understanding Tie-in Points and Battery Limits.

UNIT FOUR: THE P&ID DEVELOPMENT LIFECYCLE AND REVIEW PROCESS

- Developing a P&ID from a PFD and Process Data Sheets.
- The Inter-Disciplinary P&ID Review Cycle (Squad Check).
- Best Practices for P&ID Checking and Markup.
- The Role of P&IDs in Process Hazard Analysis (PHA) and HAZOP Studies.
- Incorporating Safety and Operability Requirements.

- Managing Revisions and Clouding on P&IDs.
- Achieving the "Issued for Design" and "Issued for Construction" Milestones.



UNIT FIVE: P&ID APPLICATION IN PROJECT MANAGEMENT AND OPERATIONS

- The P&ID as a Master Document Throughout the Project Lifecycle.
- Using P&IDs for Material Take-Off (MTO) and Cost Estimation.
- The Importance of As-Building P&IDs after Construction.
- Management of Change (MOC) and its Impact on P&IDs.
- Introduction to Intelligent P&IDs and Database Linkage.
- The Role of P&IDs in Plant Operation, Troubleshooting, and Training.
- P&ID Management in the Digital Era and Future Trends.

FAQ:

QUALIFICATIONS REQUIRED FOR REGISTERING TO THIS COURSE?

There are no requirements.

HOW LONG IS EACH DAILY SESSION, AND WHAT IS THE TOTAL NUMBER OF TRAINING HOURS FOR THE COURSE?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

SOMETHING TO THINK ABOUT:

How might the evolution of digital twin technology and AI-driven analytics transform the traditionally static P&ID into a dynamic, predictive operational tool?

WHAT UNIQUE QUALITIES DOES THIS COURSE OFFER COMPARED TO OTHER COURSES?

This course distinguishes itself by focusing on the P&ID as a living document central to the entire asset lifecycle, rather than treating it as a static drawing to be merely deciphered. While other programs may concentrate heavily on symbol memorization, our curriculum emphasizes the "why" behind the "what"—exploring the design intent, safety considerations, and operational logic embedded within the diagram. We move beyond basic interpretation to cultivate a deeper, holistic understanding of how P&IDs facilitate communication and decision-making across engineering, operations, and maintenance. The methodology is heavily rooted in practical application, using case studies that reflect real-world complexities and inter-disciplinary challenges. Participants engage in simulated review meetings and develop P&IDs from scratch, ensuring they can not only read a diagram but also critically evaluate and contribute to its creation. The course content is forward-looking, touching upon the integration of intelligent P&IDs with modern digital tools, preparing participants for the future of process engineering documentation. It is this blend of foundational depth, practical skill-building, and lifecycle-oriented perspective that provides a uniquely comprehensive and valuable learning experience.