Process Piping Layout Engineering – Design, Drafting & Construction

Course Dates: Starts Every 45 Days
(02\textsuperscript{nd} Jan, 15\textsuperscript{th} Feb, 03\textsuperscript{rd} Apr, 15\textsuperscript{th} May, 03\textsuperscript{rd} Jul, 16\textsuperscript{th} Aug, 03\textsuperscript{rd} Oct & 15\textsuperscript{th} Nov – 2017)

Course Venue: IPEBS, Hyderabad, INDIA.

Note: Download IPEBS Training Calendar for exact course start dates for the year 2017 from www.ipebs.in
PROGRAM OVERVIEW

Process Piping Layout Engineering – Design, Drafting & Construction

This is a comprehensive program designed to present all major topics relative to the Process Piping Drafting, Detailed Engineering / Layout Engineering of Piping Systems, Mechanical design, Hydraulic design, Construction of Piping Systems and Stress Analysis of Process Piping Systems.

It is one of the Unique Training Program which covers comprehensive understanding of Piping basics, Process Equipments, Plant Layout, and Mechanical & Hydraulic Design of Piping & Pipelines.

The program duration is 30 days Full time Instruction including concept theory, design calculations, piping drawings, system design & drafting.

WHO SHOULD ATTEND

Fresh Mechanical / Chemical Engineering Graduates, Diploma & ITI.


WHAT YOU WILL LEARN

Upon completion of this course the participant will be able to

- Perform various tasks in piping works, which can be related to Layout & Design, Drafting, & Fabrication, in Design Office, EPC Companies, & Plant Owner Companies.
- Create & Understand Piping Layouts and Isometrics.
- Create MTO (Material Take off).
- Establish Pressure Ratings for Piping Components, Valves / Flanges.
- Select Flange, Gaskets, Valves etc.
- Understand Equipment Vendor Drawings.
- Create Plant equipment & piping layouts.
- Understand Flow Diagrams (BFD/PFD’s & P& ID’s).
- Interpret Pipe Properties.
- Create Piping Material Specifications.
- Perform Pressure Design/Hydraulic Design Calculations.
- Understand Piping Fabrication Requirements.

Trainer Synopsis

- Faculty with 15 years of practical consulting & construction experience.
- Gulf Experienced.
- International Corporate Speaker & Trainer.
- Practising Piping Engineering Consultant for India / International Projects.

“Gain complete understanding of Piping Systems, related Standards, Piping Drawings, Design Calculations.”

“Attend this knowledge – packed professional training diploma course & become a Piping Specialist”

www.ipebs.in | Energizing Engineering – Empowering Engineers
Walk in for a Training Demo –
Orientation / Course Overview by
Course Upcoming Start Date.

Training Features:

- Individual Attention & Placement
  Guidance.
- Thousands of Trained Engineers
  working in India & Middle East,
  Far east & Europe, .
- Excellent Training Material
  provided including ( Piping
  Manual, Piping Data Book, Demo
  Software’s, Drawings & Project
  Work )

COURSE MAJOR MODULES

I) Piping Systems Detailed Engineering /Plant & Piping Layout Engineering
   / Piping Drafting.
   ➢ Piping Fundamentals
   ➢ ASME Codes & Standards
   ➢ Pipe Fittings
   ➢ Flanges
   ➢ Valves
   ➢ Special Elements
   ➢ Mechanical/Process Equipments
   ➢ Flow Diagrams
   ➢ Piping Specifications
   ➢ Piping & Equipment Layout
   ➢ Piping Isometrics
   ➢ Piping Spools
   ➢ Pipe Supports
   ➢ Pipe Rack Design

II) Piping & Pipeline Systems Design.
   ➢ Pressure Design of Process Piping Systems/ Pipelines/ Building
     Services Piping.
   ➢ Hydraulic Design of Liquid Piping Systems & Pipelines.
PROGRAM DESCRIPTION

I) Piping Systems Detailed Engineering /Plant & Piping Layout Engineering / Piping Drafting.

Module – 1) Piping Fundamentals

- Introduction to Process Plants
- Difference between Code and Standards
- Scope of Piping in Projects.
- Plant Piping Systems and Transportation Pipelines.
- Definition & Application of Pipe
- Difference between pipes and tubes,
- Pipe Designators – NPS, IPS, NB, DN, Pipe Wall Thickness & Schedule, Pipe Weights, Lengths, Grades, Ends, Joining Methods, Methods of Manufacture, Pipe Ratings, Pipe Symbols.
- ASTM Specifications of pipes.


- Types of Fittings – Butt Weld, Screwed & Socket Weld.
- Elbow – 90 degree (LR & SR), 45 degree, Reducing Ell, Elbow Representations on drawings, different views, drawing call outs.
- Pipe Bends – Miter Bends, Miter types, Miter angle determination, Miter stress requirements, 180 degree Return, Representations on drawings.
- Reducers – Concentric & Eccentric, Reducer Offsets Representations on drawings, Drawing call outs.
- Eccentric reducer applications, offset calculation.
- Stub Ends, Stub end types: Long, Short, Class A, Class B Representations on drawings, Application of Stub Ends.
- Fabricated Branch Connections – Stub In & Stub On, Representations on drawings, Welding Minimums for Stub In.
- Weld Cap, Plug, Representations on drawings, Drawing call outs.
- Fitting Makeup – Dimensioning, Placement of Dimensions.
- Minimum Pipe length requirements.
- Screwed & Socket Weld Fittings – Union, Plug, Coupling, Types of couplings, coupling applications. Types of Swages, Swage end configurations. Swage applications.
- Classes of Screwed & Socket Weld Fittings
- Dimensioning Exercises


- Definition of Flange.
- Types of Flanges and Application, P-T. Ratings. – Forged Steel and Cast Iron Flanges.
- Flange Facings – Flat Face, Raised Face, RTJ, & Male - Female, Tongue & Groove. Flange Face Finish types, application.
- Flange considerations by a Piping Engineer and by Code. Bolt hole requirements. Bolts & Nuts types.
- Gaskets – Types, Thickness, selection requirements
- Flange selection exercise.
- Dimensioning Exercises


- Definition.
- Valve Functions, P-T Ratings, Difference in Valve and flange Ratings, Valve Tag numbers, Locations & End Connections.
- Valve Types – Gate, Globe, Ball, Check, Butterfly, Angle, PRV/PSV, Plug, Control Valve, Diaphragm, Needle, Piston, Flush bottom, 3-Way, 4-Way, etc.
- Control Valve Manifold: Types, Function, Layout types, Representation & Requirements on flow Diagrams and Layouts.
- Valve Operators.
- Valve Data Sheet preparation and understanding.
- Valve Trim.
PROGRAM DESCRIPTION (contd)

- Valve Selection.
- Valve Layout Considerations.
- Dimensioning Exercises.

Module – 5) ASME Codes & Standards

- Introduction to ASME Pressure Piping Design Codes.
- ASME Standards for Common Piping Elements.
- API Codes.
- Other Codes & Standards.

Module – 6) Piping Special Elements.

- Strainers
- Bellows/Expansion Joints.
- Rupture Disc.
- Spectacle Blind.
- Blanks.
- Spacers.
- Steam Traps.
- Flame Arrestor.
- Vortex Breaker.


- Static – Horizontal Vessels, Distillation columns, Storage Tanks, Heat Exchanger & Re boiler, Fired Heaters, Reactors, Cooling Towers.
- Rotary – Pumps, Compressor, Fans.
- Vessel trim.


- Block flow Diagrams-BFD,
- Process Flow Diagram – PFD.
- Utility Flow Diagram- UFD,
- Piping & Instrumentation Diagram – P & ID.
- Line Numbering,
- Line Number requirements,
- Piping Tracing(Jacket Piping ,Steam/Electric tracing).
- P& ID Requirements,
- Line Designation table/ Line list creation from P & ID.
- Print Reading Exercise,
- Flow Diagram Exercises,
- Symbols & Abbreviations.
- Equipment vendor data/PDS,
- Instrument Types & Symbols – Flow, Temp, Pressure & Level.
- Instrument Hook-up Drawing

Module – 9) Piping Material Specification (PMS)/ Piping class

- PMS and its requirements,
- Piping Specifications / Material Selection / P-T ratings / Valve Data / Branch table / Abbreviation details.
- PMS Application/Use by various departments.
PROGRAM DESCRIPTION (contd)

   o Plot Plan Development & Requirements, Layout Terminology & call outs,
   o Control Point & Plant north, Battery Limits,
   o Equipment Layout: Types, Guidelines for preparation based on type,
   o Guidelines for Building layout types,
   o Piping GA Drawing Requirements and Layout Procedure, Pipe routing requirements,
   o Pump GA Drawing and Layout Consideration,
   o Tank & Vessel Layout Consideration,
   o GA - Print Reading Exercise,
   o Inputs (Drawings/Documents) for piping GA drawings.

Module – 11) Piping Isometrics
   o Isometric requirements
   o Drawing Piping Isometrics
   o Isometric Dimensions, Notes & Callouts,
   o Isometric Offsets
   o Print Reading Exercises
   o Exercises on Creation of Isometrics form Piping Plans and Sections,
   o Inputs (Drawings/Documents) for piping Isometric drawings.

Module – 12) Piping Spools
   o Definition
   o Types of Spool Drawings
   o Guidelines to Prepare Spool Drawings
   o Print Reading Exercises
   o Exercises on Creation of Piping Spool from Piping Isometrics,
   o MTO (Material Take Off): Types, and applications.

Module – 13) Pipe Supports
   o Classification of Supports
   o Primary supports
   o Secondary supports
   o Rest supports
   o Anchor supports
   o Standard supports
   o Standard support details required
   o Non Standard supports/Special pipe supports(SPS)
   o SPS requirements
   o Anchors
   o Pipe Guides
   o Limit Stops
   o Pipe Shoe
   o Shoe Guides / Hold down guides
   o Dummy Leg / Trunion
   o Field Support / Base Support
   o Rigid Hangers – Rod & Clevis, Trapeze
   o Pick up supports
   o Flexible/Spring supports – Variable & Constant
   o Control valve manifold supports
   o Piping support Engineer work procedure
   o Pipe Rack Design – Types, Height & Width Calculations, Pipe Arrangements
   o Control Station & Utility Station on Pipe Racks
PROGRAM DESCRIPTION (contd)

II) Piping Systems Design

- Scope of ASME B 31.3, B31.4 & B 31.8
- ASME B 31.3 Fluid Service Categories.
- Design Pressure & Design Temperature for Piping Systems.
- P-T Rating Determination of Flanges, Threaded & Socket Weld Fittings.
- Pressure Design of Straight Pipe under Internal Pressure – Wall thickness Calculations.
- MDP – Maximum Design Pressure for Piping Systems
- Branch Reinforcements – Reinforcement Pad Calculations.
- Pressure Design of Miter Bends – Single & Multiple Miters.
- Pressure Design of Blanks.
- Pipeline Wall thickness Calculations – B 31.4 / B 31.8.
- MAOP – Maximum Allowable Operating Pressure for Pipelines.
- Piping Material Selection per ASME Code.


A. Pressure Drop Due to Friction
- Velocity Variation in Pipes
- Typical Velocities for Water Piping & Other Liquids
- Pipe Sizing
- Hazen Williams Equation
- Darcy Weisbach Equation
- Friction Factor
- Reynolds Number
- Colebrook White Equation
- Moody Diagram

B. Pressure & Horse Power Required
- Total Pressure Required to Transport – Friction Head, Elevation Head, And Minimum Delivery Pressure.
- Elements of Total Dynamic Head – Static Head, Pressure Head, Velocity Head, Friction Head.
- Pump Horse Power Required.
- Cavitation in Pumps.
- NPSH Required & NPSH Available for Pumps.

*Numerous Examples are covered to illustrate application of Piping Systems Detailed Engineering / Layout Engineering & Pipe Drafting. Application of ASME B31.3 Code for Piping Design, Construction & Integrity.

*100 Practical Examples shall be covered during the course for Detailed Engineering.

*Oil Refinery Project on Detailed Engineering of Piping Systems.
GENERAL INFORMATION:

- Participants are expected to be present each day and during all training periods. Participants who do not fulfill the attendance requirement will not be certified. Please remember this when making your travel arrangements.
- Course fee includes Printed Training Materials (Manual, Handouts etc.), & Participants will be awarded with Diploma / Post Graduate Diploma Certificate (*QMS Accredited to *AIAO – BAR).
- Venue for the Diploma Courses will be IPEBS facility, Hyderabad.
- The course is restricted to registered participants only. Visitors are not permitted.
- Use of mobile phones, Personal Data Assistants (PDA, Blackberry) and pagers is not permitted during training periods. Same applies for use of laptop, tablet, and computer for any purpose (E-mail, games etc.) other than course training.
- Participants are expected to maintain a professional standard of appearance and behavior. Any participant wearing inappropriate attire or behaving in an unprofessional manner will be given a verbal warning. Further incidents may result in the participant being asked to leave the class without refunding their fee.
- Failure to meet or comply with these requirements will result in non-certification.
- Accommodation can be arranged on request for the participants near to the training facility. (Accommodation is not included in the course fee).
- **International participants registering for the diploma courses, please contact IPEBS by email to info@ipebs.in for further course details & visa assistance.**


2) AIAO – BAR – American International Accreditation Organization, California, USA.
INSTRUCTOR PROFILE

- Mechanical Engineering Graduate from JNTU, Hyderabad
- Over 15 years of experience in Plant Engineering (Operations & Maintenance), Process Plant piping & pipeline layout, design, Stress Analysis & Construction.
- Worked in Gulf Countries & India as Mechanical Maintenance Engineers & Senior Piping Engineer for Consulting & Construction Companies.
- Major work areas included Plant Piping 3d Modeling, CAESAR II flexibility analysis, piping & equipment layouts, pipe support design, ASME Code calculations – Piping Material Specifications, Piping Maintenance - Corrosion Control, Repair, Re-rating, Non Destructive Examination, Testing of Piping Systems, Piping Construction including Fabrication, Assembly & Erection, QA / QC for various oil & gas projects.
- Expertise in Various Codes & Standards including ASME, API, DIN, IS & BS.
- Successfully trained more than One Thousand Piping Engineers.
- International Course Speaker.
- Over 6 years of Quality Training Experience in Piping & Pipeline Engineering Courses.
- Practicing Piping Engineering Consultant for local & International Projects.

IPEBS team develops the training programs based on the practical consulting and site construction expertise that has been built up over the years in various specialist areas.

We set out to teach top-quality engineering skills training courses and we have achieved this— we constantly strive to make them as good as it’s possible to— but over the years we have also refined our methods, adding several enhancements to the construction stages of course description, design of the courses and assessment.

We believe that these are important to our training participants; it’s easy to see what the courses consist of, what value they will gain from attending them and how they can apply their new knowledge and skills in their workplace in a structured, evidence-rich way.
**DIPLOMA COURSE**

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<thead>
<tr>
<th>Process Piping Layout Engineering – Design, Drafting &amp; Construction</th>
<th>DURATION</th>
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<tr>
<td><em>For course fee details please contact, E-mail: <a href="mailto:info@ipebs.in">info@ipebs.in</a> Phone: +91-40-30623249, Mobile: +91-9885946711</em></td>
<td>30 Days (Inclusive of Public Holidays)</td>
<td>10:00am to 03:00pm</td>
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Can’t take 4-6 Weeks for training?

Attend the Accelerated Training Workshop - A 5-Day Version of our Highly Acclaimed Diploma Courses.

*For Further details about Workshops, please visit our website [www.ipebs.in](http://www.ipebs.in)*

Interested In Onsite training, For further Information on Onsite Trainings please contact, E-mail: corptrain@ipebs.in Phone: +91-40-30623249, Mobile: +91-9885946711

**Terms & conditions:**

**CANCELLATIONS: IPEBS** does not provide refunds for Cancellations done after registration & fee payment. However, credit maybe granted to a later program. This credit will be available for up to one year from the date of issuance.

**COURSE MATERIAL AGREEMENT:** It is the intention of IPEBS that the course text and materials supplied to participants at IPEBS courses are prepared and issued for the participants’ sole use. Codes and standards constantly change and interpretations are issued by the publishing societies. Information contained in IPEBS course materials is based on the best available data obtained by IPEBS at the time of publication. IPEBS is in no way responsible for subsequent use regardless of intention.

**PROGRAM CHANGE POLICY:** Please note that instructors and topics were confirmed at the time of publishing this document; however, circumstances beyond the control of the training organizers may necessitate substitutions, alterations or cancellations of the instructors and/or topics. As such, IPEBS reserves the right to alter or modify the instructors and/or topics if necessary. Any substitutions or alterations will be updated on our web site.

**COURSE CANCELLATION BY IPEBS:** IPEBS reserves the right to cancel any course due to circumstances beyond our control. All tuition fees will be refunded in the event of cancellation. IPEBS liability is limited to only those tuition fees paid in advance.

**FORCE MAJEURE:** Except for the obligations to make money payments as outlined hereunder, neither party shall be responsible to the other for delay or failure to perform any of the terms and conditions, or other activities, of this agreement if such delay or failure is caused by strike, war, act of God, or force majeure.
REGISTRATION FORM

Please visit www.ipebs.in for details on courses we offer and more updated information.

You can register online.

Or

For applications by E-mail, please fill the form below and send to info@ipebs.in

COURSE TITLE: Process Piping Layout Engineering – Design, Drafting & Construction

COURSE DATE: _________________________  COURSE LOCATION: _________________________

NAME: ___________________________________________________ NATIONALITY: _________________________

QUALIFICATION: ________________________  WORK EXPERIENCE (if any): _________________________

JOB TITLE: _____________________________  COMPANY: __________________________________________

ADDRESS: ______________________________________________________________________________________

CITY: _____________  STATE: _____________  POSTAL CODE: _____________  COUNTRY: _____________

PHONE: _______________  FAX: _______________  EMAIL: _____________________________________________

In case of Emergency, contact

NAME: _________________________________  PHONE: _______________

ADDRESS: ______________________________________________________________________________________

EMAIL: _________________________________________________________________________________________

NOTE: Training Fee can be paid at the time of Joining the Course.

I, acknowledge to the terms & conditions of the organizer.

Date: __________________________

Signature: ______________________