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Piping Engineering Course : 21-Modules

Certification Course (Paid)
21 Modules: Organized Systematically

Click on Below link to land on Course Page

1. Introduction to Piping Engineering
2. Project Life Cycle : Oil & Gas
3. Design basis & Process interface
4. What is Pipe & Various Types
5. Valve Classification and Useful facts
6. Valves : Isolation Valves
7. Valves : regulation type
8. All About Flanges
9. Flanges II Strainers II Steam traps
10. Overall & Unit plot plan
11. Pipe Rack design
12. Compressor Piping and Layouts
13. Column Piping and Layouts
14. Heat Exchangers : Piping Layouts
15. Pump Piping and Layouts
16. Isometric Management
17. Codes and Standards
18. Pipe wall Thickness
19. API 600 II Clauses II Valve Design
20. Material of Construction (MOC) II Valve Design
21. Difference between ASME B31.1 & ASME B31.3

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Introduction: Piping Engineering

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1 of 21 Modules

1. Introduction: Piping Engineering
   - Understanding Global Oil and gas value chain (Upstream/Midstream/Downstream)
   - Scope of Piping Engineering
   - Introduction to Piping Layout
   - Introduction to Piping Stress
   - Introduction to Piping Material
2. List of Various piping components
   - Graphical & Actual snaps of Various components
   - Why Piping components are required & how they are connected to each other
3. Typical EPC Organogram
   - Typical Organogram of Piping Discipline
   - Piping role and Contribution in Overall cost of project
   - Major Responsibilities of Piping Engineering discipline
4. Various deliverables of Piping (Layout/Stress/Material/ 3D admin teams)
   - Piping Interface with other disciplines : Input received by Piping
   - Piping Interface with other disciplines : Output given by Piping

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Introduction to Piping Engineering

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Project Life Cycle : Oil & Gas Project

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2 of 21 Modules

Agenda :

1. Understanding Various Broad phases of Project
2. Listing down the various stages of a Project in Oil & Gas
3. Identification of various Projects phases w.r.t. Project stages
4. Understanding Various Project phases covering :
    1. Purpose
    2. Various deliverables
    3. Activities performed By

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Project Life Cycle : Oil & Gas

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Design Basis : Piping Engineering

Certification Course (Paid)
3 of 21 Modules

What are the items/activities covered in Design Basis?

- INTRODUCTION
- ABBRVIATION
- DEFINATIONS & PARTIES INVOLVED
- UNITS OF MEASUREMENT
- DESIGN LIFE
- CODES, STANDARDS AND SPECIFICATIONS
- ORDER OF PRECEDENCE
- PIPING MATERIAL REQUIREMENTS
  - CORROSION ALLOWANCE
  - ALLOWABLE STRESSES

- GENERAL DESIGN PHILOSOPHY
  - REQUIREMENTS RELATED TO PLOT PLANS AND EQUIPMENT LAYOUTS
  - GENERAL CLEARANCE AND ACCESSIBILITY
- VARIOUS PIPING SYSTEMS
  - PIPING ON PIPE RACKS
  - PUMP PIPING
  - PRESSURE VESSEL PIPING
  - TOWER PIPING
  - COMPRESSOR PIPING
  - EXCHANGE PIPING
  - HEATER PIPING
  - REACTOR PIPING
  - UNDERGROUND PIPING
- PIPING FLEXIBILITY AND SUPPORTS

- PIPING DELIVERABLES
  - 3D Model
  - Plot Plans
  - Piping General Arrangement Drawings
  - Piping Isometric Drawings
  - Material Take-off
- INSULATION, PAINTING & COATING
- NDT REQUIREMENTS
- APPENDICES

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Design basis & Process interface

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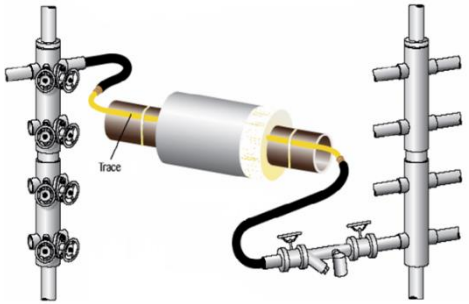
What is Pipe

Agenda

- Introduction to Piping Engineering
- Introduction to Piping Components
- What is Piping System
- What is Pipe
- What is Pipe schedule
- Plastic Pipe : Thermoplastic & Thermosetting
- Jacketed Pipe
- Steam traced lines
- Electric Heat Tracing
- Lined & FBE Coated Pipes
- Advantages & Disadvantages of Non-Mettalic Pipes
- ASME 36.10 : Piping Dimensional Standard



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Valve Classification and Useful facts

Certification Course (Paid)
5 of 21 Modules

Discussion on Valve classification and useful facts

- What is Valve?
- What does a valve do?
- Classification of valves

Isolation valves

- Gate valves
- Ball valves
- plug valves
- Butterfly valves
- DBB valves

Regulation Valves

- Globe valves
- Needle valves
- Butterfly valves
- Diaphragm valves
- Ball valves
- Plug valves

Non-Return Valves

- Swing check valves
- Lift check valves
- Dual Plate check valves

Discussion on Valve operation and Accessibility

- Operational Accessibility for Valves with Horizontal/Vertical Stems
- Operational Accessibility for Valves of Level instruments
- Operational Accessibility for lever operated valves
- Operational Accessibility while standing
- Operational Accessibility While Squatting
- General Operational Accessibility

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Link for Course
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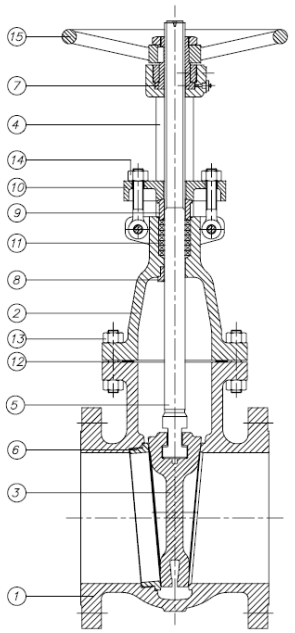
Isolation Valves

Certification Course (Paid)
6 of 21 Modules

Agenda covered :

- Isolation valves
  - Gate valves
  - Ball valves
  - plug valves
  - Butterfly valves
  - DBB valves



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Valves : Isolation Valves

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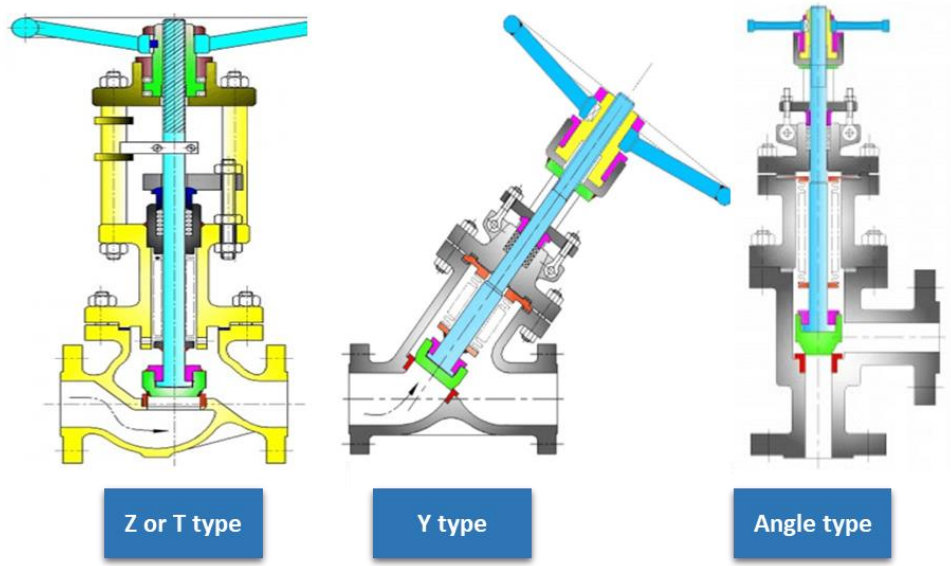
Regulation valves

Agenda covered

- Regulation Valves
  - Globe valves
  - Needle valves
  - Butterfly valves
  - Diaphragm valves
  - Ball valves
  - Plug valves



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Valves : regulation type

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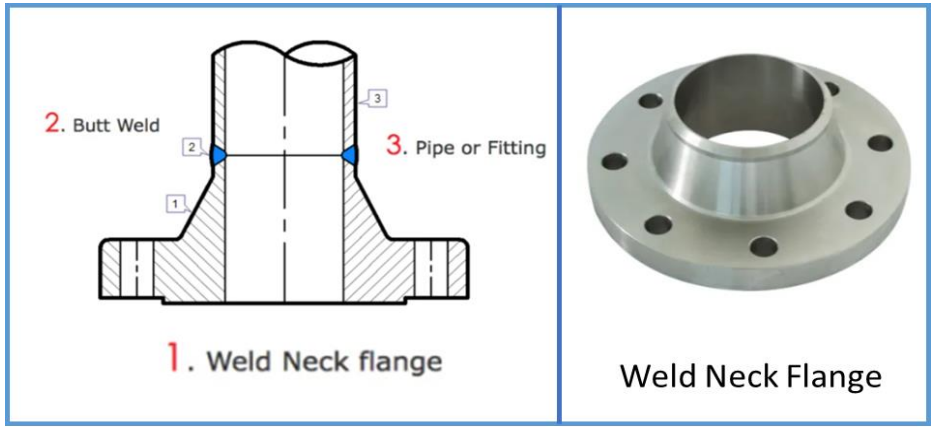
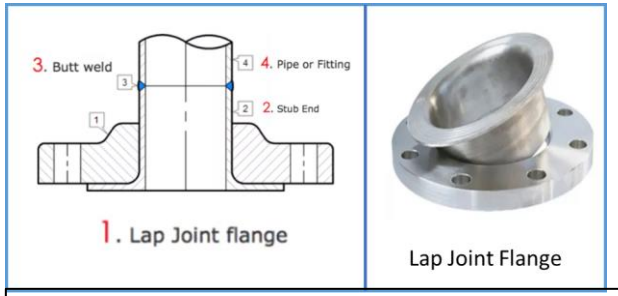
All About Flanges

Certification Course (Paid)
8 of 21 Modules

Agenda

- What is Flange
  - Slip on Flange
  - Socket welded Flange
  - Screwed Flange
  - Lap Joint Flange
  - Weld Neck Flange
  - Blind Flange
- Pressure Temperature rating (PT Rating)
  - Pressure Temperature Rating : Definitions
  - Pressure Temperature Rating : Understanding with an Example of A-105
  - Pressure Temperature Rating : Understanding Flanges
- ASME B16.5 vs ASME B16.47
- Comparison between Series A & Series B for ASME B16.47





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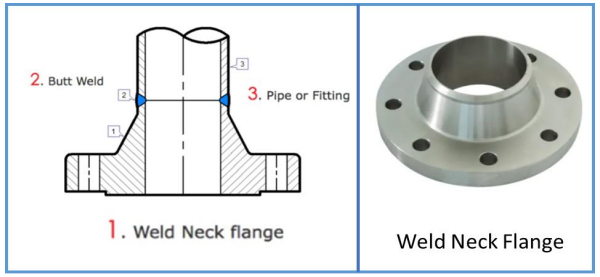
Piping Components : Flanges, Strainers & Traps

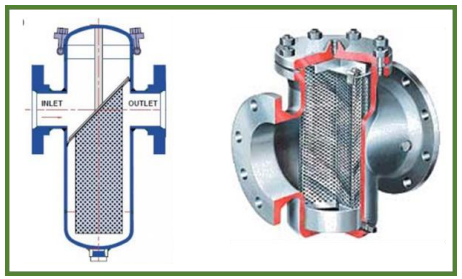
Certification Course (Paid)
9 of 21 Modules

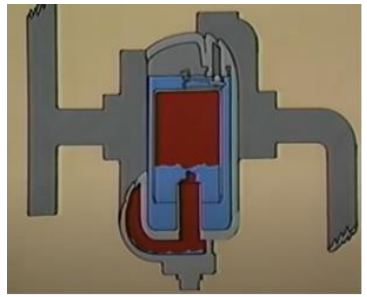
Agenda

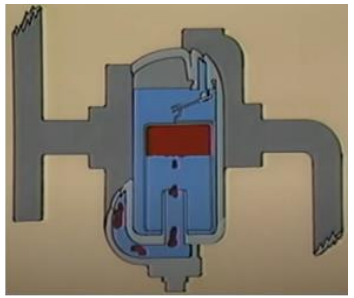
1. What is Flange
   - Slip on Flange
   - Socket welded Flange
   - Screwed Flange
   - Lap Joint Flange
   - Weld Neck Flange
   - Blind Flange
2. Strainers
   - Y-Type Strainers
   - Basket Type Strainers
   - T-Strainer
   - Conical
3. Pump Piping Components
4. Steam Traps
   - Mechanical Traps
   - Thermostatic Traps
   - Thermodynamic Traps



Weld Neck Flange




Inverted Bucket Traps : Closed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Flanges II Strainers II Steam traps

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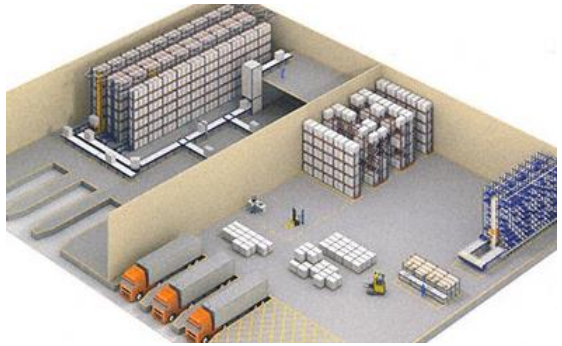
Overall & Unit plot plan : Piping Layouts

Certification Course (Paid)
10 of 21 Modules

All Aspects & Parameters which need to be taken care have been listed and explained

1. Unit plot plan definitions and Various stages have been discussed.
2. Various inputs required to start developing the plot plan have been discussed.
3. Various guidelines required to locate the Column, Furnace and Reactors in any plot plan have been captured.
4. Various guidelines required to locate the Compressors & Pumps in any plot plan have been captured.
5. Various guidelines required to locate the Exchangers & air-coolers in any plot plan have been captured.
6. Various guidelines required to locate the Drums & Pipe rack in any plot plan have been captured.
7. Various Check points required to finalize plot plan have been captured.



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Link for Course
Overall & Unit plot plan

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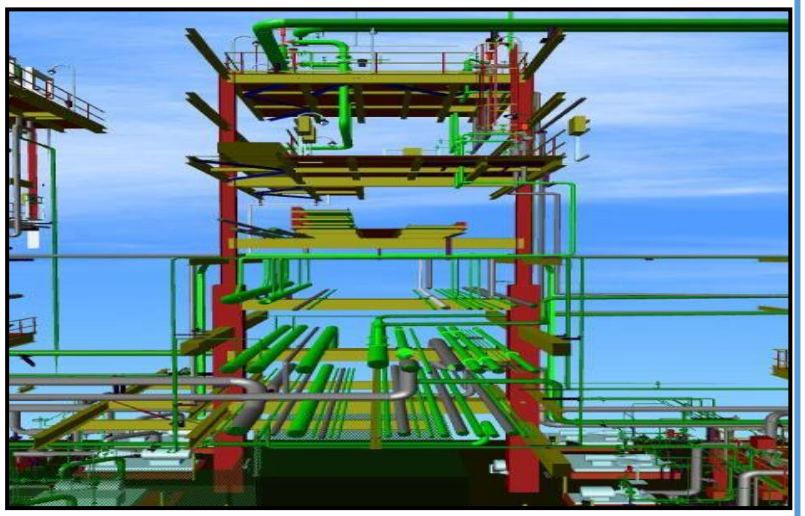
Pipe Rack Piping and Layout

Certification Course (Paid)
11 of 21 Modules

Content:

- Inputs required
- Conceptual Design
  - Interconnection Diagram
  - Calculating rack width and no. of Tiers from Interconnection Diagram
  - Operational/Maintenance/Access requirements
  - Deciding the Elevation of transverse beams
- Design Considerations
  - Guidelines for placing lines on Piperack
  - Battery Limit Configurations:
  - Supporting & Flexibility requirements
  - Equipment on Piperack
  - Platforms above Piperack
- 3D Deliverables



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Pipe Rack design

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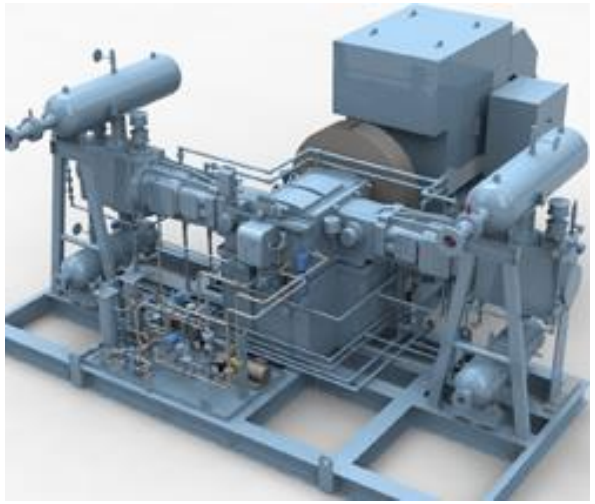
Compressor Piping and Layouts

Certification Course (Paid)
12 of 21 Modules

Agenda

1. Types of compressors
2. Various Compressor Drives
3. Auxiliary Equipment :
   - Compressor Suction Drum
   - Pulsation Dampener / Volume Bottle
   - Lube oil Console
   - Run down Tank and Seal oil console
   - Cooling water console
4. Associated items with Steam Turbines
5. How to decide the elevation of Compressors
6. General Layout Requirements
7. Layout considerations for Centrifugal & reciprocating compressors



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Column piping and Layout

Certification Course (Paid)
13 of 21 Modules

Agenda

- **Distillation Operation**
- Inputs required
- Typical Column layout – Plan and Elevation views
- Deciding the Bottom Tangent Elevation (BTL)
- Understanding Tower internals (tray arrangement & different passes)
- Nozzle Orientation :
  - Manhole Orientation
  - Feed Nozzle Orientation and Piping
  - Column Reboiler Piping connections
  - Nozzle connections at top
  - Nozzle connections at bottom
  - Instrument Nozzle connections
  - Nozzle connections for level instruments
- Platforms and ladder arrangement
- Column piping concepts
- Supporting & Flexibility requirements
- Operation and Maintenance

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Exchanger Piping & layouts

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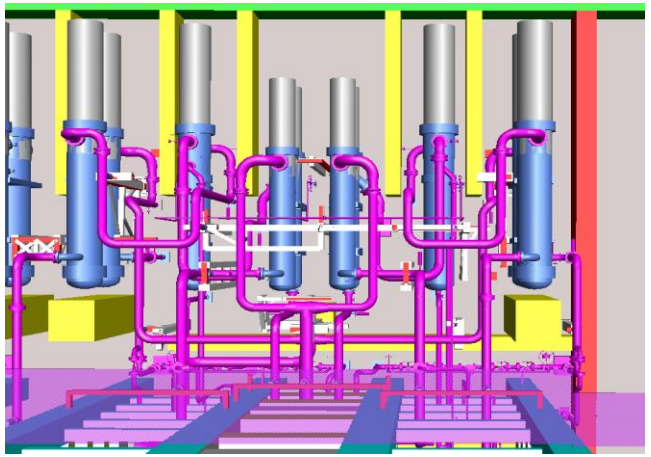
14 of 21 Modules

1. Definitions & Classification of Exchangers
2. Construction and operating Features for all Types of Exchangers
3. Input required
4. Fixing Location in plot plan
5. Fixing Elevation
6. Layout Aspects
7. Layout Aspects : 3D Pictorial Views
8. Interesting facts : Optimizing Layout



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Heat Exchangers : Piping Layouts

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Pump Layout and Piping

Certification Course (Paid)
15 of 21 Modules

- What is a Pump? & Common types of Pumps used in our Industry.
- What is NPSH & Possible Solutions for NPSH problems
- What is Cavitation and What are the major causes?
- Important Components on Pump Suction Piping.
- **Important Components on Pump Discharge Piping.**
- Layout aspects of Pump Piping.
- Stress considerations for Pump Piping.
- 3D Model Snaps
- Seal Plans

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Isometric Management : Path Forward

Certification Course (Paid)
16 of 21 Modules

Definitions :

Understanding Isometric sheet

Isometric management :

- Understanding various stages an isometric sheet travels before getting issued to site
- Sample Isometric tracker (Understanding Tracker items)
- Understanding Pivot tables :
- How to create Pivot tables :(Will create actual table showing status of isometrics)
- How to add slicer (Will add slicer for Checkers/Modelers/Line sizes)
- Understanding Combination of Pivot tables & Slicers (Will understand how various sheets are associated w.r.t. checker & modelers)
- Adding More than one pivot in same sheet : (Will bring Checkers & Modelers status along with previous Pivot)

- How to combine Pivot tables: (Will combine Overall status with Checkers & Modelers Pivot using slicers)
- How to use Pivot table Options with current & new Pivots:
  - Layout & Format
  - Totals & Filters
  - Display
  - Data

  (will understand the features which will save time in formatting when data at background is changed)
- Filling data in Tracker : With an example of Hold list
  - Vlookup Command
  - Making list from files in a folder
  - Copying files given in a list from a common folder
  - Extract soft files from Various folders
- Tracking individual (checkers & modelers) progress based on date (daily/weekly/monthly)

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Isometric Management

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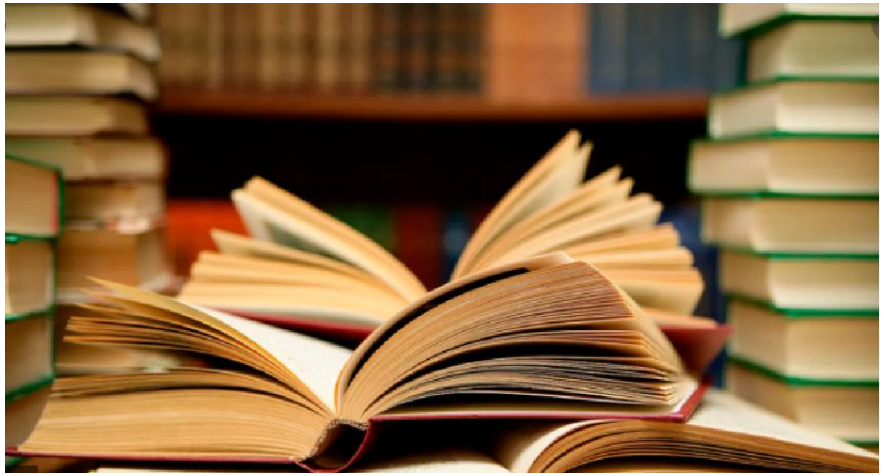
Codes and Standards : Piping Industry

Certification Course (Paid)
17 of 21 Modules

Following Modules have been covered :

1. API 600 : Valve design
2. API 6D
3. ASTM standard
4. ASME B36.10
5. API 598



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Codes and Standards

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Pipe wall thickness Calculation as per ASME B31.3

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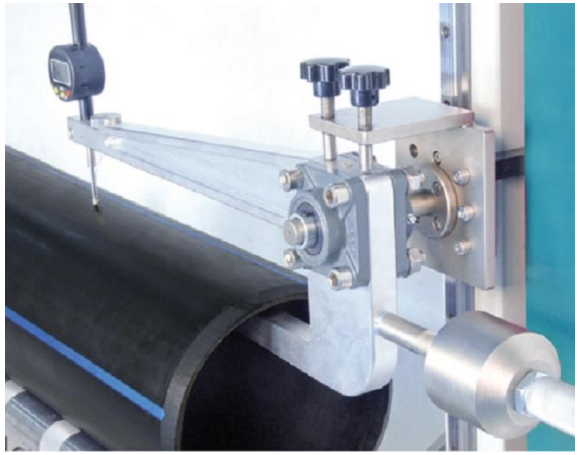
18 of 21 Modules

1. Pipe :
   - What is pipe
   - Understanding the Pipe schedule
   - Relationship between outer, inner diameters w.r.t. Pipe wall thickness.
   - Why always minimum thickness is desirable?
2. Dimensional standards for Carbon & stainless steels (ASME 36.10 & 36.19)
   - Understanding the Standards
   - Total scope covered in standards
3. Pipe wall thickness Calculation as per ASME B31.3 (Class conditions & Line Conditions)
   - What are various inputs required to start calculating pipe thickness?
   - Where do we get the inputs from?
   - Understanding Co-relation between Various ASTM Standards
   - Understanding the PT rating concept w.r.t ASME 16.5
   - Understanding the Allowable stresses, Tensile stress & Yield Stress w.r.t Stress-strain diagram
   - Unit system used while referring code & standards while calculating wall thickness?
   - Actual Pipe wall thickness calculations (4” Carbon steel)
   - Pipe wall thickness calculation based on line conditions given in Line list.



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Pipe wall Thickness

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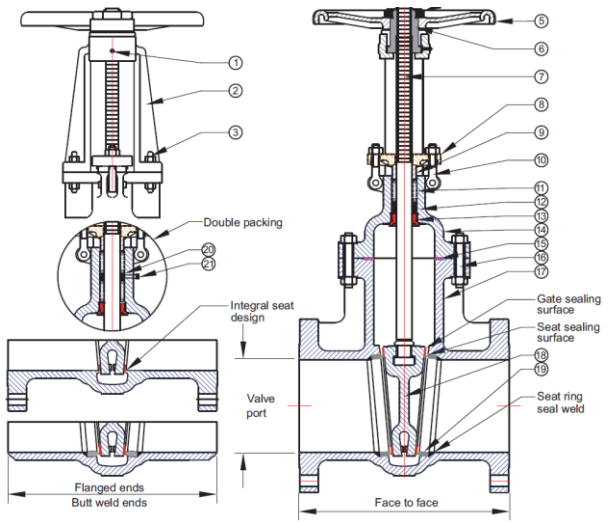
Valve standard API 600 : Gate Valves

Certification Course (Paid)
19 of 21 Modules

- Understanding the Scope of API 600
- List out the Salient features
- Understanding the relations between various associated API & ASME std
- Detailed discussion on Valve stem types
- Detailed discussion on valve wedges
- Small Case study on bonnet thickness calculations with practical examples
- Various applicable clauses
  - To understand Valve end connections requirements
  - To determine the inside diameter of the valve
  - To understand the wedge & Body guide
  - To decide wear travel
  - About stem design
  - To design packing box & lantern ring
  - About fugitive emissions requirements
  - Valve operator types
- Valve materials Clauses
  - Non-trim materials
  - Trim materials



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API 600 II Clauses II Valve Design

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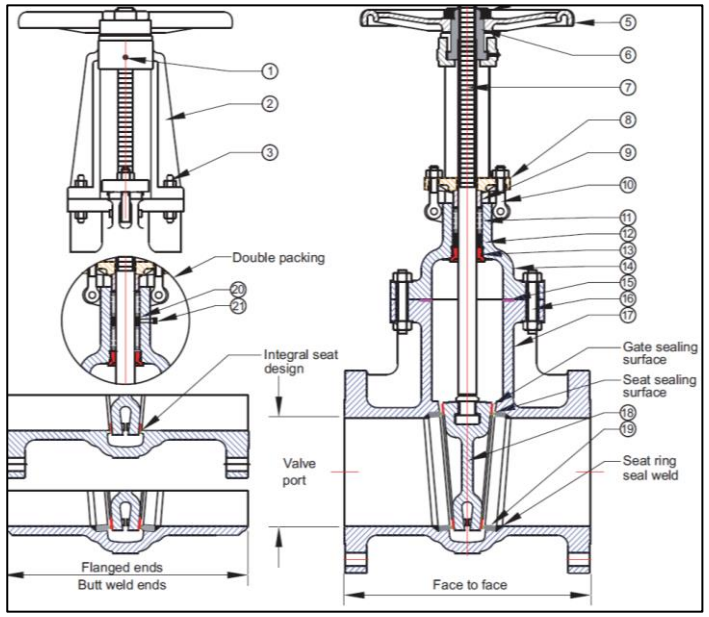
Understanding MOC for valves : ASTM stds

Agenda:

1. Division of Materials in four categories
2. Based on forging and casting, the selection of 8 ASTM standards and 20 associated grades
3. Discussion on selected grades & ASTM in details :
   - Carbon steel
   - High temperature steel
   - Low temperature Steel
   - Stainless steel



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Material of Construction (MOC) II Valve Design

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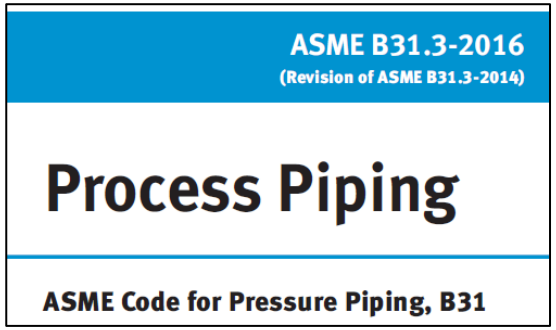
Major Differences B/W ASME B31.1 & ASME B31.3

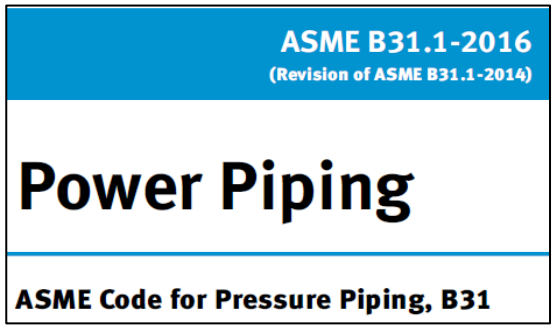
Certification Course (Paid)
21 of 21 Modules

Agenda :

Identification & discussion on 12 Major Differences between ASME B31.1 & B31.3

- Application
- Allowable stresses – (Two Steps)
- Design Life
- Factor of safety
- Pipe wall thickness
- Variation on Normal operation
- Post weld heat treatment
- Random Inspection & examination
- Testing
  - Hydrostatic test
  - Pneumatic Test
  - Service Test





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