FACT SHEET

ASME B31 | Piping systems for industrial plants

Online Course: Pressure Loss, Materials, Components, Insulation, Thickness Calc, Buried Piping, Stress Analysis, Supports.

Who Should Attend?

This course is intended for **graduates (or soon to be), designers, freelancers, technicians and engineers** involved in: calculation, design, selection, manufacturing, safety, quality and maintenance of systems and equipment in industrial processes.

Previous knowledge of this subject is not required to attend to the course.

Training Objectives

The main objective of this course is to **transfer to participants the theoretical and practical skills required in projects**, obtained from experience and sound engineering practices.

What to Expect?

Get familiar with the Design Code, Scope, and related design specifications.

Master the terminology and key concepts for the design and calculation of piping systems.

Learn to design and perform the main calculation for piping systems in industrial plants.

Benefit from Lessons Learned and Best Practices from different international projects.

Course Duration

Full Course: 120 hs; to be completed in 90 days. The Virtual Campus will be open for 365 days (flexibility).

Methodology

At your own pace

Available 24/7, Self-paced course

“Learn by doing” concept

Non-scheduled sessions

Included in the course

Study Notes

Summary Videos

Conceptual Questions

Case Studies based in real designs

Design & calculation sheets

Lesson 1: Codes & Design Criteria

Applicable Codes

ANSI Code

ASTM Code

ASME B31 Code

Design Loads

Sustained Loads

Displacement Loads

Occasional Loads

Proposed Case Studies

- *Assimilation test*

Lesson 2: Diameter & Pressure Loss

Flow of fluids in pipes

Properties of fluids

Flow of fluids

Energy conservation law

Pressure loss

Pressure loss in straight runs

Pressure loss in fittings

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Energy Conservation – Bernoulli*
- *Case Study No.2: Diameter and Pressure Loss Calculation*

Lesson 3: Material Selection

Material selection

Corrosion types

Corrosion Allowance

Essential properties of materials

Allowable stress

Material designation

Most used materials

General requirements

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Material Selection*

Lesson 4: Piping Specification

Types of pipes

Schedule & Calibrated pipes

Joining methods

Components

Pipes, flanges and fittings

Valves specification

Piping class

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Piping Systems*

Lesson 5: Piping Insulation

Purpose of insulation

Selection parameters

Insulation Calculation

Effective thickness

Cold & hot piping insulation

Thickness selection

Insulation installation

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Insulation material properties*
- *Case Study No.2: Heat transfer equation*
- *Case Study No.3: Effective thickness*
- *Case Study No.4: Insulation specification*

Lesson 6: Thickness Calculation

Stresses in cylindrical shells

Thin walled cylinders

Thickness calculation procedure

ASME B31.1 Formulae: Power Piping

ASME B31.3 Formulae: Process Piping

ASME B31.4 Formulae: Pipeline Transportation

ASME B31.8 Formulae: Gas Transport

Commercial thickness selection

Proposed Case Studies

- *Assimilation test*
- *Case Study N.1: Thickness Calculation ASME B31.1*
- *Case Study N.2: Thickness Calculation ASME B31.3*
- *Case Study N.3: Thickness Calculation ASME B31.4*
- *Case Study N.4: Thickness Calculation ASME B31.8*

Lesson 7: External Pressure Design

Applicable Codes

Failure Mechanisms

Moment of Inertia of the System

Support Lines

System verification

Wall thickness and Stiffening rings

Best Practices

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Pipe Thickness*
- *Case Study No.2: Separation between support lines*
- *Case Study No.3: Stiffening rings*

Lesson 8: Buried Piping Design

Introduction

Design Codes

Terrain Importance

Design Considerations

Loads Definition

Stress Verification

Failure Modes

Installation

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Buried Piping Design*

Lesson 9: Piping Layout

Basic Philosophy

Piping Layout Specification

Plot Plan

Equipment Location

Piping Arrangement

Distance between Equipment

Pipe Rack

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Piping Arrangement*

Lesson 10: Equipment Interconnection

Importance of an adequate Layout

Equipment Interconnection

S&T Heat Exchangers

Air Coolers

Compressors

Pressure Vessels

Centrifugal Pumps

Instrumentation Piping

Proposed Case Studies

- *Assimilation test*

Lesson 11: Stress & Flexibility Analysis

Introduction

Stages in Flexibility Analysis

Thermal expansion of piping

Induced loads due to Thermal Expansion

Induced Stresses in the pipe

Pipe Allowable Stresses

Simplified Analytical Calculation

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Thermal expansion of pipes*
- *Case Study No.2: Force induced by temperature*
- *Case Study No.3: Arm needed to absorb the expansion*
- *Case Study No.4: Loop needed to absorb the expansion*
- *Case Study No.5: Number of loops required*
- *Case Study No.6: Loads on supports*
- *Case Study No.7: Loads and moments at nozzles*

Lesson 12: Supports Design

Introduction

Supports functions

Classification

Commercial & Structural Supports

Types of Supports

Symbology

Location

Supports Selection

Proposed Case Studies

- *Assimilation test*
- *Case Study No.1: Isometric of Flexibility*
- *Case Study No.2: Standard Rigid Supports*
- *Case Study No.3: Variable load supports*
- *Case Study No.4: Constant load supports*
- *Case Study No.5: Standard of Supports*
- *Case Study No.6: Structural Supports Calculation*
- *Case Study No.7: Distance between supports*

Instructor

Senior Mechanical Engineer and Master in Business Administration (MBA). **More than 20 years of experience in design, calculation and fabrication of pressure vessels, heat exchangers, storage tanks, piping systems and structures in general.**

Duties of the above-mentioned positions cover the entire cycle of an equipment, **from the very conception, drawings, design and calculation, technical specifications, technical requisitions, vendor drawings, to the manufacturing phase and installation assistance**. Among the developed projects, clients such as SHELL, EXXON, REPSOL, CHEVRON, GALP, CEPSA, TUPRAS and SAUDI ARAMCO can be found.

Vast experience providing specific training sessions in both classroom and online approaches. More than 75 training courses carried out in different institutions and in-company, courses oriented to graduates, designers, engineers and experienced professionals.

Tailored Training

The most effective training is one that satisfies the needs of each company's business focus and deliverables. **We adapt our training programs to each specific requirement, offering bespoke solutions for each need.** The result, 100% tailored programs, developed to maximize the time investment and deliver tangible and intangible returns to the work teams.

After assessment phase, a tailored training plan is designed jointly with the client. This plan is specifically tailored to meet the client's needs, focusing on effectively enhancing the capabilities of the work team. **We provide practical, dynamic and hands-on training,** making available the best instructors in each subject.

Arveng Training

Arveng Training has developed effective and practical courses for the needs of today's industrial challenges by delivering specific and high-quality engineering training courses utilizing all three approaches: classroom, on-line and tailored training. We are proud to have imparted more than 250 classroom courses, 1200 online courses and over 65 in-company sessions. Our training activities has benefited over 4,500 professionals. Our greatest pride is in the letters of recommendation we receive from so many of our customers in this area.

We consider the time of our students as the most valuable. For this reason, all our courses have been designed with the main objective of quickly the professional skills of the participants, through our expert instructors in different disciplines. **We stimulate creativity, innovation and initiative to make the participants inquisitive to bring good engineering practices and lessons learned to the field that benefits their employers in the long term.**

Our Company

Arveng Training & Engineering SL is a leading company providing Training and Engineering services based in Madrid, Spain. Our mission and vision are to be a leading training and engineering services company. We are a team of highly motivated, talented high qualified professionals with more than 20 years of experience. Our main goal is to provide our clients, the best training and engineering services and to exceed their expectations in all their spheres of industrial activity, through our renowned services which are based on efficient, innovative, cost-effective and transparent principles.

Established in July 2010, mainly oriented to the industrial sector, from the very beginning Arveng has always worked with closeness, responsibility and commitment in the different areas of activity.