

FACT SHEET (SELF-GUIDED)

Piping Stress Analysis: Fundamentals



Basics of Strength of Materials, Piping Design Codes, Piping Loads and Piping Stresses, Flexibility Analysis & Stress Limits Code Requirements and Pipe Supports.

Who Should Attend?

This course is intended for engineering graduates, piping designers, technicians and engineers involved in design, selection, manufacturing, safety, and maintenance of piping systems 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 to understand the basics of piping stress analysis.

What to Expect?

Get familiar with the ASME B31 Piping Codes, ASME Piping Code Stress Limits, Basics of Flexibility Analysis, Pipe Supports, Basics of Strength of Materials and Loads and Stresses in Piping Systems.

Master the terminology and key concepts of piping stress analysis.

Become familiar with the types of calculations involved in pipe stress analysis.

Course Duration

Full Course: 40 hs; to be completed in 40 days. The Virtual Campus will be open for 60 days (flexibility).

Methodology

Self-guided, Hands-On Course

Available 24/7

Self-paced course

“Learn by doing” concept

Non-scheduled sessions

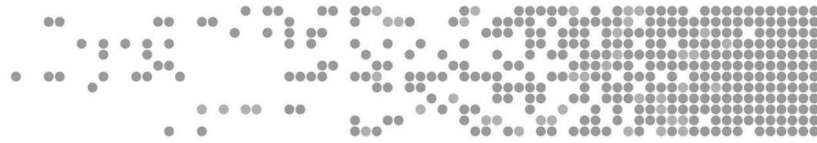
Instructor available during the entire course

Included in the course

Study Notes

Summary Videos

Assimilation Questions



Contents

Introduction to piping stress analysis

Introduction to piping stress analysis

What is a piping system?

What is pipe stress analysis?

Why is a piping stress analysis required?

Challenges of piping stress analysis

Exercises & Case Studies

- Assimilation test

Basics of Strength of Materials

Basics of Strength of Materials

Stress and strain

Engineering stress/strain versus true stress/strain

The ductile material stress - strain relationship

Poisson's ratio

Modulus of elasticity

Linear coefficient of thermal expansion

Stresses due to forces and moments

Normal & shear stresses on inclined planes

Modes of failures

Exercises & Case Studies

- Assimilation test

ASME B31 Piping Design Codes

ASME B31 Piping Design Codes

Introduction

Code sections

Piping codes overview

Exercises & Case Studies

- Assimilation test

Piping Loads and Piping Stresses

Piping Loads and Piping Stresses

Primary loads

Secondary loads

Principal stresses

Pipe stresses due to pressure

Pipe stresses due to forces and moments

Combined loading and total stresses in piping systems

Failure theories

Stress categories

Exercises & Case Studies

- Assimilation test

Flexibility Analysis and Stress Limits

Flexibility Analysis and Stress Limits

Basics of thermal stress

Methods of mitigating thermal stresses in piping systems

When is formal flexibility analysis required?

Stress intensification factors and flexibility factors

Allowable thermal stress range - B31.1 and B31.3 codes

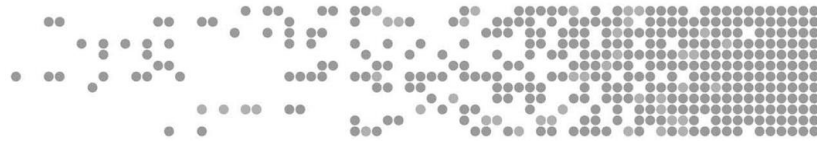
Displacement stress range – B31.1 and B31.3 codes

Sustained stress limits - B31.1 and B31.3 piping codes "2016"

Occasional stress limits - B31.1 and B31.3 piping codes

Exercises & Case Studies

- Assimilation test



Piping Supports and Restraints

Piping Supports and Restraints

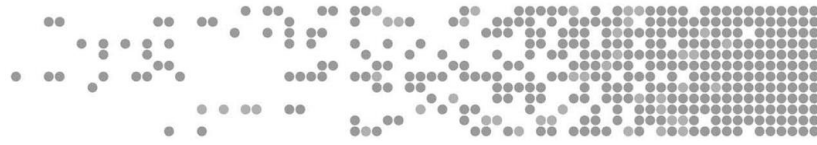
Supports classifications

Selection of pipe support locations

MSS pipe hangers and supports standards

Exercises & Case Studies

- Assimilation test



Instructor

Senior Mechanical Engineer with a **broad consulting experience in oil and gas, mining, and power generation industries**. Since 2005 has been providing consulting engineering services for leading North American energy industry clients such as Mosaic, Nutrien, SaskPower Enbridge, Suncor, Shell Canada and TransAlta.

Proficiency in piping design and industrial ducting systems design, hydraulic and thermal analysis, piping stress analysis (metallic and non-metallic piping), finite element analysis (FEA), spring hanger design, equipment data sheet specifications, pumping systems, heat exchangers, bins/hoppers, and storage tanks design.

Working knowledge of **CSA Z662, ASME B31.1, ASME B31.3, ASME Section VIII Div. 1, ASME BPVC Code Case 886, ASME BPVC Code Case 755-4, API 610 and API 650 codes and standards**.

Conversant with a wide variety of software such as AutoPipe (Bentley), CAESAR II, AFT Fathom, AFT Arrow, Autodesk Simulation Mechanical, NavisWorks, AutoCAD and Microsoft Office applications.

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 100 classroom courses, 200 online courses and over 15 in-company sessions. Our training activities has benefited over 1,500 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.