

# FACT SHEET

## ASME B31.12 | Design of Hydrogen Piping and Pipelines



**Design of safe and economical Hydrogen Piping and Pipeline Systems using ASME B31.12.**

### 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.

**No prior knowledge of this topic is required.**

### 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.

### Methodology

Instructor-led training course in adult learning format with discussions, individual exercises and simplified case studies, providing practical knowledge to implement in the field.

### Duration

The duration of this training course is **15 hours**, divided into several sessions to facilitate the learning process.

### What to expect?

Get familiar with the **main configurations** of Hydrogen piping and pipelines.

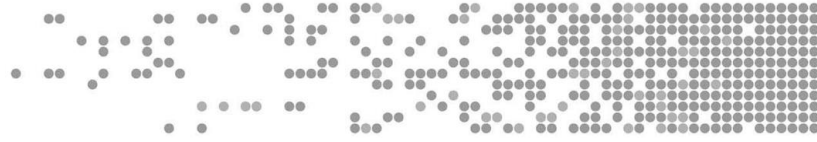
**Get to know** the **B31.12 code organization**.

**Understand** the **general requirements** of these systems, such as materials, brazing, welding, heat treating, forming, testing, inspection, examination, operating, and maintenance.

**Design** and **calculate** pipe wall thicknesses and other key variables for hydrogen industrial piping systems and pipelines.

**Deep-dive** in best-suited **materials** for hydrogen Piping and Pipeline Systems.

**Understand** key aspects involved in the **repurposing** of natural gas pipelines to hydrogen service.



## Contents

### ASME B31.12 – Code Section Overview

Scope and General Requirements

Piping Systems and Pipelines

Appendices

### Hydrogen Characteristics Overview

Hydrogen properties

Properties as a fluid | Compressed and liquefied state

Permeation and Embrittlement

### B31.12 GR – General Requirements

**Materials**

Materials for hydrogen service | Welding and Brazing | Heat treatment

**Forming of pipe components**

**Inspection, examination, and testing**

**Operation and Maintenance plan**

Leakage management and repairing | Valve maintenance | Pipeline maintenance | Integrity assessment | Specific Facilities

**Quality System**

**Abandonment and decommissioning**

### B31.12 IP – Hydrogen Industrial Piping

**Scope**

**Design**

Design conditions and criteria | Allowable stresses | Weld joint quality factors | Pressure design of piping components

**Components**

Branch connections | Closures, Flanges and Reducers

Valves and specialty components | Piping Joints

Dimensions and rating of components

**Flexibility Analysis and supports**

**Instrument and pressure-relieving piping**

**Fabrication, erection, and assembly**

**Examination requirements. Leak testing and other testing**

### B31.12 PL – Gaseous Hydrogen Pipelines

**Scope**

**Components**

Valves, Flanges and other pipeline fitting components | Branch connections.

**Loads**

Expansion, flexibility and longitudinal stress | Cyclic loading

**Supports and anchorage**

**Provisions for design. Steel pipe design requirements**

**Bends, elbows and miters. Hot taps**

**Precautions and testing**

Location classes and risk assessment | Pipeline protection | Precautions during construction | Testing and commissioning

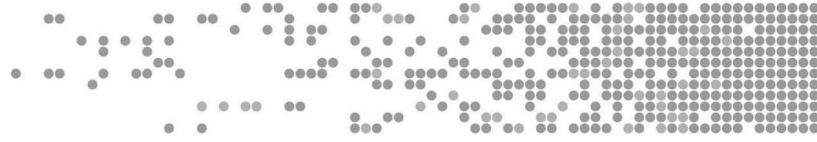
**Control and limiting of pressure**

Valves, meters and regulators | Service lines

**Inspection and examination**

**Steel pipeline service conversion**

### Appendices



## Instructor

Senior Mechanical Engineer with a focus in management. **More than 31 years of experience in design, calculation and fabrication of piping systems and equipment**

Duties of the above-mentioned positions range from the initial conception of pipes and static equipment to their delineation, design, calculation, purchase, approval of vendor documentation, and commissioning. Among the developed projects, clients such as SHELL, EXXON, REPSOL, CHEVRON, GALP, CEPESA, TUPRAS and SAUDI ARAMCO stand out.

**Extensive experience providing specialized training sessions in both classroom and online methodologies. More than 50 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 an 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 solutions for today's industrial challenges by delivering specific, high-quality engineering courses utilizing three different approaches: **classroom, online, 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 have benefitted over 4500 professionals, our greatest accomplishment of all.

**We consider our students' time to be of utmost importance.** For this reason, all our courses have been designed with the main objective of quickly improving the professional skills of the participants through our expert instructors in different disciplines. **We stimulate creativity, innovation, and initiative to make the participants inquisitive, bringing good engineering practices and lessons learned to the field, that benefits their professional lives 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, providing our clients with the best in the sector. We are a team of highly motivated, talented, highly qualified professionals with over 20 years of experience. We aim to exceed expectations by offering efficient, innovative, cost-effective, and transparent services.

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

**Through experience gained by partaking in multidisciplinary engineering projects** in sectors such as Petrochemical, Energy Generation, and Industrial, we provide answers and solutions to concrete requirements, making the effort to build long-lasting and mutually beneficial relationships.