

# FACT SHEET

## Introduction to ASME B31.12 Hydrogen Piping and Pipelines



**Introduction to ASME B31.12 “Hydrogen Piping and Pipelines”. Code structure. Comparison with other codes. Materials for hydrogen service.**

### 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.**

### 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 and simplified case studies, providing practical knowledge to implement in the field.

### Duration

The duration of this training course is **8 hours**, divided into several sessions to facilitate the learning process.

### What to expect?

**Get familiar** with **ASME taxonomy** of codes dedicated to piping and pipelines.

**Understand** some key **hydrogen properties** affecting piping system design.

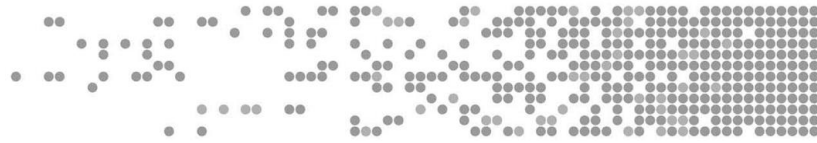
**Get to know** the **B31.12 code organization**.

**Know** the approach given by the code to the design, construction, operation and maintenance of **industrial piping** and linear **pipelines** for hydrogen.

**Understand** the main **differences** between the previous codes **B31.3** and **B31.8**, compared to **B31.12**.

**Identify materials** compatible with hydrogen.

**Know** the applicability of the code to **repurpose** natural gas pipelines to hydrogen service.



## Contents

### ASME B31.12 – Background

#### Genesis of ASME codes

Development of ASME B31 for Piping Systems

ASME B31.12 Release Chronology

### Hydrogen Characteristics Overview

**Hydrogen properties** | Compressed and liquefied state

Comparison between hydrogen and natural gas

Permeation and Embrittlement

### B31.12 - Code Structure

GR – General Requirements

IP – Industrial Piping

PL – Pipelines

Mandatory and non-mandatory appendices

### B31.12 IP –Industrial Piping

Scope

General Requirements that apply to Industrial Piping | Materials | Welding

Design | Components

Manufacturing and assembly

Inspection and testing requirements

Operation and maintenance plan

### IP – B31.12 vs B31-3

Background

Materials

Thickness design

Displacement stress

Welded connections

Non-destructive Examinations

General recommendations

### B31.12 PL – Pipelines

Scope | Components

Pipeline system design

Manufacturing and assembly

Inspection and Testing

### PL – Prescriptive vs Performance-based design

Design according to predecessor code B31.8.

Example

Prescriptive design of pipeline thickness

Performance-based design

Comparison with B31.8

Implications of using one or the other method

### PL – New vs reconverted pipelines

Development expectation

B31.12 – Requirements for reconversion

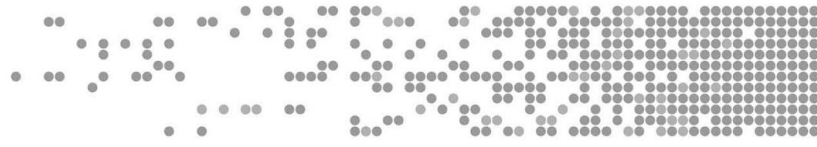
Application alternatives

### Materials for hydrogen service

Susceptibility to embrittlement | Correlation with other properties

B31.12: Acceptable and Unacceptable Materials for Hydrogen Service

General considerations



## 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.