



# FACT SHEET

## EN 13445 | Design and Fabrication of Pressure Vessels



EN 13445: scope, materials, design of main components, key aspects of manufacturing and inspection, CE marking.

### 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 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.

At the end of the course, participants will have a clear vision of the requirements of this standard.

### What to expect?

Get familiar with the vocabulary, terminology and fundamentals of the design and manufacturing of a PV.

Understand the structure of the EN 13445 code, its scope, and key sections.

Benefit from lessons learned and best practices from different international projects.

By the end of the course, participants will possess the fundamental knowledge to undertake the design and manufacturing of PVs according to EN 13445.

### Course Duration

The duration of this training course is **20 hours**, to be completed in 45 days. The Virtual Campus will be open for 90 days (flexibility).

### Methodology

At your own pace, no scheduled sessions

Available 24/7, Individual Progress

Solved Case Studies

#### Included in the course

Study Notes

Summary Videos

Assimilation Questions

Real Case Studies

Access to the Virtual Campus



## Contents

### Introduction & EN 13445 Part 1

Hierarchy of European Standards

ISO, CEN

ASME VIII vs EN 13445

EN 13445 vs AD 2000

Framework

Reference Standards

Structure

Parts of the EN 13445 Standard

EN 13445 Part 1, General

### Part 2, Materials

Organization, Contents, Scope

Types of Permitted Materials

Essential Mechanical Properties

Chemical Properties and Composition

References to Design and Manufacturing

Annex A: Material Grouping

Material Grade, Specification, Unique Number

Annex B: Brittle Fracture

Annex E: European Steels for PVs

### Part 3, Design

Organization, Contents, Scope

Joint Efficiency

Design Stress

Design of Components for Internal / External Pressure

Openings and Nozzles

Flat Ends | Standard Flanges | Non-standard Flanges

Loads on Nozzles

Lifting Lugs | Supports

### Part 4, Fabrication

Organization, Contents, Scope

Tolerances

Alignment, Peaking

Outer Diameter

Ovality of Shells, Cones, and Heads

Welding

Forming of Pressure Parts

Shells | Cones | Heads

PWHT | Post Weld Heat Treatment

### Part 5, Inspection & Testing

Organization, Contents, Scope

Non-Destructive Testing of Welds

Scope | Testing Group

Relationship Between Tables and Requirements

Recommendations for Welded Joints

Selection of NDT Methods

Volumetric and Surface

Acceptance Criteria

Hydrostatic Test

### EN 13445 Part 7, Guide for PED

Organization, Contents, Scope

Pressure Equipment Directive (PED)

Legal Framework | Scope

Steps to Obtain CE Marking

CE Marking Category and Module

Notified Body (NB)

When Required and Importance of Choosing the NB



## Instructor

Senior Mechanical Engineer and master's in business administration (MBA). More than 25 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, CEPESA, TUPRAS and SAUDI ARAMCO can be found.

Vast experience providing specific training sessions in both classroom and online methodologies. 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 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 taught more than 500 classroom courses, 1800 online courses, and over 200 in-company sessions. Our training activities have benefitted over 6000 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.