

FACT SHEET

API 650 | Aboveground Storage Tanks



Design of Aboveground Storage Tanks according to API 650 for industrial applications.

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 terminology and acquire vocabulary and fundamentals.

Understand the code organization and learn to define loads and design conditions.

Learn to design and calculate all the main components of Storage Tanks.

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

Instructor available during the entire course

Included in the course

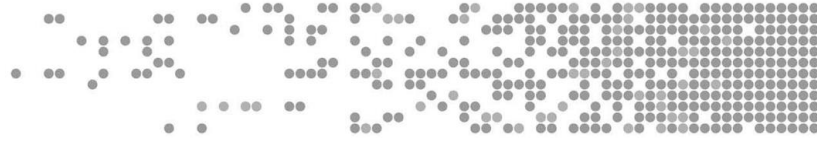
Study Notes

Summary Videos

Conceptual Questions

Case Studies based in real designs

Design & calculation sheets



Lesson 1: Codes & Design Conditions

Design Codes

API 650 code

Code organization, Scope

Other applicable codes

Design conditions

Design loads

Internal and External pressure

Design temperature

Proposed Case Studies

- *Assimilation test*

Lesson 2: Material Selection

Material selection

Corrosion types

Corrosion Allowance

Essential properties of materials

Material designation

Most used materials

General requirements

Proposed Case Studies

- *Assimilation test*

Lesson 3: Tank Shell Design

Design Considerations

One-foot calculation method

Thickness due to Liquid Level

Minimum Thickness

Fabrication requirements

Welding

Non-destructive examination

Hydrostatic Test

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Tank Wall Design N°1*
- *Case Study No. 2: Tank Wall Design N°2*

Lesson 4: Tank Bottom Design

Bottom plates design

Plates arrangement, minimum thickness

Annular ring

Width calculation, minimum thickness

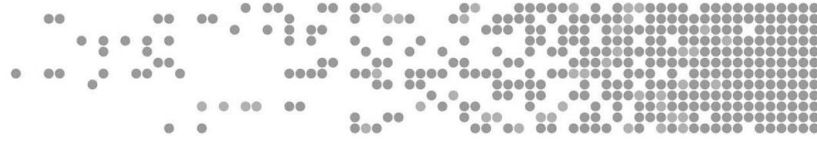
Fabrication requirements

Plate edge finishing

Welding

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Tank Fund Design N°3*
- *Case Study No. 2: Tank Fund Design N°4*



Lesson 5: Design of Wind Girders

Tank shell stability

Top ring

Self-supported roofs

Supported roofs

Tank shell stiffeners due to wind

Top and Intermediate rings

Profile selection

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Wind Rings Tk N°1*
- *Case Study No. 2: Wind Rings Tk N°2*
- *Case Study No. 3: Wind Rings Tk N°3*

Lesson 6: External Pressure - Vacuum

Design considerations

External pressure verification (Vacuum)

External pressure range

Tank shell verification

Load combinations: wind + pressure

Wind girders

Number of girders and spacing

Moment of inertia required

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Vacuum Rings No. 1*
- *Case Study No. 2: Vacuum Rings No. 2*
- *Case Study No. 3: Vacuum Rings No. 3*

Lesson 7: Fixed Roof Design

Types of fixed roofs

Conical type

Dome & umbrella type

Fixed roofs configuration

Self-supported roof

Supported roof

Structure for supported roofs

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Fixed Roff N°1*
- *Case Study No.2: Fixed Roff N°2*

Lesson 8: Floating Roof Design

Floating roof selection

External floating roof

Single & double deck roofs

Floating roofs appurtenances

Buoyancy – Pontoon design

Internal floating roof

Types of roofs

Design requirements, materials

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Floating Roff N°1*
- *Case Study No. 2: Floating Roff N°2*



Lesson 9: Nozzle Design

Nozzle configuration

Standard flanges

Nozzle necks

Reinforcements

Nozzles in tanks

Tank shell nozzles

Tank roof nozzles

Cleaning nozzles

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Nozzle Design N°3*
- *Case Study No. 2: Nozzle Design N4*

Lesson 10: Wind Loads

Wind loads

Wind profile according to job site

Wind speed and pressure

Wind overturning verification

Impose loads

Overturning resistance

Tank sliding due to wind

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Wind Load TK N°1*
- *Case Study No. 2: Wind Load TK N°2*
- *Case Study No. 3: Wind Load TK N°3*

Lesson 11: Seismic Loads

Seismic Loads

Seismic Spectrum (accelerations)

Overturning moment & base shear

Vertical loads

Design loads verification

Resistant moment

Sliding verification

Freeboard requirement

Proposed Case Studies

- *Assimilation test*
- *Case Study N° 1: Seismic Load Tk N°1*
- *Case Study N° 2: Seismic Load Tk N°2*
- *Case Study N° 3: Seismic Load Tk N°3*

Lesson 12: Tank Anchorage

Anchor bolts requirements

Wind loads

Seismic loads

Internal pressure

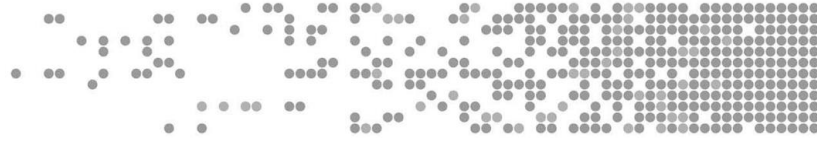
Tank uplift

Bolts number and cross-section

Chairs design

Proposed Case Studies

- *Assimilation test*
- *Case Study No. 1: Tank Anchorage N°1*
- *Case Study No. 2: Tank Anchorage N°2*



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, CEPESA, 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 an assessment phase, a tailored training plan is de-signed 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 4500 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.