



*Training Course:  
Welding Technology*

*25 - 29 August 2024*

*Cairo (Egypt)*

*Holiday Inn & Suites Cairo Maadi, an IHG Hotel*

## Training Course: Welding Technology

Training Course code: EN6044 From: 25 - 29 August 2024 Venue: Cairo (Egypt) - Holiday Inn & Suites Cairo Maadi, an IHG Hotel Training Course Fees: 3900 € Euro

### Introduction

Welding is a common and a very important joining process in most industries, and of particular importance in the chemical, oil and gas industries, including, for example, pipelines and storage tanks.

This 5-day training program aims to provide the fundamental principles of welding and welding techniques, helping participants recognize various welding processes.

Principal emphasis is placed on:

- Understanding the types of welding processes.
- Appreciating the different types of welding joints.
- Recognizing technical prints and symbols related to welding.
- Recognizing weld defects and associated problems and learning about mechanical testing, failure of welds and Non Destructive Testing.
- Learning about basic welding metallurgy.

### Course Objectives of Welding Technology

The course will cover the following areas;

- Types of welding processes, including oxyacetylene, SMAW, TIG, MIG, and others.
- Types of joints and joint design will be introduced, e.g. but, square, grooved, bevel, butt, U, J and T, flush.
- Various weld defects and imperfections will be presented including, porosity, solidification cracking, hydrogen cracking, incomplete root fusion or penetration, residual stresses, reheat cracking, lamellar tearing, liquation cracking, slag inclusion and troubleshooting.
- Basic metallurgy will be presented and related to welding technology, including the weldability of ferrous and non-ferrous metals, heat treatment and the significance of the heat-affected zone, HAZ.
- Welding parameters, including standards, metal transfer, welding currents, shielding gas, and electrode selection will be included in the course.
- Welding engineering drawing including standard welding symbols will be presented.
- Finally, mechanical testing and failure of welds will be presented in addition to non-destructive techniques, NDT.

### Course Benefits of Welding Technology

Upon completion of this course, participants will have;

- Gained an understanding of the important principals of welding processes and joint design.
- Gained valuable knowledge, related to weld defects, properties and welding characteristics of various metals, mechanical and non-destructive testing of welds.
- Acquire sufficient knowledge and skills to independently evaluate possible welding and design solutions.
- Enhanced their competence and productivity thereby improving their performance level and making

additional value-added contributions to their organizations

## Course Results of Welding Technology

- The company will be able to understand and specify relevant welding processes, with cost-effective outcomes.
- The company will be able to achieve measurable improvement through effective interaction between various engineering disciplines, including design, manufacturing, workshop, operation and maintenance functions.
- This will also lead to an improvement in operating and financial performance, and lead to improvement and optimization of relevant welding processes.

## The Core Competencies

At the end of the seminar, the delegates should be able to;

- Understand the use and application of welding techniques and standards
- Understand the various types of welding joints
- Learn about the different types of electrodes and standards
- Appreciate the variations of welding various types of metals
- Know, through the study of basic metallurgy, how heat treatment may be used to overcome some of the problems associated with welding, including the HAZ
- Recognize and define the basic types of welding defects and failure
- Learn how NDT can be used to detect weld defects.
- Understand how to apply materials testing techniques to examine the strength and quality of welded joints
- Gain an understanding of corrosion test methods and interpretation of results

## Course Outlines of Welding Technology

### Day One

#### Introduction and Weld Joint Design

- Introduction, welding terminology, codes and standards, welding failure and case studies.
- Introduction to quality, meeting requirements, customer satisfaction, quality control, how can quality be achieved?
- Weld joint design, load performance, types of joints, butt joint, square, grooved butt joint, single V, Double V butt joint, bevel and double bevel butt, U, J and T, flush.
- Welding techniques, positional welding, backing, examples, butt welds without backing

### Day Two

#### Welding Processes

- Welding processes, process options, benefits, problems and applications, oxyacetylene process, fusion welding processes, shielded metal arc welding SMAW, submerged arc welding, TIG welding, solid wire MIG welding, types of flux/electrodes, metal transfer mode, power source and welding current, arc starting, shielding gas, operating characteristics, applications.
- Arc welding electrodes, US standard electrodes, electrode identification, electrode size and currents, common electrode types, extended electrode classification examples, BS classification of electrodes.

#### Day Three

#### Welding Defects and Imperfections

- Welding defects, introduction, heat affected zone, HAZ, weld defects and imperfections, porosity,

solidification cracking, hydrogen cracking, incomplete root fusion or penetration, residual stresses and cracking, reheat cracking, lamellar tearing, liquation cracking, slag inclusion.

- Geometric shape imperfections - types and causes, excess weld metal, undercut, overlap cold lapping, linear misalignment, incomplete filled groove, troubleshooting.

#### Day Four

##### Welding Technical Prints, Symbols and Basic Metallurgy

- Welding drawings symbols, introduction, types of projection, welding joints, symbols for welds, parts of the welding symbols, placement of welding symbols, special welds, weld all around, field weld symbols and multiple reference lines.
- Basic metallurgy crystalline structure of metals, crystal growth an overall bulk solidification of metals, solid solution, intermetallic compounds, diffusion, microstructure of carbon steel, heat treatment of steel, critical cooling rate and mass effect, heat-affected zone HAZ in Welding, HAZ of carbon and alloy steels, HAZ of stainless steel.
- Materials for welded sections, weldability of steel groups, stainless steels, cast irons, aluminum alloys, filler alloys, avoiding weld imperfections.

#### Day Five

##### Materials Testing and Non-Destructive Testing NDT

- Materials testing and failure, tensile testing, properties obtained from the tensile test, ductility and fracture in metals, impact testing Izod and Charpy, transition temperature, hardness tests Vickers and Rockwell, failure due to fracture, stress concentration, fracture toughness, fatigue failure, improving fatigue resistance, creep failure, destructive testing of welds, bend tests, bead-on-plate test, controlled thermal severity C.T.S. test, the test and assessment hierarch.
- Non-destructive testing NDT, definition and purpose of non-destructive testing, engineering demands for sounder materials, ensuring the integrity and reliability, maintaining the uniform quality level of a product, dye penetrant, magnetic methods, X-ray methods, g-ray methods, ultra-sonic methods, eddy current testing, selection of N. D. T. methods, ISO standards for NDT Inspection.

## Registration form on the Training Course: Welding Technology

**Training Course code:** EN6044 **From:** 25 - 29 August 2024 **Venue:** Cairo (Egypt) - Holiday Inn & Suites Cairo Maadi, an IHG Hotel **Training Course Fees:** 3900 € Euro

Complete & Mail or fax to Global Horizon Training Center (GHTC) at the address given below

### Delegate Information

Full Name (Mr / Ms / Dr / Eng): .....  
 Position: .....  
 Telephone / Mobile: .....  
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### Company Information

Company Name: .....  
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### Person Responsible for Training and Development

Full Name (Mr / Ms / Dr / Eng): .....  
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- Please find enclosed a cheque made payable to Global Horizon
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