Introduction to Equipment Technology

Overview

LEVEL
Knowledge

PURPOSE
This course provides a good knowledge of equipment technology, including thermal, static and rotating equipment.

LEARNING OBJECTIVES
Upon completion of the course, the participants will be able to:
- provide basic understanding of static and rotating equipment installed in process plants,
- describe the technology of thermal equipment,
- explain operating practices and key performances of each family of equipment.

WAYS AND MEANS
Sharing of participants’ best practices.
Study of actual cases based on industrial Oil & Gas and petrochemical processes.

LEARNING ASSESSMENT
Final quiz.

PREREQUISITES
No prerequisites for this course.

Agenda

PIPING, VESSELS & MATERIALS
Symbols and equipment representation on P&ID drawings.
Pressure and temperature ratings. Different types of piping equipment and fittings: pipes, flanges, gaskets, valves, steam traps, safety valves, insulation, pipe supports, etc.
Vessels: technology of separator drums; technology and internals of distillation columns and reactors.
Storage tanks: different types (atmospheric, pressurized, cryogenic…). Design and technology.
Overview of ASTM and EN material.

INTRODUCTION TO THERMAL EQUIPMENT
TEMA standard heat exchangers and other types: tubular or plate type, air coolers and condensers.
Different types of furnaces, technology and characteristics.
Burner technology: fuel and air supply. Low NOx and ultra-low NOx burner technology.
Flare systems. Safety operation.

BASICS IN ROTATING EQUIPMENT
Different types of pumps.
Centrifugal pump performance curves: head, efficiency, shaft power, NPSH3.
Centrifugal pump technologies. Mechanical seals: various arrangements, ancillary systems.
Common failures and related root causes.
Reciprocating compressor architecture: number of stages, cylinders, overall layout, standard applications.
Technology of main components and ancillaries. Flow control, specific safety devices. Start-up procedures and troubleshooting.
Centrifugal compressor: description, technology of main components and auxiliaries.
Performance curves, influence of suction conditions and gas composition.
Operating window: low and high speed limits, stonewall, surge, typical anti surge protection systems.
Typical failures and related root causes.
Introduction to other types of rotating equipment: positive displacement pumps, other rotary positive displacement compressors, blowers, steam turbines, gas turbines, motors.