Formation - Heat Exchangers

HEDES-EN-P | Présentiel | 5 jours

This course provides detailed understanding of heat exchangers technology. It covers also thermal and mechanical calculation methods used to design exchangers and their performance monitoring

Niveau

Expertise

Public

Engineers and staff from the technical and process departments of refining, petrochemical and chemical companies

Objectifs

Attendees will be able to implement the following skills:

- List advantages and drawbacks of TEMA Types and associate the most appropriate type with operating conditions and fluids properties
- Describe the heat exchange laws and identify key parameters impacting the exchange coefficients and pressure drops
- Define the required data used in HX design software and analyze the output file
- Elaborate, from a process data sheet, a TEMA specification data sheet used for HX construction

Pédagogie & ressources techniques

- A case study is organized throughout the training program to select, design and check performances of a single phase shell and tube heat exchanger, from the process data sheet to the TEMA specification data sheet
- Study of reboilers and condensers
- Special emphasis on interaction between mechanical aspects and process requirements in the thermal and hydraulic design of heat exchangers

Évaluation des acquis

- Trainees are assessed throughout the training through practical application phases and interactions with the trainer
- A final on-the-spot evaluation may also be carried out at the end of the course and/or at the end of each module using tests designed to verify the learners' understanding and assimilation of the knowledge linked to the training objectives

Prérequis

No prerequisites are necessary to follow this course

Responsable

IFP Training instructors, with expertise in the field and trained in modern teaching methods adapted to the specific needs of learners from the professional world

Programme

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HEAT TRANSFER LAW APPLIED TO HEAT EXCHANGERS — 0.75 day

Heat exchange conditions: convection coefficients, resistance caused by the walls and by fouling.
Overall heat transfer coefficient. Mean heat potential in a heat exchanger as a function of fluid distribution, specific case of phase change. Transferred heat flow rate across an installed surface. Influence of installed area and fouling.
Application:

- Evaluation of exchange area requirements as a function of fluid flow distribution.
- Thermal performance follow-up and prediction.

TEMA STANDARD TUBULAR HEAT EXCHANGERS - TECHNOLOGY & SELECTION CRITERIA — 0.5 day

TEMA standard heat exchangers: nomenclature, different types of shell, floating heads and fixed front head.
Selection criteria, advantages and drawbacks of the different types.
Geometrical characteristics of TEMA heat exchangers and technological constraints.
Technological solutions to improve film coefficient or reduce shell side pressure drops: tubes inserts, type of baffle...
Application: selection of a TEMA type and fluid flow allocation according to a process data sheet.

THERMAL & HYDRAULIC DESIGN - PERFORMANCE FOLLOW-UP — 3.25 days

Heat exchanger design procedure: fluid flow allocation, TEMA type selection, heat exchange area estimate, area organization (tubes diameter and length, tube pattern and pitch), baffle (type, spacing and cut), shell side stream analysis, performance and geometrical hypothesis checking, acceptance criteria, reconsideration of initial design (number of shell in series or in parallel, number of tube passes...).
Vibrations induced by flow in a shell: prediction, severity criteria, influence on design.
Condensation or vaporization performance: two phase flow (patterns and pressure drop), condensation modes, film condensation, characteristics, boiling mechanisms, film boiling and convective boiling coefficient.
Hydrodynamics of thermosiphon reboilers.
Application:

- Thermal and hydraulic design of a single-phase heat exchanger.
- Initial design of condenser and reboiler.

PLATE TYPE HEAT EXCHANGERS — 0.5 day

Main type of plate heat exchangers: advantages and drawbacks. Limitations and application area.
Main design rules and arrangement possibilities (parallel, series...).
Application: heat exchange area to install in case of a perfect counter-current plate type HX.

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Pour vérifier l'accessibilité de cette formation à une personne en situation de handicap, contactez notre référent à l'adresse suivante : referent.handicap@ifptraining.com

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