

Course Content 4 days

Theoretical and practical (preliminary)

Introduction to CO₂

- Why carbon dioxide?
- Environmental impact of refrigerants
- Basic refrigeration
- CO₂ system solutions
- Energy efficiency
- Theoretical cases/exercises

System components

- Typical pack designKompressorer
- Compressors
- Heat exchangers
- Valves

Safety

- Handling of gas bottles
- Safety valves
- Gas detectors
- Personal safety
- Safety equipment

PED & Materials

- PED - Pressure Equipment Directive
- Pressure testing
- Materials in systems
- Seals, hoses, etc.
- Tube material and brazing technology

Heat recovery solutions

- Types of heat recovery systems
- Heat recovery control
- Temperature levels - one or two stages
- Performance and efficiency
- Optimized systems

CO₂ applications

- Small applications
- Heat pumps
- Industrial

Refrigeration units and systems

- Single units
- Booster units
- 3-temperature level units
- Condensing units

Case studies – system design and calculation exercises

- Pack design
- Heat exchangers theoretical and practical design
- Component design tools
- Pipe sizing
- System comparison and simulation tools
- Application examples



Softwares and tools

- Compressor selection tool
- CoolPack
- Pack Calculation II
- Simple-one-stage
- Refprop

Practical operation with CO₂ as a refrigerant

- Handling of gas, cylinders, couplings, hoses, etc.
- Draining and filling the system
- Safety aspects and safety equipment
- Pressure testing

Commissioning and adjustments of CO₂ systems

- Refrigerators and freezers
- How the control system works and the benefits of using the full range of control system features
- Commissioning report
- Checklists

The Pressure Equipment Directive and general rules for using CO₂ as a refrigerant

- Introduction
- Equipment
- Exercises

CO₂ systems

- Refrigerators and freezers
- How the control system works and the benefits of using the full range of control system features

Summary and wrap up

- Q&A
- Discussion
- Final comments

Documentation to participants

- USB including all documents

Course Details

Duration

4 days

Location

Aeres Tech, Zandlaan 29
Ede, Holland
Nearest airport is Schiphol, Amsterdam

Starting point

The importance of understanding CO₂ refrigeration technology and the essential role of the consultant/engineer in contacts with end users and contractors.

Focus

Awareness of the role of the consultant/engineer as the linchpin between end users and contractors/suppliers of materials etc.

Motto

Learning by doing, learn things today – do things tomorrow, in your own professional situation.

Approach

1. Explanation of the subject by the instructor.
2. Discussion and exchange of knowledge and experiences between participants and instructor.
3. Personal approach – present and wanted/desired.
4. The participants practise the new behaviour
5. Personal action plan for each practised subject.

Size of the group

7-12 participants