LABORATORY PLANNING GUIDE

L33 Refrigeration & Air Conditioning Laboratory

Content

G.U.N.T. Gerätebau GmbH, Hanskampring 15-17, 22885 Barsbüttel, Germany
Phone: +49 40 670854-0, E-mail: sales@gunt.de, Web: www.gunt.de

Covered subjects according to the curriculum

Major topics of learning content:

- design of compression refrigeration circuit
- draining and filling of refrigeration systems
- operation of refrigeration components
- cyclic process of cold production
- fault finding in a refrigeration systems
- compare different expansion elements
- read, understand, wire and test electric circuit diagrams
- design and operation of electrical components from refrigeration
- design and testing of a safety chain
- star / delta connection
- safety aspects when handling mains voltage
- design and operation of the electrical components of a refrigerant compressor
- operation and programming of a DDC
- practice-oriented principles of air conditioning and ventilation technology
- design and servicing of an air conditioning and ventilation system
- principles of room air conditioning (h-x diagram)
- explanation of components: filter, air heater, air cooler, humidifier, condensing unit, air conditioning controller, flaps, outlets
- operation of safety devices
- measurement of pressure curve and pressure losses
- effect of air cooler, air heater and humidifier on the state of the air at the outlet
- investigation of the control behaviour of an automatic air conditioning controller, determination of limiting factors
- demonstrate the basic principle of an absorption refrigeration system

Main concept

The laboratory is designed for accommodation of 24 students + 2 laboratory staff:

- 2 - 4 students form a team and work together at a workstation / training system
- 16 workstations with 11 different experiment units
- Each experiment unit either floor standing or on its own table to allow short prepare times
- Each workstation is equipped with a manual containing technical information, basic theory, experiment instructions, evaluation help and safety advice.
- Student teams are scheduled to change workstations from lab session to lab session in order to perform the entire range of experiments within the course duration.
- Average time per experiment: 90 to 120 minutes.

2 workstations for laboratory staff (with PC and internet access)

1 printer for common use

1 cupboard for small parts, consumables, tools, paper etc.

Initial training provided for laboratory personnel

Trainer: Specialized engineer of G.U.N.T. Gerätebau GmbH, Germany.

To be conducted immediately after installation and commissioning of the equipment.

General topics to be covered for any of the educational systems:

- Basic familiarization with the system.
- Functions and components.
- Overall system configuration aspects.
- Start-up and operational aspects.
- Conduction experiments, including evaluation and calculation.
- Using the system with and without the software (where applicable).
- Trouble shooting and maintenance aspects.
- Hands-on, practical familiarization aspects.
- Seminar participants with the delivered system.
- Details of the manuals.
- Safe operation and preventive maintenance.

Requirements / Utilities

Power supply:

- 230 V / 50 Hz / 1 phase – at least 15 power sockets distributed according to lab lay-out
- 400 V / 50 Hz / 3 phases – at least 2 power sockets distributed according to lab lay-out

Water:

- Cold water
- Drain

Laboratory computer network:

- 2 internet connections for staff

Location:

- Laboratory space min 108 m²
- This laboratory should be installed on the ground floor

Schedule of requirements

Item No.	Description	Quantity
Item 1	Refrigeration training system, base unit	6 pcs.
Item 1.1	Refrigeration laboratory workplace	6 pcs.
Item 1.2	Refrigeration components for basic experiments	6 pcs.
Item 1.3	Refrigeration components for advanced experiments	6 pcs.
Item 1.4	Set of accessories	6 pcs.
Item 1.5	Maintenance set	3 pcs.
Item 2	Electrical installation in refrigeration systems	1 pcs.
Item 3	Electrical faults in simple air conditioning systems	1 pcs.
Item 4	Electrical connection of refrigerant compressors	1 pcs.
Item 5	Electrical faults in refrigerant compressors	1 pcs.
Item 6	Electrical faults in full air conditioning systems	1 pcs.
Item 7	Building automation in heating and air conditioning systems	1 pcs.
Item 8	Air conditioning and ventilation system	1 pcs.
Item 9	Absorption refrigeration system	1 pcs.