

Purging, Piping, and Safety

Course 464: Purging, Piping, and Safety

Explains the effects of noncondensables on an ammonia system and the importance of their removal. Covers a wide range of piping considerations—sizing, flow rate, pressure drop, and others. Concludes with a thorough coverage of safety codes and programs, including ANSI/ASHRAE, IIAR, OSHA, and EPA information.

TPC Training Systems is accredited by IACET to offer **0.5 CEU** for this program.



Lesson 1: Purging Air and Noncondensables

Topics

Materials to be purged; Effects of noncondensables; Power penalty; Purge point locations; Automatic purging; Economics of purging

Objectives

- List common noncondensable vapors and discuss their effects in a refrigeration system.
- Discuss the power penalty resulting from noncondensable gases in terms of compression and loss of refrigeration capacity.
- Explain how to determine the presence of noncondensables.
- Explain how to minimize the entrance of noncondensables and describe common entry points.
- Compare the features and operation of manual and automatic purging equipment and name the best connection points for the purge unit.
- Discuss the economic benefits of the purge unit in terms of typical payback times.

Lesson 2: Ammonia System Piping

Topics

Pressure drop in pipes; Laminar and turbulent flow; Line sizing, flow rate, suction line pressure drop, discharge line pressure charts; Special piping situations

Objectives

- Discuss the relationship between pressure drop requirements and pipe sizing.
- Discuss the factors that affect the pressure drop in a pipe.
- Explain the significance of the Reynolds number and the distinction between laminar and turbulent flow.
- Discuss the use of various kinds of line sizing charts including flow rate tables, equivalence tables for fittings and valves, and pressure drop charts.
- Explain how to select the proper suction line, discharge line, and liquid line sizing for an ammonia system.
- Discuss special piping situations that require alternative sizing or installation.

Lesson 3: Ammonia System Safety Codes and Guidelines

Topics

Codes for ammonia refrigeration systems; ANSI/ASHRAE 15-1994; ASME B 31.5; IIAR2; IIAR bulletin 111; IIAR bulletin 112

Objectives

- Describe the basic differences between ASHRAE and ASME codes and IIAR standards and guidelines.
- Discuss several main points in the ASHRAE 15-1994 safety code for mechanical refrigeration.
- Describe code requirements based on the occupancy classifications, leak probability classifications, and refrigerant characteristic classifications.
- Describe several requirements in the ASME B 31.5 refrigeration piping code concerning the materials and fabrication of refrigeration piping systems.
- Name several safety requirements specified by IIAR 2 for ammonia refrigeration equipment.
- Describe the kinds of information provided by IIAR bulletins.

Lesson 4: OSHA Process Safety Management

Topics

OSHA regulations; PSM requirements; Estimation of ammonia inventory; PSM plan development; Process safety information, hazard analysis; Standard operating procedures; Contractor procedures

Objectives

- Discuss the purposes of Process Safety Management and describe the thirteen elements that make up PSM.
- Describe the process for estimating a plant's ammonia inventory and establishing a plant ammonia library and explain why each is needed.
- Discuss the personnel and steps involved in developing a PSM plan for a specific refrigeration plant.
- Describe the process hazard analysis (PHA) and explain how it can reduce the likelihood of ammonia accidents and spills.
- Describe the requirements for preparing standard operating procedures (SOPs) for all normal plant service, repair, and maintenance.
- Discuss contractor responsibilities for PSM.
- Discuss the importance of management-of-change procedures in keeping paperwork up to date.

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Lesson 5: EPA Regulations and Ammonia Safety

Topics

40 CFR 68; Worst case/alternate ammonia release scenario; Elements in common with OSHA PSM; Penalties for nonconformance

Objectives

- Describe the purposes of the EPA Risk Management Plan and compare it to the OSHA Process Safety Management program.
- Explain the reasoning behind the dual hazard assessment requirements of a worst-case ammonia release and the more practical alternative ammonia release.
- Discuss the toxic end point criteria for an ammonia release and distinguish between rural and urban end points and differences in requirements.
- Discuss the importance and difficulties of presenting the required release data and plan to the community.
- Discuss the hazards of working with ammonia and the importance of using personal protective equipment to avoid or minimize the effects of an ammonia release.
- Describe correct first aid procedures pertaining to contact with ammonia vapor and liquid.