



Safety and Health Topics: Ammonia Refrigeration

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Other Standards & Guidelines

The information contained in this section constitutes a **partial** list of good engineering practices which apply to many ammonia refrigeration facilities. This list is not intended to be all-inclusive or definitive, but should provide employers with a good starting point for finding applicable codes, standards, and guidelines. There may be a cost associated with some of these documents.

Note: The following are industry standards and good engineering practices, but have not been adopted by OSHA.

- **Factory Mutual Property Loss Prevention Data Sheets**
 - 7-13 Mechanical Refrigeration. Factory Mutual, (1998).
- **Compressed Gas Association**
 - G-2 Anhydrous Ammonia. CGA, (1995). Reviews the properties, physiological effects, first aid, safety, security and emergency actions, manufacture, transportation, storage, handling, and use of anhydrous ammonia.
- **American Society of Mechanical Engineers (ASME)**
 - ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels.
 - ASME Boiler and Pressure Vessel Code, Section V, Nondestructive Examination.
 - ASME B31.5-1992, Refrigeration Piping Code.
- **American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)**
 - 1998 ASHRAE Handbook - Refrigeration. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This handbook covers the refrigeration equipment and systems used for applications other than human comfort. This book includes information on cooling, freezing, and storing food; industrial applications of refrigeration; and low-temperature refrigeration. While this Handbook is primarily a reference for the practicing engineer, it is also a useful reference for anyone involved in the cooling and storage of food products. Specifically, Chapter 3 - System Practices for Ammonia Refrigerant, and Chapter 6 - Control of Moisture and Other Contaminants in Refrigerant Systems contain useful Process Safety Management related information.
- **American National Standards Institute (ANSI)**
 - American National Standard for Equipment, Design and Installation of Ammonia Mechanical Refrigerating Systems. ANSI/IIAR 2-1992. Sponsored by IIAR, this standard applies to closed circuit mechanical refrigerating systems utilizing ammonia as the refrigerant. It was written as a guide to the design, manufacture, installation and use of ammonia mechanical refrigerating systems and equipment in industrial occupancies. This standard is not intended to supplant existing requirements that are more stringent than those in the standard, that authority shall prevail.
 - American National Standard: Safety Code for Mechanical Refrigeration. ANSI/ASHRAE Standard 15-1994. This standard is intended to promote the safe design, construction, installation, and operation of refrigerating systems. The provisions of this code are not intended to apply to the use of water as a refrigerant. This code establishes reasonable safeguards of life, limb, health, and property; defines practices that are consistent with safety; and prescribes safety standards.

- American National Standard: Mechanical Refrigeration and Air-Conditioning Installations Aboard Ship. ANSI/ASHRAE 26-1996. This standard provides recommendations and requirements for the safe and efficient design, construction, installation, operation, inspection, and maintenance of mechanical refrigeration equipment aboard ships.
- **International Institute of Ammonia Refrigeration (IIAR)**
 - Ammonia Data Book. IIAR, (December, 1992). An authoritative volume providing a variety of information on ammonia. The publication includes a data on the various properties of ammonia and information on its use.
 - Guidelines for: Ammonia Machinery Room Design. IIAR Bulletin No. 112-1998. This bulletin is intended to summarize the generally accepted industry practices for machinery room design.
 - Guidelines for: Suggested Safety and Operating Procedures When Making Refrigeration Plant Tie-Ins. IIAR Bulletin No. 107-1997. This bulletin addresses the need to approach ammonia refrigeration system tie-ins in a safe and methodical manner. It provides owners and contractors with a general checklist of safety and logistical items that should be reviewed when planning system shutdowns and tie-ins. Equally important, it provides engineers with ideas on how and where to design for future connections and taps that can make future tie-ins easier and safer.
 - Guidelines for: Water Contamination in Ammonia Refrigeration Systems. IIAR Bulletin No. 108-1986. Water contamination in ammonia refrigeration systems has always been a problem. Owners typically know they have water in a system, but may not be familiar with how it got there, measures to quantify the amounts, analyzing the specific penalties it causes on the system performance, and removing the water in a safe manner. This bulletin offers insights on where the water can come from and how to minimize continued infiltration. It provides an analytical approach to quantifying water concentrations, and recommends apparatus to remove the water.
 - Guidelines for: IIAR Minimum Safety Criteria for a Safe Ammonia Refrigeration System. IIAR Bulletin No. 109-1988. This bulletin embraces an IIAR goal of ensuring that ammonia refrigeration systems are engineered, constructed and operated in a safe manner. This bulletin provides detailed lists of items to consider when designing, inspecting, or operating a system. Housekeeping, recordkeeping, code considerations and personnel safety equipment are some of the safety issues addressed. The bulletin also provides inspection checklist forms for compressors, condensers, evaporators, vessels and heat exchangers to check system installation against recognized industry safety requirements.
 - Guidelines for: Start-Up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems. IIAR Bulletin No. 110-1993. This bulletin covers: ammonia characteristics and hazards, inspection and maintenance of equipment, start-up issues, reference standards, safety equipment, and log book recordkeeping. Definitions of system components and terms are provided to help in understanding ammonia systems. This bulletin is a must for machinery room supervisors and operators.
 - Guidelines for: Ammonia Machinery Room Ventilation. IIAR Bulletin No.11-1990. Major differences can be found between codes when determining ventilation requirements for ammonia machinery rooms. These differences result in confusion for the engineer and possible code misapplication. This bulletin cuts through the jargon and provides a practical ventilation design criteria that will satisfy existing code requirements and improve machinery room safety.
 - Guidelines for: Identification of Ammonia Refrigeration Piping and System Components. IIAR Bulletin No. 114-1991. This bulletin provides a comprehensive ammonia labeling scheme for companies in need of an identification system that "covers it all." It offers recommendations on label sizes, colors, installation locations, and label material requirements.
 - Guidelines for: Avoiding Component Failure in Industrial Refrigeration Systems Caused by Abnormal Pressure or Shock. IIAR Bulletin No. 116-1992. This bulletin identifies three significant factors that can lead to ammonia refrigeration system damage and personnel injury: trapped liquid, sudden liquid deceleration, and vapor propelled liquid. This bulletin explains the most likely causes for each of these problems and provides design, operation and servicing tips that can minimize the chances of them occurring. It also offers numerous suggestions on

making hot gas defrost operations safer and more effective.

- Process Safety Management Guidelines. IIAR, (1998) includes a CD-ROM. A manual that provides guidance on the interpretation and implementation of the OSHA Process Safety Management standard. The manual has a chapter discussing each of the fourteen elements of PSM and includes a series of work practices, checklists, and other guidance materials to assist employers in developing a PSM program.
- Risk Management Program Guidelines for Ammonia Refrigeration. IIAR, (1998) includes a CD-ROM. A manual that provides guidance on the interpretation and implementation of EPA's Risk Management Rule. A good companion to the Process Safety Management Guidelines manual also published by IIAR.

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