



Refrigeration Design, Construction, and Installation for

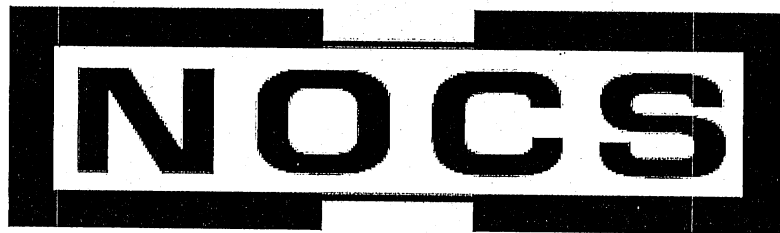




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Section 1 – GENERAL

1.01 SCOPE OF WORK

The work to be performed under this section shall comprise that which is required to furnish, install, interconnect and place the equipment in operation condition in conformance with the contract documents. The refrigeration contractor shall supply all supervision, labor, materials, equipment, accessories, services, scaffolding, and tools necessary for the entire proper and acceptable completion of his work as shown on the drawings, all in accordance with the contract documents.

1.02 CONTRACTOR QUALIFICATIONS:

This is a PSM facility and complies with all OSHA and EPA regulations requiring documented Pre- Qualification for all contractors working on or near the process. If you have not previously completed the Pre-Qualification process please notify your point of contact to request a form. Refrigeration contractors are required to provide proof of extensive experience in the design, installation and operation of ammonia design, installation and operation of ammonia refrigeration system for a minimum of five continuous years and adequate maintenance facilities within the area of the proposed installation. Provide last two years of OSHA 300 logs and also provide a list of projects of equal or greater magnitude to the one being considered herein. Bids from unqualified contractors will not be considered.

1.03 DESCRIPTION OF WORK

- A. All ammonia refrigeration equipment and piping.
- B. All ammonia mains from the equipment room through building into the designated refrigerated spaces.
- C. All tie-ins of the ammonia mains to the different evaporators.
- D. Installation of compressors in the engine room, and all appurtenances as shown on plans or as required.
- E. All pipe and vessel insulation.
- F. All equipment and piping supports.
- G. Control system including all required interlocks for automatic operation of the ammonia refrigeration of the system and equipment installed herein including all related electrical wiring.

- H. Start up and operational test of completed systems.

1.04 COORDINATION WITH OTHER CONTRACTORS

- A. Electrical – Wiring of Equipment supplied shall follow the guidelines and codes of the state of Louisiana.
- B. Compressor foundation in engine room. (The refrigeration contractor shall furnish foundation drawing and anchor bolts to general contractor).
- C. Cutting and patching of all wall, roof and ceiling openings.
- D. All floor drains and condensate drains.
- E. Painting of piping and equipment as per NOCS specifications.
- F. Process Safety Management developed in conjunction with PSM Compliance, Inc.

1.05 CODES, ORDINANCES, AND PERMITS

- A. All work to be performed in accordance with the following codes recognized industry practices, ordinances, permits, or it's latest revision.
 - 1. **ANSI/ASHRAE Standard 15-2007**
American National Standard Safety Code for Mechanical Refrigeration as provided by the American Society of Heating, Refrigeration, and Air-Conditioning Engineers.
 - 2. **ANSI/IIAR-2-2008**
American National Standard for Equipment, Design and Installation of Ammonia Mechanical Refrigeration Systems. As provided by the International Institute of Ammonia Refrigeration.
 - 3. **ASME/ANSI B31.5-2001**
American National Standard for Refrigeration Piping. As provided by the American Society of Mechanical Engineers.
 - 4. **OSHA 29 CFR PART 1926**
Occupational Safety and Health Act of 1970 Standards for Construction.

5. **OSHA 29 CFR PART 1910**
Occupational Safety and Health Act of 1970 Standards for General Industry. In particular rigid attention and compliance to OSHA 29 CFR Part 1910 Subpart H-Hazardous Materials 1910.119 Process Safety Management of Highly Hazardous Chemicals.
6. When in question, the previously mentioned codes and standards, along with the he advisory information available from the International Institute of Ammonia Refrigeration in the form of their bulletins shall be the arbiter.

- B. Apply for, obtain, and pay for all required permits and inspection certifications.

1.06 START OF WORK

- A. Prior to the start of work in any area, the refrigeration contractor shall have received from the owner's, approval as to when begin work along with instructions concerning the manner and time in which the work will be accomplished.

1.07 WELDING

- A. Welding permits must be issued by authorized representative of NOCS for all welding conducted on property.
- B. All welding operations shall be done so that all fumes and smoke created will Be exhausted to the outside by use of portable exhausts and/or by means of Exhaust fans.

1.09 DELIVERY SCHEDULE

- A. All bidders are to furnish a delivery schedule to NOCS which detail when the contractor will receive, unload, and his plans to store equipment.
- B. The contractor shall include with his schedule a list which itemizes the type and availability of every ammonia valve required, the quantity of valves in the contractor's stock, the number he must order, with whom he will place the order and the date shipment is expected.

- C. All ammonia system piping shall be inspected by an authorized NOCS representative on delivery.
 - a. All piping must capped. Any uncapped pipe will be refused.
 - b. Any piping showing indication of rust or internal corrosion may be refused at discretion of authorized NOCS representative.

1.10 SAFETY REQUIREMENTS

- A. General –all safety requirements listed in the mandatory codes must be followed even though the specific requirements are not listed herein.
- B. All equipment and components used shall be designed and manufactured for ammonia refrigeration service.
- C. Copper and its alloys shall not be used in contact with any ammonia refrigeration component or system.

1.11 PRESSURE RATINGS

- A. For low side of system – 150 PSIG.
- B. For high side of system – 250 PSIG.

1.12 PRESSURE RELIEF PROTECTION

- A. Every refrigeration system and all pressure vessels shall be protected by dual pressure activated relief valves. The materials used in pressure relief valves shall resist corrosion from the refrigerant.
- B. Pressure relief valves shall be set to begin opening at the design pressure of the system or pressure vessel being protected. Dual pressure relief valve shall be supplied with 3-way valve.
- C. Stop valves shall not be located between pressure relief valves and the equipment or system being protected. The output side of the relief shall have unrestricted flow to atmosphere release point without stop valves. There shall be no exceptions.
- D. Pressure relief valves shall discharge outside, at least 15 feet above the highest roof of the building and or areas typical accessed by personnel and at least 20 feet away from any window, ventilation openings or building exit. The exception is relief valves that discharge into the low side of the system, when permitted by code, or that discharge into vented water absorption tank, sized in accordance with the code.

1.13 INSTALLATION OF EQUIPMENT

- A. Install all equipment in accordance with manufacturer's recommendations to operate free of vibration or objectionable noise.
- D. All valving must be compactly installed and adequately supported to allow for the installation of minimum size drip pans under those valve groups.

1.14 Non-routine work authorization permits

- A. The purpose of these procedures is to ensure that our employees, contractors and company property are properly protected against fire, explosion, and other dangers resulting from non-routine work (that is, work not normally conducted as part of the routine, daily operation of the ammonia refrigeration system).
- B. Actions requiring permits include: Hot Work, Lockout/Tagout, Confined Space Entry, and Line Break/Pumpout.

Section 2 – AMMONIA PIPE AND FITTINGS

2.01 GENERAL

- A. Submit manufacturer's data reports and P&ID drawings for review before any work begins.
 - a. Contractor shall actively participate in the Process Hazard Analysis with NOCS personal prior to construction process starting.
- B. Install in accordance with ANSI/IIAR Standard for Equipment, design and Installation of Ammonia Mechanical Refrigeration Systems.
- B. ALL PIPING shall be painted as follow:
 - a. Un-insulated: pipe and vessels to primed and painted with rust oleum paint and color coded
 - b. Insulated: pipe and vessels are to be primed prior to insulating

Section 3 – WELDING

20.01 GENERAL

- A. All welding shall be made by welders certified in accordance with procedures set forth in the "Standard Procedure Specifications for Welding of Pipe, Fittings, and Flanges" by Mechanical Contractors Association of American and Section 9 of the "ASME Boiler and Pressure Vessel Code", ASA B31.1.
- B. All welding shall be done in accordance with the welding procedures of the National Certified Pipe Welding Bureau, conforming to the requirements of the ASME Boiler and Pressure Vessel Code or the ANSI Code for Pressure Piping.
- C. No welder shall be employed on the project that has not been fully qualified under the above chapter of the National Certified Pipe Welding Bureau or equally recognized pipe-welding authority. Contactor shall provide NOCS with copies of welding licenses for all welders assigned to project.
- D. Piping Identification shall be marked according to 1910.119 Process Safety Management for Ammonia Refrigeration and the IIAR Standards.

22.03 All refrigerant piping shall be pressure tested for leaks in accordance with ANSI/IIAR 2-2008, or its most recent revision.

22.04 Defective material must be replaced and leaks properly repaired.

22.07 Upon successful completion of vacuum test the system shall be charged with refrigerant.

22.08 Partial testing of piping system between the refrigeration control valves and the evaporator units is to be done immediately upon completion of that portion of piping.

Section 4 – INITIAL START-UP AND OPERATION

23.01 The initial startup and general operating tests shall cover a period of not less than three days and shall demonstrate that the entire system and equipment is functioning in accordance with the industry and manufactures specification and the satisfaction of *NOCS engineering*. The contractor will furnish instruments,

test equipment, and personnel that are required for tests and *NOCS* shall furnish the water, natural gas and electricity.

23.02 Valve tags will be labeled and numbered according to the *plant engineer* specification.

Section 5 – STOP VALVES

24.01 GENERAL

- A. Install sufficient number of stop valves to effectively isolate complete section of piping for service and maintenance.
- B. Install stop valves at inlet and outlets to condensers, receivers, evaporators and long lengths of pipe to permit them to be isolated.
- C. Install stop valves with stems in the horizontal position.
- D. Install strainers with gauge valves ahead of all solenoid valves.
- E. Install solenoid valves in an upright position. Provide with pilot light to indicate at panel when coil is energized.
- F. Install control valves and service shut off valves outside refrigerated areas to prevent leakage to these areas. Exceptions must be approved by the *Plant Engineer*.