

Guidelines for:

Identification of Ammonia Refrigeration Piping and System Components

International Institute of
Ammonia Refrigeration



NOTICE

The information contained in these guidelines has been obtained from sources believed to be reliable. However, it should not be assumed that all acceptable methods or procedures are contained in this document, or that additional measures may not be required under certain circumstances or conditions.

The International Institute of Ammonia Refrigeration makes no warranty or representation, and assumes no liability or responsibility, in connection with any information contained in this document.

While the Institute recommends use of and reference to this document by private industry, government agencies and others, this publication is intended to be voluntary and not binding.

The Institute does not "approve" or "endorse" any products, services or methods. This document should not be used or referenced in any way which would imply such approval or endorsement.

© Copyright 1991. International Institute of Ammonia Refrigeration. All Rights Reserved.

Table of Contents

1.0 INTRODUCTION	1
2.0 SCOPE	1
3.0 DEFINITIONS	1
3.1 Piping System	1
3.2 System Components	1
4.0 IDENTIFICATION SYSTEM	2
4.1 Piping Markers	2
4.1.1 Marker Body	2
4.1.2 Physical State	2
4.1.3 Pressure Level	3
4.1.4 Ammonia Piping Abbreviations	3
4.1.5 Directional Arrows	4
4.1.6 Pictorial View of a Pipe Marker	4
4.1.7 Identifying Small or Hidden Pipe	4
4.1.8 Pipe Marker Dimensions and Lettering Size	5
4.2 Component Markers	5
4.2.1 Component Marker Dimensions and Lettering Size	5
4.2.2 Pictorial View of a Component Marker	6
4.3 Marker Material Requirements	6
5.0 MARKER LOCATION	6
6.0 VISIBILITY	7
7.0 REFERENCE CHART	7
8.0 EXPANDING THE IDENTIFICATION GUIDELINES	7

International Institute of
Ammonia Refrigeration



Guidelines for Identification of Ammonia Refrigeration Piping and System Components

1.0 INTRODUCTION

Uniform guidelines for identifying ammonia refrigeration piping and system components will promote safety, facilitate maintenance and provide vital information to emergency service personnel.

In the past, various schemes of refrigeration piping identification have been devised by industrial plants, commercial institutions and contractors. Although these various methods may have been useful within a particular organization, there was no uniformity overall. Many existing refrigeration systems have no identification systems at all. Injuries to personnel and damage to property may be avoided if piping is properly identified.

2.0 SCOPE

The scope of this bulletin is to establish uniform guidelines for identifying piping in a closed circuit ammonia refrigeration system and the related refrigeration system components. It is not intended for any other use.

All piping mains, headers and branches should be identified as to the physical state of the refrigerant, i.e. vapor, liquid, etc., the relative pressure level of the refrigerant and the direction of flow. All components of the refrigeration system, e.g. receivers, heat exchangers, accumulators, etc., should also be uniformly identified.

The identifying designations given to the piping and components that comprise the refrigeration system, as shown on system drawings, should be consistent with the nomenclature used for pipe and components in these guidelines.

3.0 DEFINITIONS

For purposes of these guidelines, the following terms shall have the definitions provided.

3.1 Piping System

A piping system includes all ammonia refrigerant piping and fittings, hand valves, control valves and other devices that are mounted in the refrigeration lines. Pipe insulation is also considered part of the piping system. Pipe supports, hangers, brackets or other piping accessories are not considered part of the piping system.

3.2 System Components

System components include compressors and compressor units, condensers, receivers, thermosyphon vessels, recirculators, intercoolers, accumulators, transfer vessels, heat exchangers, oil pots and any other component of the refrigeration system containing refrigerant that is not included in the piping system.

4.0 IDENTIFICATION SYSTEM

4.1 Piping Markers

Piping markers shall be designed to identify the refrigerant (i.e., ammonia), the physical state of the refrigerant, the relative pressure level of the refrigerant and the direction of flow.

The piping marker will be considered to have (5) sections:

- a. marker body
- b. physical state section
- c. pressure level section
- d. abbreviation section
- e. directional arrow

A list of approved abbreviations, which may be used to further identify piping, is provided in paragraph 4.1.4.

4.1.1. Marker Body

The marker body shall be *SAFETY YELLOW* in color. The word *AMMONIA* shall be printed in *BLACK* letters on the yellow body.

The size of the marker body and lettering shall be in accordance with paragraph 4.1.8.

The material requirements for the marker body shall be in accordance with paragraph 4.3.

4.1.2 Physical State

The physical state of the refrigerant shall be indicated by the words *LIQUID*, abbreviated *LIQ*, or *VAPOR*, abbreviated *VAP*, printed or applied around the circumference of the marker body.

If the refrigerant is in the liquid state, *LIQ* shall be printed on an *ORANGE* band and applied around the circumference of the marker body. The band shall be applied to the left of and adjacent to the word *AMMONIA* on the marker body.

If the refrigerant is in the vapor state, *VAP* shall be printed on a *SKY BLUE* band, and applied around the circumference of the marker body. The band shall be applied to the left of and adjacent to the word *AMMONIA* on the marker body.

If the refrigerant is normally present in both the vapor and liquid state, *VAP*, printed on a *SKY BLUE* band, shall be applied around the circumference of the marker body to the left of and adjacent to the word *AMMONIA*. *LIQ*, printed on an *ORANGE* band, shall be applied around the circumference of the marker body to the left of and adjacent to the vapor band.

The size of the lettering shall be accordance with paragraph 4.1.8.

The material used to denote the physical state of the refrigerant shall be in accordance with paragraph 4.3.

4.1.3 Pressure Level

The pressure of the refrigerant in the system piping shall be labeled either *HIGH* or *LOW*.

Pressure in excess of 70 psig, under normal operating conditions, will be considered to be high pressure. *HIGH PRESSURE* will be denoted by the word *HIGH* printed on a *RED* band and applied around the circumference of the marker body to the right of and adjacent to the word *AMMONIA*.

Pressure equal to or less than 70 psig, under normal operating conditions, will be considered to be low pressure. *LOW PRESSURE* will be denoted by the word *LOW* printed on a *GREEN* band and applied around the circumference of the marker body to the right of and adjacent to the word *AMMONIA*.

The size of the lettering shall be accordance with paragraph 4.1.8.

The material used to denote the pressure level on the pipe marker shall be in accordance with paragraph 4.3.

4.1.4 Ammonia Piping Abbreviations

Applying abbreviations of the names commonly given to piping in an ammonia refrigeration system will assist the operator in identifying and tracing system piping. In addition to the abbreviation, the use of a temperature or a pressure commonly associated with a particular line may further assist the operator.

For example, the addition of "-10 degree" to a particular recirculated suction line and "0 degree" to another, would serve to differentiate between two low temperature recirculated suction (LTRS) lines. The same can be done using pressures commonly associated with the service of a particular line.

IIAR APPROVED ABBREVIATIONS	
Booster Discharge BD	High Temperature Recirculated Suction HTRS
Condenser Drain CD	Low Temperature Recirculated Liquid LTRL
Defrost Condensate DC	Low Temperature Recirculated Suction LTRS
Economizer Suction ES	Liquid Injection Cooling LIC
Hot Gas Defrost HGD	Low Stage Suction LSS
High Pressure Liquid HPL	Relief Vent RV
High Stage Discharge HSD	Thermosyphon Return TSR
High Stage Suction HSS	Thermosyphon Supply TSS
High Temperature Recirculated Liquid HTRL	

The abbreviation lettering will be in *BLACK* letters on a *SAFETY YELLOW* field. The abbreviation may be an integral part of the pipe marker or it may be applied separately. The abbreviation shall be located to the left of and adjacent to the physical state band if the abbreviation is an integral part of the marker or to the left of the pipe marker if the abbreviation is applied separately.

The size of the lettering shall be in accordance with paragraph 4.1.8.

The material used for the abbreviation section shall be in accordance with paragraph 4.3.

4.1.5 Directional Arrows

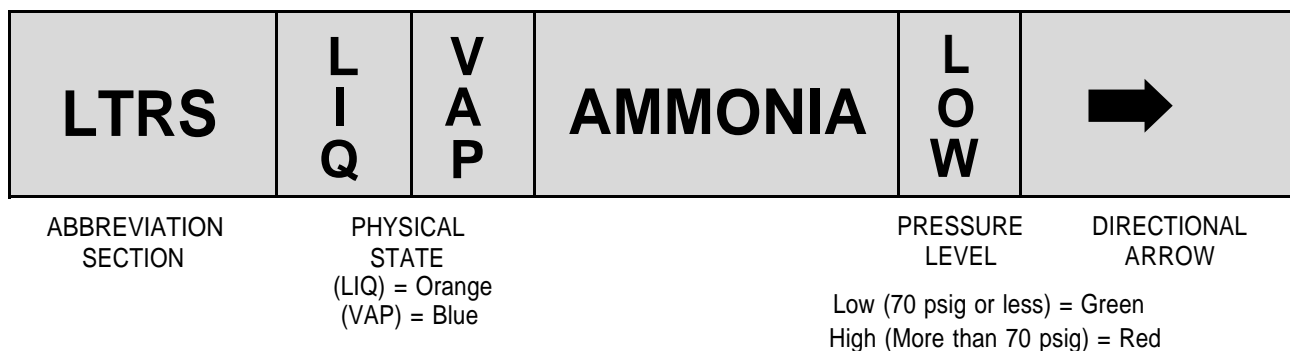
Directional arrows may be printed on the marker body. In the case of the vinyl “snap-on” type of pipe marker, the arrows and legend will be printed universally, meaning that regardless of the position of the marker (either vertically or horizontally) the arrows will point in the correct flow direction. The “self-adhesive” type of marker can be printed with two directional arrows (one at each end of the marker); the arrow not required to indicate the direction of flow can be manually cut off before application.

In either case, the directional arrow or arrowhead shall be BLACK in color and proportionate in size to the marker.

The material used for directional arrows shall be in accordance with paragraph 4.3.

4.1.6 Pictorial View of a Pipe Marker

A typical pipe marker for a saturated Low Temperature Recirculated Suction (LTRS) line, where both liquid and vapor are present, is pictured below:



Marker Body (Black on Safety Yellow)

4.1.7 Identifying Small or Hidden Pipe

In those instances where one pipe is hidden behind another, or where the pipe outside diameter (O.D.) is too small for a pipe marker to provide proper visibility, an alternate method of marking shall be used.

If the pipe is 1/2" or less, or if a pipe is hidden, a properly sized marker should be applied to a durable piece of material, such as Plexiglas or sheet metal, cut to the dimensions of the marker and suspended from the pipe so that the marker is clearly visible. The marker should be suspended using durable, corrosion resistant wire or chain.

4.1.8 Pipe Marker Dimensions and Lettering Size

The size of the pipe marker and the lettering thereon is determined by two factors:

- a. the outside diameter of the pipe, including insulation on insulated pipe.
- b. the distance between the viewer and the pipe.

Considering these factors, the size of the pipe marker and lettering should be selected to provide quick and positive identification. Pipe location, from a viewer's standpoint, will be different on every installation. Therefore, on-site decisions will be necessary to provide the optimum pipe marking system.

Table 1 provides guidance for the selection of pipe markers and lettering:

TABLE 1					
Pipe Diameter (O.D.)	Marker Width	Marker Length	Letter Size	Physical State	Pressure Level
3/4" - 1-1/4"	1"	8 "	1/2"	1/2"	1/2"
1-1/2" - 2"	1-1/2"	8 "	3/4"	3/4"	3/4"
2-1/2" - 6"	2-1/2"	12"	1-1/4"	1"	1 "
8" -10"	3-1/2"	24"	2-1/2"	1-1/2"	1-1/2"
Over 10"	4-1/2"	32"	3-1/2"	2"	2 "

4.2 Component Markers

Component markers will bear the name of the equipment they identify, e.g., *RECEIVER*, *ACCUMULATOR*, *RECIRCULATOR*, etc. In addition, component markers will be provided with a pressure level designation.

Component markers will have *BLACK* letters on a *SAFETY YELLOW* field.

Pressure Level will be indicated by the word *HIGH* in *RED* letters or the word *LOW* in *GREEN* letters printed or applied flush with the right edge of the marker.

The material used for component markers shall be in accordance with paragraph 4.3.

4.2.1 Component Marker Dimensions and Lettering Size

Component markers will be approximately 3-1/2" wide and long enough to accommodate the name of the component leaving a 2-1/2" margin at either end of the name to allow room for the pressure level designation.

Lettering on component markers will be 2-1/2" high.

4.2.2 Pictorial View of a Component Marker

A typical component marker for an Accumulator is pictured below:



Component (Black on Safety Yellow)

PRESSURE LEVEL

Low (70 psig or less) = Green

High (More than 70 psig) = Red

4.3 Marker Material Requirements

Pipe markers may be of the "self-adhesive" or vinyl "snap-on" type. The identifying information may also be stenciled directly onto the piping, provided that the stenciling is done in a professional manner and is in accordance with the general requirements of this guideline.

All pipe markers shall be made of a material suitable for the area of use.

Markers shall not fade in the presence of indoor lighting or if subjected to infra-red or ultraviolet radiation. The markers shall be suitable for application to insulated or non-insulated piping. In the case of self-adhesive markers, the adhesive backing shall be such that it adheres in all temperature ranges served by the refrigeration system and also retains its adhesive qualities when applied to piping located outdoors.

5.0 MARKER LOCATION

Piping markers shall be located as follows:

- a. before and after a change in piping direction,
- b. before and after piping penetrations of walls, ceilings and floors,
- c. on extended horizontal or vertical runs of pipe, with a maximum spacing of 40 feet between markers, in order to provide positive identification, and
- d. at least once on the piping in every area through which the refrigeration piping passes.

6.0 VISIBILITY

Care should be taken in placing the marker on the pipe to provide good visibility. Where piping is located above or below the normal line of vision the lettering shall be placed above or below the center line of the pipe, respectively.

7.0 REFERENCE CHART

A reference chart that fully explains the ammonia refrigeration piping and component identification markers, including the approved abbreviations, shall be placed in areas that are conspicuous to operating personnel. The reference chart shall be made of durable material that will remain legible.

8.0 EXPANDING THE IDENTIFICATION GUIDELINES

The above are recommended guidelines for uniform identification of ammonia refrigeration piping and system components. Additional information, pertinent to a particular application, e.g. operating temperature or pressure levels that would be of value to the operator, may be incorporated into the identification guidelines.

Any augmentation of the identification guidelines shall be done in a manner that does not circumvent the intent or quality of the guidelines. The addition of other useful information to the identification system is encouraged, as long as the addition is done in the spirit of this publication.

REFERENCES:

ANSI A13.1 - 1981, "Scheme for Identification of Piping Systems".

DIN 2403 (March 1984), "Identification of Pipelines According to the Fluid Conveyed".

DIN 2405 (July 1965), "Pipelines in Refrigeration Plants - Characterization (mark, sign)".



International Institute of Ammonia Refrigeration

1200 19th Street, N.W., Suite 300

Washington, DC 20036-2422

(202) 857-1110