

AHRI Guideline M

2020 Guideline for

**Unique Fittings and
Service Ports for
Flammable Refrigerant Use**



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& REFRIGERATION INSTITUTE**

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IMPORTANT

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Note:
This is a new guideline.

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UNIQUE FITTINGS AND SERVICE PORTS FOR FLAMMABLE REFRIGERANT USE

Section 1. Purpose

1.1 Purpose. This guideline establishes recommendations of good practice for the design and application of unique Fittings for all refrigerant handling Containers and Service Ports for air-conditioning and commercial refrigeration equipment. The purpose of the guideline is to prevent equipment using non-flammable refrigerant from being contaminated with flammable refrigerant and vice versa. This document is not intended to be an exhaustive listing of all such recommendations. Applicable federal, state, and local requirements should be reviewed.

1.1.1 Intent. This guideline is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors, and users.

1.1.2 Review and Amendment. This guideline is subject to review and amendment as technology advances.

Section 2. Scope

2.1 Scope. This guideline applies to all Service Ports for use with Class A2L, B2L, A2 and A3 refrigerants per the classifications outlined in ANSI/ASHRAE Standard 34. The guideline applies to air-conditioning and commercial refrigeration equipment, such as chillers and unitary equipment, and all refrigerant handling Containers, such as refrigerant cylinders and tanks used for service and commissioning.

Section 3. Definitions

All terms in this document will follow the standard industry definitions in the *ASHRAE Terminology* website (<https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology>) unless otherwise defined in this section.

3.1 Containers. A cylinder or tank for the transportation of refrigerant.

3.2 Fitting(s). Parts used to join, adapt, or adjust other parts of the piping (e.g., flange, joint, manifold,) including for joining to Service Ports.

3.3 Non-refillable Cylinder. A single-use container not intended to be refilled after being emptied.

3.4 Refillable Cylinder. A container capable of being filled, emptied and filled again multiple times.

3.5 Service Port(s). An access point or valve used to charge or recover, add or remove refrigerant to the system and add or remove oil to the compressor crankcase.

3.6 Should. “Should” is used to indicate provisions that are not mandatory but are desirable as good practice.

3.7 Special Permit Cylinder. A cylinder that has been authorized by the DOT to be manufactured outside the scope of existing DOT regulations but in accordance with the requirements specified by DOT in a special permit. The requirements in the special permit may include design, composition, manufacture, testing, marking, and transportation criteria as well as special provisions.

3.8 Ton Tank. A refillable cylindrical Container having a water capacity of at least 1500 lb and not more than 2600 lb.

Section 4. Refrigerant Storage Containers

4.1 *Cylinder Fittings for Refillable and Non-refillable A2L, B2L, A2, and A3 Refrigerant Containers, such as DOT-39/TC-39M Non-refillable Cylinders and DOT/TC Refillable Cylinders and Special Permit Cylinders.*

Refillable Cylinders and Ton Tanks should be produced in accordance with either Title 49, Code of Federal Regulations, Sections 178.36 (DOT 3A), 178.37 (DOT 3AA), 178.51 (DOT 4BA), 178.61 (DOT 4BW), or 179.300 (106A or 110AW) or with CSA Standard B-339, Clauses 5 (TC- 3AM), 6 (TC- 3AAM), 15 (TC- 4BAM), 16 (TC- 4BWM), or as specified in an applicable equivalence certificate authorization as provided by the cylinder manufacturer.

Non-refillable Cylinders should be produced in accordance with Title 49, Code of Federal Regulations, Section 178.65 or produced in accordance with CSA Standard B-339, Clause 23.

4.1.1 Fittings for refrigerant cylinders should be of the type described in Table 1.

Table 1. Fittings for Refrigerant Cylinders and Ton Tanks		
Refrigerant Container Type Net Product Weight (W), lb	Refrigerant Classification	
	A2L	A2/A3
$W < 2$	CGA 164	Consult refrigerant manufacturer
$2 \leq W < 50$	CGA 164	CGA 510
$50 \leq W < 240$	CGA 670	CGA 510
$240 \leq W < 1000$	CGA 670	Consult refrigerant manufacturer

4.1.2 For Fittings that do not have a defined pressure rating, a minimum of service pressure equivalent to the saturated vapor pressure of the fluid at 131°F (55°C) is recommended.

4.1.3 For cylinders containing less than 1 lb of class A2/A3 refrigerant and using a Fitting not listed in Table 1, the connections should be color coded and labeled as highly flammable.

4.1.4 Cylinders containing B2L refrigerant gases should have unique Fittings, beyond those listed in Table 1. CGA standard V-1 should be consulted for Fitting recommendations specific to gas type.

4.1.5 Markings of the Containers and cylinders should be per AHRI Guideline N and AHRI Guideline K.

Section 5. Equipment

5.1 *Fittings for HVAC, Refrigeration and Portable Equipment Using A2L, A2, and A3 Gases.*

5.1.1 Fittings for equipment should be of the type described in Table 2.

5.1.2 Equipment falling under UL 484, UL 471, UL 60335-2-40, UL 60335-2-89, or ASHRAE 15 may have specific requirements for Fittings. For example, Fittings may have a color requirement, colored, sleeved or labeled red (ex. Pantone Matching System PMS No 185). Fittings may have a positioning requirement, such as they may not be placed within a certain distance of compression or high energy components. In some situations, service Fittings may not be allowed at all. The relevant UL standard should be consulted for such requirements.

Note: For window air conditioners and packaged terminal air conditioner (PTAC) see SNAP ruling August 15, 2015 and CFR Title 40 Part 82, Subpart G, Appendix R.

5.1.3 Equipment containing B2L refrigerant gases should have unique Fittings, beyond those listed in Table 2. CGA Standard V-1 and IAR Standard 2-2014 should be consulted for Fitting recommendations specific to gas type.

5.1.4 Large commercial equipment currently utilizing refrigerant service fittings other than SAE 45° flares, including face seals or press connect fittings should be analyzed per manufacturer recommendation.

Table 2. Fittings/Service Ports for Equipment¹

Current Fitting for Equipment with Class A1 Refrigerant	Recommended A2L Fittings	Recommended A2/A3 Fittings
3/16 in SAE Flare RH Thread 3/8-24	3/16 in SAE Flare RH Thread 3/8-24	3/16 in SAE Flare LH Thread 3/8-24
1/4 in SAE Flare RH Thread 7/16-20	1/4 in SAE Flare RH Thread 7/16-20	1/4 in SAE Flare LH Thread 7/16-20
5/16 in SAE Flare RH Thread 1/2-20	5/16 in SAE Flare RH Thread 1/2-20	5/16 in SAE Flare LH Thread 1/2-20
3/8 in SAE Flare RH Thread 3/16-24	3/8 in SAE Flare RH Thread 3/16-24	3/8 in SAE Flare LH Thread 3/16-24
1/2 in SAE Flare RH Thread 5/16- 20	1/2 in SAE Flare RH Thread 5/16 - 20	1/2 in SAE Flare LH Thread 5/16 - 20
3/4 in SAE Flare RH Thread 1/2 - 16	3/4 in SAE Flare RH Thread 1/2 - 16	3/4 in SAE Flare LH Thread 1/2 - 16

Notes:

1. SAE Flare is 45°, per SAE Standard J513.

APPENDIX A. REFERENCES - NORMATIVE

A1 Listed here are all standards, handbooks and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of the standard.

None.

APPENDIX B. REFERENCES - INFORMATIVE

B1 Listed here are standards, handbooks, and other publications which may provide useful information and background but are not considered essential. References in this appendix are not considered part of the guideline.

B1.1 AHRI Guideline K-2015, *Containers for Recovered Non-flammable Fluorocarbon Refrigerants*, 2015, AHRI, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

B1.2 AHRI Guideline N-2017, *Assignment of Refrigerant Container Colors*, 2017, AHRI, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

B1.3 ANSI/ASHRAE Standard 15-2019, *Safety Standard for Refrigeration Systems and Designation and Safety Classification of Refrigerants*, 2019, ASHRAE, 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.4 ANSI/ASHRAE Standard 34-2019, *Designation and Safety Classification of Refrigerants*, 2019, with Addenda, ASHRAE, 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

B1.5 ANSI/IIAR 2-2014, *Standard for Safe Design of Ammonia Refrigeration Systems*, 2014, International Institute of Ammonia Refrigeration, 1001 N Fairfax St # 503, Alexandria, VA 22314 U.S.A.

B1.6 ANSI/UL Standard 471-2010, *Standard for Commercial Refrigerators and Freezers*, 2010, Underwriters Laboratories, 333 Pfingsten Road, Northbrook IL 20062, U.S.A.

B1.7 ANSI/UL Standard 484-2014, *Standard for Room Air Conditioners*, 2014, Underwriters Laboratories, 333 Pfingsten Road, Northbrook IL 20062, U.S.A.

B1.8 ANSI/UL Standard 60335-2-40-2019, *Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers*, 2019, Underwriters Laboratories, 333 Pfingsten Road, Northbrook IL 20062, U.S.A.

B1.9 ANSI/UL Standard 60335-2-89-2017, *Household and Similar Electrical Appliances – Safety – Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit*, 2017, Underwriters Laboratories, 333 Pfingsten Road, Northbrook IL 20062, U.S.A.

B1.10 ASHRAE Terminology, <https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology>, 2019, American Society of Heating, Refrigeration, and Air-conditioning Engineers, 1791 Tullie Circle, N.E., Atlanta, GA 30329, U.S.A.

B1.11 CGA Standard V-1-2019, *Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections*, 2019, Compressed Gas Association, 14501 George Carter Way, Chantilly, VA 20151, U.S.A.

B1.12 CSA Standard B339-2018, *Cylinders, spheres, and tubes for the transportation of dangerous goods*, 2018, CSA Group, 178 Rexdale Blvd., Toronto, ON, Canada, M9W 1R3.

B1.13 SAE Standard J513-1999, *Refrigeration Tube Fittings - General Specifications*, 1999, Society of Automobile Engineers, 400 Commonwealth Dr., Warrendale, PA 15086 U.S.A.

B1.14 Title 40, Code of Federal Regulations (CFR), Part 82, Subpart G, Appendix R, U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.

B1.15 Title 49, Code of Federal Regulations (CFR), Part 178.36 (DOT-3A), U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.

B1.16 Title 49, Code of Federal Regulations (CFR), Part 178.37 (DOT-3AA), U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.

B1.17 Title 49, Code of Federal Regulations (CFR), Part 178.51 (DOT-4BA), U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.

B1.18 Title 49, Code of Federal Regulations (CFR), Part 178.61 (DOT-4BW), U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.

B1.19 Title 49, Code of Federal Regulations (CFR), Part 178.65 (DOT-39), U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.

B1.20 Title 49, Code of Federal Regulations (CFR), Part 179.300 (106A or 110AW), U.S. National Archives and Records Administration, 8601 Adelphi Road, College Park, MD 20740-6002 or www.ecfr.gov.