

**2009
STANDARD for**

**AIR-CONDITIONING
AND
REFRIGERATING
EQUIPMENT
NAMEPLATE
VOLTAGES**

***ISHRAE - RAMA
STANDARD***

Standard 110

IMPORTANT

SAFETY RECOMMENDATIONS

It is strongly recommended that the product be designed, constructed, assembled and installed in accordance with nationally recognized safety requirements appropriate for products covered by this standard.

ISHRAE uses its best efforts to develop standards employing state-of-the-art and accepted industry practices. However, ISHRAE does not certify or guarantee safety of any products, components or systems designed, tested, rated, installed or operated in accordance with these standards or that any tests conducted under its standards will be non-hazardous or free from risk.

ISHRAE – RAMA

TABLE OF CONTENTS

SECTION	PAGE
Section 1. Purpose	1
Section 2. Scope	1
Section 3. Definitions.....	1
Section 4. Voltage Rating Requirements	1
Section 5. Equipment Performance Requirements	3
Section 6. Conformance Conditions.....	3

TABLES

Table 1. Standard System Voltage Relationships for Power Circuits	2
---	---

APPENDICES

Appendix A. References - Normative.....	4
Appendix B. References - Informative	4

AIR-CONDITIONING AND REFRIGERATING EQUIPMENT NAMEPLATE VOLTAGES

Section 1. Purpose

1.1 Purpose. The purpose of this standard is to establish, for air-conditioning and refrigerating equipment: definitions; voltage rating requirements; equipment performance requirements; and conformance conditions.

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

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

1.2 The provisions herein are recommendations intended for implementation only through reference to other authoritative documents.

Section 2. Scope

2.1 Scope. This standard applies to 50 Hz electrical voltage ratings and operating limits as applied to air-conditioning and refrigerating equipment, heat pumps, and electric furnaces.

2.1.1 Exclusions. This standard does not apply to 60 Hz electrical voltage ratings

Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration* and **for other relevant Indian Standards** unless otherwise defined in this section.

3.1 "Shall" or "Should." "Shall" or "should" shall be interpreted as follows:

3.1.1 Shall. Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.1.2 Should. "Should" is used to indicate provisions which are not mandatory but which are desirable as good practice.

3.2 Voltages.

3.2.1 Equipment Nameplate Voltage Rating. The nominal Utilization Voltage marked on the equipment nameplate by the manufacturer (Table 1).

3.2.2 Nominal System Voltage. A nominal value assigned to the local electric power supply system for the purpose of conveniently designating its voltage class.

3.2.3 Service Voltage. The voltage at the point where the electric systems of the supplier and the user are connected.

3.2.4 Utilization Voltage. The voltage at the line terminals of the utilization equipment.

Section 4. Voltage Rating Requirements

4.1 Standard System Voltage Relationships. Table 1 presents the basic relationships between standard Nominal System Voltages and Utilization Voltages for air-conditioning and refrigeration equipment and components.

4.2 Application of Voltage Ranges.

4.2.1 Range 'A'-Service Voltage. Electric supply systems are to be so designed and operated that most Service Voltages are within the limits specified for this range. The occurrence of Service Voltages outside of these limits should be infrequent.

4.2.2 Range 'A'-Utilization Voltage. User systems are to be so designed and operated that, with Service Voltages within Range 'A' limits, most Utilization Voltages are within the limits specified for this range.

Utilization equipment shall be designed and rated to give fully satisfactory performance throughout this range.

4.2.3 Range 'B'-Service and Utilization Voltages. This range includes voltages above and below Range 'A' limits that necessarily result from practical design and operating conditions on supply or user systems or both. Although such conditions are a part of practical operations, they shall be limited in extent, frequency and duration. When they occur, corrective

ISHRAE / AHRI STANDARD - 2009

measures shall be undertaken within a reasonable time to improve voltages to meet Range 'A' requirements.

Table 1. Standard System Voltage Relationships for Power Circuits¹

Nominal System Voltage	Equipment Nameplate Voltage Rating ^{2, 3}	Voltage Range A			Voltage Range B		
		Minimum		Maximum	Minimum		Maximum
		Utilization Voltage ¹	Service Voltage	Utilization and Service Voltage	Utilization Voltage ¹	Service Voltage	Utilization and Service Voltage
Single-Phase							
115	115	108	114	126	104	110	127
230	230	216	228	252	208	220	254
Three-Phase							
230	230	216	228	252	208	220	254
415	415	390	411	454	375	397	458

Comment [K1]: 115V is not applicable for India. Shall be omitted.

Comment [K2]: 230V, 3 phase is not applicable for India. Please delete.

Comment [K3]: Delete 115V line

*Alternate values.

Notes: 1. Minimum Utilization Voltages for 120 thru 600 volt combination lighting and power circuits serving cord-and-plug-connected equipment are:

Nominal System Voltage	Range A	Range B
115	105	101
230	210	202
415	375	359

2. It is recognized that there are in existence, power systems whose operating characteristics deviate from the voltage range limits of this Table. It shall not be construed that nameplate voltage rated equipment, suitable for application to such systems and deviating from the values appearing in this table, may not be produced.

Insofar as practicable, utilization equipment shall be designed to give acceptable performance in the extremes of this range of Utilization Voltage, although not necessarily as good performance as in Range 'A'.

It must be recognized that, because of conditions beyond the control of the supplier or user, or both, there will be infrequent and limited periods when sustained voltages outside of Range 'B' limits will occur. Utilization equipment may not operate satisfactorily under these conditions, and protective

devices may operate to protect the equipment. When voltages occur outside the limits of Range 'B', prompt corrective action is recommended. The urgency for such action will depend upon many factors, such as the location and nature of load or circuits involved, and the magnitude and duration of the deviation beyond Range 'B' limits.

Section 5. Equipment Performance Requirements

5.1 *Equipment Standard Rating Requirements.* Equipment standard rating tests, in accordance with equipment rating standards, shall be conducted at the Equipment Nameplate Voltage Rating.

Section 6. Conformance Conditions

6.1 *Conformance.* While conformance with this standard is voluntary, conformance shall not be claimed or implied for products or equipment within its *Purpose* (Section 1) and *Scope* (Section 2) unless such claims meet all of the requirements of the standard.

APPENDIX A. REFERENCES - NORMATIVE

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

A1.1 ANSI C84.1-1995, *Electrical Power Systems and Equipment - Voltage Ratings (60 Hz)*, 1995, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, U.S.A.

A1.2 *ASHRAE Terminology of Heating, Ventilation, Air Conditioning & Refrigeration*, Second Edition, 1991, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

Comment [K4]: We shall give suitable IS code for Electrical name plate rating – it being our country code.

APPENDIX B. REFERENCES - INFORMATIVE

B1 Listed here are all 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 standard.

B1.1 IEC Standard Publication 60038, *IEC Standard Voltages*, 1983, International Electrotechnical Commission, 3 rue de Varembe, P.O. Box 131, 1211 Geneva 20, Switzerland.