



National Differences For

Household and Similar Electrical Appliances – Safety – Part 2-34: Particular Requirements for Motor-Compressors

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National Differences For

Household and Similar Electrical Appliances – Safety – Part 2-34: Particular Requirements for Motor-Compressors

Sixth Edition

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The following is the Sixth Edition of ANSI/UL 60335-2-34, the common CSA Group and UL (binational) standard that is an adoption of IEC 60335-2-34, Safety Standard for of Household and Similar Electrical Appliances – Safety – Part 2-34: Particular Requirements for Motor-Compressors (IEC 60335-2-34, Edition 5.2:2016.)

This document provides a single listing of the National Differences included in the UL adoption of the corresponding IEC standard.

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Preface

This document provides a single listing of the technical National Differences included in the UL adoption of the corresponding IEC standard.

In its IEC-based standards, UL uses the notations indicated below to identify national difference type, and these types are additionally noted in this document. The standard may not use all types of these deviations.

D1 - These are deviations which are based on basic safety principles and requirements, elimination of which would compromise safety for U.S. consumers and users of products.

D2 - These are deviations based on safety practices. These are deviations for IEC requirements that may be acceptable, but adopting the IEC requirements would require considerable retesting or redesign on the manufacturer's part.

DC - These are deviations based on the component standards and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE - These are deviations based on editorial comments or corrections.

DR - These are deviations based on the national regulatory requirements.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

National Differences

1DV.1 D2 Modification to replace the second sentence of the second paragraph in Clause 1 with the following:

It applies to motor-compressors tested separately, under the most severe conditions that can be expected to occur in normal use, their rated voltage being not more than 300 V for single-phase motor-compressors and 600 V for other motor-compressors intended for use in accordance with:

- CSA C22.1, Canadian Electrical Code (CE Code) Part I, in Canada;
- NFPA 70, National Electrical Code (NEC), in the United States.

1DV.2 D2 Modification by adding the following to Clause 1 of the Part 2:

For **MOTOR-COMPRESSORS** rated greater than 600 V, see the requirements of Annex 101.DVI.

2DV DC Modification by adding the following to Clause 2:

Any reference within this standard to International Standards that are adopted in Canada and in the United States shall be replaced by a reference to the equivalent adopted standard. The requirements of these adopted Standards shall take precedence over International Standards on which they are based.

**CSA C22.1-15,
Canadian Electrical Code (CE Code) Part I**

**CAN/CSA-C22.2 No. 0-10,
General requirements – Canadian Electrical Code, Part II**

**C22.2 No. 253,
Standard for Medium-Voltage AC Contactors, Controllers and Control Centers**

**CAN/CSA-C22.2 No. 60335-1,
Safety Standard for Household and Similar Electrical Appliances, Part 1: General Requirements**

**IEC 60068-2-52,
Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium, chloride solution)**

**IEC 60112,
Method for the determination of the proof and the comparative tracking indices of solid insulating materials**

IEC 60216,
Electrical insulating materials – Thermal endurance properties – Part 4-1: Ageing ovens – Single-chamber ovens

IEC 60243-1,
Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies

IEC 60243-2,
Electrical strength of insulating materials – Test methods – Part 2: Additional requirements for tests using direct voltage

IEC 60695-11-20,
Fire hazard testing – Part 11-20: Test flames – 500 W flame test methods

IEEE 1776,
IEEE Recommended Practice for Thermal Evaluation of Unsealed or Sealed Insulation Systems for AC Electric Machinery Employing Form-Wound Pre-Insulated Stator Coils for Machines Rated 15 000 V and Below

ISO 817,
Refrigerants – Designation system

ISO 4892-2,
Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps

ASHRAE 34,
Designation and Safety Classification of Refrigerants

ASME, Boiler and Pressure Vessel Code, Section VIII

ASTM A90/A90M,
Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

NFPA 70,
National Electrical Code (NEC)

UL 347
Safety Standard for Medium-Voltage AC Contactors, Controllers and Control Centers

UL 60335-1
Safety Standard for Household and Similar Electrical Appliances, Part 1: General Requirements

3.112DV DE Addition of the following definitions to Clause 3 as follows:

3.112DV.1 PRIMARY SINGLE PHASING

Primary single-phasing occurs when one of the three incoming lines to the primary of the transformer supplying the MOTOR-COMPRESSOR supplies no voltage to the transformer.

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3.112DV.2 MAXIMUM CONTINUOUS CURRENT

The maximum amount of current that is allowed to flow to the MOTOR-COMPRESSOR MOTOR by the MOTOR-COMPRESSOR PROTECTION SYSTEM.

3.112DV.3 BYPASS VALVE

A device that relieves high-side pressure into the low-side at a predetermined pressure differential.

3.112DV.4 FORM WOUND MOTOR

A motor using insulated rectangular shaped conductors that are wrapped with additional electrical insulation over the entire coil prior to insertion and are precisely positioned and formed into coils.

3.112DV.5 RANDOM WOUND MOTOR

A motor using insulated round conductors in which the winding turns occupy random positions in a slot.

3.112DV.6 MAXIMUM RATED CURRENT (MRC)

The current resulting when a hermetic refrigerant motor-compressor and ELECTRONIC CIRCUIT are operated under any conditions such as maximum speed/maximum load, maximum speed/minimum load, minimum speed/minimum load, minimum speed/maximum load, including locked-rotor such that current to the motor-compressor and ELECTRONIC CIRCUIT is at a maximum. The MRC is the current at the input of the ELECTRONIC CIRCUIT controlling device.

3.112DV.7 FORMETTE

A special test model used for the evaluation of the electrical insulation systems for form-wound windings.

3.112DV.8 BARG

The pressure, in units of bars, above or below atmospheric pressure. The "g" at the end of the word indicates that the measurement is not absolute pressure, sometimes indicated by bara.

3.112DV.9 MAXIMUM ALLOWABLE PRESSURE

A limit to the refrigerating system operating pressure, generally the maximum pressure for which the equipment is designed, as specified by the manufacturer. Maximum allowable pressure constitutes a limit to the operating pressure whether the equipment is working or not.

4DV.101 DR Addition (Canada only):

This clause of Part 1 is applicable except as follows.

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CAN/CSA-C22.2 No. 0 shall form a part of, and be read in conjunction with, this Standard as far as the requirements apply, except that, where this Standard contains requirements that are at variance with those of CAN/CSA-C22.2 No. 0, the requirements of this Standard shall take precedence.

5.104DV DR Add the following clause to Clause 5 of the Part 1:

Cheesecloth specified in this Standard shall be untreated cotton cloth 0,8 – 1,0 m (31 – 39 inches) wide and 28 – 30 m/kg (42 – 45 ft/lb). Tests involving cheesecloth shall be conducted in a room free of drafts.

7.1DV.1 DR Modification of Clause 7.1 of the Part 1 to replace the second dashed item with the following:

- symbol for nature of supply including number of phases, unless for single phase operation;

7.1DV.2 DR Modification of Clause 7.1 of the Part 1 to add the following after the eighth dashed item:

- motor compressor locked rotor amperage (LRA) rating(s). If motor winding switching or alternate motor wiring options cause or allow different LRA, the highest resulting LRA shall be marked;
- manufacturing date or date code and location if the product is produced in more than one location.

If the motor compressor is thermally protected it shall be marked with:

- “Thermally Protected” if a THERMAL PROTECTOR is provided or is specified by the MOTOR-COMPRESSOR manufacturer; or
- “Thermally Protected System” if a protective system with all sensing elements and motor-current-interrupting means is provided or specified by the MOTOR-COMPRESSOR manufacturer.

A motor-compressor subjected to the Optional Pressure Test in Annex 101.DVG shall be legibly and permanently marked with the maximum allowable or design pressure, psig (kPa) or Barg.

19.101DV DR Add Clauses 19.101ADV.1 to 19.101ADV.5 to Clause 19.101 of the Part 2:

19.101ADV.1 For MOTOR-COMPRESSORS with primary thermal protection, Clauses 19.101ADV.2 – 19.101ADV.4 shall be used. For MOTOR-COMPRESSORS with electronic protection, Clause 19.101ADV.5 shall be used.

19.101ADV.2 The value of locked-rotor current of a MOTOR-COMPRESSOR assembly as determined by test shall not exceed 110 % of the marked locked-rotor current rating.

19.101ADV.3 The locked-rotor current and voltage shall be measured 4 s after the MOTOR-COMPRESSOR assembly is energized in accordance with Clause 19.101. Values measured in less than 4 s are acceptable if the motor protective device operates within that time. If the MOTOR-COMPRESSOR is designed for more than one rated voltage or a voltage range, the test shall be performed using the higher RATED VOLTAGE.

19.101ADV.4 A calculation shall then be made by multiplying the locked-rotor current measured at 4 s by the MOTOR-COMPRESSOR rated voltage. This value shall then be divided by the voltage measured at 4 s and used for comparison to the marked locked-rotor current rating. For three-phase motors, the locked-rotor current and voltage at 4 s shall be the average of these values measured in each of the three supply lines.

19.101ADV.5 Motor-compressors intended to be controlled or protected by an electronic circuit shall be marked with MAXIMUM RATED CURRENT (MRC). This current shall be:

- The maximum current value as measured during Clause AA.4 testing; or
- The current rating of the motor-compressor controlling device if a PROTECTIVE ELECTRONIC CIRCUIT OR ELECTRONIC CIRCUIT is part of the controlling device.

19.105DV D1 *Modification by adding the following after the third paragraph:*

As an alternate test method, two of the MOTOR-COMPRESSOR windings shall be connected together to form a single line. A single-phase supply source rated at 0,866 of the RATED VOLTAGE of the MOTOR-COMPRESSOR shall be applied to the single line (formed from the two windings) and the remaining line (from the remaining winding) so that maximum current flows in an unprotected winding of the MOTOR-COMPRESSOR.

21.1DV D2 *Modification by adding the following Note to Clause 21.1DV of the Part 1:*

NOTE For the alternative test of Clause 21.1DV.1 in Part 1, a force of 6,8 J might be required by some existing North American final application product standards. The 6,8 J value would be employed to evaluate a non-metallic enclosure cover if additional protection was not afforded by final application equipment design.

21.101DV D1 *Add the following clause to Clause 21 of the Part 1:*

If electrical enclosure seal gaskets are required to comply with the tests of Clause 15, then they shall comply with Annex 101.DVA.

22.102DV D1 *Add the following clause to Clause 22 of the Part 1:*

Motor-compressors intended to be used with A2 or A3 classified refrigerants shall be of a hermetically sealed design construction with a leakage rate of 3 grams per year or less.

The leakage rate shall be measured by filling the MOTOR-COMPRESSOR HOUSING with helium to a pressure of not less than one-third of the pressure applied during the testing conducted under Clause 22.7 or Annex 101.DVG. A mass spectrometer shall be used to determine the leakage rate.

22.103DV DR Add the following clause to Clause 22 of the Part 1:

A positive displacement compressor operating at pressures exceeding 103 kPa and having a displacement exceeding 0,02 m³/s shall be equipped with a **PRESSURE RELIEF DEVICE** having the capacity and the pressure setting necessary to prevent rupture of the compressor. The pressure relief device shall be located between the compressor and stop valve on the discharge side. Discharge from the device may be vented to the atmosphere or into the low pressure side of the system.

22.104DV DR Add the following clause to Clause 22 of the Part 1:

A pressure relief device shall comply with the applicable national pressure code. The device shall have a nameplate providing any applicable code symbol, together with the set pressure and capacity.

24DV DC Modification to replace Clause 24 of the Part 2 with the following:

Except for 24.1.4, 24.1.4DV, 24.101, and 24.102DV, component requirements are replaced by the relevant component standards in Annex DVA. A component not complying with a Standard in Annex DVA shall be evaluated using the applicable component standard. If a standard does not exist for a component, then the component shall comply with requirements in this standard as far as they reasonably apply.

24.1.4DV D1 Modification to Clause 24.1.4 in the Part 2 to add the following:

– Compressor pressure bypass valves 30 000**

** Tested per the requirements of Annex 101.DVD.

24.102DV D1 Add Clauses 24.102DV.1 to 24.102DV.3 to the Part 1:

24.102DV.1 A controller that is included as an integral assembly of the **MOTOR-COMPRESSOR**, and which is required to break a motor load under locked-rotor conditions, shall have a current-interrupting capacity not less than the locked-rotor load of the motor controlled.

24.102DV.2 An external thermal protective device employed on a motor-compressor shall withstand short circuit conditions in accordance with the Limited short-circuit test described in Clause 27.7DV.1.5 to 27.7DV.1.7 of Part 1. The short circuit tests on the protective device may be waived if:

- the thermally protected motor or separately enclosed motor overload protective device is within an outer cabinet of a product or section of a product;
- the motor or device is intended to be protected by the overcurrent protective device as specified on the unit nameplate, or provided as part of the product, and which is acceptable for the branch circuit protection;
- the assembly is constructed so that flame and molten metal will be confined within the compressor terminal enclosure; or
- combustible material, except electrical insulation or an air filter, is not located below the motor.