



# UL 347

## STANDARD FOR SAFETY

Medium-Voltage AC Contactors,  
Controllers, and Control Centers



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

Seventh Edition, Dated November 23, 2020

### **Summary of Topics**

***The Seventh Edition of the Standard for Medium-Voltage AC Contactors, Controllers, and Control Centers, UL 347 has been issued to reflect the latest ANSI approval date, and to incorporate the proposals dated November 1, 2019 and May 29, 2020.***

The requirements are substantially in accordance with Proposal(s) on this subject dated November 1, 2019 and May 29, 2020.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

No Text on This Page



Association of Standardization and Certification  
NMX-J-564/106-ANCE  
Third Edition



CSA Group  
CSA C22.2 No. 253:20  
Third Edition



Underwriters Laboratories Inc.  
UL 347  
Seventh Edition

## Medium-Voltage AC Contactors, Controllers, and Control Centers

November 23, 2020



ANSI/UL 347-2020

This is a preview. [Click here to purchase the full publication.](#)

## **Commitment for Amendments**

This standard is issued jointly by the Association of Standardization and Certification (ANCE), the Canadian Standards Association (operating as "CSA Group"), and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to ANCE, CSA Group, or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of ANCE, CSA Group, and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue. ANCE will incorporate the same revisions into a new edition of the standard bearing the same date of issue as the CSA Group and UL pages.

---

## **Copyright © 2020 ANCE**

Rights reserved in favor of ANCE.

---

## **ISBN 978-1-4883-2407-9 © 2020 Canadian Standards Association**

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

To purchase CSA Group Standards and related publications, visit CSA Group's Online Store at [store.csagroup.org](http://store.csagroup.org) or call toll-free 1-800-463-6727 or 416-747-4044.

---

## **Copyright © 2020 Underwriters Laboratories Inc.**

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

This ANSI/UL Standard for Safety consists of the Seventh Edition.

The most recent designation of ANSI/UL 347 as an American National Standard (ANSI) occurred on November 23, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

To purchase UL Standards, visit UL's Standards Sales Site at <http://www.shopulstandards.com/HowToOrder.aspx> or call toll-free 1-888-853-3503.

---

## CONTENTS

<b>Preface .....</b>	<b>7</b>
1 General .....	9
1.1 Scope and object .....	9
1.2 Normative references, component standards, and general requirements .....	9
2 Normal and Special Service Conditions .....	10
2.1 Normal service conditions .....	10
2.2 Special service conditions .....	10
3 Definitions .....	11
3.1 General terms .....	11
3.2 Assemblies of controlgear .....	13
3.3 Parts of assemblies .....	13
3.4 Switching devices .....	13
3.5 Parts of a controller .....	15
3.6 Operation .....	16
3.7 Characteristic quantities .....	17
3.101 Fuses .....	20
3.201 Medium-voltage fuse .....	21
3.202 Index of definitions .....	21
4 Controller and Control Center Ratings and Characteristics .....	25
4.1 Rated maximum voltage ( $U_r$ ) .....	25
4.2 Rated insulation level ( $U_d$ ), ( $U_p$ ) .....	25
4.3 Rated frequency ( $f_r$ ) .....	26
4.4 Rated continuous current and temperature rise .....	26
4.5 Rated short-time withstand current ( $I_k$ ) .....	26
4.6 Rated peak and momentary withstand current .....	27
4.7 Rated duration of short-circuit ( $t_k$ ) .....	27
4.8 Rated supply voltage of operating devices and of auxiliary and control circuits ( $U_a$ ) .....	28
4.9 Rated supply frequency of closing and opening devices and of control circuits .....	28
4.10 Rated pressure of compressed gas supply for installation and/or operation .....	28
4.101 Rated operational current or rated operational power ( $I_e$ ) .....	28
4.102 Rated duties .....	28
4.103 Rated making and breaking capacities .....	28
4.104 Utilization category .....	28
4.105 Mechanical endurance (standard and optional) .....	29
4.106 Electrical endurance .....	29
4.107 Coordination with medium-voltage fuses .....	29
4.108 Types and characteristics of automatic change-over devices and automatic acceleration control devices .....	29
4.109 Types and characteristics of autotransformers or reactors .....	29
4.110 Types and characteristics of the starting resistors for rheostatic motor starters .....	30
4.111 Characteristics dependent on starter type .....	30
4.112 Rated capacitive switching currents .....	30
4.201 Characteristics of Class E2 controllers .....	31
4.202 Fault-interrupting rating .....	31
4.203 Control center short-circuit rating .....	31
4.204 Starting duty of reduced-voltage starters .....	32
4.205 Duty rating for solid state resistive load controllers .....	33
5 Design and Construction .....	33
5.1 Requirements for liquids .....	33
5.2 Requirements for gases .....	33
5.3 Provisions for protective grounding .....	33
5.4 Auxiliary and control equipment .....	35

5.5	Dependent power operation .....	35
5.6	Stored energy operation.....	35
5.7	Independent manual operation .....	35
5.8	Operation of releases.....	35
5.9	Low- and high-pressure interlocking and monitoring devices .....	35
5.10	Markings .....	35
5.11	Interlocks .....	41
5.12	Position indication.....	42
5.13	Degrees of protection (optional) .....	43
5.14	Spacings.....	43
5.15	Gas and vacuum tightness .....	44
5.16	Liquid tightness .....	44
5.17	Flammability .....	44
5.18	Electromagnetic compatibility .....	44
5.19	X-ray emission .....	45
5.101	Types of relay or release .....	45
5.102	Enclosures .....	45
5.201	Latched controllers.....	48
5.202	Power circuit isolating means.....	48
5.203	Equipment protection .....	50
5.204	Service equipment .....	51
5.205	Internal wiring .....	55
5.206	Terminals and connections .....	57
5.207	Bus bar connections.....	58
5.208	Connector and grounding kits .....	58
5.209	Insulating material.....	58
5.210	Wire-bending space for field-installed conductors.....	58
5.211	Field-installed accessories (kits).....	59
5.212	Blank spaces, provision for future controllers, and spare controllers.....	59
5.213	Insulated bus (optional) .....	60
5.214	Controllers – general requirements.....	60
6	Type Tests .....	60
6.1	General .....	60
6.2	Dielectric tests.....	61
6.3	Radio interference voltage (RIV) test.....	64
6.4	Resistance measurement.....	65
6.5	Temperature-rise tests .....	66
6.6	Short-time, momentary, and peak withstand current bus tests .....	71
6.101	Mechanical tests .....	73
6.102	Make and break capacity.....	74
6.103	Overload test.....	76
6.104	Fault interruption test .....	78
6.105	Verification of operating limits and characteristics of overload relays .....	82
6.106	Verification of coordination with SCPDs .....	83
6.107	Electrical endurance tests.....	83
6.108	Motor switching tests.....	83
6.109	Capacitive current switching tests .....	83
6.201	Switching capacity test – isolating means .....	85
6.202	Short-time capability .....	86
6.203	Driven rain test .....	88
6.204	Mechanical tests of viewing panes .....	89
6.205	Enclosure ground integrity test.....	89
6.206	Shutter integrity test .....	89
6.207	Rod entry test .....	89
6.208	Operation tests for all solid state controllers .....	90
7	Routine Tests.....	91



7.1	Power-frequency voltage withstand test on the main circuit.....	91
7.2	Power-frequency voltage withstand test on auxiliary and control circuits .....	92
7.3	Measurement of the resistance of the main circuit .....	92
7.4	Tightness test (vacuum integrity test) .....	92
7.5	Design and visual checks .....	92
7.101	Operating tests .....	92
7.102	Tests dependent on controller type .....	93
7.201	Routine tests – general.....	93
TABLES	.....	94
FIGURES	.....	103

## **Annex A (Normative) – References**

## **Annex B – (Reserved)**

## **Annex C (Informative) – Markings required to be translated and suggested French and Spanish translations**

## **Annex D (Informative) – Standards for components**

## **Annex E (Normative) – Voltage Dividers Used in Medium Voltage Controllers**

E1	Scope .....	119
E2	Definitions .....	119
E3	Construction .....	119
E4	Performance.....	120
E4.2	Dielectric withstand test .....	120

No Text on This Page

## Preface

This is the harmonized ANCE, CSA Group, and UL standard for medium-voltage ac contactors, controllers, and control centres. It is the third edition of NMX-J-564/106-ANCE, the third edition of CSA C22.2 No. 253:20, and the seventh edition of UL 347. This edition of NMX-J-564/106-ANCE supersedes the previous edition published on January 2016. This edition of CSA C22.2 No. 253 supersedes the previous edition published on January 2016. This edition of UL 347 supersedes the previous edition published on January 29, 2016.

This harmonized Standard was prepared by the Association of Standardization and Certification, CSA Group and Underwriters Laboratories Inc. The efforts and support of the medium-voltage control manufacturing industry and the CANENA Technical Harmonization Subcommittee THSC TC17 WG1 – Medium Voltage Controllers, which includes representatives of UL, CSA Group, ANCE, and North American medium voltage control manufacturers, are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

The present Mexican Standard was developed by the CT GTD – Generación, Transmisión y Distribución from the Comité de Normalización de la Asociación de Normalización y Certificación, A.C., CONANCE, with the collaboration of the medium-voltage controller manufacturers and users.

This Standard was reviewed by the CSA Integrated Committee on Industrial Control, under the jurisdiction of the CSA Technical Committee on Industrial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

## Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

## Level of harmonization

This Standard was prepared by comparing UL 347, existing CSA Group standards, and ANCE and IEC 60470-2000 requirements. These requirements were reviewed, compared, and, where possible, harmonized. Where harmonization was not possible due to local installation codes, the differing requirements are noted in the text of the document. When conflicts between existing North American and IEC practices existed, the practice in North America is retained.

This Standard is published as an equivalent standard for ANCE, CSA Group, and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

## Formatting

This Standard is formatted to facilitate comparison to IEC 60470 requirements, and to IEC 60694, which is the common clauses document to which IEC 60470 is subservient. Requirements are categorized and