

UL 489

STANDARD FOR SAFETY

Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures



APRIL 22, 2019 – UL 489 tr1

UL Standard for Safety for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures, UL 489

Thirteenth Edition, Dated October 24, 2016

SUMMARY OF TOPICS

This revision of ANSI/UL 489 dated April 22, 2019, incorporates the following:

Exception for 6" Minimum Length of Field Wiring Conductor (Lead)

Revision to the Requirements for Draw-out Circuit Breakers

Revisions to the Calibration Requirements for Supplement SB

Revision to Table 7.1.7.3 – Available current in test circuits

Revised Requirements for Accessory Terminal Leads Wire Size

Addition of Requirements from UL 489G into UL 489

Editorial corrections

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated May 11, 2018, October 5, 2018 and December 21, 2018.

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.

tr2 APRIL 22, 2019 – UL 489

No Text on This Page

This is a preview. Click here to purchase the full publication.



Association of Standardization and Certification NMX-J-266-ANCE-2016 Fifth Edition



CSA Group CSA C22.2 No. 5-16 Fourth Edition



Underwriters Laboratories Inc. UL 489
Thirteenth Edition

Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures

October 24, 2016

(Title Page Reprinted: April 22, 2019)



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 © 2016 ANCE

Rights reserved in favor of ANCE.

ISBN 978-1-4883-0242-8 © 2016 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. The technical content of the IEC and ISO publications is kept under constant review by IEC and ISO. To submit a proposal for change, please send the following information to inquires@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 shop.csa.ca or call toll-free 1-800-463-6727 or 416-747-4044.

Copyright © 2019 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 Thirteenth Edition including revisions through April 22, 2019. The most recent designation of ANSI/UL 489 as an American National Standard (ANSI) occurred on April 22, 2019. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

The Department of Defense (DoD) has adopted UL 489 on January 18, 1985. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

NEMA (National Electrical Manufacturers Association) has adopted UL 489 (US Requirements) on August 11, 1999 as NEMA Standard AB1. The publication of revised pages or a new edition of this Standard will not invalidate the NEMA adoption.

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

PREFACE	14
INTRODUCTION	
1 Coope	16
·	
·	
5 Reference Publications	23
MOLDED CASE CIRCUIT BREAKERS	
6 Construction	24
6.1 All types	
6.1.1 General	
6.1.2 Corrosion Protection	
6.1.3 Cases – Insulating Material	
6.1.4 Current-Carrying Parts	
6.1.5 Operating Mechanism	
6.1.6 Spacings	
6.2 Current-limiting circuit breakers	
6.3 Instantaneous-trip circuit breakers	
6.4 Circuit breaker and ground-fault circuit-interrupters	
6.4.1 General	
6.4.2 Supervisory Circuit	
6.5 Circuit breakers with equipment ground-fault protection	
6.6 Integrally fused circuit breakers, high-fault protectors, and high-fault modules	
6.7 Adjustable circuit breakers	
6.8 Heating, air conditioning, and refrigeration (HACR) circuit breakers	42
6.9 Remotely-operated circuit breakers	42
6.10 Switching duty (SWD) rated circuit breakers	42
6.11 400 Hz rated circuit breakers	42
6.12 Draw-out circuit breakers	42
6.13 Series-connected circuit breakers	43
6.14 Interchangeable-trip circuit breakers	43
6.15 High-intensity-discharge (HID) type circuit breakers	
6.16 Circuit breakers for use with 16 or 18 AWG wire	44
6.17 4-pole circuit breakers	
6.18 Circuit breakers and surge protective devices	44
6.19 Special purpose not for general use circuit breakers	44
6.20 Circuit breakers with electronic trip units	44
7 Tests	44
7.1 Standard circuit breakers	44
7.1.1 General	44
7.1.2 Calibration Tests	51
7.1.3 Overload Test	54
7.1.4 Temperature Test	58
7.1.5 Endurance Test	66
7.1.6 Calibration Test	69
7.1.7 Interrupting Test	69

	7.1.8 Trip-out at 200 Percent Current Test	
	7.1.9 Dielectric Voltage-Withstand Test	78
	7.1.10 Miscellaneous Tests	79
	7.1.11 High Available Fault Current Test Sequence	80
7.2 (Current-limiting circuit breakers	87
	7.2.1 General	87
	7.2.2 Calibration test	88
	7.2.3 Interrupting and Let-Through Measurement Test	88
	7.2.4 Trip-Out Test	
	7.2.5 Dielectric Voltage-Withstand test	
	7.2.6 Interpretation of Results	
	nstantaneous-trip circuit breakers	
	7.3.1 General	
74 (Circuit breaker and ground-fault circuit-interrupters	
、	7.4.1 General	
	7.4.2 Circuit Breaker Test Sequences	
	7.4.3 High Available Fault-Current Circuits	
	7.4.4 Ground-Fault Circuit-Interrupter Tests	
75 (Circuit breakers with equipment ground-fault protection	
7.0	7.5.1 General	
	7.5.2 Circuit Breaker Test Sequences	
	7.5.3 High Available Fault Current Circuits Tests	
	7.5.4 Ground Fault Protection Tests	
	ntegrally fused circuit breakers, high-fault protectors, and high-fault modules	
	Adjustable circuit breakers	
	7.7.1 General	
	7.7.2 Adjustable Current Setting (I _r)	
	7.7.3 Short-Time Delay	
	7.7.4 Instantaneous Pick-Up Setting	
	7.7.5 Ground-Fault Trip Response	
	Heating, air conditioning, and refrigeration (HACR) circuit breakers	
	Remotely-operated circuit breakers	
	Switching duty (SWD) rated circuit breakers	
	400 Hz rated circuit breakers	
7.12	Draw-out circuit breakers	
	7.12.1 Electrical Continuity Test	
7.40	7.12.2 Dielectric Voltage-Withstand Test	
	Series-connected circuit breakers	
	7.13.1 General	
	7.13.2 Selection of Test Samples	
	7.13.3 Test Procedure	
	7.13.4 Closing Test	
	7.13.5 Interrupting Test	
	7.13.6 Intermediate Interrupting Test	
	7.13.7 Trip-Out Test	
	7.13.8 Other functionality calibration test	
	7.13.9 Dielectric Voltage-Withstand Test	
	7.13.10 Interpretation of Test Results	
	Interchangeable-trip circuit breakers	
	High-intensity-discharge (HID) type circuit breakers	
7.16	Circuit breakers for use with 16 or 18 AWG wire	
	7.16.1 General	
	7 16 2 Circuit Breaker Test Seguences	127

7.16.4 Thermal Withstand Sequence	
7.17 4-pole circuit breakers	128
7.18 Joints with insulators	128
7.19 Circuit breakers and surge protective devices	
7.20 Special purpose not for general use circuit breakers	
8 Ratings	
9 Markings	
9.1 General	
9.1.1 Details	
9.1.2 Terminations	
9.1.3 Interrupting Ratings	
9.1.4 Special Markings	
9.2 Current-limiting circuit breakers	
9.3 Instantaneous-trip circuit breakers	
9.4 Circuit breaker and ground-fault circuit-interrupters	
9.5 Circuit breakers with equipment ground-fault protection	
9.6 Integrally fused circuit breakers and high fault protectors	
9.7 Adjustable circuit breakers	
9.8 Heating, air conditioning, and refrigeration (HACR) circuit breakers	
9.9 Remotely-operated circuit breakers	
9.10 Switching duty (SWD) rated circuit breakers	
9.11 400 Hz rated circuit breakers	
9.12 Draw-out circuit breakers	
9.13 Series-connected circuit breakers	
9.14 Interchangeable-trip circuit breakers	
9.15 High-intensity-discharge (HID) type circuit breakers	
9.16 Rating plugs	
9.17 Circuit breakers for use with 16 or 18 AWG wire	
9.18 4-pole circuit breakers	
MOLDED CASE SWITCHES	
10 Construction	144
10.1 All types	144
10.1.1 General	145
10.1.2 Corrosion Protection	145
10.1.3 Cases – Insulating Material	145
10.1.4 Current-Carrying Parts	145
10.1.5 Operating Mechanism	
10.1.6 Spacings	146
10.2 Draw-out switches	146
11 Performance	146
11.1 General	
11.1.1 Details	146
11.1.2 Temperature Test	149
11.1.3 Overload Test	
11.1.4 Endurance Test	
11.1.5 Dielectric Voltage-Withstand Test	
11.1.6 Miscellaneous Tests	
11.1.7 Withstand Test	151
11.2 Draw-out switches	

			11.2.2 Electrical Continuity Test	156
	12	Rating	s	156
	13	Markin	ngs1	157
AC(CES	SORIES	3	
	14		ruction1	
		14.1	General	
			14.1.1 General Details	160
			14.1.2 Installation	
			14.1.3 Mounting	
			14.1.4 Field Wiring	
			14.1.5 Strain Relief	
			14.1.6 Spacings	
		14.2	Shunt trip release devices	164
		14.3	Undervoltage-trip release devices16	64A
		14.4	Overvoltage-trip release devices	165
		14.5	Electrical operators	165
		14.6	Alarm and auxiliary switches	165
		14.7	Mechanical interlock	166
		14.8	Lock-off device	166
		14.9	Lock-on device	166
	15	Perfor	mance1	167
		15.1	General	167
		15.2	Shunt-trip release devices	169
			15.2.1 Temperature	169
			15.2.2 Overvoltage Test	169
			15.2.3 Operation Test	169
			15.2.4 Endurance Test	169
			15.2.5 Dielectric Voltage-Withstand Test	170
		15.3	Undervoltage-trip release devices	170
			15.3.1 Temperature	170
			15.3.2 Overvoltage Test	171
			15.3.3 Operation Test	171
			15.3.4 Endurance Test	172
			15.3.5 Dielectric Voltage-Withstand Test	172
			15.3.6 Contact Closing Test	172
		15.4	Overvoltage-trip release devices	173
			15.4.1 Temperature	173
			15.4.2 Overvoltage Test	173
			15.4.3 Operation Test	173
			15.4.4 Endurance Test	173
			15.4.5 Dielectric Voltage-Withstand Test	174
		15.5	Electrical operators	174
			15.5.1 Endurance Test	174
			15.5.2 Dielectric Voltage-Withstand Test	175
		15.6	Alarm and auxiliary switches	
			15.6.1 Temperature	
			15.6.2 Overload Test	175
			15.6.3 Endurance Test	
			15.6.4 Dielectric Voltage-Withstand Test	177
		15.7	Mechanical interlock	
		45.0	Look off davigo	170