



UL 61810-1

STANDARD FOR SAFETY

Electromechanical Elementary Relays – Part 1: General Requirements

UL Standard for Safety for Electromechanical Elementary Relays – Part 1: General Requirements, UL 61810-1

First Edition, Dated July 31, 2015

Summary of Topics

This revision of ANSI/UL 61810-1, dated September 3, 2020 includes the harmonization of UL 61810-1 Edition 1 with IEC 61810-1, Edition 4, Amendment 1, to correlate the revision to [Table 4](#).

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 revised requirements are substantially in accordance with Proposal(s) on this subject dated June 26, 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



Electronic Components Industry Association
UL 61810-1-2015
First Edition



Underwriters Laboratories Inc.
UL 61810-1
First Edition

Standard for Electromechanical Elementary Relays – Part 1: General Requirements

July 31, 2015

(Title Page Reprinted: September 3, 2020)



ANSI/UL 61810-1-2020

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

Commitment for Amendments

This standard is issued jointly by the Electronic Components Industry Association (ECIA) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of UL. ECIA and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

Copyright © 2015 Electronic Components Industry Association (ECIA)

Rights reserved in favor of ECIA.

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 First Edition including revisions through September 3, 2020. The most recent designation of ANSI/UL 61810-1 as an American National Standard (ANSI) occurred on August 5, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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 (UL)	7
NATIONAL DIFFERENCES	9
FOREWORD	11
1 Scope	13
2 Normative references	13
2DV Modify Clause 2 and all subclauses as follows:	13
3 Terms and definitions.....	15
3.1 Definitions related to general terms	16
3.2 Terms and definitions of relay types	16
3.3 Terms and definitions related to conditions and operations.....	17
3.4 Terms and definitions of operating values	19
3.5 Terms and definitions related to contacts	19
3.6 Terms and definitions related to accessories	21
3.7 Terms and definitions related to insulation	22
4 Influence quantities	23
5 Rated values.....	24
5.1 General	24
5.2 Rated coil voltage/rated coil voltage range.....	24
5.3 Operative range	24
5.3DV Modify Clause 5.3 and all subclauses as follows:	24
5.4 Release	25
5.5 Reset.....	25
5.6 Electrical endurance	25
5.7 Frequency of operation	25
5.8 Contact loads	26
5.8DV Modify Clause 5.8 b) by adding the following:	26
5.9 Ambient temperature	26
5.9DV Modify Clause 5.9 as follows:	26
5.10 Categories of environmental protection	26
5.10DV Modify Clause 5.10 as follows:	26
5.11 Duty factor.....	27
6 General provisions for testing.....	27
6DV Modify Clause 6 and associated tables as follows:.....	28
7 Documentation and marking	29
7.1 Data	29
7.1DV Modify Clause 7.1 as follows:.....	29
7.2 Additional data	31
7.3 Marking	31
7.3DV Modify Clause 7.3 by replacing with the following:	31
7.4 Symbols	31
8 Heating	32
8.1 Requirements.....	32
8.1DV Modify Clause 8.1 by adding the following:.....	33
8.2 Test set-up	34
8.2DV Modify Clause 8.2 b) by replacing with 8.2DV.1 , and Clause 8.2 h) by adding 8.2DV.2 :.....	35
8.3 Test procedure	35
8.3DV Modify Clause 8.3 as follows:.....	36
8.4 Terminals	36
9 Basic operating function.....	39

9.1	General test conditions	39
9.2	Operate (monostable relays)	39
9.3	Operate/reset (bistable relays).....	41
10	Dielectric strength	41
10.1	Preconditioning	41
10.1DV	Modify Clause 10.1 by replacing as follows:	42
10.2	Dielectric strength.....	42
10.3	Special cases for test procedure B	45
11	Electrical endurance	45
11.1	General.....	45
11.2	Overload and endurance test.....	46
11.3	Failure and malfunction criteria	46
11.4	Final dielectric test	46
12	Mechanical endurance.....	49
13	Clearances, creepage distances and solid insulation.....	49
13.1	General provisions.....	49
13.1DV	Modify Clause 13.1 as follows:	50
13.2	Clearances and creepage distances.....	51
13.3	Solid insulation	55
13.4	Accessible surfaces	56
13.5	Solid insulation in the coil assembly as part of the insulation coordination.....	56
14	Terminations	56
14DV	Modify Clause 14 and all subclauses by replacing with the following:	57
14.2	Screw terminals and screwless terminals.....	57
14.3	Flat quick-connect terminations	57
14.4	Solder terminals	57
14.5	Sockets.....	58
14.6	Alternative termination types.....	58
15	Sealing	58
15DV	Modify Clause 15 by replacing with the following:	58
16	Heat and fire resistance	59
16DV	Modify Clause 16 by replacing with the following:	59

Annex A (normative) Explanations regarding relays

Annex B (informative) Inductive contact loads

Annex BDV	Modification to Annex B :	65
BDV.1	Modify Annex B by adding the following:	65

Annex C (normative) Test set-up

Annex CDV	Modification to Annex C :	69
C.1	Test circuit.....	69
C.2	Description and requirements	71
C.2.1	Power source for coil energization	71
C.2.2	Switching (coil control) device	71
C.2.3	Power source for contact loads.....	71
C.2.4	Control device.....	71
C.2.5	Measuring and indicating device.....	72
C.3	Test schematic.....	72
C.4	Contact load categories (CC).....	72
C.5	Special loads	73

Annex D (informative) Special loads

Annex DDV Modification to Annex D :	74
D.1 Dedicated device application tests and test sequences	74
D.2 Special loads for telecom and signal relays	80
D.3 Special loads with inrush current	81

Annex E(normative) Heating test arrangement**Annex F (normative) Measurement of clearances and creepage distances****Annex G (normative) Relation between rated impulse voltage, nominal voltage and overvoltage category****Annex H (normative) Pollution degrees****ANNEX I (normative) Proof tracking test****ANNEX J (informative) Schematic diagram of families of terminations****ANNEX K (normative) Glow-wire test****ANNEX L (normative) Ball pressure test****ANNEX M (informative) Needle flame test****ANNEX N (informative) Resistance for standard soldering processes**

N.1 General	105
N.2 Double wave soldering process	105
N.2.1 Profile	105
N.2.2 Conditions	105
N.3 SMT and through hole reflow (THR) soldering process	106
N.3.1 Profile	106
N.3.2 Conditions	106
N.4 Evaluation	106

ANNEX O (informative) Risk assessment

O.2 RISK assessment procedure	107
O.3 Achieving tolerable risk	109
O.4 An application of risk assessment procedures (proposal for the user)	111

Annex DVA (normative) Standard references

Annex DVA Addition of Annex DVA :	113
---	-----

Annex DVB (normative)

Annex DVB Addition of DVB :	115
---	-----

ANNEX DVC (normative) Insulating material requirements

Annex DVC Addition of Annex DVC :	116
---	-----

Alphabetical list of terms

Bibliography