



UL 61800-5-2

STANDARD FOR SAFETY

Adjustable Speed Electrical Power
Drive Systems – Part 5-2: Safety
Requirements – Functional

UL Standard for Safety for Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Functional, UL 61800-5-2

First Edition, Dated August 28, 2012

Summary of Topics

This revision of ANSI/UL 61800-5-2 dated December 15, 2020 includes the removal of references to UL 508C; [1DV.3.1](#) and Annex [101.DVB](#)

Please note that the national difference document incorporates all of the U.S. national differences for UL 61800-5-2.

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 November 3, 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

AUGUST 28, 2012

(Title Page Reprinted: December 15, 2020)



ANSI/UL 61800-5-2-2020

1

UL 61800-5-2

Standard for Adjustable Speed Electrical Power Drive Systems – Part 5-2:

Safety Requirements – Functional

First Edition

August 28, 2012

This ANSI/UL Standard for Safety consists of the First Edition including revisions through December 15, 2020.

The most recent designation of ANSI/UL 61800-5-2 as an American National Standard (ANSI) occurred on November 3, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or 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>.

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.

COPYRIGHT © 2020 UNDERWRITERS LABORATORIES INC.

No Text on This Page

CONTENTS

Preface (UL)	5
NATIONAL DIFFERENCES	7
FOREWORD	9
INTRODUCTION	11
1 Scope and object	13
1DV.1 Modification to scope by adding the following:	14
1DV.2 Modification to scope by adding the following:	14
1DV.3 Modification to scope by adding the following:	14
2 Normative references	15
2DV.1 Modification by adding the following to 2:	16
2DV.2 Modification by adding the following to 2:	17
3 Terms and definitions.....	17
Table 1DV Modification of Table 1:.....	17
4 Designated safety functions	21
4.1 General	21
4.1DV.1 Modification to 4.1 by adding the following note to the third paragraph:	22
4.1DV.2 Modification to 4.1 by adding the following note to the fourth paragraph:	22
4.2 Safety functions.....	22
5 Management of functional safety	25
5.1 Objective	25
5.2 PDS(SR) development lifecycle	25
5.3 Functional safety planning.....	27
5.4 Safety requirements specification (SRS) for a PDS(SR).....	29
6 Requirements for design and development of a PDS(SR).....	30
6.1 General requirements	30
6.2 PDS(SR) design requirements.....	32
6.2.6DV Addition:	41
6.3 Behaviour on detection of fault.....	41
6.4 Additional requirements for data communications	42
6.5 PDS(SR) integration and testing requirements	43
7 Information for use	44
7.1 Information and instructions for safe application of a PDS(SR)	44
7.1DV Modification to 7.1(c) :	46
8 Verification and validation	46
8.1 General	46
8.2 Verification	46
8.3 Validation	47
8.4 Documentation	47
9 Test requirements	47
9.1 Planning of tests	47
9.2 Test documentation	47
10 Modification	48
10.1 Objective.....	48
10.2 Requirements.....	48
10.2.5DV Addition:	49

Annex A (informative) Sequential task table

Annex B (informative) Example for determination of *PFH*

B.1	General	53
B.2	Example PDS(SR) structure	53
B.2.1	General	53
B.2.2	Subsystem A/B	54
B.2.3	Subsystem PS/VM	55
B.3	Example PDS(SR) <i>PFH</i> value determination	55
B.3.1	Subsystem “A/B” (main subsystem)	55
B.3.2	Subsystem “PS/VM”	61
B.3.3	<i>PFH</i> value of the safety function STO of PDS(SR)	64

Annex C (informative) Available failure rate databases

C.1	Databases	65
C.2	Helpful standards concerning component failure	66
C.2DV	Modification to C.2 by adding the following:	66

Annex D (informative) Fault lists and fault exclusions

D.1	General	67
D.2	Remarks applicable to fault exclusions	67
D.2.1	Validity of exclusions	67
D.2.2	Tin whisker growth	67
D.2.3	Short-circuits on PWB-mounted parts	67
D.3	Fault models	68
Table D.2DV	Modification of Table D.2 by adding the following under the Remarks column: ..	68
Table D.4DV	Modification of Table D.4 by adding the following:	69
Table D.5DV	Modification of Table D.5 :	70
Figure D.5DV.1	Addition:	72
Table D.6DV	Deletion of Table D.6 :	73
Table D.8DV	Modification of Table D.8 by adding the following:	73
Table D.12DV	Modification of Table D.12 by adding the following note:	75
Table D.13DV	Modification of Table D.13 by adding the following:	75
Table D.14DV	Modification of Table D.14 by adding the following:	75
Table D.15DV	Modification of Table D.15 by adding the following:	76
Table D.16DV	Modification of Table D.16 by adding the following:	78

Annex 101.DVA – Normative References and Component Standards (normative)

101.DVA	Addition:	79
---------	-----------------	----

Annex 101.DVB – IEC to U.S. Standard references (normative)

101.DVB	Addition:	80
---------	-----------------	----

Bibliography

Preface (UL)

This UL Standard is based on IEC Publication 61800-5-2, first edition (published July 2007), Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Functional. IEC publication 61800-5-2 is copyrighted by the IEC.

These materials are subject to copyright claims of IEC and UL. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of UL. All requests pertaining to the Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Functional, UL 61800-5-2 Standard should be submitted to UL.

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.