

UL 60034-1 (IEC 60034-1:2017)

STANDARD FOR SAFETY

Rotating Electrical Machines – Part 1: Rating and Performance



UL Standard for Safety for Rotating Electrical Machines – Part 1: Rating and Performance, UL 60034-1 (IEC 60034-1:2017)

Second Edition, Dated September 18, 2018

Summary of Topics

This is the Second Edition of the Standard for Rotating Electrical Machines – Part 1: Rating and Performance, UL 60034-1, which is a UL-only identical adoption of IEC 60034-1: 2017 Ed. 13

The new requirements are substantially in accordance with Proposal(s) on this subject dated July 20, 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.

No Text on This Page

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



UL 60034-1 (IEC 60034-1:2017)

Standard for Rotating Electrical Machines - Part 1: Rating and

Performance

First Edition - July, 2016

Second Edition

September 18, 2018

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

The most recent designation of ANSI/UL 60034-1 as an American National Standard (ANSI) occurred on September 11, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The IEC Foreword is 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 © 2018 UNDERWRITERS LABORATORIES INC.

No Text on This Page

CONTENTS

| refac | (UL) | 6 |
|-------|--|-----------------|
| -0DE\ | VADD. | _ |
| ORE | ORD | / |
| 4 | Coons | 10 |
| | Scope | |
| | Normative references | |
| | Terms and definitions | |
| 4 | Duty | |
| | 4.1 Declaration of duty | |
| _ | 4.2 Duty types | |
| 5 | Rating | |
| | 5.1 Assignment of rating | |
| | 5.2 Classes of rating | |
| | 5.3 Selection of a class of rating | |
| | 5.4 Allocation of outputs to class of rating | |
| | 5.5 Rated output | |
| | 5.6 Rated voltage | |
| | 5.7 Co-ordination of voltages and outputs | |
| 6 | Site conditions | |
| O | 6.1 General | |
| | 6.2 Altitude | |
| | 6.3 Maximum ambient air temperature | |
| | 6.4 Minimum ambient air temperature | |
| | 6.5 Water coolant temperature | |
| | 6.6 Standstill, storage and transport | |
| | 6.7 Purity of hydrogen coolant | |
| 7 | Electrical operating conditions | |
| , | 7.1 Electrical supply | |
| | 7.2 Form and symmetry of voltages and currents | |
| | 7.3 Voltage and frequency variations during operation | |
| | 7.4 Three-phase a.c. machines operating on unearthed systems | . 50 |
| | 7.5 Voltage (peak and gradient) withstand levels | 50 51 |
| 8 | Thermal performance and tests | |
| O | 8.1 Thermal class | |
| | 8.2 Reference coolant | |
| | 8.3 Conditions for thermal tests | |
| | 8.4 Temperature rise of a part of a machine | |
| | 8.5 Methods of measurement of temperature | |
| | 8.6 Determination of winding temperature | |
| | 8.7 Duration of thermal tests | |
| | 8.8 Determination of the thermal equivalent time constant for machines of duty type S9 | |
| | 8.9 Measurement of bearing temperature | |
| | 8.10 Limits of temperature and of temperature rise | |
| 9 | Other performance and tests | |
| Ü | 9.1 Routine tests | |
| | 9.2 Withstand voltage test | |
| | 9.3 Occasional excess current | |
| | 9.4 Momentary excess torque for motors | |
| | 9.5 Pull-up torque | |

| | 9.6 | Safe operating speed of cage induction motors | ./4 |
|----|--------|---|-----|
| | | Overspeed | |
| | | Short-circuit current for synchronous machines | |
| | | Short-circuit withstand test for synchronous machines | |
| | 9.10 | Commutation test for commutator machines | .76 |
| | 9.11 | Total harmonic distortion (<i>THD</i>) for synchronous machines | .76 |
| 10 | Rating | plates | .77 |
| | | General | |
| | 10.2 | Marking | .78 |
| 11 | | laneous requirements | |
| | | Protective earthing of machines | |
| | | Shaft-end key(s) | |
| 12 | Tolera | nces | .82 |
| | | General | |
| | 12.2 | Tolerances on values of quantities | .82 |
| 13 | | pmagnetic compatibility (EMC) | |
| | 13.1 | General | .83 |
| | | Immunity | |
| | | Emission | |
| | | Immunity tests | |
| | | Emission measurements | |
| 14 | Safety | | .85 |

Annex A (informative) Guidance for the application of duty type S10 and for establishing the value of relative thermal life expectancy TL

Annex B (informative) Electromagnetic compatibility (EMC) limits

Bibliography

No Text on This Page

Preface (UL)

This UL Standard is based on IEC Publication 60034-1: 13th edition, Rotating electrical machines – Part 1: Rating and performance. IEC publication 60034-1 is copyrighted by the IEC.

UL 60034-1 (IEC 60034-1:2017)

This is the UL Standard for Safety for Rotating Electrical Machines – Part 1: Rating and Performance. This UL Part 1 is to be used in conjunction with the appropriate UL Part 2, UL 60034-2-1, which contains clauses to supplement or modify the corresponding clauses in the Part 1, to provide relevant requirements for each type of product.

The text, figures, and tables of IEC Publication 60034-1, copyright 2017-05, are used in this Standard with the consent of the IEC and the American National Standards Institute (ANSI). The IEC copyrighted material has been reproduced with permission from ANSI. ANSI should be contacted regarding the reproduction of any portion of the IEC material. The IEC Foreword and Introduction are not a part of the requirements of this Standard but are included for information purposes only. Copies of IEC Publication 60034-1 may be purchased from ANSI, 11 West 42nd Street, New York, New York, 10036, (212) 642-4900.

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.