

---



**DOWNLOAD**

[Iec 60812 Pdf Free Download](#)

# Comparison of IEEE 112 and New IEC Standard 60034-2-1

Wenping Cao, *Member, IEEE*

**Abstract**—This paper describes a comparative study of induction motor testing standards IEEE 112 and newly published IEC 60034-2-1, primarily used in the United States and Europe, respectively. IEC 60034-2-1 has been refined from its earlier version IEC 60034-2 with reference to the IEEE 112. Six induction motors are tested following the two standards and the results are compared with regard to their instrumental accuracy and testing procedures. Power loss results are validated by the calorimetric method. A quantitative method is devised to evaluate the measurement uncertainty that can be interpreted into an efficiency deviation by quadrature addition. This paper is aimed to provide a guideline on interpreting the measured machine efficiency values using these standards and to validate the new IEC standard.

**Index Terms**—Calorimetry, IEC, IEEE standards, induction motors, loss measurement.

## I. INTRODUCTION

It is well known that induction motor testing standards vary significantly in their defined methodologies, instrumentation accuracy, and testing procedures. Sometimes, the efficiency value for the same motor can differ by 5% with different standards [1]. Even though the same standard is used in experimental tests, the machine efficiency can still vary by more than 2% when performed in different testing sites or by different testers [2]. Although some authors have suggested working toward a worldwide uniform standard for the testing of induction motors [3]–[5], this is far cry from an easy task. The difficulties are partially due to diverse sources of measurement uncertainty and lack of accurate uncertainty estimation techniques.

IEEE 112 [6] is perhaps the most widely adopted standard in industry. Although it is primarily used in the United States, some international standards are in line with it such as the Canadian standard C390-93 [7]. In Europe, the International Electrotechnical Commission (IEC) standard 60034-2 [8] was in use until recently. This was a relatively easy standard to apply in practice and required little information in determining the winding temperature and stray-load loss. As a result, it suffered from high measurement uncertainties and had been criticized for many years [4], [9]–[12]. The new standard IEC 60034-2-1 [13] was published in November 2007 and refined from its previous version with significant reference made to IEEE 112. In this paper, IEEE 112 serves as a yardstick for comparison purpose.

Manuscript received December 10, 2008; revised January 5, 2009. First published August 7, 2009; current version published August 21, 2009. Paper no. TEC-00477-2008.

The author is with the School of Science and Technology, University of Teesside, Tees Valley TS1 3BA, U.K. (e-mail: w.cao@tees.ac.uk).

Color versions of one or more of the figures in this paper are available online at <http://ieeexplore.ieee.org>.

Digital Object Identifier 10.1109/TEC.2009.2025321

TABLE I  
INSTRUMENTATION ACCURACY AND EFFICIENCY ESTIMATION (IN PERCENT)

Variable	IEEE 112	IEC 34-2-1
<i>Instrument transformer</i>	0.5	0.3
<i>Voltage</i>	0.2	0.2
<i>Current</i>	0.2	0.2
<i>Power</i>	0.2	0.2
<i>Torque</i>	0.2	0.2
<i>Speed</i>	1 rpm	1 rpm
<i>Frequency</i>	0.1	0.1
<i>Resistance</i>	0.2	0.2
<i>Temperature</i>	1°C	1°C
<i>Efficiency by WCE</i>	0.31	0.33
<i>Efficiency by RPBE</i>	0.17	0.18

By investigating the measurement uncertainties in experimentally determined induction motor efficiency, each error source's relative influence on the losses and efficiency can be estimated. As a consequence, a realistic perturbation-based estimation (RPBE) method is proposed that incorporates all the significant error sources and that can be used to evaluate the overall accuracy of loss and efficiency calculations.

A test rig is set up to directly measure the machine power loss by the standard methods and a high-precision 30 kW calorimeter is also employed to justify these power loss measurements. Six general purpose three-phase induction motors rated between 5.5 and 150 kW are carefully tested using IEC 60034-2-1 and IEEE 112-B methods.

The aims of this paper are to assist in interpretations of measured efficiency data and also to check the effectiveness of IEC 60034-2-1.

## II. IEEE 112 AND IEC 60034-2-1

IEEE 112 has been widely accepted as being a milestone in induction motor testing standards and proven to be reliable and consistent while the newly published standard IEC 60034-2-1 has not yet been validated in the literature.

In order to compare the two standards, three error sources are considered here: instrumental, methodological, and human factors. These in combination determine the overall accuracy of power losses and efficiency of the induction motor under test.

### A. Instrumentation Accuracy

Without a doubt, instrumentation accuracy plays a key role in an experimental measurement. Shown in Table I are the instrumentation accuracies specified in the two standards. It can be seen that the new IEC standard defines nearly the same instrumental accuracy as the IEEE counterpart, and thus, represents

---

[Iec 60812 Pdf Free Download](#)

**DOWNLOAD**

---

Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA). Reference number. IEC 60812:2006(E). INTERNATIONAL.. IEC 60812, Analysis Techniques for System Reliability. ... interests, which can slow the process down or impede free sharing of information needed to develop .... Publisher: International Electrotechnical Committee. Published: 08-13-2018. Available Formats: PDF - English - French More Info on product .... Missing page numbers correspond to the French- language pages. This preview is downloaded from www.sis.se. Buy the entire standard via <https://www.sis.se/std> .... INTERNATIONALE CEI. IEC INTERNATIONAL. STANDARD. 60812 ... Download international standard iec 60812 iec webstore (PDF, ePub, .... Revision: 3rd Edition, August 2018; Published Date: August 2018; Status: Active, Most Current; Document Language: English, French; Published By: International .... IEC Standard, IEC 60812: Analysis Techniques for System Reliability ... All of the deliverables must be supplied as protected PDF files or equivalent. ... with whether or not the system is well-engineered and error-free, i.e. is the .... IEC 60812, Analysis Techniques for System Reliability. • US Military Standard MIL-STD-1629A Guidance Notes on Failure .... BS EN IEC 60812:2018 Failure modes and effects analysis (FMEA and ... on British Standards. Click to learn more. Format PDF. Format. IEC-60812-2008-.pdf - Free download as PDF File (.pdf), Text File (.txt) or read online for free.. This is a free 6 page sample. Access the full version online. Page 2. Publication numbering. As from 1 January 1997 .... 3 60812 IEC: CONTENTS FOREWORD Scope Normative references Terms and definitions Overview Introduction Purpose and objectives of the analysis Failure .... analysis. 5 IEC 60812: 2006. Analysis techniques for system reliability – Procedure for failure mode.

Bookmark File PDF Iec 60812 Standard ... aim to download and install the iec 60812 standard, it is extremely simple then, ... simple! AvaxHome is a pretty simple site that provides access to tons of free eBooks online under different categories.. We followed IEC 60812:2006 “Analysis techniques for system reliability — Part 2: Procedure for failure mode and effects analysis (FMEA)” as .... IEC 60812:2006—Analysis techniques for system reliability—Procedure for failure mode and effects analysis (FMEA) (2006)—International .... View IEC 60812=2006 FMEA.pdf from AMFE 1548 at National University of Technology. Disclosure to Promote the Right To Information Whereas the Parliament .... Printed Edition + PDF; Immediate download; \$581.00; Add to Cart ... IEC 60812:2018 explains how failure modes and effects analysis (FMEA), .... US Department of Defense MIL-STD-1629A,. ◇ IEC Standard, IEC 60812: 'Analysis Techniques for System Reliability - . ◇ Procedure for Failure Mode and Effects .... [PDF] Free Download Book Iec 60812.PDF [BOOK]. Download Free eBook Iec 60812 file PDF at Our Huge Book. Library. Here is the Complete ...

71b77ec3ef

[assassin's creed 1 only crack download](#)  
[FULL CyberLink LabelPrint v2.5.1916 \[Portable\]](#)  
[the elder scrolls v skyrim legendary edition walmart crack only](#)  
[supervision today 8th edition pdf download](#)  
[deejaysystem video vj2 full cracked](#)  
[Pinnacle Studio Ultimate 23.0.1 Content Pack crack](#)  
[padmasree bharath dr saroj kumar 2012 malayalam full movie download](#)  
[neat video 3.5 ofx crack](#)  
[Singh Saab The Great hindi movie full movie download](#)  
[Resident evil 4 model swap trainer](#)