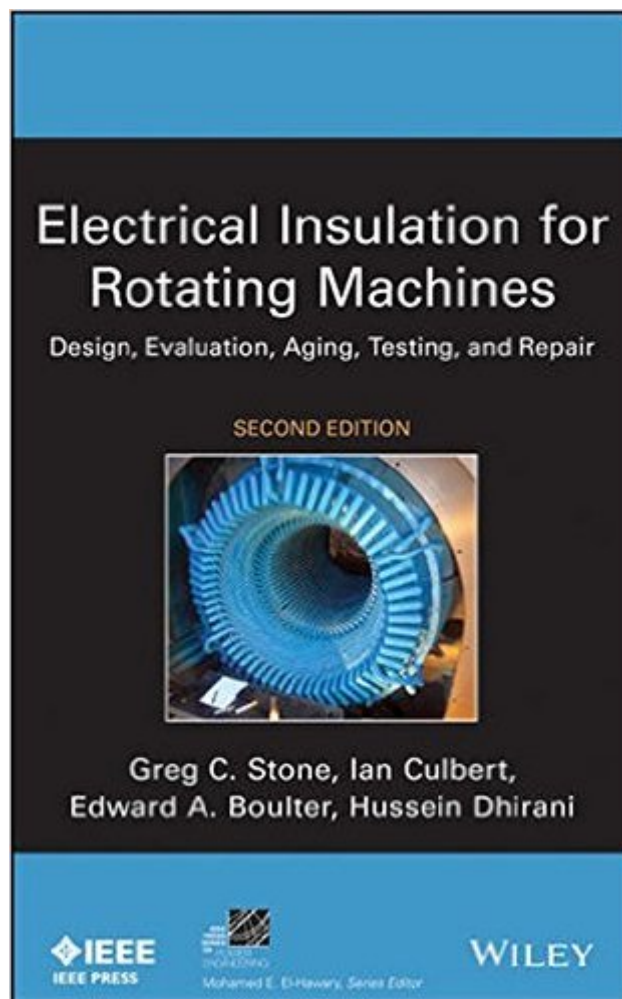


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# Electrical Insulation For Rotating Machines: Design, Evaluation, Aging, Testing, And Repair (IEEE Press Series On Power Engineering)



## Synopsis

A fully expanded new edition documenting the significant improvements that have been made to the tests and monitors of electrical insulation systems *Electrical Insulation for Rotating Machines: Design, Evaluation, Aging, Testing, and Repair, Second Edition* covers all aspects in the design, deterioration, testing, and repair of the electrical insulation used in motors and generators of all ratings greater than fractional horsepower size. It discusses both rotor and stator windings; gives a historical overview of machine insulation design; and describes the materials and manufacturing methods of the rotor and stator winding insulation systems in current use (while covering systems made over fifty years ago). It covers how to select the insulation systems for use in new machines, and explains over thirty different rotor and stator winding failure processes, including the methods to repair, or least slow down, each process. Finally, it reviews the theoretical basis, practical application, and interpretation of forty different tests and monitors that are used to assess winding insulation condition, thereby helping machine users avoid unnecessary machine failures and reduce maintenance costs. *Electrical Insulation for Rotating Machines: Documents the large array of machine electrical failure mechanisms, repair methods, and test techniques that are currently available* Educates owners of machines as well as repair shops on the different failure processes and shows them how to fix or otherwise ameliorate them Offers chapters on testing, monitoring, and maintenance strategies that assist in educating machine users and repair shops on the tests needed for specific situations and how to minimize motor and generator maintenance costs Captures the state of both the present and past in rotating machine insulation system design and manufacture, which helps designers learn from the knowledge acquired by previous generations An ideal read for researchers, developers, and manufacturers of electrical insulating materials for machines, *Electrical Insulation for Rotating Machines* will also benefit designers of motors and generators who must select and apply electrical insulation in machines.

## Book Information

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## Customer Reviews

This second edition of *Electrical Insulation for Rotating Machines* has much of the original material, but has been expanded to add information on the effect of drives on insulation, the addition of a number of relatively new failure mechanisms, and new diagnostic tests. The concentration of the material applies to 1 k W machinery. Application can be made for smaller machinery if needed. Standards looked at are from the perspective of the IEC and IEEE guidelines. The book, in addition to covering a lot of history and theory, has a lot of practical applications. There are case studies, so to speak, of problems and how to solve them. For example, we learn about such things as thermal deterioration. We are given a historical overview, read about the material degradation, the cause of deterioration, and symptoms. Other parts of the book are referenced in each problem and additional recommended book references are included at the end of each chapter. The book has numerous informative charts, graphs, sketches, and some calculations. In the back of the book are appendices that carry Insulation Material Tables, Insulation System Tables, as well as a comprehensive index.

CHAPTER 1: ROTATING MACHINE INSULATION SYSTEMS  
CHAPTER 2: EVALUATING INSULATION MATERIALS AND SYSTEMS  
CHAPTER 3: HISTORICAL DEVELOPMENT OF INSULATION MATERIALS AND SYSTEMS  
CHAPTER 4: STATOR WINDING INSULATION SYSTEMS IN CURRENT USE  
CHAPTER 5: ROTOR WINDING INSULATION SYSTEMS  
CHAPTER 6: ROTOR AND STATOR LAMINATED CORES  
CHAPTER 7: GENERAL PRINCIPLES OF WINDING FAILURE, REPAIR AND REWINDING  
CHAPTER 8: STATOR FAILURE MECHANISMS AND REPAIR  
CHAPTER 9: ROUND ROTOR WINDING FAILURE MECHANISMS AND REPAIR  
CHAPTER 10: SALIENT POLE ROTOR WINDING FAILURE MECHANISMS AND REPAIR  
CHAPTER 11: WOUND ROTOR WINDING FAILURE MECHANISMS AND REPAIR  
CHAPTER 12: SQUIRREL CAGE INDUCTION ROTOR WINDING FAILURE MECHANISMS AND REPAIR  
CHAPTER 13: CORE LAMINATION INSULATION FAILURE AND REPAIR  
CHAPTER 14: GENERAL PRINCIPLES OF TESTING AND MONITORING  
CHAPTER 15:

OFF-LINE ROTOR AND STATOR WINDING TESTS  
CHAPTER 16: IN-SERVICE MONITORING OF STATOR AND ROTOR WINDINGS  
CHAPTER 17: CORE TESTING  
CHAPTER 18: NEW MACHINE WINDING AND REWIND SPECIFICATIONS  
CHAPTER 19: ACCEPTANCE AND SITE TESTING OF NEW WINDINGS  
CHAPTER 20: MAINTENANCE STRATEGIES

Electrical Insulation for Rotating Machines is a well written reference book for all things associated with large electrical motors. This is a classic reference book published by IEEE. In that mold it is highly structured with every section numbered and cross referenced. My complaint with the book is the problem with many revisions from years past editions that include way too much fundamental background information that doesn't connect with the problems at hand. There are roughly 150 pages of background, definitions, and history. Some of this is incredibly interesting other was interesting when people carried slide rules. There are references to simple and powerful computer programs that can do certain calculations and referencing SAS. Today, most of what is necessary can be done with Excel. These are relatively simple problems that don't require a person to know the formula for standard deviation or the chemical makeup of mica. My complaint is pages wasted on formulas nobody will ever need later in the book. They are all good to know, and fun for some engineers; certainly not important information. The meat and potatoes of this book are outstanding. It is logically organized and follows a wonderful structure. There are around 150 pages of problems that can occur with electric motors. Each problem is structured around the type of problem, general process, root cause, and symptoms. The next big section is on testing with the type of tests to perform, the data that needs to be collected, interpreting that data, and what to monitor longer term. The next major section of the book is about repairs. And the book ends with a large number of pages of tables for different materials used in electrical motors. This is an outstanding reference book. The authors clearly understand their business, the standards around motors, and how to analyze and fix problems. I think it is time to finally get rid of all those math equations that have no application later on in the book.

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