

Maintenance of Rotating Electrical Machines

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1 Introduction

A rotating electrical machine can be defined as a machine that converts electrical energy into mechanical energy or vice versa. Such machines either in the form of electric motors or generators quite often constitute the heart in a production unit, whether in the industry or on offshore plants. No matter which maintenance system is utilized the right maintenance of the unit is hence of major importance since any breakdown usually is more or less catastrophic.

The stator- and rotorwindings in electrical machines are often unknown territory to maintenance staff because the windings are well-hidden below shields and covers. Only the output cables in the terminal boxes are usually visible, which unless you have special equipment are difficult for measurement since the windingresistance is fairly low and the windings often are connected in an unknown manner.

2 Why do windings in electrical machines break down?

Depending on design and protection, electrical machines are exposed to many different stress factors. Some of the worst stress factors are the **electrical**, the **thermal**, and the **mechanical** factors.

2.1 Electrical stress factors

The winding insulation is constantly exposed to a transient (excess voltage) bombardment. Due to the transient amplitude of many times nominal operating voltage, the winding insulation can quickly be broken down if it is not completely tight and in order.

The transients can come from the supply network, by the re-connection of other equipment, from controls and frequency converters capable of interfering in discordant oscillations, and not least from the winding itself when it is connected to or disconnected from the network.

Contrary to generators, usually connected to or disconnected to the network without any further current change in the windings, it is completely different with electric motors.

Motorbreakdowns are frequently noted during the start-up phase, which leads to the presumption that the starting current which can be from 6-14 times the full load current [In] is the sinner.

This might be true, but electric motors are rarely unloaded before disconnection, which causes the full-load current to be momentarily cut off on its way through the winding.

Depending on the connector type and switch construction, substantial transients can occur by disconnection, in the form of voltage [Upeak] and not least energy content [Joule] causing a flashover in the windings.

Maintenance Manual Electrical Rotating Machines

Richard Bailey



Maintenance Manual Electrical Rotating Machines:

Electrician's Maintenance Manual William E. Steward, 1946 **Electrical Power Equipment Maintenance and Testing** Paul Gill, 2016-12-19 The second edition of a bestseller this definitive text covers all aspects of testing and maintenance of the equipment found in electrical power systems serving industrial commercial utility substations and generating plants It addresses practical aspects of routing testing and maintenance and presents both the methodologies and engineering basics needed to carry out these tasks It is an essential reference for engineers and technicians responsible for the operation maintenance and testing of power system equipment Comprehensive coverage includes dielectric theory dissolved gas analysis cable fault locating ground resistance measurements and power factor dissipation factor DC breaker and relay testing methods Bureau of Ships Manual: Electric plant general (1948, 1956) United States. Navy Department. Bureau of Ships, 1948 **Handbook of Electric Motors** Hamid A. Toliyat, Gerald B. Kliman, 2018-10-03 Presenting current issues in electric motor design installation application and performance this second edition serves as the most authoritative and reliable guide to electric motor utilization and assessment in the commercial and industrial sectors Covering topics ranging from motor energy and efficiency to computer aided design and equipment selection this reference assists professionals in all aspects of electric motor maintenance repair and optimization It has been expanded by more than 40 percent to explore the most influential technologies in the field including electronic controls superconducting generators recent analytical tools new computing capabilities and special purpose motors **Handbook of Large Turbo-Generator Operation and Maintenance** Geoff Klempner, Isidor Kerszenbaum, 2011-09-20 This book offers the complete scope of information regarding operation and maintenance of all types of turbine driven generators built in the world The information presented is designed to inform the reader about actual machine operational problems and failure modes that occur in generating stations and other types of facilities **GS Maintenance Manual**, 1991 *Electric Motor Handbook* B. J. Chalmers, 2013-10-22 *Electric Motor Handbook* aims to give practical knowledge in a wide range of capacities such as plant design equipment specification commissioning operation and maintenance The book covers topics such as the modeling of steady state motor performance polyphase induction synchronous and a c commutator motors ambient conditions enclosures cooling and loss dissipation and electrical supply systems and motor drives Also covered are topics such as variable speed drives and motor control materials and motor components insulation types systems and techniques and the installation site testing commissioning and maintenance The text is recommended for engineers who are in need of a convenient guide in the installation usage and maintenance of electric motors **Manual ...** United States. Navy Department. Bureau of Ships, 1943 **Technical Manual** United States. War Department, 1959 **Directives, Publications and Reports Index** United States. Coast Guard, 1959 **Monthly Catalog of United States Government Publications**, 1976 *NBS Special Publication*, 1945 Fossil Energy Update, 1984 National Bureau of Standards Miscellaneous Publication, 1945

Miscellaneous Publication - National Bureau of Standards United States. National Bureau of Standards,1934

National Directory of Commodity Specifications United States. National Bureau of Standards,1945 **A Practical Guide to the Wiring Regulations** Geoffrey Stokes,2008-04-15 This book provides a thorough practical guide to the Wiring Regulations BS 7671 2001 It features in particular worked design examples extensive tabular material and checklists numerous illustrations particular attention to the subjects of inspection testing verification certification and reporting NICEIC specimen certificates and other forms guidance on specialised installations The Third Edition has been updated to take account of the 2001 amendments to the Wiring Regulations including revisions on protection against overcurrent isolation and switching zoning requirements for locations containing a bath or shower construction site installations highway power supplies and street furniture and equipment *Proceedings of the Institution of Electrical Engineers* Institution of Electrical Engineers,1928 Vols 56 61 accompanied by Institution notes no 1 40 Dec 1917 Oct 1923 v 10 and 57 each accompanied by a suppl other vols accompanied by special issues and supplements **Equipment Intelligent Operation and Maintenance** Ruqiang Yan,Jing Lin,2025-03-07 The proceedings of the First International Conference on Equipment Intelligent Operation and Maintenance ICEIOM 2023 offer invaluable insights into the processes that ensure safe and reliable operation of equipment and guarantee the improvement of product life cycles The book touches upon a wide array of topics including equipment condition monitoring fault diagnosis and remaining useful life prediction With special emphasis on the integration of big data and machine learning the papers contained in this publication highlight how these technologies make the equipment operation process highly automated and ingenious Intelligent operation and maintenance is set to act as the driving force behind a new generation of smart manufacturing and equipment upgradation and promote demand for intelligent product services and management This is a highly beneficial guide to students researchers working professionals and enthusiasts who wish to stay updated on innovative research contributions and practical applications of state of the art technologies in equipment operation and maintenance *The Weekly Underwriter* ,1923

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