

Asce Substation Design Guide

Design of Electrical Transmission Lines
Structural Engineering Handbook, Fifth Edition
Guide to Improved Earthquake Performance of Electric Power Systems
2015 International Fire Code Commentary
Minimum Design Loads for Buildings and Other Structures
Electrical Systems Design
Civil Engineering Body of Knowledge
2009 Report Card for America's Infrastructure
Seismic Design for Buildings
Design of Blast-resistant Buildings in Petrochemical Facilities
Electric Power Substations Engineering
Composites for Construction
Guidelines for Electrical Transmission Line Structural Loading
Electrical Transmission Line and Substation Structures
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Design of Steel Transmission Pole Structures
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IEEE Guide for Design of Substation Rigid-bus Structures
Substation Automation Systems
Seismic Design of Industrial Facilities

Design of Electrical Transmission Lines

This book covers structural and foundation systems used in high-voltage transmission lines, conductors, insulators, hardware and component assembly. In most developing countries, the term “transmission structures” usually means lattice steel towers. The term actually includes a vast range of structural systems and configurations of various materials such as wood, steel, concrete and composites. This book discusses those systems along with associated topics such as structure functions and configurations, load cases for design, analysis techniques, structure and foundation modeling, design deliverables and latest advances in the field. In the foundations section, theories related to direct embedment, drilled shafts, spread foundations and anchors are discussed in detail. Featuring worked out design problems for students, the book is aimed at students, practicing engineers, researchers and academics. It contains beneficial information for those involved in the design and maintenance of transmission line structures and foundations. For those in academia, it will be an adequate text-book / design guide for graduate-level courses on the topic. Engineers and managers at utilities and electrical corporations will find the book a useful reference at work.

Structural Engineering Handbook, Fifth Edition

Prepared by the Task Committee on Electrical Transmission Line Structural Loading of the Electrical Transmission Structures Committee of the Special Design Issues Technical Administrative Committee of the Structural Engineering Institute of ASCE Fully revised and updated, Guidelines for Electrical Transmission Line Structural Loading, Fourth Edition, MOP 74, provides the most current and relevant loading concepts and applications specific to transmission line design. A valuable resource for the development of a loading philosophy for electrical transmission structures, the information presented can be applied to an individual project or at a regional level. Key topics addressed in this manual are Uniform procedures and definitions used in the industry for the calculation of loads, Design procedures addressing uniform levels of reliability for transmission lines, Up-to-date techniques for quantifying weather-related loads, Procedures for calculating design loads and determining their corresponding load factors, Updated techniques for quantifying wire system and other non-weather-related loads, Failure containment philosophy, and Practical examples providing more detail on the application of load recommendations. This Manual of Practice will be an important guide to engineers involved in electrical utility and structural engineering.

Guide to Improved Earthquake Performance of Electric Power Systems

This collection contains 46 papers discussing electrical transmission line engineering presented at the Electrical Transmission in a New Age Conference, held in Omaha, Nebraska, on September 9-12, 2002.

2015 International Fire Code Commentary

Covering the fundamental theory of electric power transformers, this book provides the background required to understand the basic operation of electromagnetic induction as applied to transformers. The book is divided into three fundamental groupings: one stand-alone chapter is devoted to Theory and Principles, nine chapters individually treat major transformer types, and fourteen chapters cover many ancillary topics associated with power transformers. Throughout the book, tables, charts, photographs, and equations describe the operation and performance of power transformers and facilitate the reader's understanding of the technical material.

Minimum Design Loads for Buildings and Other Structures

This Standard provides a uniform basis for the design, detailing, fabrication, testing, assembly, and erection of steel tubular structures for electrical transmission poles. These guidelines apply to cold-formed single- and multipole tubular steel

structures that support overhead transmission lines. The design parameters are applicable to guyed and self-supporting structures using a variety of foundations, including concrete caissons, steel piling, and direct embedment. Standard ASCE/SEI 48-11 replaces the previous edition (ASCE/SEI 48-05) and revises some formulas that are based on other current industry standards. This Standard includes a detailed commentary and appendixes with explanatory and supplementary information. This Standard will be a primary reference for structural engineers and construction managers involved in designing and building electrical transmission lines, as well as engineers and others involved in the electric power transmission industry.

Electrical Systems Design

MOP 113 provides a comprehensive resource for the structural design of outdoor electrical substation structures.

Civil Engineering Body of Knowledge

Rigid-bus structures for outdoor and indoor, air-insulated, and alternating-current substations are covered. Portions of this guide are also applicable to strain-bus structures or direct-current substations, or both. Ampacity, radio influence, vibration, and forces due to gravity, wind, fault current, and thermal expansion are considered. Design criteria for conductor and insulator strength calculations are included.

2009 Report Card for America's Infrastructure

The essential guide to blending safety and health with economical engineering Over time, the role of the engineer has evolved into a complex combination of duties and responsibilities. Modern engineers are required not only to create products and environments, but to make them safe and economical as well. *Safety and Health for Engineers, Second Edition* is a comprehensive guide that helps engineers reconcile safety and economic concerns using the latest cost-effective methods of ensuring safety in all facets of their work. It addresses the fundamentals of safety, legal aspects, hazard recognition, the human element of safety, and techniques for managing safety in engineering decisions. Like its successful predecessor, this Second Edition contains a broad range of topics and examples, detailed references to information and standards, real-world application exercises, and a significant bibliography of books for each chapter. Inside this indispensable resource, you'll find: * The duties and legal responsibilities for which engineers are accountable * Updated safety laws and regulations and their enforcement agencies * An in-depth study of hazards and their control * A thorough discussion of human behavior, capabilities, and limitations * Key instruction on managing safety and health through risk management, safety analyses, and safety plans and programs Additionally, *Safety and Health for Engineers*

includes the latest legal considerations, new risk analysis methods, system safety and decision-making tools, and today's concepts and methods in ergonomic design. It also contains revised reference figures and tables, OSHA permissible exposure limits, and updated examples and exercises taken from real cases that challenged engineering designs. Written for engineers, plant managers, safety professionals, and students, *Safety and Health for Engineers, Second Edition* provides the information and tools you need to unite health and safety with economical engineering for safer technological solutions.

Seismic Design for Buildings

Provides structural engineers with the knowledge and practical tools needed to perform structural designs for wind that incorporate major technological, conceptual, analytical and computational advances achieved in the last two decades. With clear explanations and documentation of the concepts, methods, algorithms, and software available for accounting for wind loads in structural design, it also describes the wind engineer's contributions in sufficient detail that they can be effectively scrutinized by the structural engineer in charge of the design. *Wind Effects on Structures: Modern Structural Design for Wind, 4th Edition* is organized in four sections. The first covers atmospheric flows, extreme wind speeds, and bluff body aerodynamics. The second examines the design of buildings, and includes chapters on aerodynamic loads; dynamic and effective wind-induced loads; wind effects with specified MRIs; low-rise buildings; tall buildings; and more. The third part is devoted to aeroelastic effects, and covers both fundamentals and applications. The last part considers other structures and special topics such as trussed frameworks; offshore structures; and tornado effects. Offering readers the knowledge and practical tools needed to develop structural designs for wind loadings, this book: Points out significant limitations in the design of buildings based on such techniques as the high-frequency force balance Discusses powerful algorithms, tools, and software needed for the effective design for wind, and provides numerous examples of application Discusses techniques applicable to structures other than buildings, including stacks and suspended-span bridges Features several appendices on Elements of Probability and Statistics; Peaks-over-Threshold Poisson-Process Procedure for Estimating Peaks; estimates of the WTC Towers' Response to Wind and their shortcomings; and more *Wind Effects on Structures: Modern Structural Design for Wind, 4th Edition* is an excellent text for structural engineers, wind engineers, and structural engineering students and faculty.

Design of Blast-resistant Buildings in Petrochemical Facilities

Combining select chapters from Grigsby's standard-setting *The Electric Power Engineering Handbook* with several chapters not found in the original work, *Electric Power Substations Engineering* became widely popular for its comprehensive, tutorial-style treatment of the theory, design, analysis, operation, and protection of power substations. For its

Electric Power Substations Engineering

Composites for Construction

Details the rationale behind grades in 15 categories as announced by ASCE. This book presents an analysis of each category, an assessment of your state's status, case studies of successful projects, suggestions for actions you can take and ways you can get involved, and more.

Guidelines for Electrical Transmission Line Structural Loading

Substation Automation Systems: Design and Implementation aims to close the gap created by fast changing technologies impacting on a series of legacy principles related to how substation secondary systems are conceived and implemented. It is intended to help those who have to define and implement SAS, whilst also conforming to the current industry best practice standards. Key features: Project-oriented approach to all practical aspects of SAS design and project development. Uniquely focusses on the rapidly changing control aspect of substation design, using novel communication technologies and IEDs (Intelligent Electronic Devices). Covers the complete chain of SAS components and related equipment instead of purely concentrating on intelligent electronic devices and communication networks. Discusses control and monitoring facilities for auxiliary power systems. Contributes significantly to the understanding of the standard IEC 61850, which is viewed as a "black box" for a significant number of professionals around the world. Explains standard IEC 61850 - Communication networks and systems for power utility automation - to support all new systems networked to perform control, monitoring, automation, metering and protection functions. Written for practical application, this book is a valuable resource for professionals operating within different SAS project stages including the: specification process; contracting process; design and engineering process; integration process; testing process and the operation and maintenance process.

Electrical Transmission Line and Substation Structures

Solid design and craftsmanship are a necessity for structures and infrastructures that must stand up to natural disasters on a regular basis. Continuous research developments in the engineering field are imperative for sustaining buildings against the threat of earthquakes and other natural disasters. Performance-Based Seismic Design of Concrete Structures and Infrastructures is an informative reference source on all the latest trends and emerging data associated with structural design. Highlighting key topics such as seismic assessments, shear wall structures, and infrastructure resilience, this is an ideal resource for all academicians, students, professionals, and researchers that are seeking new knowledge on the best

methods and techniques for designing solid structural designs.

Wind Effects on Structures

This updated edition provides general guidelines for the structural design of blast-resistant petrochemical facilities. Information is provided for U.S. Occupational Safety and Health Administration (OSHA) requirements, design objectives, siting considerations, and load determination, and references cite sources of detailed information. Detailed coverage is provided for types of construction, dynamic material strengths, allowable response criteria, analysis methods, and design procedures. Typical details and ancillary considerations, such as doors and windows, are also included. A how-to discussion on the upgrade of existing buildings is provided for older facilities which may not meet current needs. Three example calculations are included to illustrate design procedures.

Design of Steel Transmission Pole Structures

This book covers the fundamentals of electrical system design commonly found in residential, commercial, and industrial occupancies. The emphasis is on practical, real-world applications, and stresses designing electrical systems in accordance with the National Electrical Code® (NEC®). This book leads the reader through topics starting with the basics of electrical system design through more advanced subjects such as voltage drop, short circuit, coordination, and harmonics. For electrical designers and electrical engineers.

Guidelines for Seismic Evaluation and Design of Petrochemical Facilities

Probabilistic Methods Applied to Electric Power Systems contains the proceedings of the First International Symposium held in Toronto, Ontario, Canada, on July 11-13, 1986. The papers explore significant technical advances that have been made in the application of probability methods to the design of electric power systems. This volume is comprised of 65 chapters divided into 10 sections and begins by discussing the probabilistic methodologies used in the assessment of power system reliability and structural design. The following chapters focus on the applications of probabilistic techniques to the analysis and design of transmission systems and structures; evaluation of design and reliability of distribution systems; system planning; and assessment of performance of transmission system components such as insulators, tower joints, and foundations. The probability-based procedures for dealing with data bases such as wind load and ice load are also considered, along with the effects of weather-induced loads on overhead power lines and the use of probability methods in upgrading existing power lines and components. The final section deals with applications of probability methods to power system problems not covered in other chapters. This book will be of value to engineers involved in uprating, designing,

analyzing, and assessing reliability of transmission and distribution systems.

Evaluation of Soil and Rock Properties

Third Printing, incorporating errata, Supplement 1, and expanded commentary, 2013.

IEEE Standards

This collection contains 46 papers discussing electrical transmission line engineering presented at the Electrical Transmission in a New Age Conference, held in Omaha, Nebraska, on September 9-12, 2002.

Electric Power Transformer Engineering

MOP 96 describes methods to improve the earthquake response of electric power systems.

NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures

Seismic Design of Industrial Facilities demands a deep knowledge on the seismic behaviour of the individual structural and non-structural components of the facility, possible interactions and last but not least the individual hazard potential of primary and secondary damages. From 26.-27. September 2013 the International Conference on Seismic Design of Industrial Facilities firstly addresses this broad field of work and research in one specialized conference. It brings together academics, researchers and professional engineers in order to discuss the challenges of seismic design for new and existing industrial facilities and to compile innovative current research. This volume contains 50 contributions to the SeDIF-Conference covering the following topics with respect to the specific conditions of plant design: · International building codes and guidelines on the seismic design of industrial facilities · Seismic design of non-structural components · Seismic design of silos and liquid-filled tanks - Soil-structure-interaction effects · Seismic safety evaluation, uncertainties and reliability analysis · Innovative seismic protection systems · Retrofitting The SeDIF-Conference is hosted by the Chair of Structural Statics and Dynamics of RWTH Aachen University, Germany, in cooperation with the Institute for Earthquake Engineering of the Dalian University of Technology, China.

Expansion Joints in Buildings

This text teaches readers how to analyse and design with fiber reinforced polymers (FRP) for civil engineering applications. It demystifies FRP composites and demonstrates applications where their properties make them ideal materials to consider off-shore and waterfront structures, factories, and storage tanks.

Performance-Based Seismic Design of Concrete Structures and Infrastructures

Publisher's Note: Products purchased from Third Party sellers are not guaranteed by the publisher for quality, authenticity, or access to any online entitlements included with the product. The industry-standard guide to structural engineering—fully updated for the latest advances and regulations For 50 years, this internationally renowned handbook has been the go-to reference for structural engineering specifications, codes, technologies, and procedures. Featuring contributions from a variety of experts, the book has been revised to align with the codes that govern structural design and materials, including IBC, ASCE 7, ASCE 37, ACI, AISC, AASHTO, NDS, and TMS. Concise, practical, and user-friendly, this one-of-a-kind resource contains real-world examples and detailed descriptions of today's design methods. Structural Engineering Handbook, Fifth Edition, covers:

- Computer applications in structural engineering
- Earthquake engineering
- Fatigue, brittle fracture, and lamellar tearing
- Soil mechanics and foundations
- Design of steel structural and composite members
- Plastic design of steel frames
- Design of cold-formed steel structural members
- Design of aluminum structural members
- Design of reinforced- and prestressed-concrete structural members
- Masonry construction and timber structures
- Arches and rigid frames
- Bridges and girder boxes
- Building design and considerations
- Industrial and tall buildings
- Thin-shell concrete structures
- Special structures and nonbuilding structures

Substation Structure Design Guide

Many factors affect the amount of temperature-induced movement that occurs in a building and the extent to which this movement can occur before serious damage develops or extensive maintenance is required. In some cases joints are being omitted where they are needed, creating a risk of structural failures or causing unnecessary operations and maintenance costs. In other cases, expansion joints are being used where they are not required, increasing the initial cost of construction and creating space utilization problems. As of 1974, there were no nationally acceptable procedures for precise determination of the size and the location of expansion joints in buildings. Most designers and federal construction agencies individually adopted and developed guidelines based on experience and rough calculations leading to significant differences in the various guidelines used for locating and sizing expansion joints. In response to this complex problem, Expansion Joints in Buildings: Technical Report No. 65 provides federal agencies with practical procedures for evaluating the need for through-building expansion joints in structural framing systems. The report offers guidelines and criteria to standardize the practice of expansion joints in buildings and decrease problems associated with the misuse of expansions joints. Expansions

Joints in Buildings: Technical Report No. 65 also makes notable recommendations concerning expansion, isolation, joints, and the manner in which they permit separate segments of the structural frame to expand and to contract in response to temperature fluctuations without adversely affecting the buildings structural integrity or serviceability.

Safety and Health for Engineers

Primarily for the three parties named in the subtitle, this manual offers information and recommendations on principles and procedures that have been shown effective in enhancing the quality of construction projects the projects themselves not the finished product. Among other aspects, it discusses

Column Base Plates

Publisher's Note: Products purchased from Third Party sellers are not guaranteed by the publisher for quality, authenticity, or access to any online entitlements included with the product. The industry-standard guide to structural engineering—fully updated for the latest advances and regulations For 50 years, this internationally renowned handbook has been the go-to reference for structural engineering specifications, codes, technologies, and procedures. Featuring contributions from a variety of experts, the book has been revised to align with the codes that govern structural design and materials, including IBC, ASCE 7, ASCE 37, ACI, AISC, AASHTO, NDS, and TMS. Concise, practical, and user-friendly, this one-of-a-kind resource contains real-world examples and detailed descriptions of today's design methods. Structural Engineering Handbook, Fifth Edition, covers:

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- Bridges and girder boxes
- Building design and considerations
- Industrial and tall buildings
- Thin-shell concrete structures
- Special structures and nonbuilding structures

Electric Power Substations Engineering

Overhead Lines

Substation Structure Design Guide

This handbook offers all aspects of Overhead Transmission Lines as the backbone of networks of electrical power. The content of the book includes, after a historical flash-back: Planning and management concepts, electrical and mechanical considerations, influences of the weather, and on the environment, detailed design of all line components, construction and maintenance aspects, line optimization, and asset management, as well as a comparison between overhead lines and underground cables. The book was written by more than 50 experts and assembled through the Cigré study committee on Overhead Lines. This guarantees valuable exchange and dissemination of unbiased information for technical but also non-technical audiences.

Electrical Transmission in a New Age

This collection contains 36 papers on structural issues in the electrical transmission industry that were presented at the 2006 Electrical Transmission Conference, held in Birmingham, Alabama, October 15-19, 2006.

Structural Engineering Handbook, Fifth Edition

This report outlines 21 foundational, technical, and professional practice learning outcomes for individuals entering the professional practice of civil engineering.

Lineman's and Cableman's Handbook 12th Edition

Earthquake Engineering for Structural Design

The use of electric power substations in generation, transmission, and distribution remains one of the most challenging and exciting areas of electric power engineering. Recent technological developments have had a tremendous impact on all aspects of substation design and operation. With 80% of its chapters completely revised and two brand-new chapters on energy storage and Smart Grids, Electric Power Substations Engineering, Third Edition provides an extensive updated overview of substations, serving as a reference and guide for both industry and academia. Contributors have written each chapter with detailed design information for electric power engineering professionals and other engineering professionals (e.g., mechanical, civil) who want an overview or specific information on this challenging and important area. This book: Emphasizes the practical application of the technology Includes extensive use of graphics and photographs to visually convey the book's concepts Provides applicable IEEE industry standards in each chapter Is written by industry experts who have an average of 25 to 30 years of industry experience Presents a new chapter addressing the key role of the substation

in Smart Grids Editor John McDonald and this very impressive group of contributors cover all aspects of substations, from the initial concept through design, automation, and operation. The book's chapters—which delve into physical and cyber-security, commissioning, and energy storage—are written as tutorials and provide references for further reading and study. As with the other volumes in the Electric Power Engineering Handbook series, this book supplies a high level of detail and, more importantly, a tutorial style of writing and use of photographs and graphics to help the reader understand the material. Several chapter authors are members of the IEEE Power & Energy Society (PES) Substations Committee and are the actual experts who are developing the standards that govern all aspects of substations. As a result, this book contains the most recent technological developments in industry practice and standards. Watch John D. McDonald talk about his book A volume in the Electric Power Engineering Handbook, Third Edition. Other volumes in the set: K12642 Electric Power Generation, Transmission, and Distribution, Third Edition (ISBN: 9781439856284) K12648 Power Systems, Third Edition (ISBN: 9781439856338) K13917 Power System Stability and Control, Third Edition (ISBN: 9781439883204) K12643 Electric Power Transformer Engineering, Third Edition (ISBN: 9781439856291)

Probabilistic Methods Applied to Electric Power Systems

When the technical requirements of the 2015 INTERNATIONAL FIRE CODE (IFC) aren't enough, look no further than the 2015 INTERNATIONAL FIRE CODE COMMENTARY. In the tradition of the other titles in the International Code Council's highly successful Code Commentary series, the book includes the complete text of the 2015 International Fire Code, and presents it alongside detailed, in-depth commentaries. These commentaries help users to navigate critical IFC requirements, explaining why they were developed, their implications, and the problems that can result when they are not followed properly. This book is a must-have for any code official, engineer, architect, inspector, plans examiner, contractor, or firefighter seeking a solid foundation in the 2015 IFC and its applications.

Minimum Design Loads for Buildings and Other Structures

Developments in Earthquake Engineering have focussed on the capacity and response of structures. They often overlook the importance of seismological knowledge to earthquake-proofing of design. It is not enough only to understand the anatomy of the structure, you must also appreciate the nature of the likely earthquake. Seismic design, as detailed in this book, is the bringing together of Earthquake Engineering and Engineering Seismology. It focuses on the seismological aspects of design – analyzing various types of earthquake and how they affect structures differently. Understanding the distinction between these earthquake types and their different impacts on buildings can make the difference between whether a building stands or falls, or at least to how much it costs to repair. Covering the basis and basics of the major international codes, this is the essential guide for professionals working on structures in earthquake zones around the

world.

Quality in the Constructed Project

This document presents state-of-the-practice information on the evaluation of soil and rock properties for geotechnical design applications. This document addresses the entire range of materials potentially encountered in highway engineering practice, from soft clay to intact rock and variations of materials that fall between these two extremes. Information is presented on parameters measured, evaluation of data quality, and interpretation of properties for conventional soil and rock laboratory testing, as well as in situ devices such as field vane testing, cone penetration testing, dilatometer, pressuremeter, and borehole jack. This document provides the design engineer with information that can be used to develop a rationale for accepting or rejecting data and for resolving inconsistencies between data provided by different laboratories and field tests. This document also includes information on: (1) the use of Geographical Information Systems (GIS) and Personal Data Assistance devices for the collection and interpretation of subsurface information; (2) quantitative measures for evaluating disturbance of laboratory soil samples; and (3) the use of measurements from geophysical testing techniques to obtain information on the modulus of soil. Also included are chapters on evaluating properties of special soil materials (e.g., loess, cemented sands, peats and organic soils, etc.) and the use of statistical information in evaluating anomalous data and obtaining design values for soil and rock properties. An appendix of three detailed soil and rock property selection examples is provided which illustrate the application of the methods described in the document.

Electrical Transmission in a New Age

IEEE Guide for Design of Substation Rigid-bus Structures

Prepared by the Subcommittee on the Design of Substation Structures of the Committee on Electrical Transmission Structures of the Structural Engineering Institute of ASCE. Substation Structure Design Guide provides a comprehensive resource for the structural design of outdoor electrical substation structures. This manual offers the most current guidelines available on analysis methods, structural loads, deflection criteria, member and connection design, structure testing, quality control, quality assurance, connections used in foundations, detailing, fabrication, construction, and maintenance. Utility engineers, structural and electrical engineers, and anyone who works in the field of transmission line substation design will benefit from this manual.

Substation Automation Systems

Topics include design and evaluation philosophy, seismic hazards such as ground shaking, fault rupture, and tsunamis, analysis and load definition, primary structural design criteria and considerations, walkdown evaluations of existing facilities, design and evaluation of tanks at grade, and retrofit design and procedures for seismically deficit structures.

Seismic Design of Industrial Facilities

The definitive guide to distribution and transmission line technology--fully updated Completely revised to reflect the 2012 National Electrical Safety Code (NESC), The Lineman's and Cableman's Handbook, 12th Edition, provides in-depth information on overhead and underground distribution and transmission lines. The latest OSHA, ANSI, and ASTM standards are emphasized throughout. This authoritative resource presents basic principles, equipment, standards, and safety regulations, allowing electrical workers to avoid costly errors, diagnose and repair power failures, and ensure optimum safety. A wealth of illustrations and photographs make it easy to understand the material, and self-test questions and exercises help reinforce key concepts. Comprehensive coverage includes: Electrical principles and systems * Substations * Circuits * Construction * Wood-pole, aluminum, concrete, fiberglass, and steel structures * Distribution automation * Emergency system restoration * Unloading, hauling, erecting, setting, and guying poles * Insulators, crossarms, and conductor supports * Line conductors * Distribution transformers * Lightning and surge protection * Fuses * Switches, sectionalizers, and reclosers * Voltage regulators * Transmission tower erection * Stringing, sagging, and joining line conductors * Live-line maintenance * Grounding * Street lighting * Underground distribution * Vegetation management * Distribution transformer installation * Electrical drawing symbols * Single-line and schematic diagrams * Voltage regulation * Units of measurement, electrical definitions, electrical formulas, and calculations * Maintenance of transmission and distribution lines * Rope, knots, splices, and gear * Climbing and wood poles * Protective equipment * OSHA 1910.269 * Resuscitation * Pole-top and bucket rescue

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