

1. Record Nr.	UNINA9910830519403321
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Titolo	Power system engineering : planning, design, and operation of power systems and equipment / Juergen Schlabbach and Karl-Heinz Rofalski
Pubbl/distr/stampa	Weinheim, [Germany] : , : Wiley-VCH Verlag GmbH & Co. KGaA, , 2008 ©2008
ISBN	1-281-94702-4 9786611947026 3-527-62279-9 3-527-62280-2
Descrizione fisica	1 online resource (351 p.)
Disciplina	621.31 621.319/1
Soggetti	Electric power systems Electric power systems - Design and construction
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Power System Engineering; Contents; Foreword; 1 Introduction; 1.1 Reliability, Security, Economy; 1.2 Legal, Political and Social Restrictions; 1.3 Needs for Power System Planning; 1.4 Basic, Development and Project Planning; 1.4.1 Basic Planning; 1.4.2 System Development Planning; 1.4.3 Project Planning; 1.5 Instruments for Power System Planning; 1.6 Further Tasks of Power System Engineering; 2 Power System Load; 2.1 General; 2.2 Load Forecast with Load Increase Factors; 2.3 Load Forecast with Economic Characteristic Data; 2.4 Load Forecast with Estimated Values 2.5 Load Forecast with Specific Loads and Degrees of Electrification 2.6 Load Forecast with Standardized Load Curves; 2.7 Typical Time Course of Power System Load; 3 Planning Principles and Planning Criteria; 3.1 Planning Principles; 3.2 Basics of Planning; 3.3 Planning Criteria; 3.3.1 Voltage Band According to IEC 60038; 3.3.2 Voltage Criteria; 3.3.3 Loading Criteria; 3.3.4 Stability Criteria; 4 Economic Consideration and Loss Evaluation; 4.1 Present Value and Annuity Method; 4.2 Evaluation of Losses; 4.2.1 Energy Losses; 4.2.2 Power Losses; 5 Topologies of

Electrical Power Systems

5.1 Development of Power Systems 5.2 Recommended Voltage Levels; 5.3 Topology of Power Systems; 5.3.1 Radial Systems; 5.3.2 Ring-Main Systems; 5.3.3 Meshed Systems at HV and MV Levels; 5.3.4 Meshed Systems at the LV Level; 5.4 Special Operating Considerations; 6 Arrangement in Gridstations and Substations; 6.1 Busbar Arrangements; 6.1.1 General; 6.1.2 Single Busbar without Separation; 6.1.3 Single Busbar with Sectionalizer; 6.1.4 Special H-Arrangement; 6.1.5 Double Busbar Arrangement; 6.1.6 Double Busbar with Reserve Busbar; 6.2 Arrangement in Switchyards; 6.2.1 Breakers and Switches 6.2.2 Incoming and Outgoing Feeders 6.2.3 Current Transformers; 6.2.4 Voltage Transformers; 7 Transformers; 7.1 General; 7.2 Utilization and Construction of Transformers; 7.2.1 Utilization of Transformers; 7.2.2 Oil-Immersed Transformers and Dry-Type Transformers; 7.2.3 Characteristic Data of Transformers; 7.3 Operation of Transformers; 7.3.1 Voltage Drop; 7.3.2 Permissible Loading of Transformer Neutral; 7.4 Thermal Permissible Loading; 7.4.1 Temperature Models; 7.4.2 Maximum Permissible Loading of Oil-Immersed Transformers; 7.4.3 Maximal Permissible Loading of Dry-Type Transformers 7.5 Economical Operation of Transformers 7.6 Short-Circuit Strength; 8 Cable Systems; 8.1 General; 8.2 Construction Details; 8.3 Electrical Parameters of Cables; 8.4 Losses and Permissible Current; 8.4.1 General; 8.4.2 Calculation of Losses; 8.4.3 Soil Characteristics; 8.4.4 Thermal Resistances of Cables; 8.4.5 Calculation according to VDE 0276-1000; 8.4.6 Determination of Maximal Permissible Loading by Computer Programs; 8.5 Planning and Design of Cable Routes and Trenches; 8.5.1 Coordination with Other Cables and Pipes; 8.5.2 Effect of Thermally Unfavorable Areas 8.5.3 Influence of Other Parameters

Sommario/riassunto

Describing in detail how electrical power systems are planned and designed, this monograph illustrates the required structures of systems, substations and equipment using international standards and latest computer methods. The book discusses the advantages and disadvantages of the different arrangements within switchyards and of the topologies of the power systems, describing methods to determine the main design parameters of cables, overhead lines, and transformers needed to realize the supply task, as well as the influence of environmental conditions on the design and the permissible lo